Supply and Demand for Management Accounting Innovations: Multidimensional Analyses of the Diffusion of Activity-Based Costing and Time-Driven Activity-Based Costing

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Abstract

The purposes of this study are to examine ABC paradox via identifying the diffusion pattern of ABC and TDABC over time, and to compare the industries where ABC and TDABC are spreading well and those that are not, and to find out how and why the differences in diffusion occurs in these fields. For macro analysis, diffusion patterns of ABC/TDABC are analysed through a systematic literature survey between 1988 and 2019. And for micro analysis, comparison between the industries where ABC and TDABC are spreading well and those that are not are analysed. For this, Korean hospital industry and manufacturing industry are studied through case studies focused on the suppliers (academics and consultants), the demanders (practitioners), and the dynamics between the two.

Findings of this study are two-fold. First, in macro analysis, ABC/TDABC diffusion is very active in non-business management fields, in particular to the bio/medical field. In addition, practitioner authors with practitioner content articles drive ABC/TDABC diffusion recently. Second, micro analysis reveals several reasons that TDABC spread is better in hospital industry than in manufacturing. Unlike manufacturing, the hospital industry has a distinct community of potential demanders, and TDABC suppliers pioneered the market with hospital-only TDABC package. In addition, unlike many manufacturing industries where ERP substitutes such as SAP exist, hospitals have no alternatives other than TDABC. This contributes to greater demand on TDABC as the sole provider of information. In addition, the manufacturing industry conducts performance evaluation at the department level. so practitioners are not very interested in TDABC, but in hospitals that perform individual performance evaluation on a per-doctor basis, and is evaluated on the basis of time, a fair standard, so practitioners are very interested in TDABC. This contributes another reason to the mass spread of TDABC in hospital.

This study contributes to a comprehensive review of ABC/TDABC by providing holistic longitudinal view of the development patterns and underlying forces of ABC/TDABC. This study also contributes to the study of the spread of MAI by adding new research on the supply and demand sides of diffusion process of TDABC to the study on the diffusion of ABC.

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Chapter 1. Introduction

1.1 Research Area of Interest

In their 1987 book, *Relevance Lost*, Johnson and Kaplan called for more research seeking to discover, develop and disseminate management accounting innovations (MAIs). As a result, a stream of new management accounting techniques including activity-based costing (ABC) and the balanced scorecard (BSC) have emerged (Kaplan, 1993, 1998; Ax and Bjørnenak, 2005). Since the emergence of ABC in the late 1980s, it has generated a lot of interests and become one of the most written about MAIs in both academic and professional journals (Bjørnenak and Mitchell, 2002; Drury and Tayles, 2005). Research into ABC can be regarded as one of the most important streams of research in MAIs (Bjørnenak and Mitchell, 2002; Drury and Tayles, 2005; Naranjo-Gil et al., 2009; Alsayed, 2010).

In order to overcome the distortions present in traditional cost accounting systems, ABC—which is a cost accounting method that focuses on issues related to distributed indirect costs with various cost objects—was developed by Cooper and Kaplan in 1987 to correct product cost information (Horngren et al., 1991). Traditional cost systems tend to report distorted product costs when a product consumes a variety of inputs (Cooper, 1988). The distortion occurs because traditional cost systems report average product costs based on a limited allocation basis, such as direct labour or machine time. The system cannot capture an accurate overhead cost of each product. As a result, certain products are overrated while others are underrated (Mahal and Hossain, 2015).

However, in practice, ABC has encountered some shortcomings, such as its complexity, its higher maintain cost, its use of subjective allocation and the difficulty in updating systems (Cooper, 1990; Brimson, 1998; Anderson et al., 2002; Armstrong, 2002; Kaplan and Anderson, 2004). Surveys on the diffusion of ABC have shown that it has not been applied in practice as widely as may have been expected, in spite of the efforts of academics who advocate for the adoption and implementation of ABC (e.g., Drury and Tayles, 1994; Malmi, 1996; Innes et al., 2000). This has led to specification of the so-called ABC paradox, the essence of which is a discrepancy between the lack of diffusion of ABC in practice and the extent of the academic

interest in ABC (Gosselin, 1997; Kennedy and Affleck-Graves, 2001, Jones and Dugdale, 2002). In other words, the cause of the ABC paradox may be due to an imbalance between the supply of ABC knowledge and the demand for ABC in practice.

Time-driven activity-based costing (TDABC) was introduced by Kaplan and Anderson in 2004 as an improved version of ABC, in order to alleviate against some of the inherent shortcomings in ABC (Kaplan and Anderson, 2004). TDABC is an attempt to simplify the processes of implementing and maintaining ABC systems and to deal with the identified shortcomings by focussing on time as the sole driver of activities. It was hoped that TDABC may be able to boost the existing low diffusion of ABC. Since TDABC emerged as a simplified form of ABC, further research into the possibility of solving the ABC paradox is needed (see section 2.4.8). Although there are many papers on TDABC, the majority are from a consulting or practitioner perspective and lack empirical analysis (Hoozée, 2013).

According to many management accounting scholars (e.g., Anderson, 1995; Brown et al., 2004; Drury and Tayles, 2005; Ax and Bjørnenak, 2005; Zawawi and Hoque, 2008, Hoozée, 2013), more research is still needed on the diffusion of ABC and TDABC; there is particularly a gap in the knowledge regarding the diffusion of TDABC (Hoozée, 2013). In response to the call for more empirical research into this activity-based MAI, a desire to gain insights about the diffusion of ABC and TDABC has been a key motivator in conducting the current research.

It is therefore of interest and importance to identify the landscape of ABC and TDABC. Such an understanding will help suggest the future direction and possibilities for ABC and TDABC.

1.1.1 Research Objectives and Research Questions

The overall purposes of this study are, thus, to identify how ABC and TDABC have spread since the initial emergence of ABC in 1980s, to determine whether ABC and TDABC are spreading in a specific industry, and to unveil the reasons why this is or is not the case. The purposes of this study can be divided into two objectives: (1) to examine the ABC paradox through a study of journal publication patterns in order to

identify the development trends related to ABC and TDABC knowledge, and (2) to investigate how and why ABC/TDABC spread well in certain industries in the context of South Korea.

The aim of this section is to expand on the two aforementioned objectives and presents the research questions guiding this study.

To achieve the first objective, this study provides a macro analysis of ABC and TDABC development in English-language journal publications since the emergence of ABC in 1980s, widening the scope of extend beyond the accounting and management fields. This enables a comprehensive review of the overall development trends of ABC and TDABC knowledge and use. By analysing various fields, as well as the supply and demand aspects of diffusion, this study attempts to contribute to a more thorough understanding of the overall development of ABC and TDABC.

To achieve the second objective, this study provides a micro analysis of the roles that activity-based innovation (ABI) players (from both the supply and demand sides) play in the process of development. This helps to build an understanding of how and why the spread of ABI has changed over time, in order to identify the diffusion factors and details of the diffusion process in South Korean context.

The detailed research objectives and research questions are presented in Table 1.1.

Table 1.1: Research objectives and research questions

Research Objectives	Research Questions	How the Question is Addressed	Location in this Study
1. Examine the ABC paradox and identify the development of ABC and TDABC in journal publications	• In the course of the development of ABC and TDABC, are there specific fields that are more prone to implementing ABC and avoiding the ABC paradox? • In the course of the development of ABC and TDABC, who are the key players and how do they lead the diffusion of ABC and TDABC? • What are the characteristics of and differences between the diffusion patterns of ABC and TDABC?	• Analysis of various aspects of published article data related to ABC and TDABC from the emergence of ABC in 1988 to the most recent studies in 2019	• Chapter 5: Macro Analysis of ABC/TDABC Diffusion Patterns
2. Investigate how and why ABC/TDABC spread well in certain industries in the context of South Korea.	• What are the differences in the diffusion processes of industries in which TDABC spreads and those where TDABC does not appear to be used? • Do ABC diffusion factors also apply in the case of TDABC diffusion? Are there other TDABC diffusion factors besides ABC diffusion factors?	• Multiple case studies of the diffusion suppliers and demanders related to a TDABC-diffused industry and a non-diffused industry	• Chapter 6: Findings of Multi-Case Study

In addressing the first research objective, a systematic literature review of journal publications related to ABC and TDABC is conducted to explore the development trend of ABC and TDABC, and to examine the ABC paradox. Through this review, it is possible to identify and compare the patterns in ABC and TDABC knowledge development paths, in order to examine in which industry ABC and/or TDABC are spreading and who is championing this spread.

For the second research objective, through a systematic literature review on the industry where ABC/TDABC are spreading, industries with and without the diffusion of ABC/TDABC are identified. Then, the second stage of analysis focuses on the diffusion process—involving both suppliers and demanders of diffusion—to explore out how and why TDABC diffusion in each industry is different. To this end, multiple case studies of diffusion players in each industry are performed.

The next section, section 1.1.2, explains why both macro and micro analyses are needed to be employed in this study. The following, section 1.1.3, explains the reasons why an expanded scope is needed for macro research and why both suppliers and demanders of diffusion should be studied together in the micro research aspects of this study.

1.1.2 Integrated Analysis of Macro and Micro Views

According to Al-Sayed and Dugdale (2016), ABC and TDABC can be grouped together into one category, ABI, as they consider ABI to be ‘any management accounting practice that uses the concept of “activities” as its hard core’ (p. 2).

According to Wolfe (1994), innovation research can be categorised into three streams—diffusion of innovation (DI), organisational innovativeness (OI) and process theory (PT)—as detailed in Table 1.2. He explained that these three streams have different foci, as each addresses a different question and has a different unit of analysis and a different dependent variable.

Table 1.2: The innovation research stream (adopted from Wolfe, 1994, p. 407)

Research question	*Research approach*	*Research focus*
1. What is the pattern of diffusion of an innovation through a population of potential adopter organizations?	Diffusion of innovation (DI) research	Addresses the *diffusion of an innovation* over time and/or space
2. What determines organizational innovativeness?	Organizational innovativeness (OI) research	Addresses the *determinants of the innovativeness* of organizations
3. What are the processes organizations go through in implementing innovations?	Process theory (PT) research	Addresses the *process of innovation* within organizations

DI research analyses the spread of an innovation throughout a population of potential adopters; focussing on time/space which constitutes the macro view (Wolfe, 1994). The main objective of DI research is to explain or predict rates and patterns of innovation adoption over time and/or space (Rogers, 2003). This study aims to examine the ABC paradox and identify the patterns of ABC and TDABC diffusion by identifying ABC and TDABC diffusion within a larger framework that encompasses chronological, expanded fields, and driving forces via practitioners and academia.

The current research also provides a macro view of diffusion by describing the industry-level diffusion pattern of ABI. The macro view in the context of the ABI involves determining how far ABI has spread over which period in which industry. In other words, the macro view examines the patterns of ABI diffusion from a wide perspective to help in understanding the chronological flow and development direction and characteristics of ABI diffusion to the present.

The objective of OI studies is to identify the factors of an organisation's propensity to innovate (Wolfe, 1994). Thus, the unit of analysis is the organisation. In many ABI papers, research has been conducted in order to identify diffusion factors, and studies of this kind correspond to this stream. The objective of PT studies is to identify how and why innovations emerge, develop, grow and terminate (Wolfe,

1994). In this study, both OI and PT are used for micro analysis, to identify the factors of TDABC diffusion in comparison with ABC diffusion factors with the aim of outlining the spreading process at each organisation. To date, relatively few studies have been conducted on TDABC diffusion factors. There is also very limited research on the process of TDABC spreading from suppliers to demanders. The micro view focusses on the spread of ABI into organisations. As such, this study takes a micro (intra-firm) view of the factors and/or processes that influence the spread of ABI into organisations. In addition, through a multidimensional analysis of the players that have influenced the spread of ABI, the flow of diffusion can be viewed from the perspective of ABI's demanders and suppliers together.

Wolfe (1994) suggested that using multiple approaches in innovation research can combine different perspectives to better understand innovation processes. The adoption of a single perspective can limit the scope of investigation in each of the three innovation research streams. For the first research objective of this study—examining the ABC paradox and identifying the patterns of ABC and TDABC diffusion after efforts to overcome the ABC paradox—DI is applied to aid in determining the macro flow of ABI. OI and PT studies are used for the second research objective of this study, which is to compare the industries in which ABC and TDABC are spreading well or otherwise, and to find out how and why the difference in diffusion occurs in these fields, gaining insight into the factors and processes of ABC and TDABC diffusion.

1.1.3 Integrated Analysis of Diffusion Players and Expansion of Scope

As seen in the description above, the three streams of innovation research are all focussed on organisations, which demand innovation. Hence, this innovation research can be viewed as revealing the demand side of diffusion. However, diffusion is defined by the dynamics between and interactions of multiple players, including both suppliers and demanders of innovations (Alcouffe et al., 2008). From this perspective, the dynamics and interactions of suppliers and demanders should be emphasised in addition to the innovation itself (Ax and Bjørnenak, 2007; Alcouffe et al., 2008). Many authors argue that most management accounting diffusion studies have traditionally focussed on organisations' demands for innovations and

have emphasised the role of potential followers of innovations (Ax and Bjørnenak, 2007; Leftesi, 2008; Alsayed, 2010; Nassar et al., 2011).

Also, many researchers have stressed the importance of supply side studies and have advocated the use of both the demand and supply perspective in explaining innovation diffusion (e.g., Brown, 1981; Clark, 1984; Clark and Staunton, 1989; Bjornrnak, 1997; Ax and Bjørnenak, 2005). Ax and Bjørnenak (2005) argued that to increase the understanding of management accounting practices, researchers should emphasise both the demand for MAIs and the position of those engaged in consulting on innovations with potential adopters. Clarke et al. (1999) argued that while most MAI studies take a demand perspective, the supply perspective is important because it provides an alternative description of the implementation of MAI. Similarly, Bjørnenak (1997, p. 15) suggested that, 'the results also indicate that the rather narrow demand perspective explored did not fully explain the diffusion process. Thus, other perspectives are needed to better understand the diffusion process. Taking the supply-side into account seems to be promising'.

As previously stated, the ABC paradox is the gap between the low level of actual uptake of ABC by followers (or demanders) and the high expectation of fashion setters (or suppliers) for ABC uptake. Here, 'fashion setters', or 'suppliers', are management gurus, consulting firms, business schools and others who pursue purposeful and active plans for the diffusion of management fashions (Mintzberg, 1979; Kimberly, 1981; DiMaggio and Powell, 1983; Abrahamson, 1991; Ax and Bjørnenak, 2007). 'Fashion followers', or 'demanders', are practitioners such as managers in organisations (Ax and Bjørnenak, 2007; Jung and Kieser, 2012). To gain a deeper understanding of ABC and TDABC, an analysis from both the supply and demand perspective is needed.

In addition to this, an expansion of the research scope is needed. In previous studies on rate of ABC diffusion, the extent of the focus has been a few large or listed corporations or manufacturing companies (e.g., Al-Omiri, 2003; Gosselin, 2006; Alsayed, 2010). Most studies have examined the extent of the adoption of ABC using a limited scope, and the ABC paradox has been identified and tracked based on such a scope. However, if ABC or TDABC is widely used in small, non-listed, non-

manufacturing companies, new understandings and explanations of the ABC paradox can be gained. Therefore, to obtain integrated insights into the diffusion of ABC and TDABC, there is a need for a wider range (i.e., involving more non-business fields) of diffusion studies on the demand side.

1.1.4 Summary of Motivation

ABC and TDABC emerged and developed for unique reasons. ABC has generated a lot of research and empirical analysis since the late 1980s. However, most of the ABC research was conducted using only micro analysis or macro analysis. In the case of TDABC, it has been more than 15 years since its introduction, but there remain relatively few academic studies. It is a little surprising that no study has yet focussed on the diffusion of TDABC to investigate whether it has helped in overcoming the ABC paradox.

To gain a fuller understanding of ABC and TDABC diffusion, analysis using various perspectives is needed. To do this, the current study first examines the evolution of the overall spread of ABC and TDABC within extended period and industries. Based on this, the prominence of ABI diffusion can be identified in a certain industries along with the characteristics of the diffusion of ABI. An in-depth understanding of TDABC diffusion is then gained from the perspective of players in the context of South Korea.

1.2 Background of the Research Setting: South Korea

In this section, an economic and cultural overview of the research context is given. South Korea is one of the most developed countries in East Asia. It has achieved rapid economic growth and has changed dramatically over the last 50 years. In 1953, after the Korean War, South Korea was left in ruins, with high levels of poverty and hunger in the late 1950s; however, over the following 50 years, South Korea became a major player in the global economy (Eichengreen et al., 2020). After the Korean War, South Korea’s gross domestic product (GDP) was £30 million, and its GDP per capita was only £1.5. In 2019, South Korea’s GDP exceeded £1,725 billion, and its GDP per capita was £31,754, indicating an average of 7.2% growth in GDP and marking the world’s tenth-largest economy (Statistics Korea, 2020). Figure 1.1 below shows South Korea’s GDP and its GDP growth rate by year since the Korean War.

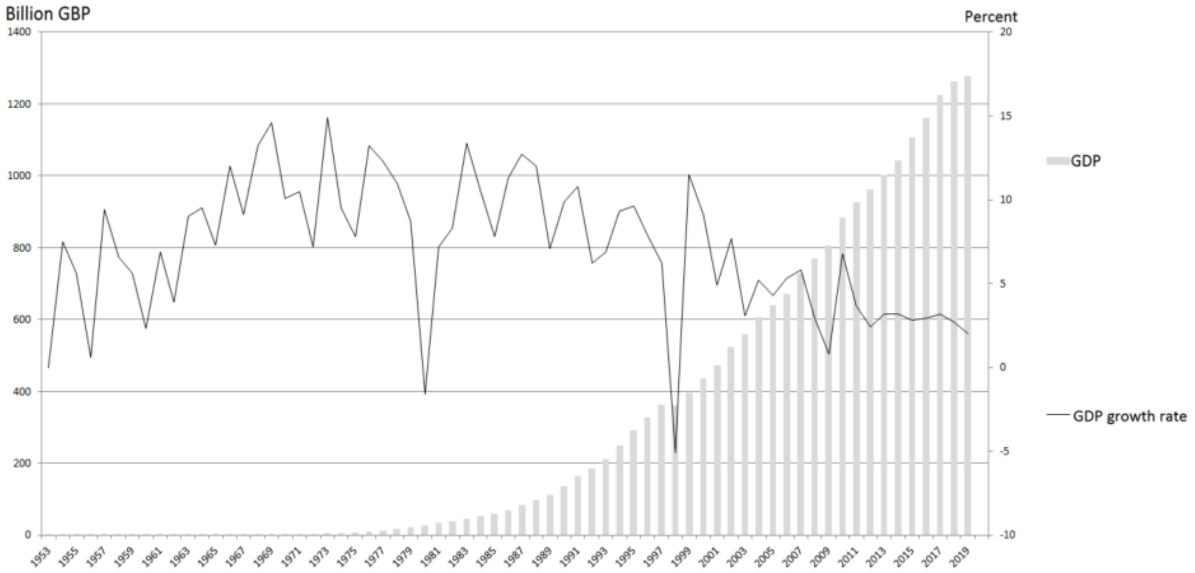

Figure 1.1: GDP and GDP growth rate of South Korea (Statistics Korea, 2020)

The integration of government-sponsored nationalism and the pro-growth Confucian approach—with respect to the cultural background, which played a crucial role in the rapid economic growth—has created a perception of meaning and value in work in South Korea (Kim and Park, 2003). Taking advantage of the nationalistic sentiments, both the government and private companies stressed that workers should make sacrifices for national economic growth under harsh situational conditions, such as the resource scarcity and security problems caused by the division of Korea (Kim and Park, 2003).

In addition, Confucian values such as hard work, loyalty and harmony were well matched with capitalism to justify the modernisation of South Korea (Lew et al., 2011). While nationalism was the basis of commitment to labour, to urge workers to sacrifice for economic growth, the Confucian philosophy has provided South Korean employees with the attitude of wanting to work (Kim and Park, 2003). The main Confucian values relating to standards in interpersonal relationships are respect for elderlies, loyalty to bosses and harmonious relationships (Kee, 2008).

These values are in line with the hierarchical culture of the South Korean companies that have accelerated South Korean economic growth based on their fast decision making and remarkable drive (Morden and Bowles, 1998). Employees tend to respect senior staff and to obey the leader’s orders or decisions by showing deep

loyalty to the boss or leader (Song and Meek, 1998). In addition, the mandatory military service for every man in South Korea appears to affect corporate behaviour and emphasise the hierarchical order and (Cho and Yoon, 2001). This submissive culture has led to an execution of instructions and acceptance of decisions from bosses, leading to rapid decision making and incredible momentum (Fuhl, 2006). In sum, South Korean organisational culture must be understood in light of the national culture, which values loyalty to bosses, harmonious relationships and obedience to leaders' decisions and instructions, without doubting them.

According to Hofstede (2007, p. 417),

> Power Distance is the extent of inequality in a society: I defined it as the extent to which the less powerful members of institutions and organisations within a country expect and accept that power is distributed unequally. . . . Power Distance norms are transferred in parent–child relationships: they determine the role of respect for authority in organisations. Large Power Distance cultures can also be called respect cultures. . . . Collectivism stands for a society in which people from birth onwards are integrated into strong, cohesive in-groups, which throughout their lifetime continue to protect them, in exchange for unquestioning loyalty.

In his work, Hofstede put South Korea into the 'large power distance' and 'collectivist' groups. According to Brewer's (1988) study, based on Implementation Attitudes Questionnaire (IAQ) scores and interviews in both Asian countries and Western countries, large power distance / collectivist cultures in Hofstede's taxonomy had better conditions for ABC application and execution. It can, thus, be conjectured that South Korean organisational culture features few obstacles, such as internal resistance, to ABC application and execution if an organisation decides to apply ABC (see section 2.8).

South Korea introduced ABC for the first time in the 1990s. However, many companies in South Korea subsequently abandoned ABC (Lee, 2003). The adoption rate of ABC before the adoption of TDABC in South Korea was consistent with the global patterns shown in the ABC paradox (Lee, 2003). Also, South Korea has applied TDABC since the late 2000s (Yoo, 2013). South Korea is building a similar level of management system to that of Western organisations, and the timing and spreading patterns of ABC and TDABC are similar to the global patterns. However, South Korean organisational culture is completely different from that in Western

organisations. In addition, the diffusion factors in Asia and Europe may be different, but most existing ABC diffusion studies were conducted in Western organisations. Globally, relatively few studies have identified the diffusion factors for TDABC. For this reason, a study of the diffusion factors of ABC/TDABC in South Korea is meaningful.

1.3 Research Significance and Contributions

This study is considered to be a significant attempt to provide a holistic view of the development patterns and underlying forces of ABC and TDABC, one of the more important MAIs. This study makes contributions to both practical and academic stands of research.

First, it sheds light on the interests of academics and practitioners surrounding ABC and TDABC, offering a holistic view of the evolution of ABC and TDABC. The spreading patterns of ABC and TDABC are also meaningfully compared, using a statistical analysis of ABC's and TDABC's overall publishing patterns.

Second, it provides a comprehensive review of ABC and TDABC studies beyond the accounting and finance disciplines. With the inclusion of ABC and TDABC publications in both business management and non-business management fields, and from 1988 to 2019, the findings of this study may help provide a relatively complete picture of ABC and TDABC diffusion.

Third, most previous innovation studies have focussed either on innovation itself, on adopters and/or on the environment surrounding the adopters. The dynamics and interactions among the players may not have been fully explored. This study, however, focuses on innovators as well as the relationships between suppliers and adopters to extrapolate dynamics in the process of innovation diffusion.

Fourth, this study provides a contribution for practitioners and/or those thinking of introducing ABC/TDABC. This study can provide practical help for practitioners using or adopting ABC/TDABC by describing in detail the progression of how TDABC moves from the supply side to the demand side, identifying factors important to its

diffusion. Especially in the present situation, where there is little research related to the diffusion of TDABC, this study can provide useful information to practitioners.

Fifth, this study provides the results of the characteristics and business environment of industries in which TDABC is taken up more in Korean hospitals than in manufacturing companies. This is due to some unique contextual management environment of the hospital industry, where there is an existence of stable community to share knowledge and tried innovative ideas. This finding sheds the first insight to underlying reasons for TDABC proliferation in bio-medical journals.

Sixth, there are relatively few studies that reveal how the characteristics of South Korean organisational culture influence on the spread of MAI. By examining the cultural aspects of South Korean companies being affected by the spread of TDABC, it is hoped that this study will enhance the understanding of the characteristics of management diffusion in a unique cultural context.

Last, this is the first study to identify the disparity between hospitals and manufacturing in terms of diffusion of ABC/TDABC. The finding of this study adds new knowledge to the existing ABC/TDABC literature with the first-hand empirical evidence on such disparity. In particular, this study reveals that TDABC popularity in Korean hospitals is not only due to some common diffusion factors, but also to the unique characteristics of the business environment such as incentives related to doctors' performance evaluation, and the existing of business community pertinent to the hospitals in Korea which significantly influences the spread of the MAI.

1.4 Structure of the Thesis

This thesis comprises eight chapters. Chapter 1 presents the research rationale, research objectives and research questions, background of the research setting, and research significance and contributions.

Chapter 2 provide a literature review to support the study. It gives an overall explanation of the conceptual design and use of ABC and TDABC. It also provides an overview of innovation, diffusion and MAI. In addition, an overview of MAI research is provided, and ABC-related research is explored.

Chapter 3 elaborates on the theoretical framework of this study. This chapter provides an overview of three theoretical perspectives to study the diffusion process and to produce this study's framework.

Chapter 4 discusses the research methodology and the data collection method employed to answer the research questions established in section 1.1.1.

Chapters 5 and 6 contain the findings generated from analysing the systematic survey results and multiple case studies.

Last, in Chapter 7, the major findings of this study are discussed, conclusions are drawn and the contributions, limitations and future research opportunities are presented.

Chapter 2. Literature Review

2.1 Introduction

This chapter provides a review of ABC and TDABC literature from the perspective of MAI. It first describes the implications of the proliferation of management innovations, and then it discusses details such as the emergence, design, usage and limitations of ABC and TDABC to extrapolate the comparative characteristics of ABC and TDABC. This is followed by a review of studies on diffusion with a specific focus on ABC and TDABC, to summarise the characteristics of those studies. This leads to an identification of the limitations in the existing studies and the research gaps.

2.2 Innovation and Diffusion

2.2.1 Innovation

Rogers' widely cited book, Diffusion of Innovation (2003), provided a widely-adopted definition of 'innovation':

> An idea, practice, or object that is perceived as new by an individual or other unit of adoption. It matters little, so far as human behaviour is concerned, whether or not an idea is 'objectively' new as measured by the lapse of time since its first discovery. (p. 12)

The concept of 'newness' has been understood in different ways in relation to the degree to which an innovation is considered an organisational phenomenon (Wolfe, 1989). Some authors have argued that innovations must be an objectively new objects in terms of age (e.g., Daft, 1978; Kimberly and Evanisko, 1981), while other authors have argued that innovations can be considered as such regardless of age (e.g., Down and Mohr, 1976; Rogers, 2003). Rogers (2003) suggested that the most adopted criterion in the definition of 'innovation' is 'newness', which can be judged not only in terms of new knowledge but also from the point of view of first persuasion, or the influence of adoption or decision to adopt (Damanpour, 1992; Ax and Bjørnenak, 2005; Damanpour and Schneider, 2006; Cooper and Crowther, 2008). Therefore, innovation can be applied to encompass new technological changes and

products and new administrative techniques and services (Ehigie and McAndrew, 2005; Askarany et al., 2007).

The element of perceived newness is the distinguishing feature between an innovation and the related concept change. Zaltman et al. (1973, p. 158) argued that all innovation implies change, but not all change involves innovation, because not everything that an organisation adopts is perceived as new. Damanpour (1991) suggested that innovation can be viewed as the adoption of something new to a company at the time of adoption, such as a system, programme, policy, process, plan or service (Damanpour, 1992; Ax and Bjørnenak, 2005; Damanpour and Schneider, 2006). Likewise, it may be concluded that 'innovation' can be viewed as the process of creating new ideas or renewing ideas that already exist (Rogers, 2003; Askarany et al., 2007).

2.2.2 Diffusion

The basic meaning of 'diffusion' is the spreading of something throughout a population (Lapsley and Wright, 2004). In order for diffusion to occur, Rogers (2003) claimed that there must first be an idea or innovation to be diffused. What makes diffusion different to any other type of spreading is the newness of the innovation. Second, there must be a population of potential adopters of the innovation. Last, there must be communication between the developers and potential adopters of the innovation. Diffusion occurs when an innovation has been adopted by an organisation. Diffusion is not an automatic result of innovation, and its ease of progress is affected by favourable factors within the environment. For instance, adoption depends on the extent of the benefit that an innovation brings to the organisation, on the consistency of the adopters' existing values with the innovation, on the complexity of the innovation, on the potential of the innovation to be implemented on a trial basis, and on the ease of observing the benefits resulting from the innovation (Rogers, 2003).

Potential adopters have to separately participate in the boundary spanning process, whereby they are included in networks outside of their own organisation to keep up to date with the latest information on accounting developments, and they must be

influential enough internally to use this knowledge for the benefit of the organisation (Swan and Newell, 1995). Therefore, important elements in all diffusion processes are internal and external networks. Internal and external networks allow potential adopters to learn about the innovation associated with the development of the organisation (Lapsley and Wright, 2004). Networks include loosely coupled cell structures of value-adding activities that constantly introduce new materials and elements (Clegg et al., 1996). The structure and scope of a network can affect the way accounting information is spread (Midgley et al., 1992). Formal relationships between organisations and informal networks—such as meetings between organisations, between universities, between professional institutions and between friends—can play a crucial role in the diffusion of innovations (Swan and Newell 1995; Rogers, 2003).

Because studies on diffusion tend to concentrate on the demand for innovations, Ax and Bjørnenak (2005) argued that in order to increase the understanding of management accounting practices, researchers must abandon their emphasis on studying the demand for MAIs by focussing on the position of those engaged in consulting about innovations with potential adopters. Suppliers can promote new accounting information regardless of whether a new technique is perceived as required by the organisation (Bjørnenak, 1997). For this purpose, propagators have to choose the right channels of communication through which to properly promote the idea (Rogers, 2003). Along the way, they may experience barriers to the communication of innovations, regardless of the subject.

Diffusion is a process in which new technologies are developed as they are distributed (Bjørnenak and Olson, 1999). The elements needed for diffusion to occur are adopters who embrace new innovations, networks that contain adopters to obtain information about innovations, and propagators who develop and propagate innovations for practitioners. It is also important to note that none of these processes are instantaneous but rather occur over a period of time, as diffusion adoption is a process, not an immediate adjustment (Hussein, 1981).

2.3 Management Accounting Innovation

The official terminology of the Chartered Institute of Management Accountants (CIMA; 2005, p. 18) defined ‘management accounting’ as the following:

> The application of the principles of accounting and financial management to create, protect, preserve and increase value for the stakeholders of for-profit and not-for-profit enterprises in the public and private sectors. Management accounting is an integral part of management. It requires the identification, generation, presentation, interpretation and use of relevant information to:
>
> - Inform strategic decisions and formulate business strategy
> - Plan long, medium and short-run operations
> - Determine capital structure and fund that structure
> - Design reward strategies for executives and shareholders
> - Inform operational decisions
> - Control operations and ensure the efficient use of resources
> - Measure and report financial and non-financial performance to management and other stakeholders
> - Safeguard tangible and intangible assets
> - Implement corporate governance procedures, risk management and internal controls

Alsayed (2010) summarised the definitions of ‘management’ and ‘management innovation’ by combining the CIMA’s definition of ‘management accounting’ and Rogers’ definition of ‘innovation’, given above in section 2.2.1:

> Management accounting innovation is: an idea or practice that is perceived as new by an adopting organisation. This idea/practice is an integral part of management that, by the application of the principles of accounting and financial management, creates, protects, preserves and increases value for the stakeholders of for profit and not-for-profit enterprises in the public and private sectors. (Alsayed, 2010, p. 35)

2.4 Understanding ABC and TDABC

This section examines ABC and TDABC from the perspective of MAI. As mentioned previously, research into ABC and TDABC could be considered some of the most important research in MAI. This chapter discusses details such as the emergence, design, usage and limitations of ABC and TDABC. It aims to identify the comparative characteristics of ABC and TDABC provided in the literature.

2.4.1 Emergence of ABC

Complexity in manufacturing has increased because of remarkable developments in information and manufacturing technology, resulting in the advancement of factory automation, distribution of capital-intensive production methods and expansion of production based on small-quantity batches (Kaplan and Cooper, 1998). Because of the advancement and availability of computer technologies, direct labour has been reduced considerably as a proportion of total cost. Meanwhile, overhead costs, such as the costs of research, development, operational support and maintenance, have grown in many organisations (Liu, 2002). In this situation of significant increase in manufacturing overhead costs, small quantity batch production, and the difference size and complexity of each products, the perversion of traditional product costing method may be caused by using distribution protocols related to the level of production including machine hours, working hours, and labour costs as well as production capacity (Johnson and Kaplan, 1991).

Traditional cost accounting systems are generally based on the assumption that products incur costs (Figure 2.1; Innes and Mitchell, 1990). This assumption leads to calculating the overhead costs of a product using a few allocation standards, such as direct labour hours (Cooper, 1988). The amount of overhead allocated to and calculated for products increases linearly depending on the number of units produced. Therefore, in this case, it is assumed that as the output increases, the overhead increases linearly (Turney, 1992). However, overhead costs to assist in the efficient production of a range of quality products, according to advocates of ABC systems, are largely unaffected by production volume (Innes and Mitchell, 1998, p. 7).

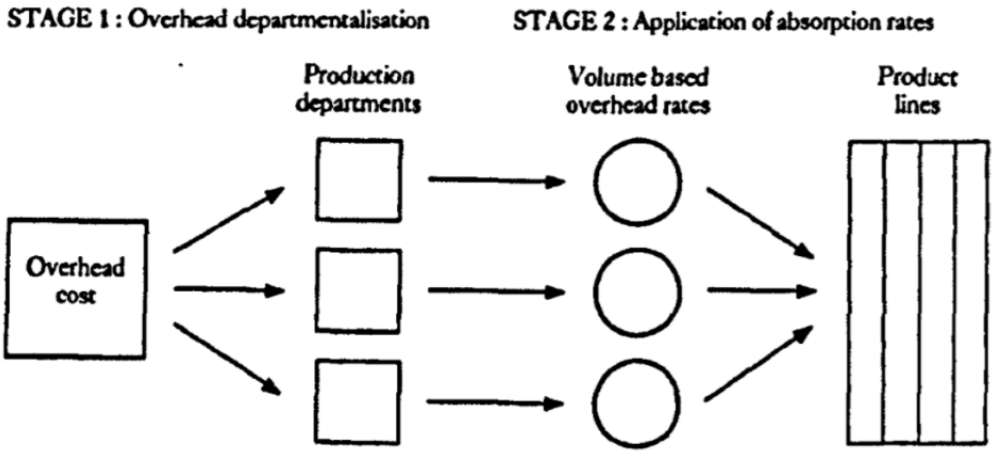

Figure 2.1: Overhead costs in a traditional costing system (adopted from Innes and Mitchell, 1990, p. 6)

Traditional cost accounting systems provide a poor picture of the actual cost drivers when product diversity and indirect resource costs are high, because traditional costing systems cannot capture the full complexity if business processes' overhead costs are dependent on variables other than production volume (Hoozée, 2013). Thus, when overheads no longer increase in proportion to production, traditional cost accounting systems provide distorted cost information and become obsolete (Kaplan, 1986).

Acknowledging that the primary drivers of manufacturing overhead costs are transactions that are not directly related to volume (Miller and Vollmann, 1985), Cooper and Kaplan introduced the ABC system in 1987, which is a cost accounting method focussing on organisational activities as the key element for analysing cost behaviour by linking organisational spending on resources to the activities performed by these resources (Horngren et al., 2003). The ABC system, in other words, has been developed to correct the potentially distorted product cost information reported by the traditional cost system. ABC rejects traditional cost accounting's assumption that products consume resources and incur costs. ABC recognises that activities link products/services and costs. Products/services consume activities, and activities consume resources, which consequently drive up costs (Innes and Mitchell, 1990).

2.4.2 Design of ABC

Cooper and Kaplan (1988, p. 96) stated, ‘All of a company’s activities exist to support the production and delivery of today’s goods and services. They should therefore all be considered product costs’. The objective of ABC is to allocate the cost of each activity to the product that demands that activity (Troxel and Weber, 1990). Therefore, ABC is two-stage model to allocate costs to products (Figure 2.2).

In the first stage, all costs are allocated to activities using ‘activity centres’, which are the segments of the production process for which the costs of the activities are required, based on the resource drivers (Kaplan and Cooper, 1998). The amount paid for a resource and allocated to an activity is called a ‘cost element’ (Cooper and Kaplan, 1988). A ‘cost pool’ has been defined as the point of focus for the costs relating to a particular activity in an ABC system (CIMA, 2005). A basic assumption of ABC is that cost pools are homogenous—that is, the costs of activities in each cost pool should have the same cause-and-effect relationship with the chosen cost driver (Novin, 1992).

In the second stage, costs assigned to the cost pools are then allocated to products depending on each product’s consumption of each activity. The final cost is allocated to the product, which is called a ‘cost object’. Cost drivers are used to assign the costs of activities to products. ‘Cost drivers’ are any factors that cause costs to be incurred, such as the number of machine set-ups, number of engineering change notices and number of purchase orders. A variety of cost pools and a greater number of cost drivers are the main differences between ABC and traditional costing methods (Charles and Hansen, 2008).

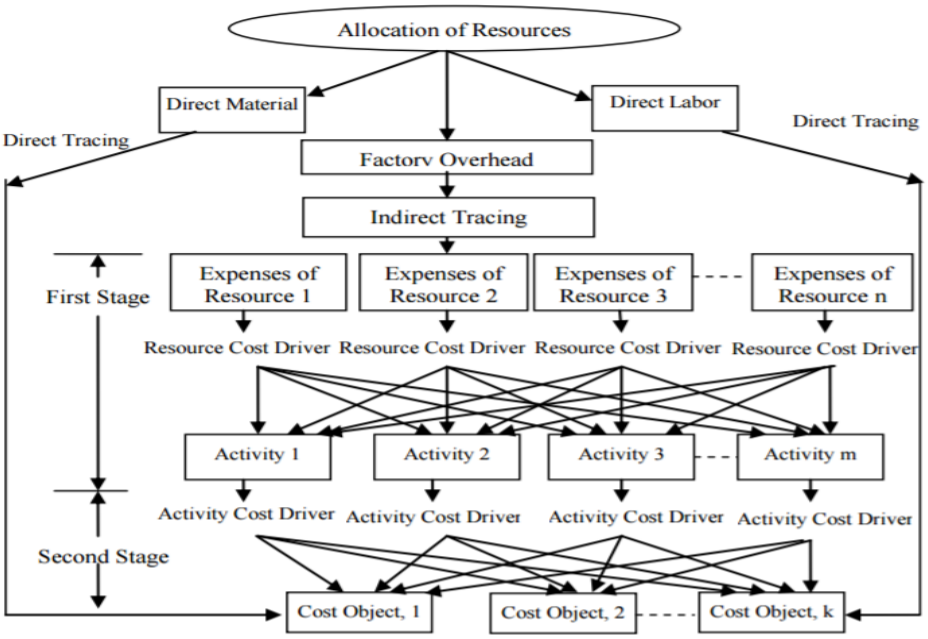

Figure 2.2: Conceptual ABC model (adopted from Namazi, 2016, p. 460)

Drury (2013) identified the following four stages, subdividing the two-stage model for establishing and operating an ABC system presented above:

1. Identifying the major activities that take place in the organisation
2. Determining the cost driver for each major activity
3. Creating a cost centre / cost pool for each major activity
4. Tracing the cost of activities to products according to the products' demand for activities

Within the first stage, Drury (2013) stated that activities consist of the aggregation of units of work or tasks. Examples of activities involve machine-related activities (e.g., machining departments), direct labour-related activities (e.g., assembly departments) and the aggregation of many different tasks, such as ordering, receiving, materials handling, identifying suppliers, production scheduling, packing and dispatching, and mailing purchase orders.

Drury (2013) argued that the activities should be at a proper level of aggregation, based on costs versus benefits criteria. For example, rather than classifying the purchasing of materials as an activity, each of its subtasks could be classified as specific activities. However, a high level of decomposition could cause the collection

of a huge amount of data and be too costly for product costing purposes. Christensen and Demski (1995) noted that the use of multiple cost pools (i.e., less aggregation) may not necessarily lead to more accurate product costs, as the potential for measurement errors may increase. Alternatively, a high level of aggregation is unlikely to provide a satisfactory determinant of the cost of the activity. For instance, selecting the number of purchase orders as a cost driver may provide a good explanation of purchasing costs but may be entirely inappropriate for explaining costs relating to receiving and issuing. Thus, it may be better to decompose it into three separate activities—purchasing, receiving and issuing activities—and to establish separate cost drivers for each activity (Börjesson, 1994). Drury (2013) suggested that the final decision about what to classify as activities must be a matter of judgement. However, this decision is influenced by factors such as the total cost of the activity centre (as it must be enough to justify separate treatment) and the usefulness of a single driver to provide a satisfactory determinant of the cost of the activity.

The aim of the second stage is to identify cost drivers that allocate the cost of a particular activity to the company's cost objects, such as products or services. A cost driver is an event or force that is a significant determinant of the cost of an activity. Drury (2013) suggested that several variables must be taken into account when a company seeks to choose an appropriate cost driver. First, a cost driver should provide a clear explanation of costs in each activity cost pool. Second, a cost driver should be easily measurable. Third, the related data should be easy to obtain and be identifiable in relation to the products. Thus, the cost of measurement should be taken into account (Needy et al., 2003). Datar and Gupta (1994) classified the errors that can occur in ABC as follows: 'specification errors', which involve using the wrong cost driver; 'aggregation errors', which involve putting together heterogeneous resources into cost pools; and 'measurement errors', which involve the practical difficulty of identifying costs with a particular cost pool, or of measuring the specific units of the resources consumed by various activities.

On the other hand, Kaplan and Cooper (1998) suggested three types of activity cost drivers that ca be used: transaction drivers, duration drivers and intensity drivers.

‘Transaction drivers’ represent the counting of all activities, such as the number of purchase orders, inspections or machine set-ups. ‘Duration drivers’ represent the amount of time required to perform an activity, such as set-up hours or inspection hours. For example, simple products may require shorter set-up times, while complex products may require much longer set-up times. Using set-up hours as the cost driver is therefore more accurate for measuring activity resource consumption than is using a transaction driver (i.e., number of set-ups), which assumes that the same amount of resources is consumed by both simple and complex products. Using set-up hours can result in the reporting of more accurate product costs, but this may cause high measurement costs. ‘Intensity drivers’ charge for the resources used each time an activity is performed. While duration drivers use an average hourly rate for performing an activity, intensity drivers involve direct charging based on the actual activity resources used for a product. Intensity drivers are the most accurate cost drivers, but they are also the most expensive to implement and maintain.

The third stage involves determining the amount of resources the company is spending on each activity. Many resources are directly attributable to certain activity centres, but other resources can be shared among a number of activities. Resource cost drivers, based on causal relationships should use assignment of the joint costs to individual activities, or interviews with staff managers who can provide reasonable estimates of resources consumed by various activities.

The final stage in ABC design is to track product costs in proportion to the activity measured by the activity drivers. Thus, this step involves calculating a predetermined cost driver rate for each activity and multiplying this rate by the products’ actual use of the activity cost driver.

2.4.3 Use of ABC

While activity costs are allocated based on the amount of consumed resources, the distribution of the costs of cost objects is based on understanding the activities that use resources and, in return, providing customers with value (Johnson and Kaplan, 1991). ABC is claimed to be not only a more accurate method for calculating product

and service costs but also a kind of information system to support the overall management strategies, such as cost management. Essentially, ABC quantifies the performance of a company by considering the causal relationships among activities, resources and cost objects. Proponents of ABC have argued that ABC allows for a detailed analysis of product costs while considering the activities and processes that typify an organisation's business (Swenson, 1995).

ABC is the ideal methodology to employ when dealing with diverse and complex manufacturing situations (Afonso and Paisana, 2009), enhancing decision making in the production mix and in the development and design of new products (Innes and Mitchell, 1998). According to Gosselin (2006), ABC can be used for cost reduction, pricing, profitability analysis, performance improvement and cost management. ABC can also be used for budgeting (Dierks and Cokins, 2000). As mentioned above, many researchers have claimed that ABC can be used for different purposes, and some of the main objectives of ABC are described briefly below.

First, ABC can be used for product costing. Using ABC for product costing is the most regular usage of ABC and often forms the basis of product pricing and profitability analysis (Swenson and Barney, 2001; Hicks, 2005). This is especially important within an increasingly competitive environment, as product differentiation is necessary to acquire accurate information about the costs of developing and providing products and services (Swenson, 1998; Swenson and Barney, 2001; Anand, 2004; Fennema et al., 2005; Hicks, 2005).

Second, ABC can be used in making pricing decisions. Several costing systems are used to provide accurate product costs and pricing. Many authors have argued that distortions are often present in reported product costs; in addressing these distortions, ABC can provide reductions in product pricing (Swenson and Barney, 2001; Anand, 2004; Fennema et al., 2005). Innes and Mitchell (1995) argued that ABC can also add weight to the significance of pricing decisions.

Third, ABC can be used for cost reduction and performance improvement. ABC can improve efficiency and effectiveness by analysing the activities related to products and services. Also, ABC can be used to find and eliminate duplication and

unnecessary activities, and thus, workflows can be improved. By attributing costs to activities, ABC can prioritise areas where effort should be focussed to increase efficiency and effectiveness, reduce costs and improve performance (Kaplan and Cooper, 1998).

Fourth, ABC can be used in conducting a customer profitability analysis. Bellis-Jones (1989) suggested that ABC can be used to calculate profit related to a specific customer. The process of calculating profit is based on the costs and sales that can be traced to particular customers. The overall profit and loss can be analysed to identify the individual profits for a specific customer (Bellis-Jones 1989; Cooper and Kaplan, 1991; Dearman and Shields, 2001). This kind of analysis can provide a profile of customer profitability, allowing prompt strategic decisions about pricing, service, distribution, promotion and policies (Dodd and Lavelle, 2002; Sievanen and Tornberg, 2002; Anand, 2004).

Fifth, ABC can be used for budgeting. Capabilities related to budgeting—which is referred to ‘activity-based budgeting’ (ABB) within ABC—were developed from the basic ABC framework (Brimson, 1991; Brimson and Antos, 1999; Cooper and Slagmulder, 2000; Bleeker, 2001; Stevens, 2004). Using ABB, practitioners have the ability to supply only those resources for the activities that are required to meet the budgeted production and sales volumes. In this sense, ABB is the reverse of ABC. In ABC, resources are allocated to activities, and activity cost drivers are used to allocate activity costs to cost objects such as products, services or customers. In contrast, ABB start with cost objects. The output of ABB can determine necessary activities, which are then used to estimate the resources that are required for the budget period (Brimson and Antos, 1999; Lukka and Shields, 1999).

Although it has been argued that ABC can be used to help strategic and operational decision making, the diffusion of ABC has not been as successful as may have been expected (Gosselin, 1997).

2.4.4 Problems Faced in ABC Implementation

The basic model of ABC seems to be relatively simple and straightforward; however, it has been reported that increases in the size and complexity of the ABC model

have caused several problems (Brimson, 1998; Kaplan and Anderson, 2004). Using ABC leads to complexity and increased costs of model creation, implementation and maintenance (Mena et al., 2002). Many organisations have found that ABC is too complex to implement, which has led to abandonment of ABC (Innes and Mitchell, 1995; Innes et al., 2000). The key to increasing the accuracy of this system is establishing clear cause-and-effect relationships among activities by reducing aggregation and specification errors (Kaplan and Cooper, 1998). These improvements, however, increase the cost and time required to develop and maintain the ABC model (Cooper, 1990; Anderson et al., 2002; Armstrong, 2002; Kaplan and Anderson, 2004).

Setting up ABC can also be time consuming and laborious (Barrett, 2005) because of the need for long interviews and surveys of staff and the high demand for data processing to determine how they spend their time among all the various activities they help perform (Öker and Adigüzel, 2010). Employees must provide a list of all the activities they spend time on and the percentage of their time they devote to each activity. This type of close analysis to establish relationships among overheads requires a lot of work and cost, and the data may be difficult to obtain (Richards, 2017). If the data can be obtained, the results can be biased because employees tend not to report that any percentage of their time is idle or unproductive, even if that is the case (Kaplan and Anderson, 2004).

When ABC is established in an organisation, modifying and adapting to changes in the organisational context are also difficult, costly and complex (Kaplan and Anderson, 2007; Everaert et al., 2008). Modifying and adapting to changes are more essential when the model needs to be updated frequently as the volumes of sales and ranges of product change (Themido et al., 2000). There are also issues with the subjectivity of ABC. The process of translating costs to activities carries a risk of subjectivity. Subjectivity may be a result of politics between departments or behavioural hurdles during interviews (Mena et al., 2002).

In short, the limitations of ABC are as follows:

- Complexity-induced disaggregated activities

- Higher costs
- Difficulties in maintaining and updating the system
- Using subjective allocation without validation

ABC has encountered this dilemma in practice, on one hand the accuracy and usefulness of an ABC system requires the ABC model to be more detailed, on the other hand, there are more challenges in building and maintaining it.

2.4.5 ABC Paradox

ABC has been incorporated into the lecture plans of most accounting education programmes and taught at universities in many countries (Gosselin, 2006). ABC is the subject of at least one chapter of the most widely used accounting textbooks (Hilton and Platt, 2013). Also, many accounting institutes offer executive training in ABC to their members. There has been a favourable context for the adoption and implementation of ABC (Gosselin, 2006). Since the early 1990s, a large number of survey-based research studies have been conducted in various countries to determine the rate of adoption of ABC (Alsayed, 2010).

In practice, surveys on the diffusion of ABC have shown that it has not been applied as widely as may have been expected, in spite of the efforts of academics to encourage the adoption and/or implementation of ABC (e.g., Innes and Mitchell, 1991; Armitage and Nicholson, 1993; Lukka and Granlund, 1996; Malmi, 1996; Innes et al., 2000). The essence of the so-called ABC paradox is that there is a discrepancy between the high levels of academic interest in ABC and the low levels of its diffusion in practice (Gosselin, 1997; Kennedy and Affleck-Graves, 2001). Table 2.1 presents a summary of surveys on the diffusion of ABC conducted in several countries.

Table 2.1: ABC adoption rate reported in past research

Study	Country	Population	Response Rate	Adoption Rate
Innes and Mitchell (1991)	UK	720 manufacturing and financial service firms	26%	6%
Bright et al. (1992)	UK	5,463 manufacturing firms	12%	32%
Armitage and Nicholson (1993)	Canada	700 largest companies	50%	14%
Drury and Tayles (1994)	UK	866 manufacturing firms	35%	4%
Innes and Mitchell (1995)	UK	1000 largest firms	33.2%	21%
Lukka and Granlund (1996)	Finland	309 manufacturing firms	43.7%	5%
Malmi (1996)	Finland	490 engineering firms	39.5%	14%
Bjørnenak (1997)	Norway	132 manufacturing organisations	57%	40%
Gosselin (1997)	Canada	415 manufacturing strategic business units	39.5	30.4%
Groot (1999)	US and the Netherlands	96 US food industry 117 Netherlands food industry firms	US: 24% Netherlands: 17%	US: 17% Netherlands: 24%
Clarke et al. (1999)	Ireland	511 manufacturing firms in the business and finance listings	41%	11.8%
Innes et al. (2000)	UK	1,000 largest firms	22.8%	17.5%
Kennedy and Affleck-Graves (2001)	UK	1,000 largest firms	23%	20.1%
Chen et al. (2001)	Hong Kong	810 listed companies and Hong Kong CIMA members	11%	11%
Bescos et al. (2002)	Canada and France	Financial Post 500 in Canada and members of the Association of Financial Directors and Management Accountants	Canada: 21.2% France: 4.7%	Canada: 23.1% France: 23%
Chongruksut (2002)	Thailand	292 companies listed on the stock exchange of Thailand	34.6%	35.6%

Cotton et al. (2003)	New Zealand	748 corporate-sector members of the Institute of Chartered Accountants of New Zealand	40%	20.3%
Pierce (2004) / Brown and Pierce (2004)	Ireland	Top 500 companies and top 50 financial services companies	23.2%	27.9%
Drury and Tayles (2005)	UK	631 manufacturing and non-manufacturing firms	55%	12%
Al-Omiri and Drury (2007)	UK	1,000 manufacturing and non-manufacturing firms	19.6%	15%
Sartorius et al. (2007)	South Africa	Around 350 companies listed on the Johannesburg Securities Exchange	51%	12%
Al-Sayed and Dugdale (2016)	UK	1,456 CIMA members	11%	32%

Note: CMA = chartered management accountant; US = United States; UK = United Kingdom

As the above table shows, many survey studies have found that although academics and management accountants showed great interest in ABC, the diffusion of ABC has not been as intense as expected (Gosselin, 2006). Moreover, many studies have showed that some firms stopped the diffusion process of ABC and that others that had adopted and implemented ABC subsequently abandoned it because of many the many difficulties they faced (Cobb et al., 1992; Nanni et al., 1992; Armitage and Nicholson, 1993; Innes et al., 2000; Kaplan and Anderson, 2004). In particular, two survey studies by Innes et al. showed that the rate of ABC application has gradually decreased (Innes and Mitchell, 1995; Innes et al., 2000).

Meanwhile, some issues may lead to the conclusion that the implementation rates of ABC have been overestimated. There is possible confusion among the survey respondents about what ABC actually is. Gosselin (2006) explained the phenomenon as follows. First, the concept of ABC is not clearly defined in the research. In addition, there may be bias in the survey respondents, as those who are working in companies that have not implemented ABC may tend not to respond to ABC surveys.

Moreover, in much survey research into ABC, respondents were working in the management accounting area, so their responses may not reflect the perception of other managers. Although there are factors that may results in the overestimation of the spread of ABC, the overall results indicate a low level of spread. This is the phenomenon described as the 'ABC paradox' (Gosselin, 1997; Kennedy and Affleck-Graves, 2001).

Some scholars have attempted to explain the reasons for ABC paradox. Kaplan (1986) ascribed the following causes to the ABC paradox: a lack of role models with successful practices that companies could follow; a lack of computerised systems; a lack of focus on management accounting; and a lack of top management involvement. Ness and Cucuzza (1995) and Vieira (2018) claimed that resistance from employees is the reason for the ABC paradox. Kennedy and Affleck-Graves (2001) argued that the ABC paradox is created because of complex cost allocation methodology, with no direct link to profitability increase and shareholder value. Gosselin (2006) suggested that even if the benefits of adopting ABC are recognised, the complexity of its implementation make ABC diffusion difficult. Kaplan and Anderson (2007) explained that the ABC paradox is caused by factors inherent to the existing ABC concept: 'Many companies, because of the time-consuming surveying and data-processing costs of ABC systems, either abandoned ABC entirely or ceased updating their systems, which left them with out-of-date and highly inaccurate estimates of process, product, and customer costs' (p. 3).

In summary, the reasons for the ABC paradox include its complexity, its cost, firm capacity and support, and internal resistance. Based on this, we can say that to resolve the ABC paradox, it must be made lower in cost, be simple enough to gain support from those inside firms and organisations, and be suited to companies' capabilities.

To overcome the difficulties inherent in implementing ABC in dynamic environments and to capture the full complexity of activities better, TDABC was developed by Kaplan and Anderson as a simpler and more powerful path to higher profits (Kaplan and Anderson, 2007). TDABC is discussed and explained in the next section.

2.4.6 Emergence of TDABC

TDABC represents a recent attempt to simplify the processes of implementing and maintaining ABC systems, to address the ABC paradox (Hoozée, 2013). TDABC changes the nature of the cost drivers and the way data is allocated in order to simplify the old ABC approach (Kaplan and Anderson, 2007; Everaert et al., 2008). Compared to ABC systems, TDABC uses only two parameters: the ‘unit cost’ of supplying resources and the ‘time’ required to perform an activity in the resource group (Bruggeman et al., 2005; Kaplan and Anderson, 2007).

TDABC is thought to be able to overcome the difficulties of traditional costing and ABC systems. TDABC assigns overhead costs into a single time equation, considering all special aspects of the chosen activities, and allocates a cost to the activity, customer, region or product determined in a better and fairer fashion. This new system also discovers unused capacities, improves operation, considers interaction among time drivers, detects in the trace of costs, the process without value (Dejnega, 2011). Several TDABC advocates have argued that this new system is capable of replacing old ABC systems (Shin, 2015).

The TDABC system is different from the ABC system in six main ways (Namazi, 2016):

1. TDABC uses time as the main cost driver for cost objects.
2. TDABC skips the step of identifying each different activity (i.e., the first step of the ABC implementation process).
3. TDABC eliminates the need to interview and survey employees for resource allocation to activities before allocating them to cost objects.
4. TDABC discovers the used capacity and the unused capacity.
5. TDABC can adapt to the complexities of actual production by formulating different time equation models.
6. TDABC is a pull model that operates based on two estimations: capacity cost rate and time required for activity. In contrast, ABC is a push model in which costs are attributed to activities, and the activity costs are then assigned to selected cost objects.

Barrett (2005) suggested that the advent of TDABC could induce the resurgence of ABC in industry, arguing that ABC and TDABC are not mutually exclusive and that most ABC models can be modified using a TDABC approach or other derived drivers, depending on the situation.

2.4.7 Design and Time Equations of TDABC

As mentioned above, TDABC requires only two parameters to make estimates: the unit cost of supplying resources and the time required to perform an activity in the resource group (Figure 2.3; Bruggeman et al., 2005). Using only two parameters simplifies the model and allows management to directly estimate the demand for resources imposed by each transaction, product or customer. This simplicity contrasts the ABC system, in which resource costs would be allocated to activities first and then to the allocated product or customers (Kaplan and Anderson, 2004).

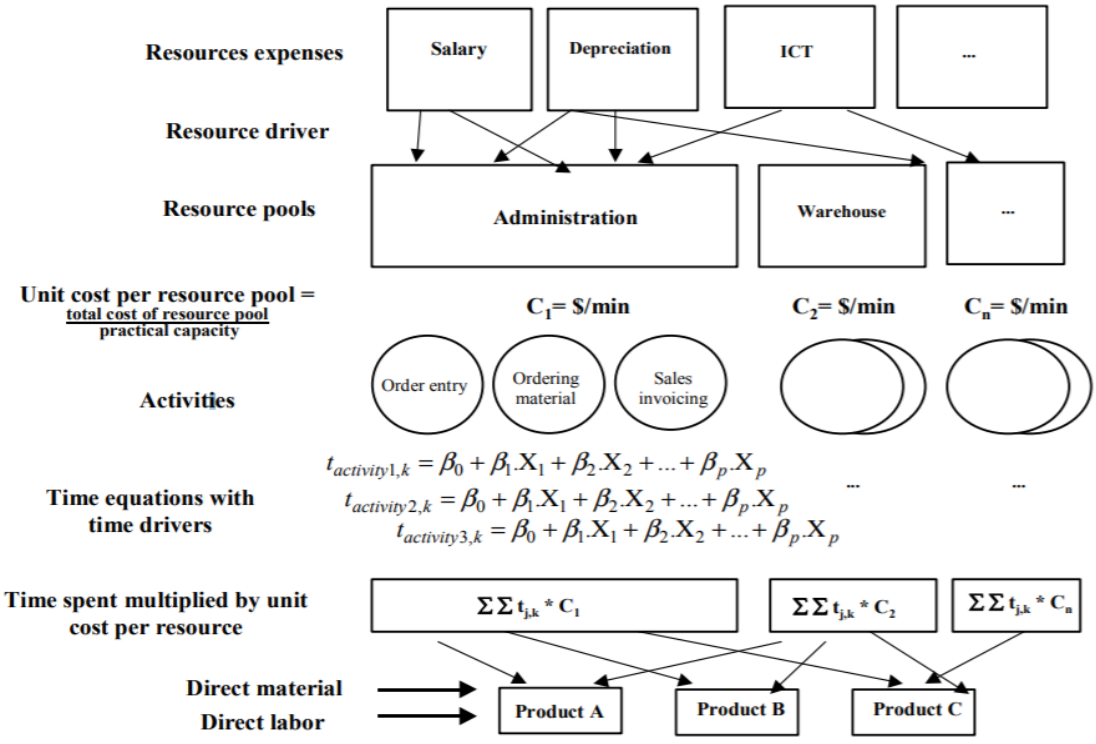

Figure 2.3: Conceptual TDABC model (adopted from Bruggeman et al., 2005, p. 38)

Kaplan and Anderson (2004) suggested six steps for establishing TDABC:

1. Identify the various groups of resources that perform activities.
2. Estimate the cost of each resource group.

3. Estimate the practical time capacity of each resource group (i.e., the available working hours).
4. Calculate the unit cost of each resource group by dividing the total cost of the resource group by the practical capacity.
5. Determine the required time for each event of an activity based on different time drivers.
6. Multiply the unit cost by the time required to trace costs to cost objects.

Bruggeman et al. (2005) argued that the breakthrough of TDABC is in the time estimation. Each activity has its time duration estimated based on its characteristics. These characteristics are called ‘time drivers’ because they increase or decrease the duration of the activity. Time equations model how the time required per activity is affected by several drivers (see Appendix A).

The use of time equations is an improvement over the ABC methodology. Time equations in the TDABC include many parameters that increase the size of the model in a linear way, not exponentially as was the case in the ABC system (Kaplan and Anderson, 2007). Although the simplicity of time equations is considered the biggest advantage of the TDABC system (Everaert et al., 2008), there are additional benefits to using TDABC, which are discussed in the next section.

2.4.8 Advantages and Limitations of TDABC over ABC

Kaplan and Anderson (2007) noted many advantages of the TDABC methodology over ABC that indicate that TDABC represents a simpler and more powerful path to higher returns. A brief summary of the shortcomings of ABC described above is that it is complex, it is expensive, it is difficult to maintain and it uses subjective information about activities and allocation. However, TDABC was created to address these shortcomings, and these benefits of TDABC will be explained here.

ABC is complex: Compared to ABC, TDABC can build an accurate model easily and quickly because of using only two parameters (capacity cost rate and capacity usage). According to Öker and Adigüzel (2010), the TDABC model is easier to use than is the standard costing model.

ABC is expensive: The TDABC model allows for rapid and affordable model maintenance (Kaplan and Anderson, 2007). Without the need to install specific programmes for TDABC, it can be implemented and maintained using a popular spreadsheet programme, such as Microsoft Excel or OpenOffice Calc (Somapa et al., 2012), and is therefore less costly than is ABC.

ABC is difficult to maintain: Stout and Propri (2011) argued that for companies with an unsophisticated business model, TDABC does not actually require maintenance (i.e., it is maintenance free). Even large companies have the advantage of maintaining the TDABC system easily. In addition, Everaert et al. (2008) noted that TDABC is not as easily affected by changes as is ABC. For example, when companies invest more assets and depreciation increases, in TDABC, only one parameter needs to be updated, whereas in ABC, all eleven of the activity cost driver rates need to be changed. Also, Kaplan and Anderson (2007) proposed monthly calculations to capture the economics of the most recent work, instead of the daily calculations required in ABC.

ABC is subjective: According to Stout and Propri (2011), in TDABC, data and parameters are already available in enterprise resource planning (ERP) and customer relationship management (CRM) systems. Therefore, TDABC is not based on employee-subjective assumptions about the percentage of time spent on activities (Kaplan and Anderson, 2007).

In addition, the cost of TDABC is calculated on a transactional or order basis using specific characteristics such as order, process, supplier and customer. This granularity is particularly suited to industries in which operations or processes change rapidly, or in which customers, products, channels and processes are complex (Kaplan and Anderson, 2007).

Moreover, TDABC determines the used capacity as well as the unused capacity unequivocally by basing the predetermined overhead cost rates on the practical capacity, which is assumed to be about 80 to 85% of the ideal capacity (Kaplan and Anderson, 2004; Hoozée, 2013).

Although many TDABC studies have been conducted in the past, most of them are replete with consulting arguments about the profit impact of TDABC. There are not many critical studies on the beneficial outcomes of TDABC. However, some studies have claimed that TDABC has some limitations. In this section, the limitations of TDABC will be explained.

First, there may be a limitation on the application of TDABC in certain fields. TDABC may not be suitable for manufacturing companies (as opposed to service companies) because in manufacturing companies, capacities are not typically measured in terms of labour times, as it is difficult to measure capacity in this way (Öker and Adigüzel, 2010). TDABC may also be inappropriate for advising and consulting work (Max, 2007) and for marketing, research and development (Wegmann, 2007), where the amount of time spent on activities cannot be predicted effectively.

Second, according to Barrett (2005), building a TDABC system should be easier than building an ABC system, but this is not actually the case because TDABC requires a lot of data collection, just as traditional ABC does. Each time the model is refreshed and recalculated, the duration drivers must be updated.

A third limitation of TDABC is the time measurement error. Cardinaels and Labro (2009) claimed that there can be an error in time estimates during the data collection phase. When people are asked about their working hours, they tend to overestimate the real time.

Fourth, some researchers have suspected that TDABC is simply a reconstruction of ABC and have claimed that similar methods have previously been used in corporations (Barrett, 2005). TDABC is suspected by some of being merely ‘new wine or just a new bottle’ (Gervais et al., 2009). Similarly, some scholars have argued that ABC and TDABC are the same things, as they have similar characteristics. Shin (2015) argued that TDABC is not a substitute but a complement to traditional ABC. Manalo and Valenzuela-Manalo (2010) also suggested that ABC and TDABC complement each other and that their strengths should be synthesised to reduce weaknesses. In this thesis, the above assertions about the complementarity of ABC and TDABC will be examined.

The characteristics of ABC and TDABC summarised above are as shown in Table 2.2.

Table 2.2: Summary of ABC and TDABC

	ABC	**TDABC**
Concept	Products and services require an organisation to perform activities, and those activities require an organisation to incur costs.	Products and services require spending time on the consumption of resource capacity.
Theoretical advantages	It allocates the indirect costs to processes in a way that accurately reflects how these costs are incurred.	It simplifies and allows management to directly estimate the demand for resources levied by each transaction, product or customer.
Use and applications	• Product costing • Pricing decisions • Cost reduction and performance improvement • Customer profitability analysis • Budgeting	• Product costing • Pricing decisions • Cost reduction and performance improvement • Customer profitability analysis • Budgeting • Identifying idle capacity
Limitations	• Complexity-induced disaggregated activities • Higher cost • Difficulties in maintaining and updating the system • Uses subjective allocation without validation	• Not suitable for manufacturers/organisations where the amount of time cannot be predicted effectively • Potential for time measurement errors • Similar limitations to ABC (‘new wine or just a new bottle’)

As we have seen so far, TDABC is more user friendly and easier to use than is ABC. So, how has the diffusion of ABC changed since the advent of TDABC? Where and by whom has this spread been driven? In addition, how has ABC’s low level of spread and abandonment rate (i.e., the ABC paradox), arising from users’ low application, changed after TDABC appeared? Addressing these questions is the first research objective of this study.

The next sections explore the diffusion studies of ABC and TDABC. In addition to a survey, the relevant studies are explored based on the type of diffusion research being applied, and a research gap is found. The research gap identified in the following sections is the basis for the objectives of this study.

2.5 Research on Diffusion of ABC and TDABC

From the beginning of the 1990s, there have been attempts to confirm the extent to which organisations have adopted and implemented ABC in many countries and to identify the factors that influence the decision to adopt and implement ABC (Gosselin, 2006). In this section, research into the diffusion of ABC is reviewed to better understand the diffusion process of ABC and to provide some explanations for the ABC paradox (Gosselin, 1997; Kennedy and Affleck-Graves, 2001). This section also includes a review of TDABC diffusion, to fill the gap in the limited existing studies on TDABC.

Many authors have maintained that using only the survey method in management accounting will not generate meaningful data in relation to questions such as why firms implement ABC, how they process it or which decisions are based on ABC information (Gosselin, 2006). As such, to understand the diffusion process of ABC and to provide some explanations for the ABC paradox, research streams other than descriptive survey research have been applied. Several research studies have aimed to identify the factors that affect the adoption of ABC (e.g., Bjørnenak, 1997; Van Nguyen and Brooks, 1997; Booth and Giacobbe, 1998; Krumwiede, 1998; Malmi, 1999). In the following sections, a brief explanation of these empirical studies and their results is provided. These studies are classified into DI, OI and PT streams, according to Wolfe's (1994) classification of innovation research.

According to Wolfe (1994), innovation research can be categorised into three streams: DI research, which studies the diffusion of innovations over time and/or space; OI research, which studies the determinants of the innovations; and PT research, which studies the process of innovation. Using multiple theoretical approaches in innovation research combines different perspectives to better

understand innovation processes. Here, DI, OI and PT research will be also explained with regard to ABC literature.

2.5.1 DI Studies on ABC

DI research analyses the spread of an innovation across a population of potential adopters (Wolfe, 1994). The main objective of DI research is to describe or predict innovation adoption rates and patterns over time and space. Thus, the unit of analysis is innovation outside of the organisational context. Normally, the data collection methods used in DI research are cross-sectional surveys and secondary data.

The rate of adoption over time has been described as having an S-shaped curve which presents an elapsed time for adopters to adopt the innovation (Abrahamson, 1991; Rogers, 2003). To identify the patterns of diffusion of MAI (namely, ABC and TDABC), which is one of the objectives of this study, a systematic literature survey should be conducted.

Malmi (1999) conducted DI research in the form of cross-sectional surveys to examine the diffusion process of ABC in Finland. For this, he built theoretical perspectives outlined by Abrahamson (1991). Abrahamson suggested using typology that included the efficient choice perspective and fashion, fad and forced selection perspectives (Table 2.3). The efficient choice perspective is that adopters make free, independent, rational decisions based on technical efficiency (Malmi, 1999). The forced selection perspective is that adopting organisations face a situation of no choice because organisations outside a group, such as governmental bodies (Carroll et al., 1988; DiMaggio, 1988), which have sufficient power, can choose which administrative innovation should diffuse or be rejected (Malmi, 1999). The fashion perspective is that organisations in a group imitate administrative models promoted by “fashion-setting organisations”, such as consulting firms, business schools and business mass media (Abrahamson, 1991). The fad perspective is different from the fashion perspective because the fad perspective is that organisations within a group imitate each other within that group instead of fashion-setting organisation (Abrahamson, 1991; Malmi, 1999).

Table 2.3: Theoretical perspectives explaining diffusion and rejection (adopted from Abrahamson, 1991, p. 591)

		Imitation–Focus Dimension	
		Imitation processes do not impel the diffusion or rejection	**Imitation processes impel the diffusion and rejection**
Outside–Influence Dimension	**Organizations within a group determine the diffusion and rejection within this group**	**Efficient choice**	**Fad**
	Organizations outside a group determine the diffusion and rejection within this group	**Forced selection**	**Fashion**

The purpose of Malmi's (1999) study was to explain what drives the innovation diffusion of ABC in Finland during its various phases. He used three data collection methods. First, surveys were conducted to collect data from the demand side about motives for adoption. Second, interviews with consultants, academics and software company employees were used to identify their motives, perceptions and involvement in ABC diffusion from the supply side. Last, the frequency at which material on ABC (e.g., articles and books) was published in Finland over a period of time was checked. He concluded that efficient choice may explain the earliest adoptions, while fashion-setting organisations have a significant effect during the take-off stage. After this point, the effect of fashion-setting organisations declined. Further diffusion can be explained by mimetic behaviour and efficient choice.

In contrast, the current study centres on the publications of suppliers in management and the communication of demanders (e.g., in which field and what kinds of authors write about ABC and TDABC in what way), analysing the areas to which the flow of interest proceeds. In other words, DI research is conducted using a systematic literature review. Therefore, studies investigating patterns of diffusion in systematic literature reviews can also be included in DI research. According to Bjørnenak (1997), media such as articles, books, seminars and conferences may be used to inform and

convince potential adopters. Also, Abrahamson (1996) argued that increases in the number of publications could be related to the take-off of an innovation.

According to Bjørnenak and Mitchell (2002), accounting journals have a permanent legacy of giving attention to ABC. Journals have been rated as an important means of technology spread, allowing the body of knowledge about ABC to expand and extend its audience. To understand the evolution of ABC and TDABC, a detailed systematic analysis of the ABC journal literature is needed (Bjørnenak and Mitchell, 2002). The origins and developments of the two technologies can be grasped by identifying how many papers have been written and published about ABC and TDABC, what kinds of journals published about them in which fields, which fields were spotlighted by which authors and what kind of content was written.

Gosselin (2006) reviewed the publication patterns of ABC over time, analysing the trends in the articles covered over the period and, in particular, summarising the contents of the papers on the diffusion of ABC. Bjørnenak and Mitchell (2002) analysed ABC articles published in 17 major business management journals. They did an in-depth analysis of the number of publications, authors, research methods, foci and content of ABC articles published in business management journals. Communication processes are also important in terms of the development and dissemination of knowledge (Bjørnenak and Mitchell, 2002). Lukka and Granlund (2002) analysed the academic communication structure of ABC and found that even within academia, communication has been fragmented, limiting the development of knowledge.

To date, there are relatively few papers taking a holistic view of the diffusion of ABC and TDABC. The analysis of the literature on the diffusion of ABC (e.g., Bjørnenak and Mitchell, 2002; Lukka and Granlund, 2002; Gosselin, 2006) has been limited either to business management journals or limited by the scope of analysis. Bjørnenak and Mitchell (2002) analysed the ABC articles published only in major business management journals from 1987 to 2000 and called for a detailed systematic analysis of the ABC journal literature to understand the evolution of ABC, emphasising that accumulated journal literature is a distinct and important chronicle of evidence relating to the phenomenon of ABC. Gosselin (2006) reviewed ABC

publications from 1988 to 2004 by investigating the changes in ABC over time. He briefly mentioned the fact that professional publications on ABC appear in certain industries, but he did not present a full analysis of publications in non-business management fields. To date, no analysis of publications has broadened its scope to review both business and non-business management journals, nor has an analysis provided a narrative of the year-by-year changes in publications. In addition, the most recent survey of ABC publications (e.g., Gosselin, 2006) did not cover the situation since 2004, when TDABC appeared. As such, the diffusion pattern of TDABC has not been studied in the existing research.

In this study, the researcher addresses these gaps by providing a detailed analysis of ABC and TDABC publications in order to identify the diffusion pattern of ABC and TDABC, as the first objective of this study.

2.5.2 OI Studies on ABC

As discussed above, the DI approach focuses on the spread of an innovation across organisations. However, DI has been found to have limitations in explaining the adoption of innovations at an organisational level (Wolfe, 1994). The objective of OI research, therefore, is to identify the factors that determine an organisation's propensity to innovate (Wolfe, 1994; Fichman, 2004). The organisation is the unit of analysis, and OI has typically measured the number of innovations adopted by an organisation. As such, the focus in this stream is the adoption or implementation stage, using cross-sectional surveys. Most ABC innovation studies belong to this research stream. The major diffusion factors identified in the OI research literature are explained here.

2.5.2.1 Perceived Attributes of Innovation

According to Rogers (2003), the diffusion of innovations is affected by the perceived attributes of innovations. The perceived attributes of an innovation are important elements in the explanation of the rate of adoption of that innovation. From 49 to 87% of the variance in innovation diffusion can be explained by the following five attributes: relative advantage, compatibility, complexity, trialability and observability (Rogers, 2003).

‘Relative advantage’ is the degree to which an innovation is perceived as being better than the idea it supersedes by a particular group of users, measured in terms of what matters to those users, such as economic advantage, social prestige, convenience or satisfaction. ‘Compatibility’ is the degree to which an innovation is perceived as being consistent with the existing values, past experiences and needs of potential adopters. An idea that is incompatible with an organisation’s values, norms or practices will not be adopted as rapidly as an innovation that is compatible with them. ‘Complexity’ (ease of use) refers to the degree to which an innovation is perceived as being difficult to understand or use. New ideas that are simpler to understand are adopted more rapidly than are innovations that require the adopter to develop new skills and understandings.

‘Trialability’ is the degree to which an innovation can be experimented with on a limited basis. An innovation that is trialable represents less risk to the individual who is considering it. ‘Observability’ is the degree to which the results of an innovation are observable and visible to others. Visible results lower the amount of uncertainty and stimulate peer discussion of the new idea, as the friends and neighbours of an adopter often request information about it. In addition, cost plays an important role in the diffusion of innovation. Tornatzky and Klein (1982) identified cost as having a significant influence on the adoption of an innovation. ‘Cost’ refers to the extent to which an innovation is perceived as being expensive (Tornatzky and Klein, 1982).

2.5.2.2 Size

Size is one of the most important influencing factors in the adoption of innovation (Moores and Chenhall, 1994). Many field studies and surveys have demonstrated that the adoption of ABC tends to be more frequent within large organisations (Armitage and Nicholson, 1993; Innes and Mitchell, 1995; Bjørnenak, 1997; Gosselin, 1997; Krumwiede, 1998; Innes et al., 2000; Brown et al., 2004; Baird et al., 2004; Al-Omiri and Drury 2007; Askarany and Smith, 2008). A possible explanation for this is that larger organisations have relatively greater access to resources to experiment with the introduction of more sophisticated accounting systems (Innes and Mitchell, 1995).

2.5.2.3 Top Management Support

According to Brown et al. (2004), ‘top management support’ refers to the degree to which a company’s upper-level executives, such as the chief executive officer (CEO) and chief financial officer (CFO), actively and openly promote innovation. Top management support can make adoption easier by decreasing the risk and uncertainty through facilitating access to resources and resolving issues across organisational boundaries (Brown et al., 2004). Many papers emphasise the importance of top management support to innovation (Malmi, 1997; Krumwiede, 1998; Anderson and Young, 1999; Brown et al., 2004; Alsayed, 2010).

2.5.2.4 Champion Support

According to Prescott and Conger (1995), ‘champion support’ refers to someone within the organisation becoming a special advocate for an innovation, taking actions to increase the possibility of its successful adoption and implementation. A champion is similar to a transformational leader who inspires others and brings about change in their organisation using a variety of other influence processes (Beath, 1991). Many papers emphasise the importance of champion support (Malmi, 1997; Krumwiede, 1998; Anderson and Young, 1999; Brown et al., 2004; Alsayed, 2010).

2.5.2.5 Culture (Competitive/Tight Control)

‘Organisational culture’ is defined as a ‘pattern of shared and stable beliefs and values that are developed within a company over time’ (Gordon and Di Tomaso, 1992, p. 784). Baird et al. (2004) examined the impact of three organisational culture dimensions: innovation, outcome orientation and tight versus loose control. ‘Outcome orientation’ is the extent to which business units emphasise action and results, have high expectations for performance and are competitive (O’Reilly et al., 1991; Baird et al., 2004). ‘Tight versus loose control’ relates to the extent to which an organisation places emphasis on the control of activities and costs (Baird et al., 2004). Baird et al. (2004) found that outcome orientation and tight versus loose control both have a strong association with the adoption of ABC.

2.5.2.6 Competition

'Competition' refers to the strength of the competing companies in a company's market (Fichman, 2000). In a study on ABC, this factor was used by Cooper (1988) to support and demonstrate the importance of adopting ABC. He maintained that a more sophisticated and accurate costing system is needed in highly competitive markets. In other words, under these conditions, competitors are more likely to take advantage of any costing errors by managers who rely on inaccurate cost information to make decisions regarding costing and pricing (Cooper 1988). Kwon and Zmud (1987), Bjørnenak (1997), Innes and Mitchell (1995), Krumwiede (1998), Malmi (1999) and Schoute (2004) all noted that organisations with more competition were more likely to adopt ABC.

2.5.2.7 Environmental Uncertainty

'Environmental uncertainty' refers to top managers' perceived inability to predict an organisation's external environment accurately (Milliken, 1987). Examples include unexpected changes in customer demand, changes in competitor action or sources of supply, unpredictable economic changes and rapidly changing technologies (Miles et al., 1978; Mintzberg, 1979; Govindarajan, 1984). Innes and Mitchell (1995), Gosselin (1997), Malmi (1997), and Chenhall and Langfield-Smith (1998) found an association between environmental uncertainty and the adoption of ABC.

2.5.2.8 Coercive Pressure (Forced Selection Perspective)

'Coercive pressures' occur when organisations experience formal or informal pressures from another organisation or entity on which they are dependent (DiMaggio and Powell, 1983). Dependent organisations are more likely to comply with decisions made by the dominant organisation (DiMaggio, 1988; Teo et al., 2003). Dominant organisations include the government, suppliers or customers, credential associations and parent corporations (DiMaggio and Powell, 1983; Teo et al., 2003). From the view of innovation adoption, Abrahamson (1991) suggested that coercive pressures could be another explanation for the adoption of innovations. Using the term 'forced selection perspective', Abrahamson (1991) stressed that organisations

adopting innovations do not have free choice when they decide to adopt or reject an innovation if they are pressured by organisations outside their own social group.

2.5.2.9 Mimetic Pressure (Fad Perspective)

'Mimetic pressures' refer to the inclination of companies to model themselves after other organisations within their environment that they deem to be successful and legitimate over a period of time (DiMaggio and Powell, 1983). The imitation of the actions of other similar organisations is a result of uncertain environments and unclear organisational objectives (DiMaggio and Powell, 1983). When an organisation has to make decision with uncertain solutions, decision makers can mimic the actions of other organisations to save on search costs, to minimise experimentation costs or to avoid risks (Teo et al., 2003). Using the term 'fad perspective', Abrahamson (1991) stressed that the adoption of innovation can occur when organisations within a group imitate other organisations within that group. Thus, in order to appear legitimate and conform to the norms under conditions of uncertainty, the organisation imitates other organisations that have already adopted certain technologies.

2.5.2.10 Normative Pressure

Normative pressures are present as a consequence of professionalisation within certain organisational fields (DiMaggio and Powell, 1983). Through different types of relational channels among the members of a professional network, the norms and values of that network are shared. As a result, organisations within a particular profession are more likely to exhibit homogeneous traits and characteristics. Normative relational channels include relational channels with suppliers, customers, organisational associations, training institutions, workshops and other organisations (Burt, 1982; Galaskiewicz and Wasserman, 1989). Therefore, in an innovation adoption context, normative pressures are related to the adoption of innovation (Teo et al., 2003).

2.5.2.11 Importance of Cost Information

According to Anderson (1995), the need in organisations for accurate cost information for strategic decision making and cost reduction can influence the adoption of ABC. Krumwiede (1998) also found a positive relationship between perceived cost information importance and ABC adoption. If cost information is considered an integral part of the decision-making process (as accurate product pricing is needed in competitive markets or for cost-cutting and pricing), decision makers will seek to adopt cost management innovations that meet those needs (Krumwiede 1998). The following table (Table 2.4) presents a summary of the various factors that emerged from the literature review.

Table 2.4: Diffusion factors of ABC from the organisation innovation literature in accounting

Factors	Literature
1. Relative advantage	Askarany et al. (2007), Krumwiede (1998), Anderson and Young (1999), Alsayed (2010)
2. Compatibility	Askarany et al. (2007), Krumwiede (1998), Bjørnenak (1997), Alsayed (2010)
3. Complexity (ease of use)	Askarany et al. (2007), Alsayed (2010)
4. Trialability	Askarany et al. (2007), Alsayed (2010)
5. Observability	Askarany et al. (2007), Alsayed (2010)
6. Cost	Tornatzky and Klein (1982), Alsayed (2010)
7. Size	Armitage and Nicholson (1993), Innes and Mitchell (1995), Bjørnenak (1997), Gosselin (1997), Krumwiede (1998), Innes et al. (2000), Brown and Pierce (2004), Alsayed, (2010)
8. Top management support	Brown et al. (2004), Krumwiede (1998), Malmi (1997), Anderson and Young (1999), Alsayed (2010)
9. Champion support	Brown et al. (2004), Krumwiede (1998), Malmi (1997), Anderson and Young (1999), Alsayed (2010)
10. Culture (competitive/tight control)	Baird et al. (2004), Alsayed (2010)
11. Competition	Innes and Mitchell (1995), Bjørnenak (1997), Krumwiede (1998), Malmi (1999)
12. Environmental uncertainty	Innes and Mitchell (1995), Gosselin (1997), Malmi (1997), Chenhall and Langfield-Smith (1998)
13. Coercive pressure (forced selection perspective)	Abrahamson (1991), DiMaggio and Powell (1983), Alsayed (2010)
14. Mimetic pressure (fad perspective)	Abrahamson (1991), Malmi (1999), DiMaggio and Powell (1983), Alsayed (2010)
15. Normative pressure	Teo et al. (2003), Alsayed, (2010)
16. Importance of cost information	Krumwiede (1998), Anderson (1995), Alsayed (2010)

2.5.2.12 Limitations of Previous OI Studies

The OI studies discussed above are all related to the diffusion of ABC. Since the advent of TDABC, which was developed to overcome the ABC paradox, there have been few OI studies on TDABC. This study conducts OI research on the diffusion of TDABC that has not been performed in previous studies. It aims to determine whether the previously revealed diffusion factors of ABC also influence the diffusion of TDABC, or whether there unique factors affect TDABC diffusion. In addition, most of the existing OI studies were conducted in the manufacturing industry. However, in this study, OI research is conducted both in the manufacturing industry, where the spread of ABC achieved only low levels, and in industries where ABC and TDABC spread well.

2.5.3 PT Studies on ABC

The PT of organisational innovation research investigates the nature of the innovation process. The focus is on how and why innovations emerge, develop, grow and possibly terminate, and the unit of analysis of PT research is the innovation process itself (Rogers, 2003). Wolfe (1994) confirmed two generations of PT research. The first generation is called ‘stage model research’ and conceptualises ‘innovation’ as a series of stages that evolve over time. The goal is to determine whether the innovation process involves identifiable stages and, if so, what they are and what their sequence is. The second generation of PT research tries to provide an in-depth description of the conditions that determine an organisation’s innovation processes. Researchers have reported several factors that affect innovation processes (Van de Ven and Poole, 1990). Previous ABC studies have adopted a unitary sequence model based on a six-step information technology (IT) innovation model (i.e., initiation, adoption, adaptation, acceptance, routinisation and infusion) by Cooper and Zmud (1990). Cooper and Zmud’s (1990) six-stage model was adapted to examine the adoption and implementation of ABC systems in studies by Anderson (1995), Krumwiede (1998) and Brown et al. (2004).

Anderson (1995) adopted Kwon and Zmud’s (1987) factor-stage model of IT implementation to create a model consisting of two elements: a stage model that

contains six sequential stages (i.e., initiation, adoption, adaptation, acceptance, routinisation and infusion) and five groups of contextual variables that influence a successful transition between the suggested stages. These groups are as follows: the characteristics of individuals associated with implementation, organisational factors, technological factors, the task to which the technology is applied and environmental factors. His study identified that different diffusion factors influenced different implementation stages.

Al-Sayed and Dugdale (2016) developed a generic stage model that consists of three major phases: initiation, implementation and integration. The first phase, 'initiation', includes awareness and interest. The second phase, 'implementation', includes the set-up and implementation. The third phase, 'integration', includes the ramp-up, routinisation and infusion (Figure 2.4).

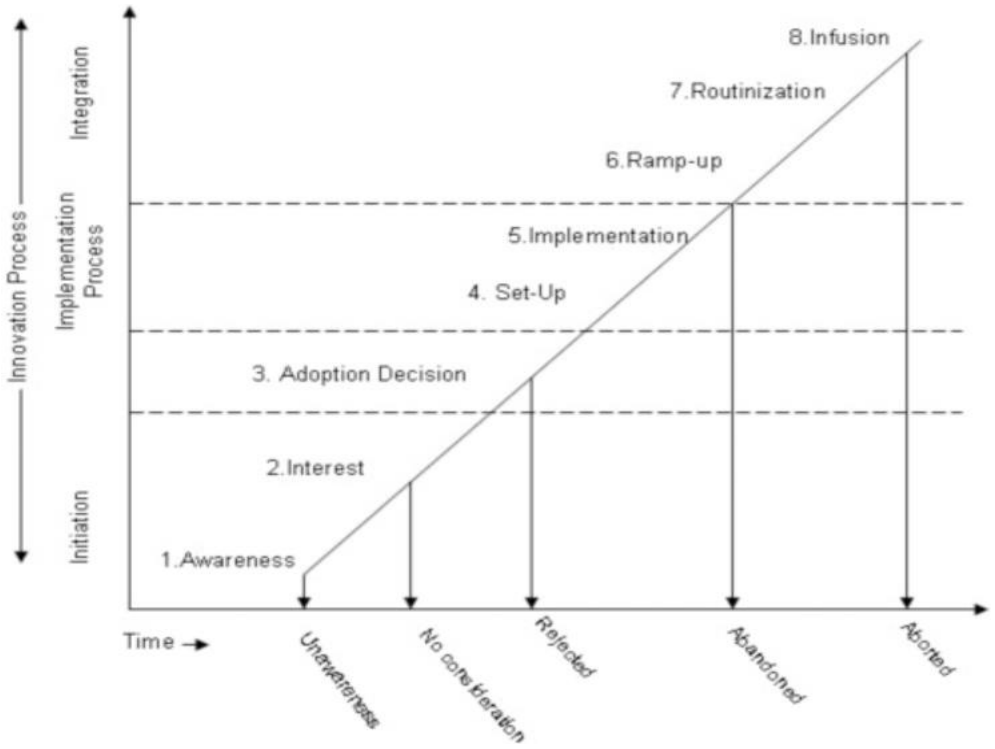

Figure 2.4: Al-Sayed and Dugdale's (2016) generic stage model

The PT studies reviewed above are studies related to the spread of ABC. Al-Sayed and Dugdale (2016) expanded the concept of ABC to ABI and analysed it. However, no PT study has focussed on TDABC. This study provides a PT-based analysis of the diffusion of TDABC, which is not covered in previous studies. This study adopts

the three major phases (i.e., initiation, implementation and integration) of Al-Sayed and Dugdale's (2016) generic stage model to analyse case studies. In addition, most of the existing studies were conducted in the manufacturing industry. However, in this study, PT research is conducted in the manufacturing industry and in industries where TDABC spread well.

2.6 Limitations of Previous Work

There are some research gaps in existing studies on the diffusion of ABC and TDABC introduced In the above sections.

A gap exists in the existing research in terms of the macro research—that is, in the DI research. First, after Gosselin's (2006) study, there has been no study of the patterns of ABC and TDABC diffusion. As such, there is no research on the TDABC diffusion patterns, as it only emerged in 2004. The first objective of this study therefore attempts to provide a detailed analysis of ABC and TDABC publications to identify the diffusion pattern of ABC and TDABC.

Another gap exists in the existing studies in terms of the micro research—that is, in the OI and PT research. Since the advent of TDABC, it has been the subject of a limited number of studies. In addition, most of the existing studies have been conducted in the manufacturing industry. There are relatively few comprehensive diffusion studies in extended fields and industries. However, this study conducts research in the manufacturing industry and in industries where ABC and TDABC have spread well. In doing so, it is possible to highlight the differences in the spread of TDABC among different industries. In particular, the characteristics of TDABC's diffusion can be revealed by examining the characteristics of the industries in which TDABC is proliferating. This is the second objective of this study.

According to Wolfe (1994) and Rogers (2003), other diffusion studies have placed too much emphasis on the demand side of diffusion. In other words, there are studies on diffusion factors and processes from the demand perspective but few studies from the supply perspective. In this study, the supply side, the demand side and the dynamics between the two are studied together in relation to TDABC to examine the process of TDABC diffusion.

These identified gaps help to inform the development of the theoretical framework of this research, which is explained in section 3.6.

2.7 ABC and TDABC in the South Korean Context

According to Lee (2003), since the 1990s, the number of South Korean companies adopting ABC has been small, but interest in ABC has been increasing. During this period, various studies of ABC were conducted in South Korea. There were studies on the introduction of ABC, the determinants of ABC introduction, satisfaction with the use of ABC and the financial performance of ABC (e.g., Park and Kim, 1995; Lee et al., 1997; Lee, 1998; Wang, 2000). However, in the 2000s, the number of companies in South Korea that had implemented ABC was lower than expected (Lee, 2003). The publication of articles on ABC in business journals has also declined significantly. Many companies abandoned ABC after introducing it (Lee, 2003).

According to Lee (2003), ABC was mainly introduced in manufacturing initially, and it then gradually expanded to entities in the service industry, such as hospitals, banks and distribution companies. Since the 2000s, papers on ABC and TDABC have been published in South Korea primarily in relation to the service industry. For example, Ryu (2005) analysed whether ABC is effective in the decision making of information users as a cost management information system in the banking industry, despite having been introduced in the manufacturing industry. Yang et al. (2006) showed that it is possible to calculate and manage costs according to the causes of logistics by applying the ABC system to the logistics industry. Park (2019) explained the conditions for ABC's success in the service industry and described the process of introducing ABC. Ahn et al. (2009) collected cost accounting data from six banks and tried to calculate cost by service using TDABC.

Most of the TDABC studies in South Korea are hospital related. There are several research publications comprising case studies on TDABC in hospitals. South Korean hospitals began to be interested in the introduction of ABC in the late 1990s (Sun, 1999). Since this time, because of increased overhead costs in hospitals, the importance of ABC in South Korean hospitals has increased, and several hospitals have begun to use ABC (Lee, 2004; Yook et al., 2019). Jung et al. (2011) provided

an example of how ABC can function effectively in hospitals with large overheads and a high complexity of work.

Kim et al. (2010) introduced ABC at a hospital in Korea. They outlined the preparations made before the start of the project, important activities when carrying out the project, design considerations and the establishment of a performance evaluation system through the use of the ABC system. Lim et al. (2011) calculated the activity cost and efficiency for nursing behaviour in hospitals when using TDABC. Through this study, they claimed that TDABC, in comparison to ABC, can provide useful and more realistic information about the efficiency of a unit's operation. Yook et al. (2019) claimed that TDABC can be effectively used to accurately compute each patient's cost. They also claimed that unused resources would be improved at all levels of management in the hospital using TDABC. Unlike in general manufacturing, papers on hospital ABC and TDABC continue to attract attention.

However, little research has been done on the proliferation of TDABC in South Korea. Most are case studies conducted in hospitals or research into practitioners' opinions. There has been no research into the context in which TDABC's characteristics have spread beyond hospitals. In addition, few studies have been conducted on the manufacturing industry in South Korea. If the macro analysis, the first step of this study, shows that the global diffusion pattern of ABC and TDABC is mainly in hospitals—as seems to be the case in South Korea—then an understanding of the difference between the spread of TDABC in manufacturing and in hospitals can be gained.

2.8 South Korean Culture for Adopting Innovations

As mentioned in section 1.3, the cultural characteristics of South Korea are Confucianism, a large power distance and collectivism. Confucianism is grounded in values such as effort, loyalty and harmony, and emphasises standards in interpersonal relationships such as respect for the elderly, loyalty to bosses, harmonious relationships, following instructions and accepting decisions made by a boss or leader (Song and Meek, 1998; Fuhl, 2006; Kee, 2008; Lew et al., 2011). The presence of a large power distance means that the country is based on a respect

culture, while ‘collectivism’ means that people within the society are integrated into strong, cohesive in-groups that protect them throughout their lifetime in exchange for unquestioning loyalty (Hofstede, 2007). Countries with a large power distance and collectivist culture tend to have better conditions for the application and execution of ABC (Brewer, 1998).

The South Korean organisational culture is typified by the country’s strong emphasis on loyalty, harmonious relationships and obedience to the leader’s decisions, without doubting them. As such, it is considered that there are few obstacles to ABC and TDABC application and execution stemming from the organisational culture in South Korea.

Some studies have looked at how these cultural characteristics of Korea have influenced the acceptance of innovation. According to Lee et al. (2013), Confucianism and the collectivist culture of South Korea affect adoption that occurs as a result of the interaction between early adopters and future adopters. The imitation effect, which involves subjective norms and word of mouth, is present in South Korean culture, as innovation adoption tends not to be based on a self-assessment of the innovation but rather on a subjective evaluation conveyed from others who have already adopted the innovation.

In addition, in a study by Chang (2003), innovation in South Korea is more effectively disseminated when an organisation with a sufficiently high ranking (such as a large organisation) drives innovation rather than when an early-adopter organisation leads the diffusion. It was also found that South Korea’s conformity and imitation, based on the Confucian tradition, elicited collective action; as a result, once dissemination began, it occurred very quickly and effectively. Choi and Geistfeld (2004) showed that South Korean culture tends to place more importance on others’ suggestions and experiences when making decisions. Therefore, word of mouth or a referral process might be effective in the diffusion of innovation in South Korea.

There is a common feature found in these studies, which is that innovation adoption is highly influenced by external forces. Once an innovation begins to be adopted by some players, there is a greater drive for future acceptance, as adoption decisions

tend to be based on the acceptance of other early adopters (rather than on making decisions based on one's own perception alone). Adoption decisions are also influenced more significantly by the highest-ranking groups that drive innovation (that is, by reference groups). South Korean culture and its strong uncertainty avoidance further strengthens the desire to defer to reference groups. In other words, based on the characteristics of South Korean culture, a main factor influencing the acceptance of innovation is the existence of a reference group that has previously accepted the innovation.

As said in the previous section, TDABC is spreading well in the hospital industry in South Korea. Based on the country's cultural perspective, the conditions needed for diffusion to occur include having a place to share opinions and thoughts about innovations among various organisations, and having a strong organisation to lead the adoption of innovation.

In the context of South Korea's TDABC diffusion, looking at the cultural aspects of the country to see how organisations using TDABC have been motivated and influenced outside their organisations is another perspective within MAI diffusion research. It would be useful to study how the existence of a place in which companies can share opinions and thoughts about innovation affects its diffusion, as this can aid in the understanding of the diffusion of innovation.

2.9 Summary

In this chapter, an overall description of ABC and TDABC was presented, along with an overview of the existing diffusion studies on ABC and TDABC. It explained the momentum, the design and the advantages and limitations of ABC's development. Then, a description of TDABC—a countermeasure against the ABC paradox—was presented. The background, design and use advantages and limitations of TDABC were also outlined.

In addition, the existing ABC and TDABC studies were described, and several research gaps were discovered. A diffusion pattern study including an enlarged field is needed, and a diffusion study covering both the supply side and the demand side is needed. Especially in the case of TDABC, because there are few diffusion studies

of any kind, it is necessary to study the changes in the diffusion pattern after the introduction of TDABC, as well as the diffusion factors of TDABC.

The next chapter, Chapter 3, provides an explanation of the theoretical framework that is used to respond to the limitations of the existing studies that were identified here.

Chapter 3. Theoretical Framework

3.1 Introduction

This chapter describes the theoretical framework that will be employed to underpin the research objectives of this study. For the first research objective, this study adopted and expanded the systematic literature review analysis method used by Bjørnenak and Mitchell (2002) to create a new macro-analysis model. For the second research objective, TDABC's suppliers and demanders, and the dynamics between the two, are analysed. To this end, PT based on the fashion perspective (Abrahamson, 1996) is applied for the supply-side analysis, while the ABC diffusion factors revealed in the existing OI and PT research are used for the demand-side analysis. The analysis of the dynamics between suppliers and demanders is based on dynamics theory (Ax and Bjørnenak, 2007). Namely, the new model for micro analysis was obtained by integrating process model in supply side with a model comprising multiple groups of the factors that influence the adoption and implementation in demand side, and dynamics between the supply and demand sides. Integrating these three developed model for micro analysis produced a whole view framework that can be used to gain better understanding of the TDABC diffusion.

3.2 Need to Adopt Macro- and Micro-Level Analyses for This Research

As explained in the section 1.1.2, research into the diffusion of innovation can be divided into the DI, OI and PT approaches. However, most diffusion studies employ only the DI approach, via surveys, or only the OI and PT approaches to determine the diffusion and success factors from the demand side (e.g., Anderson, 1995; Malmi, 1999; Ax and Bjørnenak, 2007; Leftesi, 2008; Alsayed, 2010; Nassar et al., 2011). Other studies have tended to separate the DI and OI/PT approaches, selecting specific industries or companies to focus on in advance of the study (e.g., Lukka and Granlund, 1996; Malami, 1996).

Wolfe (1994) suggested that using multiple theoretical approaches in innovation research can allow for the combination of different perspectives to better understand innovation processes. The adoption of a single theoretical perspective can limit the

scope of the investigation in each of the three innovation research streams. However, most research has used only the micro or macro analysis of ABC diffusion. Additional micro analyses of the results of the macro analyses were not done together, and each study was shown to be disconnected. However this study's approach can be meaningful because for OI and PT approaches, it selects industries that are subject to follow up after DI approach.

In addition, not many studies have used an approach that focuses on the supply side of ABC or one that considers both supply and demand relationships. The classic DI literature has been criticised for being dominated by a demand perspective, which assumes that rational adopters make technically efficient choices (Rogers, 2003). Some researchers (e.g., Brown, 1981; Clark, 1984; Clark and Staunton, 1989; Bjørnenak, 1997) have advocated the inclusion of both the demand and supply perspectives in the explanation of innovation diffusion. Clarke et al. (1999) argued that while most MAI studies take the demand perspective, the supply perspective is important because it provides an alternative description of the implementation of MAI. Similarly, Bjørnenak (1997, p. 15) suggested that, 'The results also indicate that the rather narrow demand perspective explored did not fully explain the diffusion process. Thus, other perspectives are needed to better understand the diffusion process. Taking the supply-side into account seems to be promising'. According to Bjørnenak (1997), the majority of adopters of ABC received assistance from entities on the supply side, such as consultants, indicating that they played an essential role in these diffusion processes.

Clark (1984) maintained that when the potential adopters of an innovation have unequal access to an innovation, supply factors might be considered as important influencing factors in the diffusion process of that innovation. Brown (1981) explained that the supply side of influences the rate and pattern of diffusion. He focussed on how innovations could be diffused by propagators who supply innovations. Gosselin (2006) argued that supply-side entities such as consultants have a strong influence on the diffusion of ABC, and consultants usually accelerate the diffusion of an innovation. As a result of past studies focussing on only the supply or demand side, an analysis of diffusion that combines the two sides is meaningful in explaining the

diffusion of innovation. For this reason, this study considers an approach that encompasses macro and micro frameworks, the latter of which includes both the supply and demand sides altogether. From the next chapter, the explanation of the theoretical framework for macro and micro analyses follow.

3.3 Macro Analysis employing a Systematic Literature Review

Bjørnenak and Mitchell (2002) called for a detailed systematic analysis of the ABC journal literature to understand the evolution of ABC, as they regard journals as an important means by which ABC knowledge is spread in order to expand and extend its audience. They argued that the accumulated journal literature is a distinct and important chronicle of evidence of the phenomenon of ABC. They studied how ABC began and developed through a systematic literature review of ABC papers from 1987 to 2000. A total of 17 accounting journals were selected from UK and US journals and used as data. More specifically, two practitioner journals and five academic journals from the UK were selected, and three practitioner journals and seven academic journals from the US were selected (see Table 3.1).

Table 3.1: Accounting journals used in Bjørnenak and Mitchell's (2000, p. 488) study

	UK	*USA*
Applied/Practitioner journals		
(a) Specialist management accounting	*Management Accounting*	*Management Accounting*
(b) General	*Accountancy*	*Journal of Cost Management*
		Journal of Accountancy
Academic research journals		
(a) Specialist management accounting	*Management Accounting Research*	*Journal of Management Accounting Research*
(b) General	*Accounting and Business Research*	*Accounting Horizons*
	Accounting, Organizations and Society	*Accounting Review*
	British Accounting Review	*Critical Perspectives in Accounting*
	Journal of Business Finance and Accounting	*Journal of Accounting Research*
		Journal of Accounting and Economics
		Journal of Accounting Literature

ABC papers were collected from these 17 selected accounting journals and analysed in terms of five aspects: (1) the volume and distribution of the journal, (2) authorship, (3) the research method employed, (4) the focus of the work and (5) the content and role of the article in ABC development (see Table 3.2).

Table 3.2: Bjørnenak and Mitchell's (2002) five-dimensional systematic review

Dimension	Analysis Objectives
Volume	• Measuring the extent of the publishing activity and relative importance of the specific topic area • Measuring the significance devoted to the particular area • Revealing the duration of the topic's importance and the chronological pattern by which the topic developed
Authorship	• Revealing who created the extant body of knowledge to provide significant indications of where interest levels are greatest on the topic
Research method	• Illustrating how different techniques may be used over time
Focus	• Illustrating the linkages with other management techniques
Content	• Presenting the message contained in each article and the nature of the role it played in the development of ABC

Meanwhile, Gosselin (2006) reviewed publications related to ABC from 1988 to 2004, investigating the changes in ABC over time with a focus on the results of ABC diffusion studies; they also assessed ABC's overall impact on accounting. His paper explained the characteristics of the published articles in each period—with a specific focus on diffusion articles—and summarised the findings of the major articles. He used the phrase 'activity-based costing' as a keyword to search abstract data from the ABI/INFORM collection on ProQuest. While Bjørnenak and Mitchell (2002) obtained their data from only accounting journals, Gosselin (2006) used all relevant data, regardless of the journal field.

In Gosselin's (2006) study, although the spread of ABC in the non-business field over time has not been analysed in detail, he briefly refers to ABC studies that are spreading to several industries and published in other industries' journals. Along with that, he describes the journal types as academic journals and practitioner journals. In particular, while explaining the diffusion of ABC among industries, he mentioned that many practitioner journals in some industries publish several ABC papers. Also, even though TDABC is mentioned in his study, the data used in the study were data until 2004, so studies on TDABC have not been described in detail. For this reason, his

explanation for the diffusion of ABC did not cover any diffusion after TDABC, and TDABC diffusion patterns and features were not mentioned.

In addition to the above aspects of analysis, the ratings of Association of Business Schools (ABS) journals (from the Chartered ABS Academic Journal Guide) can be used to analyse ABC and TDABC diffusion development. These ratings inform the overall ratings of each category, and this may provide an indicative measure of the academic interest at the time. The ABS ratings may also be used as a measure of the degree of impact and research quality (Gilbert, 1977; Hussain, 2010). In addition, by knowing the countries in which empirical ABC research has actually been conducted, the physical chronological spread of ABC and TDABC from the US and UK—where ABC was first developed—can be examined.

Figure 3.1 represents the theoretical framework of the macro analysis, which is based on the DI approach. This can be used to examine the ABC paradox and identify the diffusion pattern of ABC and TDABC. As a result, more insights can be revealed in areas including the specific fields that are more prone to spreading, which players drive the diffusion of ABC and TDABC, how these players lead the diffusion and the characteristics of and differences between the ABC and TDABC diffusion patterns.

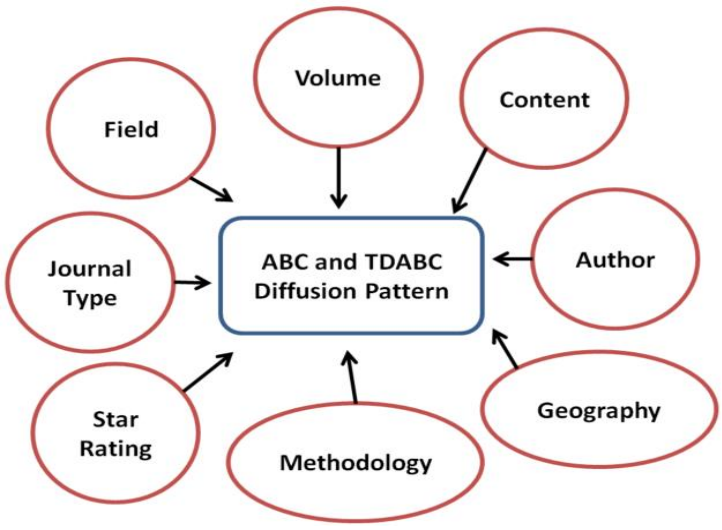

Figure 3.1: Theoretical framework of the macro analysis

3.4 Supply and Demand Side Analyses for the Micro Analysis

Jung and Kieser (2012) claimed that fashion is measured through the publications or citations that refer to it. Carmona and Gutiérrez (2003) reviewed the pattern of ABC publication and argued that ABC is a management fashion. According to Abrahamson (1996, p. 257) management fashion is ‘a relatively transitory collective belief, disseminated by management fashion setters, that a management technique leads to rational management progress’. Many other scholars have also referred to ABC as a management fashion in their research (e.g., Malmi, 1999; Bjørnenak and Mitchell, 2002; Nassar et al., 2011). In Malmi’s (1999) study, the diffusion factors of ABC were explained from the fashion perspective. Many fashion-related motives were identified as being influential to ABC diffusion. According to Nassar et al. (2011, p. 194), many companies implemented ABC because it was fashionable to do so: ‘ABC at that time was style (fashion), so everybody, every managers and each company in our industry jump quickly to look it or even use it’. Bjørnenak and Mitchell (2002), too, considered ABC to be a management fashion.

Many authors have argued that those who participate in management fashion trends are acting in an arena (Kieser, 1997; Faust, 2002; Clark, 2004; Green, 2004; Parush, 2008). These actors are consultants, management scholars, editors of management magazines, seminar organisers and managers (Abrahamson, 1996). All these actors, except managers, are united for their goal to increase their profit by increasing the discourse in the arena (Jung and Kieser, 2012). The manager is the fashion follower (representing the demand side), while all the remaining actors are the fashion setters (representing the supply side).

According to Ax and Bjørnenak (2007), management fashion setters are management gurus, consultancy firms, business schools and others who pursue purposeful and active plans for the diffusion of management fashions. Other theorists claimed that consultants, business schools and the business mass media form fashion-setting networks (Mintzberg, 1979; Kimberly, 1981; DiMaggio and Powell, 1983). Abrahamson (1986) suggested that business schools and consulting firms dominate in the selection of fashionable administrative models. As such,

academics and consultants are important actors, as they are the fashion setters (i.e., the supply side) in the diffusion of innovation.

The roles of consultants and academics in the diffusion of innovation are different. Consultants are considered by many authors to be the creators of the majority of management fashions (e.g., Abrahamson, 1996; Fincham and Evans, 1999; Faust, 2002; Clark, 2004; David and Strang, 2006; Jung and Kieser, 2012). Consultants have the goal of increasing their profit by increasing the discourse and drawing in more participants (Jung and Kieser, 2012). They facilitate the discourse about fashion trends by explaining the basic goals, principles and advantages of a management concept, and marketing it in consulting projects.

According to Jung and Kieser (2012), academics can be divided into two types, depending on how they participate in diffusion. First, academic consultants (such as Porter, Kaplan and Norton) are academics whose role is to create management fashions, as do consultants. Some authors have noted that, in contrast to academic consultants, general academics are not typically suppliers of management fashions (Adler and Beer, 2008; Werr and Greiner, 2008). Academics follow a different stream of logic than do consultants, as they reflect on management fashions and transfer them into the scholarly discourse (Jung and Kieser, 2012). Communication in the management academic arena can stimulate communication of management fashions (Astley and Zammuto, 1992). Although some academics attempt to hold a neutral or sceptical stance, scholars do tend to contribute to the legitimisation of the management fashions about which they communicate; as such, consultants sometimes regard academics as legitimators (Jung and Kieser, 2012). Therefore, consultants and academic consultants can be seen as fulfilling the role of directly supplying management fashions, while general academic indirectly supply them.

Meanwhile, practitioners—namely, fashion followers and those on the demand side—also play an important role in diffusion. Their importance is that they are the adopters of management fashions (Ax and Bjørnenak, 2007). However, practitioners can be the creators of some management fashions, too (Clark, 2004). For example, total quality management (TQM), benchmarking and Six Sigma were developed by practitioners rather than consultants or academics (Camp, 1995; Cole, 1999; Pande

et al., 2000). Of course, even in these cases, the discourse seems to be fed mainly by consultants (Jung and Kieser, 2012). Also, as demanders of management fashions, practitioners can actively change management concepts with fashion setters to make the innovation more attractive to adopt (Ax and Bjørnenak, 2005).

According to Jung and Kieser (2012), in the diffusion of management fashions, consultants and managers are seen as key actors:

> Consultants generate fashions because fashions create demand for their services. With fashions, they simultaneously create certainty and uncertainty with clients. Uncertain clients often feel dependent on consultants. Here, a basic motivation of managers to follow fashions is that they can initiate innovations without having to take the risks that are usually connected to innovations. (p. 334)

3.4.1 Fashion Theory for Analysing the Supply of ABC and TDABC

Various academics have claimed that a variety of organisations and individuals populate the management fashion–setting community: management consultants, business schools and business press organisations (Mintzberg, 1979; Kimberly, 1981; DiMaggio and Powell, 1983; Hirsch, 1986; Abrahamson, 1991; Meyer, 1992; Scott and Meyer, 1994), as well as academic gurus, consultant gurus and hero managers (Huczynski, 2012). Abrahamson (1996) developed a four-fold management fashion–setting process model (i.e., creation, selection, processing and dissemination). Figure 3.2 depicts the creation, selection, processing and dissemination of management fashions by management fashion setters.

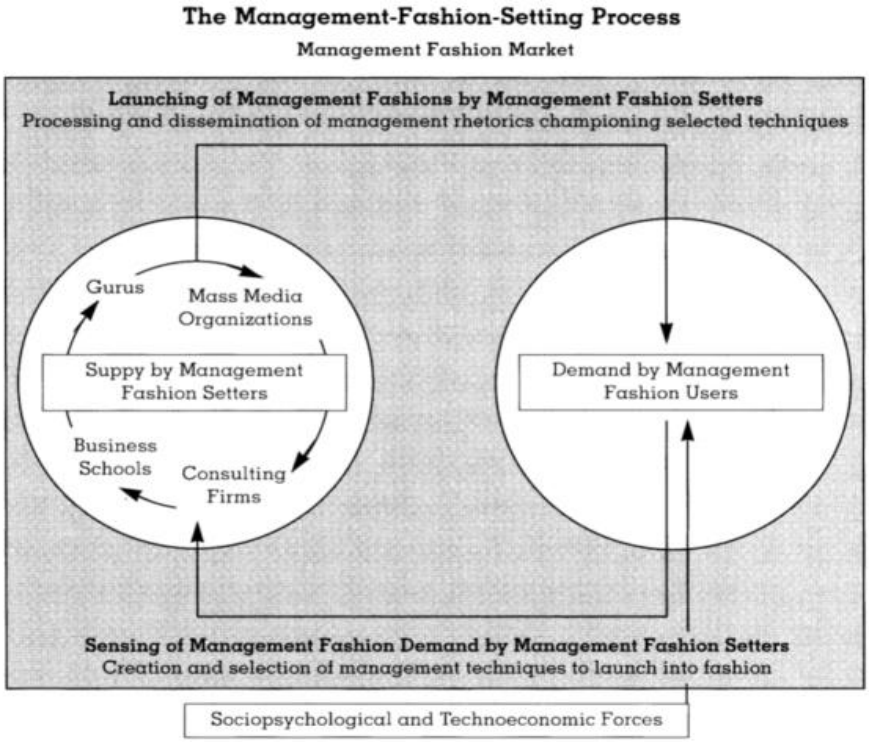

Figure 3.2: Abrahamson's (1996, p. 265) fashion-setting process

The arrow from the right bubble indicates that at the creation stage, fashion setters sense the initial preferences driving fashion demand and creating many management techniques. At the selection stage, they select a technique that they believe will meet this need. The arrow from the left bubble represents the processing stage, in which fashion setters advocate rhetoric championing the management techniques they selected. At the dissemination stage, they use this rhetoric to bring management techniques into the management fashion market (Abrahamson, 1996). These four stages—creation, selection, processing and dissemination—are described in greater detail in the following paragraphs.

Creation: Innovations are significant departures from the state of the art in management at the time they first appear (Kimberly, 1981). According to this definition, to qualify as an innovative management technique, an innovation does not need to be an improvement of the state of the art, nor it does need to be more technically efficient; the only thing it needs to be is significantly different from the existing techniques (Abrahamson, 1996). Management fashion setters share a common belief that certain management techniques are both innovations and

improvements relative to the state of the art. In such cases, fashion creation involves the invention of a management innovation that is also an improvement of the state of the art in management (Abrahamson, 1996).

Selection: Fashion setters can select the techniques they want to launch into fashion from not only a variety of new, recently created management techniques but also from old, forgotten management techniques. There are two distinct selection processes in operation, depending on whether it is managers or fashion setters who create management innovations (Abrahamson, 1996). One selection process is that management innovations may be invented by managers and absorbed into the management fashion–setting community by the fashion setters. In the second selection process, it is the fashion setters who create management innovations or revive old and forgotten management techniques. Fashion followers can then select from among the techniques that fashion setters have invented or rediscovered. Other management fashion setters may then imitate these selection decisions (Abrahamson, 1996).

Processing: In the processing stage, fashion setters elaborate on and develop a rhetoric that can convince fashion followers that a management technique is both rational and at the forefront of management progress (Abrahamson, 1996, p. 267). The rhetoric must explain that the technique makes managers pursue meaningful managerial goals in the most efficient fashion. Therefore, it must express why it is essential for managers to pursue certain organisational goals. Some rhetoric focusses on the organisational performance gaps that managers need to narrow in order to highlight why narrowing such gaps is an effective managerial goal. They attempt to frighten managers by making threats of managerial failure from ignoring a performance gap, and to attract them with great opportunities for managerial success (Abrahamson, 1996). Also, the rhetoric must express why this technique offers the most efficient means to achieve these goals. This kind of rhetoric includes stories about how companies have increased their performance by adopting the technique—justifying the efficiency of these techniques in narrowing performance gaps for all companies—and evidence of how these techniques cause performance gaps to narrow in a way that is superior to existing techniques.

Dissemination: In this stage, the rhetoric developed is transferred back to the managerial audience. A range of fashion setters are involved in this process, and there are a number of channels that fashion setters use to communicate their rhetoric to managers. For instance, mass-media publications have broad audiences, giving them great potential to generate widespread interest in progressive management techniques. A variety of publications may contribute directly or indirectly to the dissemination of management fashions (Dunbar, 1983; Barley et al., 1988; Beyer, 1992). The platforms that can be used for dissemination include publications, books, newsletters, articles in journals, workshops, formal meetings, management magazines, advertisements and presentations at conferences (Ax and Bjørnenak, 2007).

In this section, the management fashion–setting process was explained from the fashion setters' perspective. In the next section, the diffusion factors of fashion followers will be explained.

3.4.2 Factors Influencing the Adoption and Implementation of Innovations

In section 2.5.2 in this study, several diffusion factors were explained. All these diffusion factors were confirmed in the existing ABC literature as significant factors for ABC diffusion (see section 2.5.2*)*. Each of these factors can be grouped into four blocks, depending on the nature of the factor. The four blocks (Alsayed, 2010) tying the ABC-spreading elements are the perceived attributes of the innovation, the characteristics of adopters, the characteristics of the environment and the pressures and needs.

The diffusion factors in Table 3.3 are the diffusion factors of ABC. This study examines whether the below diffusion factors of ABC also affect the diffusion of TDABC. By examining factors related to the characteristics of innovation, the characteristics of adopters, the characteristics of the external environment and the pressures and needs together, various aspects of the diffusion factors surrounding TDABC can be identified. In addition, it helps in identifying whether any new factors are influencing the spread of TDABC other than the existing diffusion factors.

Table 3.3: The four blocks of diffusion factors

Factors	
1. Perceived Attributes of Innovation	**2. Characteristics of Adopters**
I. Relative advantage	I. Size
II. Compatibility	II. Top management support
III. Complexity (ease of use)	III. Champion support
IV. Trialability	IV. Culture (competitive / tight control)
V. Observability	**4. Pressures and Needs**
VI. Cost	I. Coercive pressure (forced selection perspective)
3. Characteristics of the Environment	I. Mimetic pressure (fad perspective)
I. Competition	II. Normative pressure
II. Environmental uncertainty	III. Importance of cost information

3.4.3 Dynamics of Diffusion

In the past, when MAI has spread, it has been thought to remain unchanged, in a separate, independent, fixed form (Ax and Bjørnenak, 2007). However, this view might be challenged as being too simplistic. According to Ax and Bjørnenak (2007), adopting a dynamic perspective on the process of diffusion is more realistic. They argued that dynamic perspective view considers both innovation suppliers and adopters as active group of participants involved in changing the contents and usage of innovations when innovations diffuse. This perspective assumes that innovations are not objects with fixed and definite contents, so changes in the process can occur. According to Benders and van Veen (2001), administrative innovations are characterised by a certain degree of ambiguity, which allows for different interpretations and uses of innovations and makes it possible for suppliers and adopters to create their own versions of the innovations. They can opportunistically and eclectically select and interpret various elements of innovations.

Ax and Bjørnenak (2007) developed a conceptual framework for a dynamic perspective of the diffusion of MAIs. They looked MAIs using a model consisting of two elements: design characteristics and rhetorical elements. ‘Design characteristics’ refer to the inflexible elements of the innovation, while ‘rhetorical elements’ refer to the flexible side. More specifically, design characteristics describe the technical specification of innovations. All innovations have design elements, or technical aspects. For example, the design elements of ABC are cost objects, activity hierarchies and cost drivers (Ax and Bjørnenak, 2007, p. 371). Rhetorical elements describe the alleged benefits of innovations. Rhetorical elements persuade a population of managers about the advantages of innovations to their companies. Ax and Bjørnenak (2007) maintained that in order to persuade managers, it is necessary that an innovation be the most rational and up-to-date technique for managing organisations. Rhetorical elements can include the innovation’s benefits compared with current techniques, the range of problems that the innovation can solve, the range of usage and other successful stories of companies who have implemented it. The most important aspect of this model is that design characteristics and rhetorical elements can be changed, added and combined.

In the dynamic perspective of the diffusion of MAIs, the interaction between the supply side and demand side of innovation diffusion processes plays an important role. Here, innovations are considered as flexible and unfixed solutions. In order to make the innovations more attractive and useful, both potential adopters and suppliers can change the design elements and rhetorical elements of innovations according to their own purposes.

3.4.4 Stages of the Diffusion Process

In this study, Al-Sayed and Dugdale’s (2016) three-stage model of diffusion is used to identify the process and story of diffusion. First, the researcher examines the process of the supply side and how the interest and awareness of the demand side are gained at the initiation stage. Second, the factors affecting application (i.e., set up and implementation) are identified in the implementation stage. Last, the dynamics between the supply side and the demand side in the implementation stage and integration stage (i.e., the point of use after implementation) are identified.

The reason why Al-Sayed and Dugdale's (2016) model was adopted for the micro analysis of this study is that it is a generic model that was created by integrating various diffusion stage models from previous diffusion studies (e.g., Anderson, 1995; Booth and Giacobbe, 1998; Krumwiede, 1998; Brown et al., 2004). Because using too many diffusion stages (as occurred in other researches) increases the complexity due to segmentation, their three-stage model with distinct characteristics between the stages fits well with the analysis flow of the micro analysis of this study. The focus of the micro analysis begins with the process by which a supplier of innovation selects TDABC and introduces it to demanders (i.e., the initiation stage). After that, it analyses the factors that influence the adoption/implementation of the innovation (i.e., the implementation stage). Last, a dynamics analysis is performed (i.e., the implementation and integration stages).

The following section describes the theoretical framework of the micro analysis incorporating fashion PT, the diffusion factors of ABC and dynamic theory.

3.4.5 Integrated Theoretical Framework for Micro Analysis

Figure 3.3 represents the theoretical framework of the micro analysis based on fashion PT, the diffusion factors of ABC and dynamic theory. This can be used in determining how and why ABC or TDABC is spreading well in a specific industry, if the macro research identifies a specific industry in which this is the case. The theoretical framework analyses the differences in the diffusion between specific industries in which ABC or TDABC is spreading well and those of general manufacturing, from the perspective of suppliers, demanders and dynamics. It identifies whether the existing ABC diffusion factors affect the diffusion of TDABC and whether other factors uniquely affect TDABC diffusion. It also examines how each process and the dynamics between TDABC suppliers and demanders affect the diffusion of TDABC.

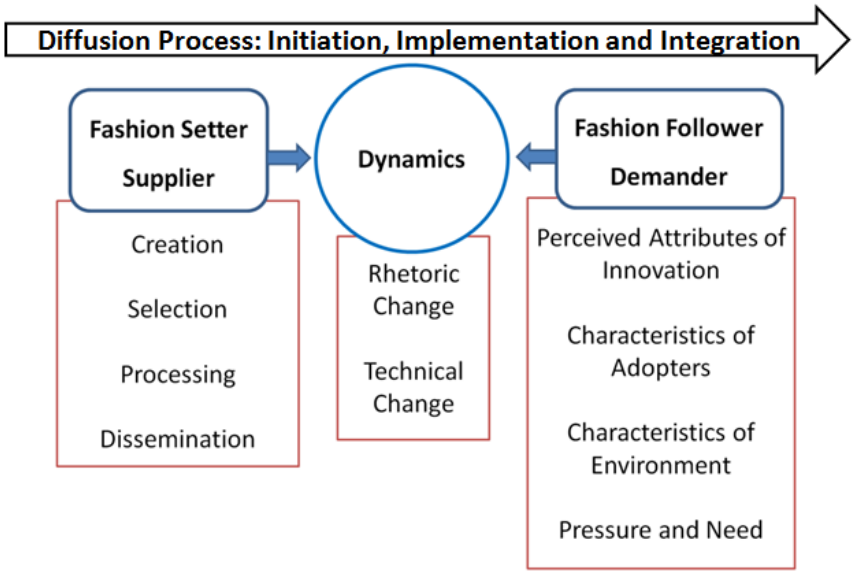

Figure 3.3: Theoretical framework of the micro analysis

3.6 The Overall Framework for this Study

According to Saunders et al. (2016), research capable of establishing hypotheses is research using data collection to evaluate propositions related to an existing theory. In the existing theory, there is an answer to a phenomenon, and it is to disprove or criticise/falsify it (Watts and Zimmerman, 1986). The purpose of this study is to investigate the diffusion patterns of ABC/TDABC and how and why these differences in diffusion occur. For this, the theories described above are used to guide the ways in which the phenomenon is observed and underlying reasons and associated process are interpreted, rather than testing a construct or theory.

In this study, DI research is used to inform the diffusion pattern in the macro analysis, and in the micro analysis, fashion theory is used for supply-side research; OI and PT research is used for demand-side research; and dynamics theory is used to study the dynamics between the supply and demand sides (Figure 3.4).

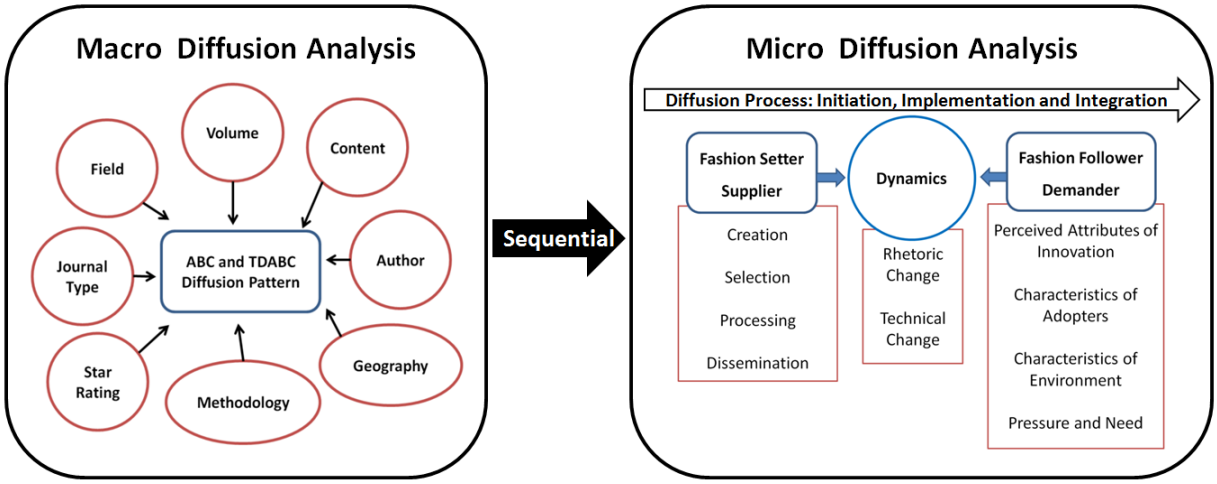

Figure 3.4: Overall theoretical framework of this study

For the macro analysis, a systematic literature analysis is performed, followed by multiple case study analyses for the micro analysis. First, the researcher compares and analyses ABC and TDABC diffusion patterns from a macro perspective. The patterns of ABC and TDABC diffusion in journal articles are analysed, including how they are different, who the major players are in the diffusion process and in which fields they have spread. This allows us to see the spread of ABC/TDABC from an integrated macro perspective and to identify whether the ABC paradox does exist. To do this, the researcher uses a systematic literature analysis of journal articles as DI research, which studies the diffusion pattern of innovations over time and space. As a result of the pattern analysis, the diffusion patterns of ABC and TDABC are examined.

Second, based on the results of the macro pattern analysis, the researcher conducts micro research on ABI diffusion through field work in an industry in which ABI is spreading well and one in which ABI is not spreading well. To this end, multiple case studies of the players influencing the spread of TDABC in the two industries are conducted to see why and how TDABC diffusion differs in the two industries. The multiple case studies may help in investigating the research objective of identifying how and why TDABC diffused as it has. Thus, two of the innovation research approaches, OI and PT, are used to identify which factors affect innovations. For this, the researcher analyses three major aspects. An analysis of the supply side (i.e., fashion setters) is first conducted. The supply side includes consultants,

management scholars and other actors whose goal is to increase their profit by increasing the discourse (Mintzberg, 1979; Kimberly, 1981; DiMaggio and Powell, 1983; Abrahamson, 1991; Ax and Bjørnenak, 2007; Jung and Kieser, 2012). This analysis will involve exploring how suppliers play a role in the spread of TDABC. It is confirmed through which fashion-setting process fashion setters such as consultants and professors spread TDABC. The researcher also analyses why and how fashion setters select specific industries to diffuse TDABC.

Next, an analysis of the demand side (i.e., fashion followers) is conducted. The demand side includes practitioners such as managers of companies (Ax and Bjørnenak, 2007; Jung and Kieser, 2012). The researcher explores whether the diffusion factors found in ABC can be applied to the context of TDABC. In addition, the researcher attempts to identify any diffusion factors that are unique to TDABC and how these factors are relevant to organisational conditions. Third, an analysis is conducted of the dynamics between innovation suppliers and demanders. In the TDABC diffusion process, the researcher examines what dynamics the suppliers and demanders engage in, how their interests and practical goals have been reflected in the dynamics process and how such dynamics have helped to spread the innovations.

Chapter 4. Research Methodology

The purpose of this chapter is to present the research design and data collection strategy. In this chapter, the main features of the methodological design of this study are illustrated.

4.1 The Overall Methodological Design

According to Saunders et al. (2016), the choice of research methods and data collection techniques should address the research questions and objectives. Figure 4.1 shows the possible research choices that could be made.

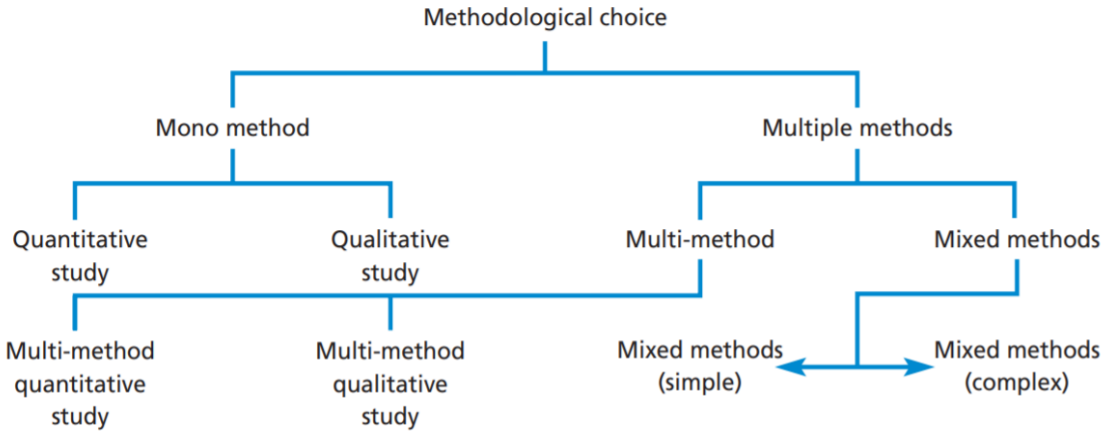

Figure 4.1: Research choices (adapted from Saunders et al., 2016, p. 167)

According to Yin (2017) and Leedy and Ormrod (2014), ‘quantitative research’ involves the collection of numerical data in an attempt to answer questions about relationships among measured variables with the purpose of explaining, predicting and controlling phenomena. ‘Qualitative research’, in contrast, is used to answer questions about the complex nature of phenomena—often with the purpose of describing phenomena associated with social science, understanding the associated processes and dealing with inadequate evidence—from the participants’ point of view.

Using mixed methods makes it possible to combine quantitative and qualitative techniques (Easterby-Smith et al., 2012). The use of multiple research methods has been championed in business and management studies (Bryman, 2006) because it is likely to overcome the weaknesses associated with using a single method and to

provide scope for a wide range of approaches to data collection, analysis and interpretation (Saunders et al., 2016). According to Saunders et al. (2016), ‘mixed-methods research’ is an area of multi-analysis research that combines the use of quantitative and qualitative data collection techniques with analytical procedures. In mixed-methods research, quantitative and qualitative techniques are combined in a variety of ways that range from concurrent forms to sequential forms. According to Easterby-Smith et al. (2012), the mixed-methods approach has the potential to unearth new perspectives on research questions and provide deeper insights that explain why things have taken place. The mixed-methods approach gives the ability to present more diverse perspectives, develop stronger reasoning, reveal deviant dimensions, synthesise and integrate theories, and stimulate creative and inventive methods.

Sequential mixed-methods research includes several stages of data collection and analysis. In this design, the researcher follows the use of one method with another in order to expand or refine the initial set of findings. In a double-stage research design, this leads to two alternative mixed-methods research strategies: a sequential exploratory research design (i.e., qualitative followed by quantitative research), and a sequential explanatory research design (i.e., quantitative followed by qualitative research). In a more complex, sequential, multi-step design, mixed-methods research will require multiple phases of data collection and analysis (e.g., qualitative followed by quantitative research, then by a further phase of qualitative research).

As described above, a strategy that uses a variety of research evidence is referred to as employing ‘triangulation’ by Webb et al. (1966). According to Patton (1987, p. 60), ‘triangulation’ is ‘building checks and balances into a design through multiple data collection strategies’. Therefore, triangulation is an ideal approach to solving the potential problem of construct validity, as multiple sources of evidence provide multiple measures of the same phenomenon (Yin, 2017). To achieve triangulation in this study, research beyond a single-method study is required (Creswell, 2017). A mixed-methods approach that combines qualitative and quantitative research is increasingly used in management accounting literature (Modell, 2005; Anderson and Widener, 2006). Modell (2010) suggested that an explanatory design—a mixed-

method design that combines surveys with semi-structured interviews—improves the predictive capacity in a research setting that uses multiple theories. Interview evidence used as a complement to quantitative data adds authority to the results, as survey findings provide conclusive support as a weakness (Modell, 2005, 2010).

Using a two-phase or multi-phase research design suggests a dynamic approach to the research process that recognises that mixed-methods research is both interactive and iterative, with one step subsequently informing and directing the next step in data collection and analysis. The precise nature of these interactions and iterations in a particular piece of research may allow for the selection and integration of qualitative and quantitative methods at each stage of the research (see Table 4.1; Greene, 2007; Benz et al., 2008; Teddlie and Tashakkori, 2009; Nastasi et al., 2010).

Table 4.1: Reasons for using a mixed-methods research design (adapted from Saunders et al., 2016, p. 173)

Reason	**Explanation**
Initiation	The initial use of a qualitative or quantitative methodology may be used to define the nature and scope of sequential quantitative or qualitative research. It may also be used to provide contextual background and to better understand the research problem. Further, it may help in the formulation or redrafting of research questions, interview questions and questionnaire items and the selection of samples, cases and participants.
Facilitation	During the course of the research, one method may lead to the discovery of new insights that inform and are followed up through the use of the other method.
Complementarity	The use of mixed methods may allow meanings and findings to be elaborated on, enhanced, clarified, confirmed, illustrated or linked.
Interpretation	One method (e.g., qualitative research) may be used to help explain relationships between the variables emerging from the other method (e.g., quantitative research).
Generalisability	The use of mixed methods may help to establish the generalisability of a study or its relative importance. In a similar way, the use of mixed methods may help to establish the credibility of a study or to produce more complete knowledge.
Diversity	The use of mixed methods may allow for a greater diversity of views to inform and be reflected in the study.
Problem solving	The use of an alternative method may help when the initial method reveals unexplainable results or insufficient data.
Focus	One method may be used to focus on one attribute (e.g., quantitative research on macro aspects), while the other method may be used to focus on another attribute (e.g., qualitative research on micro aspects).
Triangulation	Mixed methods may be used to combine data to ascertain if the findings from one method mutually corroborate the findings from the other method.
Confidence	The findings may be affected by the method used. The use of a single method will make it impossible to ascertain the nature of that effect. To seek to cancel out this ‘method effect’, it is advisable to use mixed methods. This should lead to greater confidence in your conclusions.

This study uses a mixed-methods research approach, incorporating qualitative and quantitative data collection techniques and analysis procedures. This study involves two stages (Figure 4.2), which are intended to be sequential (i.e., the macro analysis is first conducted using a systematic literature survey, which is a quantitative method, and the micro analysis is then conducted using multiple case studies, which is a qualitative method).

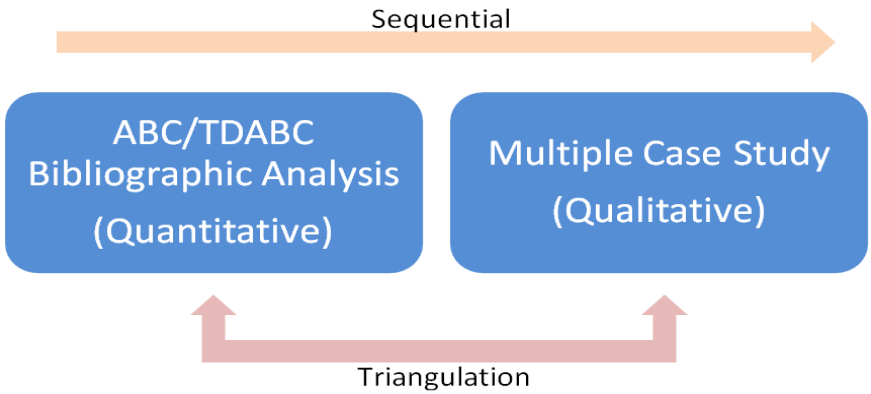

Figure 4.2: The research design of this study

The data collection method in the first stage is the ABC and TDABC systematic bibliographic analysis, which serves the primary purpose of providing quantitative evidence about the diffusion patterns of ABC and TDABC over time. Here, the researcher compares and analyses the diffusion patterns of ABC and TDABC from a macro perspective. The patterns of ABC and TDABC diffusion are analysed, including how they are different, who the major players are in driving the diffusion and in which fields they have spread. This allows us to see the spread of ABC and TDABC from an integrated macro perspective and to identify whether the ABC paradox does exist.

Based on the results of the macro pattern analysis, the researcher then conducts micro research on ABI diffusion through field work. The second data collection method is a series of interviews that form case studies; interviews are one of the most-often employed data collection methods used in management accounting studies (Birnberg et al., 1990; Young, 1996; Abernethy et al., 1999; Chenhall and Smith, 2011). The multiple case studies serve the primary purpose of providing qualitative evidence of why and how the diffusion is prominent in a particular field

and how the features of diffusion have changed from the point of view of the players. The in-depth interviews may be able to investigate the research objective of why and how TDABC has spread as it has. Interviews are incorporated into the research design because the quantitative evidence generated via the systematic literature review was regarded as necessary but not sufficient to address the research questions posed.

The following sections describe each stage in greater detail (i.e., the systematic literature review and multiple case studies).

4.2 Method for Macro analysis: Systematic Literature Review via Survey of Journal Publications

4.2.1. Use of Journal Publication as a Proxy of Diffusion in Korean Context

According to Bjørnenak and Mitchell (2002), a permanent legacy of attention to ABC is the impact on the accounting journals. The journal publication is regarded as an important means of spreading the body of knowledge on ABC. In order to understand the evolution of ABC and TDABC, a systematic detailed analysis of the ABC journal literature is needed (Bjørnenak & Mitchell, 2002). According to Bjørnenak (1997), media such as articles may be used to inform and convince potential adopters. Also, Abrahamson (1996) argued that increases in the number of publications could be related to the take-off of an innovation. The beginning of the innovations and their development can be grasped by identifying how many papers have been written and published about ABC and TDABC, what kind of journal was published in which field, which field was spotlighted by what types of author, what kind of content was written.

For example, Gosselin (2006) reviewed the adoption of ABC in practice in his survey of academic publications of ABC from 1988 to 2004. He argued that the number of publications of academic research and surveys is considered as a proxy for providing better understanding of ABC diffusion and some explanation for ABC paradox.

According to Kim et al. (2011), Korean journal articles cite articles from English language journals at a rate of about 75%, or three times more than their citation of

domestic articles. This indicates that publication of English-language journals has a large impact in Korea, as shown in the spread of ABC/TDABC. Take Korean academia as an example, there are formal criteria for publishing articles in prestigious SSCI-level foreign journals in Korean universities' recruitment and promotion processes. In addition, one of the consulting companies interviewed in this study (interviewee 'A consulting CEO' in Table 4.3) has been in partnership with Kaplan, whose initial ABC publications since 1988 have been influential in the spread of ABC globally. Their collaboration has begun since 2003 through receiving internal publications and promotion materials on innovations such as BSC and TDABC, and meeting with Kaplan at conferences. Other consultants interviewed confirm that they learn these latest management innovations from English-language journals and conferences and introduce them to Korea. Through the international links of these MAI suppliers, domestic practitioners can also obtain information on international management innovations.

In Korea, there are no international accounting professional bodies like CIMA or ACCA. The main channel to disseminate accounting knowledge and development is through an accounting professional body called Korean Institute of Certified Public Accountants (KICPA) and its journal called "Study on Accounting, Taxation & auditing". Different to the relatively clear association between practitioner journals to its affiliated professional bodies in the US and UK, this journal and other Korean-language management and accounting journals do not have this association. In fact all these Korean-language journals are classed as academic journals (Jeong and Rho, 2015). New innovations generated abroad are passed on to suppliers (academics and consultants) of innovation, and they spread them to practitioners. There is a growing trend in Korea that suppliers and practitioners constantly look for new innovations globally through those aforementioned channels, namely the affiliation with Kaplan and general undifferentiated journal outlets. The latter is the platform whereby both academics and practitioners share their ideas and opinions obtained from international journals and experiences. Korean management and accounting communities are striving for globalisation. With this increased importance and interest in international journals, South Korean readership of international journals in accounting will expand further in the future. Therefore it is reasonable for

this research setting to use survey of English language journals as a proxy measure of ABC/TDABC diffusion.

4.2.2 Systematic Literature Review

According to Hart (2018), a ‘literature review’ involves the selection and analysis of the available documents on a given subject. This includes information, ideas, data and evidence written from a specific perspective to achieve a specific goal. An effective evaluation of these documents is made in relation to the research proposed and investigated.

Two approaches can be applied to a literature review: the traditional narrative review and the systematic literature review approach (Jesson et al., 2011). Traditional narrative reviews have been widely criticised as offering a single explanatory account of the contributions made by authors in a field, often selected for inclusion based on the researcher’s implicit biases (Hart, 2018; Fink, 2019). Systematic reviews differ from traditional narrative reviews in that they employ detailed techniques aimed at minimising bias through the application of a reproducible, scientific and transparent process (Cook et al., 1997). To conduct a review of a large, fragmented body of literature distributed in many areas, it is more appropriate to adopt a systematic, explicit and well-balanced approach that helps the researcher include and investigate all major topics in a particular literature field (Tranfield et al., 2003).

As such, to address the first research objective of this study—examining the ABC paradox and identifying the development of ABC and TDABC in journal publications—a systematic literature review was used. According to Bjørnenak and Mitchell (2002), the accumulated journal literature is a distinct and important chronicle of evidence of the phenomenon of ABC. The origins of ABC and TDABC and their development over time can be grasped by identifying how many papers have been written and published about ABC and TDABC, in what kind of journals, in which fields, by what types author (e.g., academic, or practitioner,) and including what kind of content.

To achieve these aims, a structured process was followed to identify how journal articles about ABC and TDABC have evolved over the last 30 years. Figure 4.3 illustrates the main stages of this process.

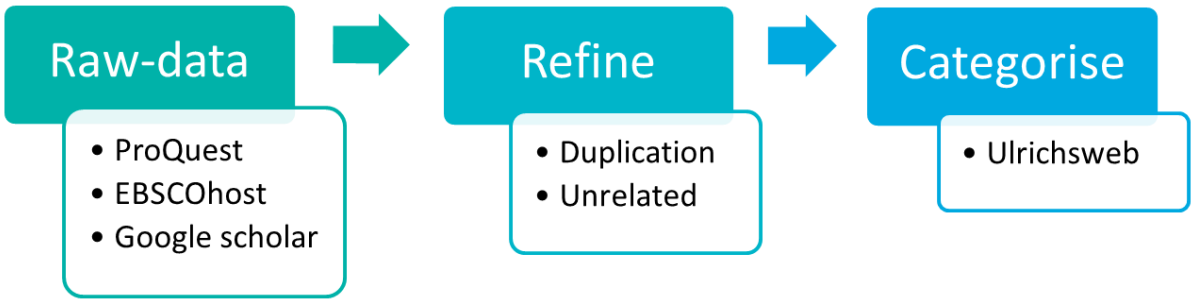

Figure 4.3: Main stages of the systematic literature review

To gather the raw data related to ABC and TDABC publications, the researcher first consulted three databases. The ProQuest ABI/INFORM Global database, the EBSCOhost database and Google Scholar were used for data collection, in order to identify how ABC and TDABC journal articles have evolved over the last 30 years. The ProQuest and EBSCOhost databases are commonly used among researchers (Shunli, 2008), and Google Scholar is a prominent citation service (De Winter et al., 2014).

The keywords used for identifying ABC articles included, ‘activity-based costing’, ‘activity-based cost management’, ‘activity-based cost accounting’, ‘activity-based product costing’, ‘activity-based management’, ‘activity-based analysis’, ‘activity-based budgeting’ and ‘activity-based technique’. The keywords used for identifying TDABC articles were the same as those above, with the addition of ‘time-driven’, as well as ‘time-driven ABC’, ‘TD-ABC’, and ‘TDABC’.

ProQuest was the main database used in this study. To supplement data from ProQuest, additional data from accounting journals in the ABS journal list and from some important practitioner journals were obtained. In addition, to increase the reliability of the data, all management journals included in the first data set were cross-checked. EBSCOhost and Google Scholar were used in this process.

After collecting all the ABC and TDABC articles, the following steps were taken for article selection. First, a duplication test was conducted by comparing titles, author names and journal information. Second, to focus on the analysis of journal articles, sources such as books, book reviews, newspapers, editorials, reports, dissertations and theses, and conference papers and proceedings were removed from the study. This was done because relevant ideas and important contributions are often published in other types of sources after they are initially published in articles (Becheikh et al., 2010). Only articles from academic journals, trade journals and magazines were included in this study.

The focus of this search was to identify articles that contained the above ABC- and TDABC-related keywords in their subject and abstract. Articles from relevant journals that did not include the keywords in their subject and abstract were examined one by one to identify whether they were suitable for inclusion. After checking the abstracts and contents of each article identified through this search and deleting articles from unidentified journals, the final number of relevant papers on ABC or TDABC was 1,874, published from 1988 to 2019; of these, 1,617 were ABC articles and 257 were TDABC articles.

The categorisation of all papers and journals was completed through the identification of the journal field category using the Ulrichsweb Global Serials Directory, one of the most critical tools for librarians (Jacsó, 2012). The categorisation of the articles was done using the following categories from Ulrichsweb: business management fields (e.g., management accounting, general accounting and general management), and other fields (e.g., bio/medical, agriculture, food/grocer, education, energy/environment, library science, public, science and social). The Ulrichsweb Global Serials Directory was also used to identify each journal's type (i.e., academic or practitioner journal).

An analysis of the authors of the articles was also carried out (i.e., academic, consultant or practitioner), so as to examine their impact on ABC/TDABC. Authors whose positions were unclear were assumed to be in alignment with the content of the article (e.g., a consultant author would produce consultant-based content). In

addition, if a paper had multiple authors in different positions, the number of papers was divided according to the ratio of the number of authors in each position.

Moreover, to identify the content of each paper, all of the articles were examined individually and categorised into consultant, practitioner and academic content (Bjørnenak and Mitchell, 2002). For this stage, the researcher made the initial classifications, and these was then discussed with the supervisors to ensure a consensus.

After these processes, the ABS rating was added to each article, where possible. The ABS journal guide informed the journal rating of each category, as this can provide an indicative measure of the academic interest in the topic at the time of publication.[1] According to Gilbert (1977) and Hussain (2010), the ABS rating can also be used as a measure of the degree of impact and research quality of journals; the higher the degree of impact, the greater the degree of diffusion to academia and practitioners, and the more likely it is to affect academics and consultants.

In addition, the categorisation of empirical studies in terms of specific geographical area was performed. Geographical analysis was undertaken to see the regions in which ABC first appeared and how it then spread around the world. This allows us to know in which countries ABC and TDABC have been studied and in which empirical analysis has been carried out.

4.3 Method for Micro Analysis: Interviews for Case Studies

Based on the results of the systematic literature review, the settings for the multi-case study were determined. In the next section, a description of the multi-case study is given.

4.3.1 The Advantages of Case Studies

Along with surveys, case studies are one of the most-often employed research methods in management accounting studies (Birnberg et al., 1990; Young, 1996;

[1] 'The ABS listing may provide a useful starting point for assessing research quality, but school managers need to recognise the heterogeneous nature of perceptions within the academic community and the intrinsic limitations of using any single metric to assess research quality' (Hussain, 2010).

Abernethy et al., 1999; Chenhall and Smith, 2011). Although the survey method is also commonly used in management accounting studies, it is not a suitable method for all management accounting research. Van der Stede et al. (2006) argued that the survey method focuses on measuring the strength of relationships between predefined variables rather than examining the mechanisms of those relationships. Scapens (1990) argued that the survey method is not suitable for the study of management accounting practices where an understanding of practice is the objective, because it can give only a superficial view of management practices. According to Lillis and Mundy (2005), survey results do not sufficiently explain the reason for phenomena, so further field study research, such as a case study, is necessary. Drury and Tayles (1995) suggested that questionnaire surveys are appropriate for providing a broad overview of existing practices in accounting theories and for identifying areas that required more in-depth case study research. As such, survey findings can suggest avenues for further field study research, which can in turn provide a more detailed description and evaluation of the phenomenon in question and pinpoint the affecting factors.

Case studies, in contrast, represent a qualitative research method that provides an in-depth analysis of particular events, activities or processes by one or more individuals; they can reveal understandings and insights of a kind that may escape broader surveys (Wilson, 2014; Allison et al., 2016; Creswell, 2017). In addition, the case studies in management accounting can provide an in-depth knowledge description of practice, testing a theory developed and development of a theory (Llewellyn, 1992; Atkinson and Shaffir, 1998; Parker, 2012). Yin (2017, p. 18) described case studies as follows:

> A case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. The case study inquiry copes with technically distinctive situations in which there will be many more variables of interest than data points, and as one result relies on multiple sources of evidence, with data need to coverage in a triangulating fashion, and another result benefits from the development of theoretical propositions to guide data collection and data analysis.

A case study can be used to address fundamental or practical problems over a certain period in real life and to answer the questions ‘how?’ or ‘why?’ (Coombes, 2001; Yin, 2017). In this way, various angles of subjects are investigated for more rounded, richer, in-depth and balanced pictures of subjects (Lapsley and Mitchell, 1994; Gummesson, 2000; Thomas, 2015).

The case study approach adopted in the study of the diffusion of TDABC meets the above requirements. Case studies are a research method suitable for the purpose of conducting a micro analysis to determine why and how TDABC has spread well in certain industries. Case studies are the best research method to learn the overall story of the players, events, activities and processes surrounding the spread of TDABC.

4.3.2 Multiple Case Studies to Overcome Limitations of the Case Study

The advantages of case study research were explained in the previous section. However, there are some limitations of the case study approach. According to Otley and Berry (1994) and Yin (2017), a single case study conducted in an organisation is not designed to be able to represent an area of study with respect to exploring a whole population. In addition, the case study approach requires an extensive amount of data to achieve the proper analysis of a case; this will normally be a time-consuming exercise.

According to Vannoni (2015), when multiple cases are compared to each other, the researcher can gain important insights by analysing the contrasts and similarities between them. Studying multiple cases highlights the differences and similarities in the experiences of various actors (Stake, 1995; Baxter and Jack, 2008). Scapens (1990, p. 278) presented the following warning about the use of case studies:

> In comparison with more traditional forms of accounting research, it is important to recognise that case studies are concerned with explanation rather than prediction. Researchers should avoid the temptation of thinking of case studies only in terms of statistical generalisation. . . . Researchers who see generalisations only in this sense will either reject case study methods or not fully exploit their potential.

In light of the limitations of a single case study, it is appropriate for this research to adopt a multi-case study method. The adoption of multiple case studies is beneficial to this research in the following ways:

- It allows the researcher to obtain a detailed description of TDABC diffusion processes and diffusion factors with viewpoints from various organisational settings (i.e., consultants, academics and practitioners in different industries) and to investigate how the processes affected the players in TDABC diffusion.
- By analysing cases of suppliers and demanders, an analysis of the effects of TDABC spread is possible in multiple dimensions.
- By analysing cases in different industries, a description of the effect of each industry's characteristics on TDABC diffusion can be made.
- It captures individual differences or variations in perceptions in 'real-world' TDABC practice.
- It tends to reduce the biases and other shortcomings of the case study method.

4.3.3 Interviews for Multiple Case Studies

According to Yin (2017), there are six sources of evidence used in conducting case studies: documentation, archival records, interviews, direct observations, participant observation and physical artefacts. In this study, only documentation, archival records and interview data were collected due to accessibility issues.

Interviews are one of the most commonly used data collection methods in conducting case studies, although they have both advantages and disadvantages to consider. Interviews can help researchers explore and understand research issues by collecting valid and reliable data related to the research questions and objectives (Saunders et al., 2016). According to Yin (2017), interviews are useful because they are targeted and insightful. The interview method focusses directly on the question of 'why?' in real conversation to identify why a particular process has occurred; this provides cause-and-effect inferences and explanations. Easterby-Smith et al. (2012) argue that researchers develop further questions from non-verbal clues of

interviewees such as the inflection of the voice and facial. In addition, confidentiality of interviews can provide another advantage to the interviewees. Semi-structured or unstructured interview questions can provide an opportunity for interviewees to reply more personal while structured interviews can provide a high degree of standardisation of questions and answers.

Despite these advantages, the weakness of interviews is the potential for bias in the data collection (Coombes, 2001; Saunders et al., 2016; Yin, 2017). Interviewer bias can occur when interviewees respond to questions being asked in a particular manner due to the comments, tone or non-verbal behaviour of the interviewer. Interviewee or response bias may occur in connection with the interviewee's perception of the interviewer or perceived interviewer bias. Also, when the interview time is limited, the interviewer may knowingly or unknowingly try to reduce the interviewee's willingness to keep talking. It is also possible that interviewees may just say what they think interviewers want to hear to improve the interviewers' satisfaction and finish the interview process quickly. There is also a potential for bias when interviewers select their own interview participants and when interviewers assume that the views of a respondent are representative of organisations. This can lead to a failure to achieve data saturation (Yin, 2017).

As mentioned above, there are both advantages and disadvantages to interviews. This study chose to use semi-structured interviews for the micro analysis following the systematic literature review. The results from the systematic literature review were used to select the industries and players to interview, using multiple case studies. The semi-structured interviews were conducted to describe and explore why and how TDABC diffusion in a certain industry was better than that in other industries, according to different points of view. The interviews were conducted in conjunction with a short survey to identify how TDABC diffusion may be different from ABC diffusion factors. Questions about the diffusion process on the supply side, the diffusion factors of TDABC on the demand side and the dynamics between suppliers and demanders were included in the interview questions for each of the interviewees, who held positions in different industries.

4.3.4 Ex ante Interviews

This research adopted a two-phase method to better understand ABI diffusion. The initial phase involved conducting a systematic literature review to examine the ABC paradox and the diffusion patterns of ABC and TDABC. Based on the results found in macro analysis, micro analysis proceeded. The systematic literature review found that ABC and TDABC spread better in the bio/medical field compared to other industries.[2] Also, at the beginning of ABC's diffusion, consultants and academics had the initiative to spread the innovation, but later, practitioners became more interested in ABC and TDABC. Thus, for the multi-case study, it was decided to draw comparisons between the general manufacturing industry and hospitals, and the players surrounding ABC/TDABC diffusion: consultants, academics and practitioners.

According to these results, in the second phase (which involved seven case studies), *ex ante* interviews with 6 interviewees were conducted first. The aim of these *ex ante* interviews was to explore the themes that emerged from the systematic literature review of ABC and TDABC diffusion patterns, explore three role players' (i.e., consultants, academics and practitioners) views of TDABC, identify the overall TDABC usage status in manufacturing and hospitals in South Korea and hear the opinions of core players about whether meaningful information could be obtained in the next stage of interviews (Wilson, 2014).

4.3.4.1 Choosing the Interviewees

The plan was to interview consultants, academics and practitioners from the manufacturing industry and hospitals that represent different players and different industries related to TDABC diffusion in South Korea. Another aim was to interview some academic authors of previous South Korean literature on ABC and TDABC. First, three South Korean professors were selected and contacted via email. All three responded, but only two professors agreed to the interview. According to them, since the mid-2000s in South Korea, ABC has been abandoned or it has a reduced range of use for many companies. As a result, it is difficult to find consultants spreading ABC these days. However, TDABC is being spread by a small number of consultants.

[2] This is explained in detail in the findings chapter.

Through one of the professors, the researcher was introduced to one of the TDABC professional consultants in South Korea. In addition, the consultant introduced the researcher to a hospital TDABC consultant. According to them, the number of TDABC consultants in South Korea is very small, and they have spread TDABC to most of manufacturing and hospitals that use TDABC. Also, from these consultants' customers, two of practitioners from manufacturing and hospitals were selected. In the case of the manufacturing industry, there were not many customers, while in the case of hospitals, the number was relatively large. After asking several clients to be interviewed, a practitioner who responded was selected. If the researcher had chosen the interviewee, there could be a selection bias in the form of choosing an interviewee who would give the researcher a satisfactory answer. However, this bias was avoided because the researcher asked all potential interviewees to participate and waited for a response.

During August 2018, a final telephone call with the selected interviewees was conducted to set up appointments for the interviews. All the interviews were conducted from September to October 2018.

Table 4.2: Details of the *ex ante* interviews

Positions / Organisations		Level of Interviewees	Durations(Hrs.)
Manufacturer/Service Consultants	A consulting	Managing Director	2:00
Hospital Consultants	B consulting	CEO	1:30
Academics	C university	Business School Professor	1:40
	D university	Business School Professor	1:15
Manufacturer Practitioner	E company	IT Team Director	1:00
Hospital Practitioner	F hospital	Manager of Costing Part	1:10
Total Interview Hours			**8:35**

4.3.4.2 The Results of the Interviews

All the *ex ante* interviews were unstructured interviews (although all the subsequent main interviews were semi-structured). According to Saunders et al. (2016, p. 391), unstructured interviews are informal, and there is no predetermined list of questions to ask in this situation. The interviewee has the opportunity to talk freely about

events, behaviours and beliefs in relation to the research topic, so this type of interaction is sometimes non-directive. In unstructured interviews, the interviewee may guide the course of the interview and the topics discussed. The aim of this *ex ante* interview was to obtain the interviewees' opinions and overall explanations of TDABC in South Korea, and unstructured interviews were suitable to fulfil these purposes.

The interviews revealed some important issues that informed the theoretical framework and, consequently, the main interview questions of the multi-case study. These issues are presented and discussed in the related chapters but are summarised as follows.

First, the interviews with the two professors were conducted in September 2018 (one face to face and one by telephone). All the interviewees were assured about the confidentiality of the interviews, and their permission to make notes about the conversation was gained. The following points were made by the interviewees:

- ABC prevalence in South Korea has decreased since the mid-2000s, as explained by the ABC paradox. Few consultants are spreading ABC now. That does not mean there are a lot of TDABC consultants, however; there are not many TDABC consultants, but they do exist.
- South Korean practitioners rarely distinguish between the terms 'ABC' and 'TDABC'. Therefore, when the main interviews about TDABC were conducted, its meaning needed to be clearly explained.
- Many South Korean professors recognise TDABC as a sub-genre of ABC. In other words, it is not new or different but is a morphological modification of the existing ABC.
- Even though some professors want to contribute in practice to the diffusion of TDABC—unlike during the spread of ABC in the late 1990s—very few TDABC projects need the help of academics. During the era of ABC diffusion, several professors were involved in various projects, but currently, there are not many projects related to TDABC, so the number of roles available to professors has decreased.

Second, the interviews with the two consultants were conducted in September 2018 (all of them face to face). All the interviewees were assured about the confidentiality of the interviews, and their permission to make notes about the conversation was gained. The following points were made by the interviewees:

- With the exception of some large companies, most South Korean companies cannot create their own ABC or TDABC systems. As such, they rely heavily on consultants for application.
- In the case of manufacturing, several companies are interested in TDABC. However, not many companies actually apply and use TDABC perfectly. Perhaps because of ABC's failure, the TDABC diffusion project is a subordinate project for most companies.
- The diffusion factors related to TDABC may be different from those of ABC. This is because TDABC eliminates ABC's shortcomings. The biggest reasons for the failure of the spread of ABC—the high price and difficulty of operation—are solved by TDABC. Therefore, it is also of interest whether consultants confirm the factors of TDABC spread.
- It was noted that the conservative culture of South Korean companies may influence the spread of TDABC. In other words, if the top management decides to adopt TDABC, the process will be easy after that; however, the top management may have a conservative attitude themselves and decide not to make a change and adopt TDABC.
- Many hospitals are already using the ABC system. In addition, a system with TDABC characteristics added is in operation. Hospital ABC/TDABC consultants know the difference between ABC and TDABC, but they do not differentiate between them using separate terms. Also, practitioners seldom distinguish between ABC and TDABC in practice.

Third, the interviews with the two practitioners working in manufacturing and in a hospital were conducted in October 2018 (the interview with the practitioner from the manufacturing company was face to face, while that of the practitioner from the hospital was by telephone). All the interviewees were assured about the

confidentiality of the interviews, and their permission to make notes about the conversation was gained. The following points were made by the interviewees:

- The role of consultants in the spread of TDABC in manufacturing is very important. Without the active work of consultants, companies would not know about TDABC and would not have a chance to spread it.
- TDABC is easy to use, and its operation is stable due to the low load on the system. However, many companies that experienced ABC's failures seem to have a negative perception of TDABC because the term 'TDABC' is similar to 'ABC'.
- In hospitals, each doctor acts as part of a regular company. That is why hospitals are interested in TDABC—because TDABC influences the performance evaluation of each doctor.
- In South Korea, only two or three consultant companies are spreading the ABC/TDABC system to hospitals. The number is small, but their influence is very large. The relationship with the consultant company is also very important.

These issues were used to consider and inform the theoretical framework, to find research sites and to identify the questions that should be asked in the main interviews of the multi-case study, in the next step.

4.3.5 Main Interviews for the Multi-Case Study

To obtain detailed descriptions about the processes of TDABC suppliers, the dynamics between suppliers and demanders, the diffusion factors relating to TDABC demanders and the opinions and stories of diffusion of TDABC systems, it may take a considerable amount of time to communicate with the interviewees in the field (Yin, 2017). In this study, data from multiple case studies were collected via individual interviews and by developing relationships with the consultants, academics and practitioners involved in TDABC practice. Thus, interviews with informants in different positions and different organisations were the fundamental source of empirical evidence to understand the 'how' and 'why' of TDABC diffusion.

The following section discusses the collection of documents and archival data, the reliability and validity of the interview data, the research sites and sampling techniques used for the interviews, the interview techniques and the processes used for noting and recording the data.

4.3.5.1 Collecting Documents and Archival Data

Before conducting the interviews, the documents used for this study, which are considered a valuable data source, were collected via two channels. Public documents such as vision and mission statements and reports to shareholders were collected through companies' websites and the 'Data Analysis, Retrieval and Transfer System (DART)' website of the Korean Financial Supervisory System. For documents not in the public domain, such as organisational charts for each company and the internal data on TDABC systems, the documents were collected by the consultants and companies (Bryman and Bell, 2007; Saunders et al., 2016). These kinds of documents are used by companies themselves, so they are likely to be true and meaningful. By analysing these internal documents along with the content of the interviews, the researcher was able to build an understanding of the organisational background, current situation and history, which is useful for the interpretation of the interview data (Simons, 2009).

4.3.5.2 Reliability and Validity of Qualitative Data

According to Creswell (2017), 'qualitative reliability' refers to consistency in the researcher's approach with those of other projects and researchers. 'Qualitative validity' indicates the accuracy of the findings, ascertained by employing certain procedures. 'Interview reliability' refers to whether the interview reflects reality at the time of data collection, which can change. The validity of interviews becomes slightly higher when researchers approach participants' knowledge and experience, and the inferred meanings of the language used by the participants (Saunders et al., 2016).

However, there is no perfect measurement or concept to ensure the reliability and validity of qualitative data (Kirk, 1986). To ensure the validity of the qualitative data in this study, semi-structured interviews were conducted for the multi-case study, based on the research questions. During the interview processes, the interview questions

and a cover letter outlining the interview objectives and assuring the confidentiality of the interview data were sent to the participants prior to the interviews. Before the interviews, the interviewees were asked for permission to allow the researcher to take notes and record the sessions. Even though the interviewer was aware that using facial expressions and non-verbal behaviour may create bias in the interviewees' answers and affect their performance (Salazar, 1990), the reliability of the interview data was ascertained according to whether the interviewees expressed their actual opinions and truly answered the interview questions.

4.3.5.3 Sampling Method and Selection of Research Sites

As the sampling method, purposive sampling was used in this study. According to the results of the first phase (macro analysis of systematic literature review), manufacturers and hospitals were revealed to be industries where ABC and TDABC are spreading well and those that do not, as the subjects of the second phase of this study, the demander of TDABC diffusion. In addition, TDABC consultants and business school professors were established as the suppliers of TDABC diffusion. For the second phase (i.e., the micro analysis via case studies), the researcher tried to find interviewees with enough knowledge and experience to fulfil the purpose of the study. According to Gummesson (2000), the aim of purposive sampling is not to establish a representative sample but rather to identify key informants whose context-specific knowledge and expertise regarding the issues relevant to the research are significant and information rich. This study focusses on interviews with three types of players—consultants, academics and practitioners—surrounding the diffusion process of TDABC.

In terms of TDABC diffusion consultants, the researcher selected consultants who have spread TDABC mainly to the manufacturing and service industries, and consultants who have spread TDABC professionally in hospitals. The interviewees were selected according to the research purpose of understanding why TDABC is spreading more in hospitals than in manufacturing. Through the *ex ante* interviews described above, a consultant who had a cordial relationship with the researcher introduced other consultants in the field of TDABC diffusion to the researcher. In the manufacturing and service industries, the spread of TDABC was more limited, so the

number of potential consultant interviewees was small. Among them, four consultants were selected for the interview. One of them conducted a pilot study as well.

The hospital consultant interviewee was similarly selected, and an *ex ante* hospital consultant interviewee who had a cordial relationship with the researcher gave information about other consulting companies that advise and supply management tools to hospitals. There are two large hospital consulting firms that dominate the hospital ABC/TDABC system market in South Korea. To obtain unbiased information about TDABC hospital consultants, the researcher tried to conduct interviews with both of the companies. Both of the consulting firms allowed the researcher to do interviews in both places, with three interviews. One of them conducted a pilot study as well.

In the case of professors at a business school, a list of professors who had published ABC- or TDABC-related papers was reviewed, and those with experience and knowledge related to TDABC were selected. However, because the number of professors who has written about TDABC was small, only five professors were contacted. Among them, three professors allowed the researcher to conduct interviews. One of them conducted a pilot study as well.

In the case of the practitioner interviewees, the interviewees were selected from both manufacturing companies and hospitals. In the case of the manufacturing industry, to obtain meaningful information about the spread of TDABC, interviewees were selected from a company that currently uses TDABC and company that chose not to use TDABC after reviewing the application of TDABC in the past. Because the number of manufacturing companies using TDABC was too small, a consultant introduced the researcher to a company that the researcher selected from a list of the consultant's former clients. In the case of companies that do not use TDABC, the companies that were on the list of ABC companies in South Korea obtained from a professor at a business school were selected as the companies that went through a review of their application of TDABC with TDABC consultants. In both selected companies, the researcher selected members of the financial team or IT team

related to the TDABC system as interviewees. A total of six interviewees were selected from among both companies. One of them conducted a pilot study as well.

In the case of hospitals, most large hospitals are using an ABC/TDABC system. Accordingly, the interviewees were selected by contacting several university hospitals and large hospitals in Seoul (the capital of South Korea) and Gyeonggi-do (the suburbs of Seoul, the most populous province in South Korea). Members of the planning team and finance team managing the hospital's TDABC system were selected for the interviews. In addition, doctors who allowed interviews were selected to obtain opinions about the spread of TDABC from the view of medical doctors. Eight planning and financial team practitioners and two doctors were selected from a total of five hospitals. One of them conducted a pilot study as well. The distribution of the personnel involved for the multi-case study interviews is summarised in Table 4.3.

Table 4.3: Details of the main interviews

Positions / Organisations		Level of Interviewees	Number of persons interviewed		
			Pilot Study	Main Study	Durations(Hrs.)
Manufacturer/Service Consultants	A consulting	CEO		1	1:15
		Managing Director	1	1	1:00
	B consulting	Managing Director		1	0:50
	C consulting	Director		1	0:40
Hospital Consultants	D consulting	CEO	1	1	1:45
		Managing Director		1	
	E consulting	CEO		1	1:30
Academics	A university	Business School Professor	1	1	0:55
	B university	Business School Professor		1	0:50
	C university	Business School Professor		1	0:30
Manufacturer Practitioner	A company	IT Team Director	1	1	0:45
		IT Team Manager		1	
		Finance Team Depute Manager		1	1:00
		Finance Team Manager		1	
	B company	Finance Team Head		1	1:05
		Finance Team Manager		1	
Hospital Practitioner	A hospital	Manager of Costing Part		1	1:15
	B hospital	Head of Management Innovation Team		1	1:25
		Leader of Costing Part		1	
		Manager of Costing Part		1	
		Doctor, Head of Planning & Coordination		1	0:25
	C hospital	Head of Management Innovation Team / Chairman of Korean Hospital Cost Association		1	0:50
	D hospital	Head of Costing and Planning Team	1	1	1:40
		Leader of Costing Part		1	
		Doctor, Vice Chair of Hospital		1	0:30
	E hospital	Leader of Costing Part		1	2:50
Total Number and Interview Hours			**5**	**26**	**21:00**

4.3.5.4 Interview Technique

Before conducting interviews, it is important to make an interview guide (Patton, 2001; Bryman and Bell, 2007; King and Horrocks, 2018). According to Patton (2001), an interview guide can provide topics or subjects that allow the interviewer to freely explain, explore, investigate and ask questions that will explain and illuminate the specific subject. The prepared list of topics and interview questions does give researchers flexibility to make modifications during the course of interview to respond to new problems. Also, the researcher can change the wording from one interview to another when questions are asked (Bryman and Bell, 2007; King and Horrocks, 2018). In addition, the information is needed to establish a collection plan within the available time period (Patton, 2001). The interview guide also allows the researcher to better compare cases (Bryman and Bell, 2007).

A set of guiding questions was developed with reference to the established theoretical framework (i.e., the process, dynamics and diffusion factors of TDABC) established as a result of the systematic literature review. The set of guideline questions helped the researcher to conduct the interviews in a systematic and comprehensive manner. The researcher used the guideline questions in conducting the six *ex ante* interviews in order to develop the semi-structured interview questions, which were then piloted in five interviews. The pilot study was conducted to ensure that suitable terms were used in the interviews and to ascertain the appropriateness of the design of the questions (Brownell, 1995). The final semi-structured questions are included in the Appendix.

As a result of the pilot interviews, the guideline set of questions was modified and developed to conduct interviews in the main study (see Appendix D). Wordings for the questions were slightly changed to ensure the interviewees' familiarity with the terms used (Brownell, 1995). A different set of guideline questions was used for interviewees in different positions and different industries (i.e., the questions for consultants, academics and practitioners in manufacturing and hospitals were different). Most of the questions were asked in an open-ended manner. This permitted the interviewees to respond in their own terms. Thus, a variety of dimensions, themes, images and words people used to describe their process, story,

opinions and experiences about TDABC systems could be obtained. A limited number of questions that were designed in conjunction with certain quantifiable measures were used to generate quantifiable responses to identify particular research answers about the diffusion factors.

In terms of the order of the questions, the number of detailed questions asked, the duration of the interviews and the wording of the questions, the researcher prepared them with consideration. Some questions also needed to be clarified; for example, the possible differences in terminology (e.g., some organisations did not use the term ‘TDABC’ to describe their systems) meant that questions related to these needed to be made absolutely clear. The researcher used pilot studies to sort these issues out.

One or more interviews were arranged on the same day, taking into account the time and schedule of the interviewees. By setting the interview time to one hour, the interviewer and interviewees could agree to a work schedule before the actual meetings started. Most interview meetings were held in formal places—usually in the interviewees’ offices or in meeting rooms—but after the interview, informal discussions were held along with some food and drinks. This allowed the researchers to observe emotions and opinions that could not be easily expressed during the official meetings. Assurances of anonymity and confidentiality were especially emphasised at the beginning of each meeting.

The interviews were conducted in 2019. The interview protocol consisted of five parts. The first part involved the introduction of the researcher and research project, the outlining of issues related to confidentiality and recording, and the gathering of general information about the interviewees. The second part involved gathering information related to the process and dynamics of TDABC diffusion. The third part of interview protocol involved collecting information related to the difference between manufacturing and hospitals in terms of TDABC diffusion. The fourth part involved identifying TDABC diffusion factors that had been identified as affecting ABC spread in existing studies. The final part featured open-ended questions to get information related to the cultural or organisational context and individual perceptions, which can affect TDABC diffusion.

The interview questions were initially written in English before being translated into Korean. The researcher played a significant role in this translation because the researcher conducted the interviews. The translated versions of the interview questions were sent to two South Korean colleagues at Hanyang University in South Korea to ensure that the interview questions were understandable in the context. These colleagues modified the way in which some of the questions were phrased if they could be understood differently than intended. In addition, back translation was done to confirm whether the intention of the question in the English and Korean versions was exactly the same.

Two basic ways of recording the interview data were adopted to help to capture the data: note taking and audio recording.

4.3.5.5 Field Notes and Audio Recording

An important task in case study research is taking field notes (Yin, 2017). The raw data of interviews consists of the actual words spoken by the interviewees. Consequently, there is no substitute for this data. In this research, notes were taken during each interview session. Field notes served three purposes in this research. The first purpose was to keep a record of what had been said to form a brief written account of the interview. The second purpose was to clarify the process flows that were being described. The third was to help understand the systems—and the relationships between the different systems—being described during the interview. The techniques used in taking field notes in this research were as follows: first, the field notes were dated and recorded, noting the name of the organisations and the participants present; second, the field notes contained a transcript of what was said during the interview meetings; and, last, the field notes contained the interviewer's own opinions, feelings and reactions to the experiences, as well as reflections about the meaning and significance of the interviewees' actions and reactions during the meetings.

Reports for each interview were usually prepared to lay the groundwork for building a database immediately after the meeting. The researcher summarised what the interviewees said, the general points communicated, the overall mood and the

information the researcher was able to gain to inform the next interviews. Through these reports, the data were properly classified in the data collection stage. This allowed the researcher to repeat the process of thinking about existing data and establishing appropriate strategies for gathering better quality data from subsequent meetings.

In addition to field notes, audio recordings can be used to record the words and phrases actually used by the interviewees during the interviews, so that the researcher can later analyse the exact content of the interview (Miles and Huberman, 1994). In this study, each interview audio file was attached to information about the interview, such as the name of interviewee and date of the interview. The interview content was saved as a recorded copy and used when writing the interview text. Through audio recording, the interviewer was free to pay more attention to the interviewee without having to make detailed. However, there was a risk that some interviewees would feel burdened by the fact that the interview was being recorded. For these cases, the interviewer reduced the concern to a minimum by providing reassurance about the confidentiality of the audio files recorded in the interview.

Chapter 5. Macro Analysis of ABC/TDABC Diffusion Patterns

5.1 Introduction

This chapter presents the systematic literature analysis of ABC and TDABC diffusion, addressing the first research objective of examining the ABC paradox and identifying the diffusion patterns of ABC and TDABC. The following section begins with a description of the various analytical aspects of the systematic literature analysis. Then, the results for each analysis aspect are described in detail. In the last two sections, a summary of the research findings of the systematic literature review and the conclusions drawn from these are explained. This chapter is followed by Chapter 6, which continues the explanation of the multi-case study based on the findings presented here.

5.2 Selection of Analytical Aspects

To understand the diffusion patterns of ABC and TDABC thoroughly, a systematic literature analysis was conducted, focussing on several aspects: volume, field, journal type, rating, author, content, research method and geographical location (see section 3.3). The four aspects (i.e., volume, field, journal type and rating) were analysed together as the journal characteristics.

Journal characteristics: First, the spread pattern of ABC and TDABC could be assessed by knowing the volume of the related published articles. In order to adopt a holistic view, this study analysed ABC and TDABC papers in both business management and non-business management fields. Moreover, by making a distinction between academic journals and practitioner journals, more in-depth analyses were possible. In addition to identifying the degree of impact, the ABS rating was also examined.

Authorship: An analysis of the authors of ABC and TDABC articles was carried out in terms of the nature of the journal (i.e., academic or practitioner journal) and the position of the author (i.e., academic, consultant or practitioner), so as to examine the impact of author types on the diffusion of ABC and TDABC.

Content: The nature of the content covered in ABC and TDABC papers was analysed among three content groups: academic content, consultant content and practitioner content. This allowed for a good understanding of the message and role of each paper in relation to the spread of ABC and TDABC.

Research methodology: The research method was analysed to understand how different techniques have been used over time and how they have progressed.

Geographical spread: A geographical analysis was undertaken to determine how ABC, which first appeared in the US and Europe, spread around the world. This allowed us to know in which countries ABC and TDABC have been studied and which types of empirical analysis were carried out in which countries.

5.3 Findings and Results of Analytical Aspects

The results of the analysis are presented in the following five sections (focussing on the journal characteristics, author, content, research method and geographical analysis). An explanation of each aspect is given, distinguishing between ABC and TDABC.

5.3.1 Journal Characteristics Aspect (Volume, Field, Journal Type and Rating)

The findings related to the journal characteristics are shown in Table 5.1. The ABC findings are explained first, followed by those of TDABC.

Table 5.1: Summary of total number of ABC and TDABC articles surveyed (April 2020)

		ABC			TDABC			
		Academic Journal	**Practitioner Journal**	**ABC Total**	**Academic Journal**	**Practitioner Journal**	**TDABC Total**	**Grand Total**
Business Management Journal		**425**	**472**	**897**	**41**	**16**	**57**	**954**
	General Accounting	186	34	220	15	3	18	238
	General Management	140	15	155	11	7	18	173
	Management Accounting	99	423	522	15	6	21	543
Non-Business Management Journals		**508**	**212**	**720**	**196**	**4**	**200**	**920**
	Agriculture	3	4	7				7
	Bio/medical	337	38	375	173	3	176	551
	Education	23	5	28				28
	Energy/Environment	43	19	62	2		2	64
	Engineering	14		14	3		3	17
	Food/Grocer	5	124	129		1	1	130
	Library Science	24	4	28	12		12	40
	Public	31	15	46	2		2	48
	Science	14		14	1		1	15
	Social	11	1	12	1		1	13
	ETC	3	2	5	2		2	7
Grand Total		**933**	**684**	**1,617**	**237**	**20**	**257**	**1,874**

5.3.1.1 Journal Characteristics (ABC)

Since the first ABC article was published in 1988,[3] a total of 1,617 papers have been published on the topic, up to 2019. The number of publications increased dramatically from 1988 to the late 1990s. However, stagnation appeared between 1997 and 1998. Since 1998, the number of ABC articles has decreased steadily until the late 1990s, at which point the number of publications remained constant, at about 40 per year, from the mid-2000s to 2019. The trend in ABC publication is shown in Figure 5.1.

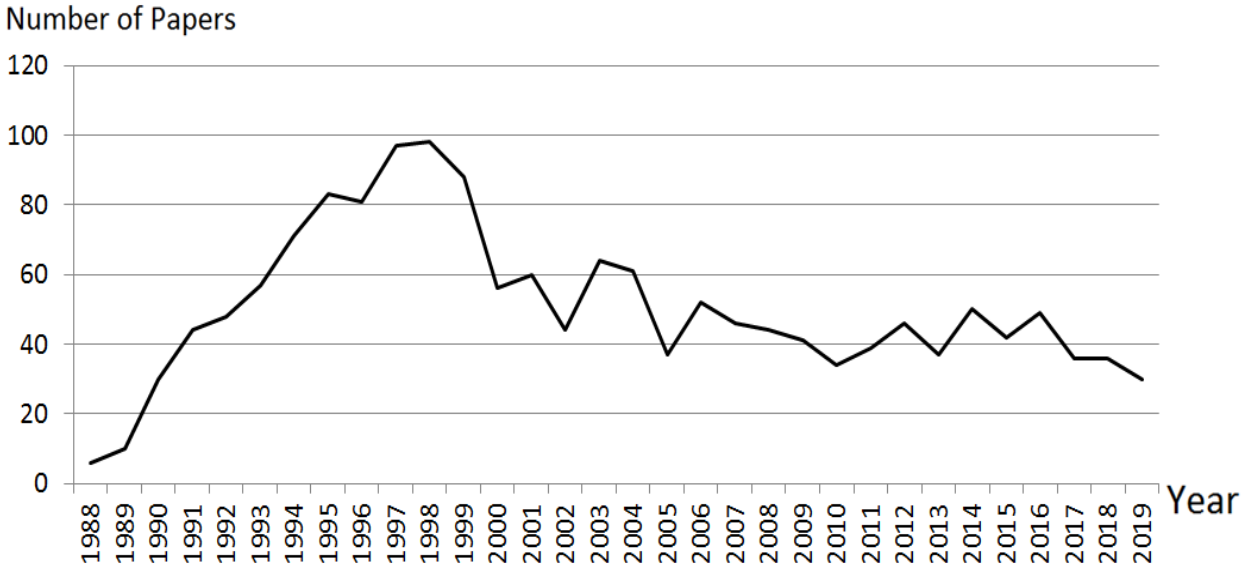

Figure 5.1: Number of ABC articles published over the years

In terms of the fields in which ABC articles appeared over the years, business management journals were the most common type of journal to feature ABC articles (897 out of 1,617, or 55%, as shown in Figure 5.2); specifically, 522 articles (58% appeared in management accounting journals, 220 articles (25%) appeared in general accounting journals and 155 articles (17%) appeared in general management journals.

[3] There were books introducing ABC published in the late 1980s; however, the focus of this analysis is journal articles, and thus, books are not included.

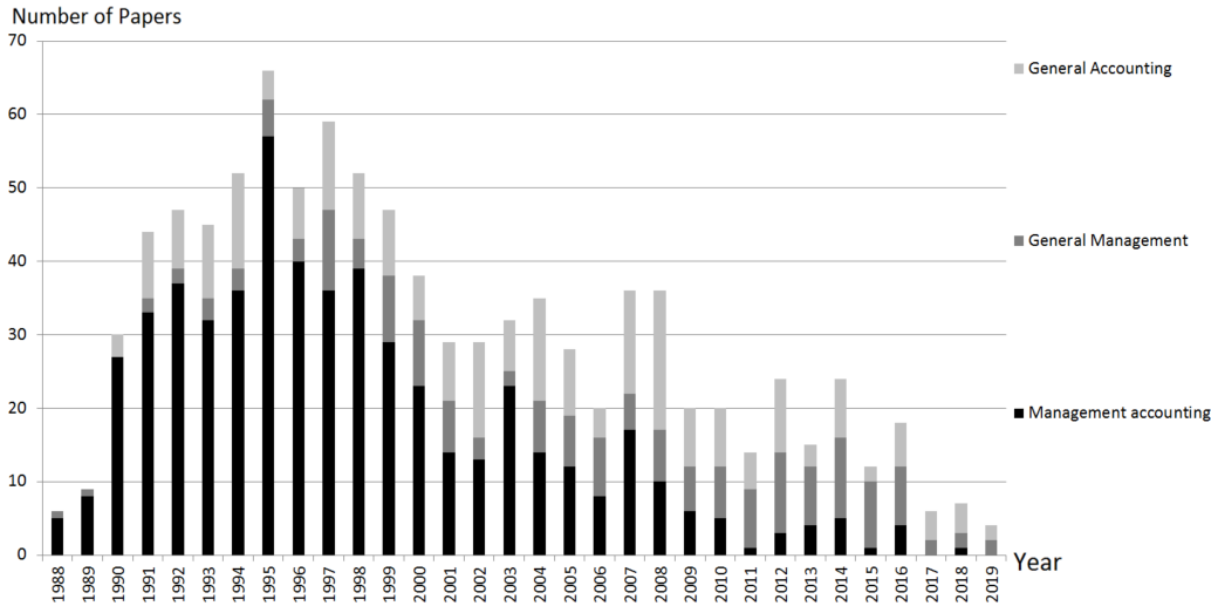

Figure 5.2: Volume of ABC publications in business management fields over the years

As can be seen from Table 5.2, the remaining 724 articles (45%) were published in non-business management journals scattered across various fields, including bio/medical, agriculture, food/grocer, education, energy/environment, library science journals and public journals, among others. Within these fields, biomedicine dominated, with a total of 378 papers, accounting for 52% of the total ABC articles in non-business management journals. Following this, the number of articles in food/grocer journals was the second largest, with 129 (18%). The remaining non-business management journal types made up less than 9% of the total papers in non-business management journals.

Table 5.2: Volume of ABC publications in non-business management fields over the years

Non-Business Management Journals												
Year	Agric-ulture	Bio-medical	Edu-cation	Energy/ Environment	Engin-eering	Food/ Grocer	Library Science	Public	Science	Social	ETC	**Total**
1988												0
1989									1			1
1990												0
1991												0
1992			1									1
1993		2	2			7				1		12
1994			1			17	1					19
1995		1	2			14					1	18
1996		11	1			14	1	4				31
1997		11		1		21	2	3				38
1998		15	2	5		18	1	3		1	1	46
1999		12	3	7		11	2	5	1			41
2000		7		3		4	2	2				18
2001	1	12	1	4		8	1	4				31
2002		6	1			4		4				15
2003		15	1	3		2	6	4			1	32
2004		18	1	3		2	2			1		27
2005		7			1	1		2	1			12
2006		20	1	1		4	4	2				32
2007		10	2					3				15
2008		12		1			1					14
2009		14	1	2	1	1	1	2				22
2010		14	1	3								18
2011	2	17	2		2	1	1	1	1	1		28
2012		19	2	3	2		1	1	1	1		30
2013	1	15		3	1			2	3	1		26
2014	2	25	1	3	2		1		1	1		36
2015		19	1	1	2			1	4	2	1	31
2016		31		1	1				1	1	1	36
2017	1	22		5				2		2		32
2018		19		9	1		1	1				31
2019		21	1	4	1							27
Total	**7**	**375**	**28**	**62**	**14**	**129**	**28**	**46**	**14**	**12**	**5**	**720**

The detailed analysis of the volume of ABC publications in business management and non-business management journals revealed some interesting trends. As shown in Figure 5.3, ABC publications proliferated from 1988 to the late 1990s. However, since 1997, the number of ABC publications in business management journals has dropped sharply, while the number of ABC publications in non-business management journals has increased steadily. In 2001, the number of ABC publications in non-business management journals exceeded the number in business management journals. Between 2001 and 2010, some fluctuations were observed in both business management and non-business management journals. In the 2010s, the number of ABC publications in non-business management journals began to exceed the number in business management journals. This evidence shows the spread of ABC (albeit in terms of publication fields) from business management to non-business management. The trends confirm the earlier observation made by Gosselin (2006), who suggests that it is due to the introduction and research on ABC technology that it spread within the business management journals until the 1990s, and then after that date the concept of ABC was introduced and propagated in non-business management journals.

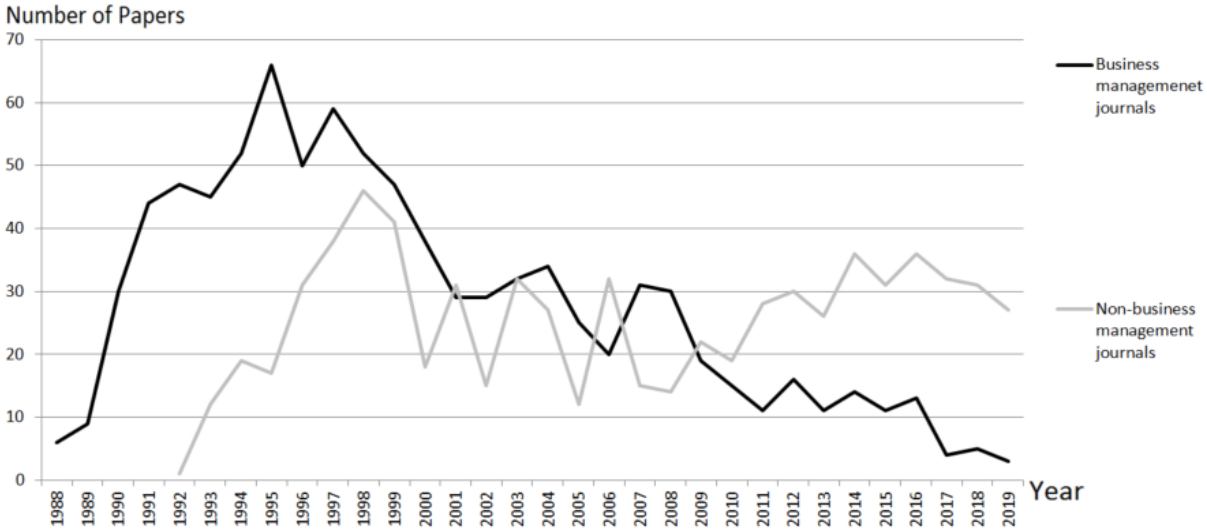

Figure 5.3: Comparison of ABC publications in business and non-business management journals

Another way of investigating the fields of ABC publications is according to the nature of the journals (e.g., academic vs. practitioner). The total number of published ABC

articles according to the nature of the journal in which they were published is shown in Figure 5.4.

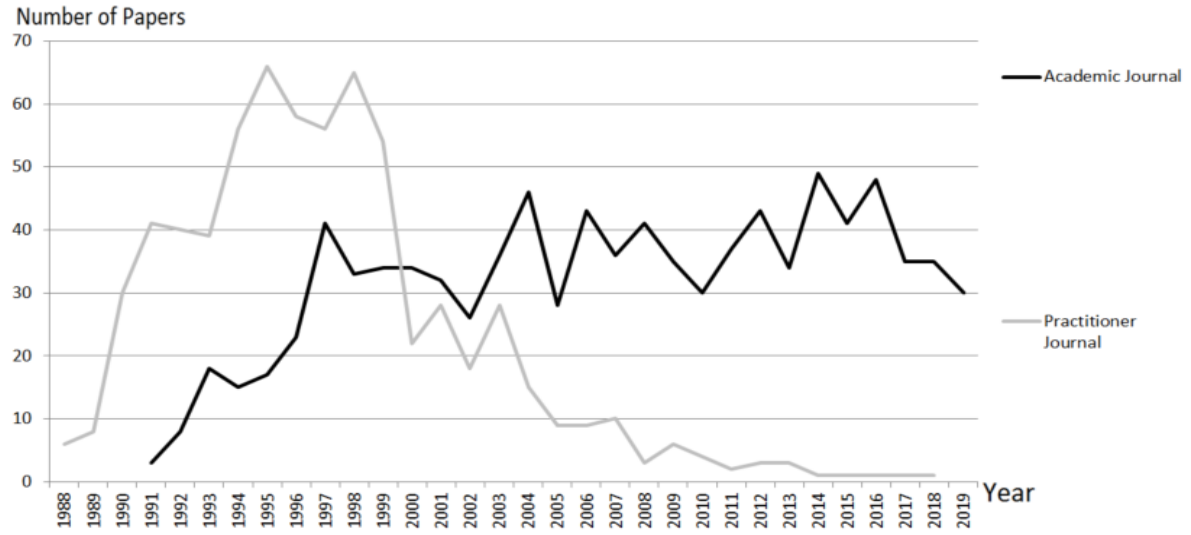

Figure 5.4: Number of ABC publications in academic versus practitioner journals

As can be seen in Figure 5.4, ABC diffusion began in practitioner journals. The spread of ABC in practitioner journals, which began in the late 1980s, dropped sharply in 1998 and steadily declined until 2019, demonstrating a declining interest in ABC. However, the number of publications in academic journals followed the trend of practitioner journals until the late 1990s but has steadily increased since 2000 (in contrast with the decrease in the number of publications in the practitioner journals).

In terms of ABS ratings, within the total of 425 academic business management journal papers, 342 papers were published in journals with ABS ratings in business management fields. In terms of the rankings, 49 papers (14% of ABC academic business management papers) were published in 4-star journals, 137 (40%) in 3-star journals, 97 (29%) in 2-star journals and 59 (17%) in 1-star journals. During the period of 1988 to the middle of 2000, ABC papers appeared mainly published in 3-star journals, but since then, there are no features that stand out in terms of rankings. This can be seen in Figure 5.5.

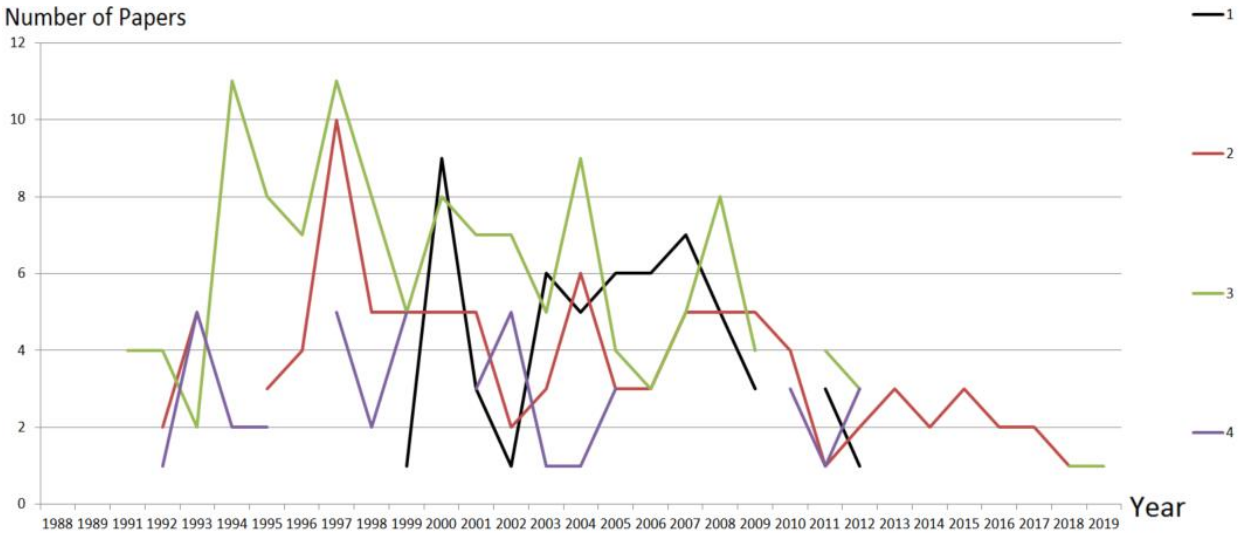

Figure 5.5: Number of ABC academic business management journal publications according to ABS rating

Although the interest of academic journals in ABC has steadily increased, the ABS ratings showed that in the 1990s, there were many publications in major academic journals with 2–4 stars publishing articles about ABS, similar to the publishing trends of the practitioner journals mentioned above. This analysis is based on a categorisation of 3- to 4-star journals being considered major journals and 1- to 2-star journals being considered minor journals. Until the late 2000s, ABC content was mainly published in major journals, but the star rating associated with journals publishing about ABC then gradually declined. Since 2010, there have been few ABC-related publications in major journals, with most being published in minor journals. This shows that the influence of academic journals in relation to academics and consultants has decreased since 2010.

Looking more closely at the nature of the publications in business management journals provides further clues about how ABC has been diffused. ABC articles in both general management articles (140 out of 155 articles, or 90%) and general accounting journals (186 out of 220 papers, or 85%) were published in academic journals. In contrast, in management accounting journals, only 99 of the 522 ABC articles (19%) were published in academic journals, and the rest (81%) were published in practitioner journals.

As shown in Figure 5.6, it is further evident that practitioner journals in management accounting led the way in terms of the initial publications related to ABC from 1988 to 2000. This is because, at the beginning of ABC, ABC research was led by academics such as Cooper and Kaplan and consultants whose papers appeared in practitioner journals.[4] Since the mid-2000s, interest in ABC has steadily spread to general accounting and general management, as shown in the growing publication of ABC papers in these journals. These papers mainly studied the possibility of coexistence and comparative analysis with other accounting and management techniques. This finding confirms Innes et al.'s (2000) suggestion that earlier ABC studies were very much prescribed in nature and led by consultants, whereas later studies were broader in scope and focussed more on academic and organisational issues.

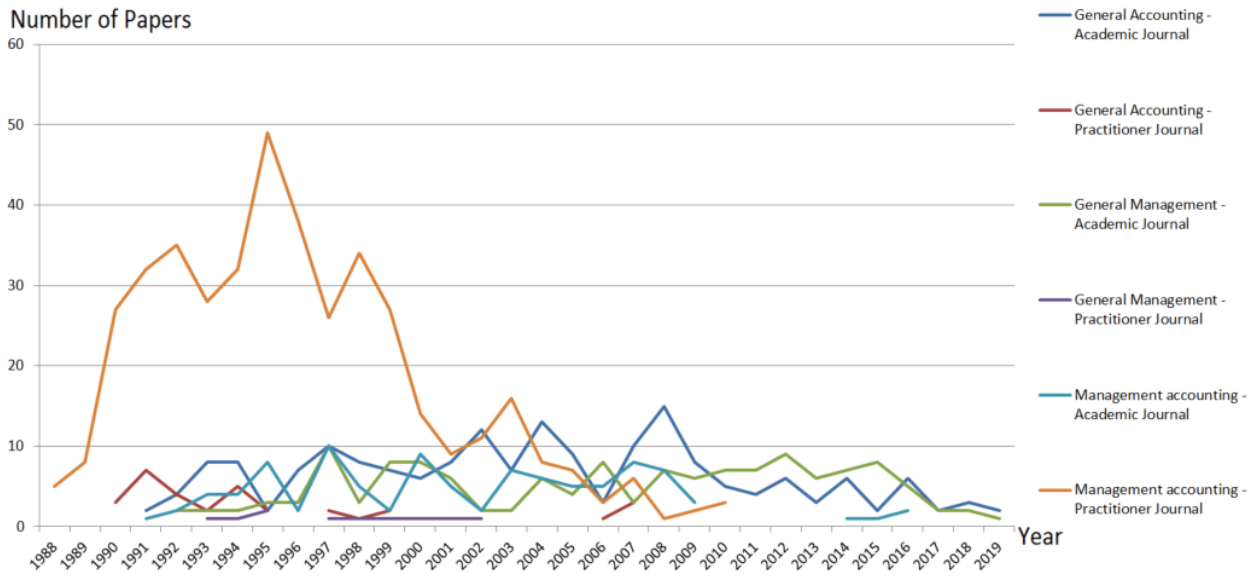

Figure 5.6: Number of ABC publications according to field and type of journal

Taking a closer look at non-business management journals, many ABC-related articles in journals of the food/grocer field were found until the late 1990s. Compared to other fields, food/grocer journals had more initial interest in ABC until the late 1990s; however, this dropped sharply from 1997. What is unusual is that in the case of all non-business management papers except those in the food/grocer field, academic journals published more papers than did practitioner journals; in the

[4] Many ABC papers appeared in three practitioner-based management accounting journals, including the *Journal of Cost Management* and the US and UK versions of *Management Accounting*, all of which were publications of management accounting professional bodies in the US and UK.

food/grocer field, more ABC papers were published in practitioner journals than in academic journals. This is because among food/grocer journals, *Frozen Food Age* and *Progressive Grocer*, which are practitioner journals, published a large number of ABC papers. Since the early 1990s, ABC-related papers were published in practitioner journals of the food/grocer field, and as in the practitioner journals of the management field, in the early 2000s, publishing sharply declined.

In addition to the popularity of ABC in the food/grocer field, it was observed that the most prominent feature among the non-business management journals was the number of publications in bio/medical journals. As mentioned earlier, bio/medical journals recorded more ABC publications than did general management journals and general accounting journals (see Table 5.3). A large number of ABC-related papers were published in bio/medical academic journals, with a steady increase from the early 2000s to 2019. While most non-business management journals published fewer than 10 ABC papers per year, the publication rates of ABC papers in bio/medical journals increased steadily, with more than 20 papers published in 2019. This can be seen in Figure 5.7.

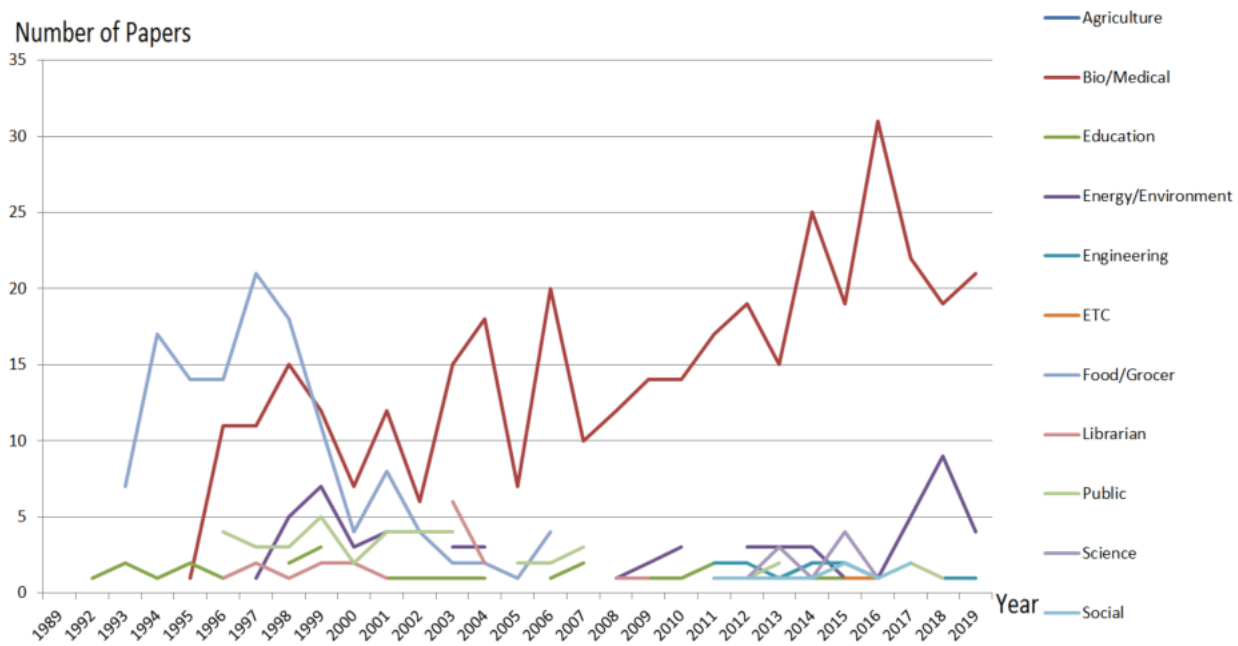

Figure 5.7: Number of ABC publications in non-business management fields

Table 5.3: Number of academic and practitioner ABC papers in non-business management journals

	Academic Journal	Practitioner Journal	Grand Total
Agriculture	3	4	7
Bio/medical	337	38	375
Education	23	5	28
Energy/Environment	43	19	62
Engineering	14		14
Social	11	1	12
Food/Grocer	5	124	129
Library Science	24	4	28
Public	31	15	47
Science	14		14
ETC	3	2	5
Grand Total	**508**	**212**	**720**

5.3.1.2 Journal Characteristics (TDABC)

Since the first TDABC paper was published in 2004, a total of 257 papers were published up until 2019. The ABC and TDABC comparative appeared around 2004, and the number of publications steadily increased since 2004. Since the beginning of 2009, the number increased sharply; the number of publications increased sharply every year thereafter, and more than 40 TDABC papers were published in 2019. The total number of publications is shown in Figure 5.8.

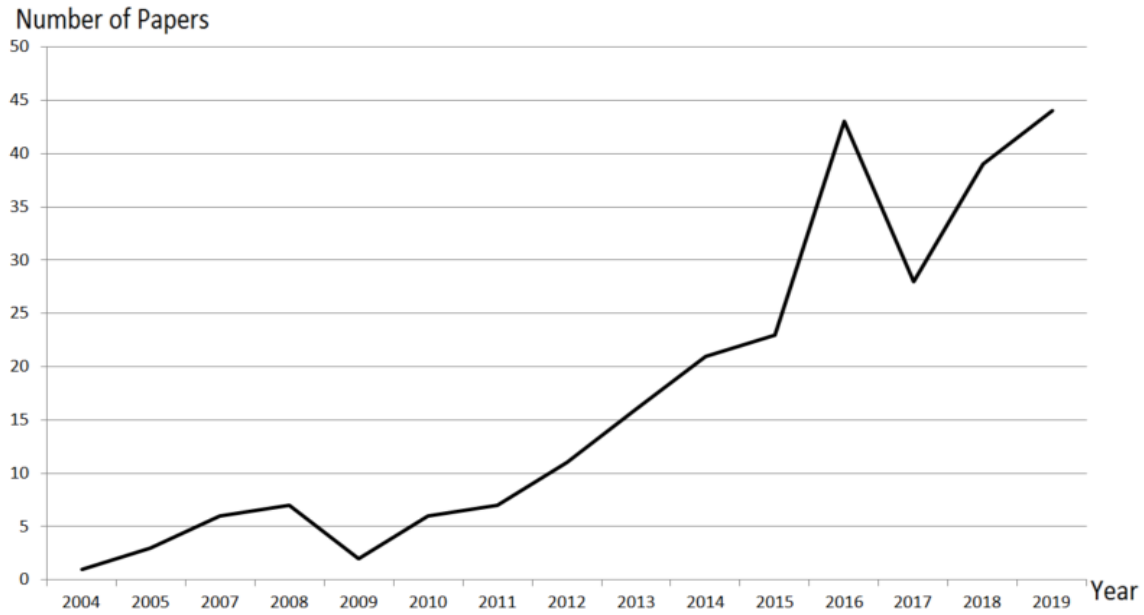

Figure 5.8: Number of publications of TDABC papers

Unlike ABC, for which 55% of all papers were published in business management journals, only 57 (22%) of the TDABC papers were published in business management journals (including general management, general accounting and management accounting journals; see Figure 5.9). Among them, 21 were published in management accounting journals (36%), and 18 were published in general accounting journals and in general management journals (32% each). As can be seen in Table 5.1, the remaining 200 (78%) were published in non-business management journals, with 176 papers of the 200 (88%) appearing in bio/medical journals. Bio/medical journals published the largest number of TDABC papers among all journal types (Figure 5.10). These results support the article by Keel et al. (2017), whose results concluded that the number of TDABC publications in the bio/medical field has steadily increased, and the majority of articles deal with the cost of surgery and operational improvements.

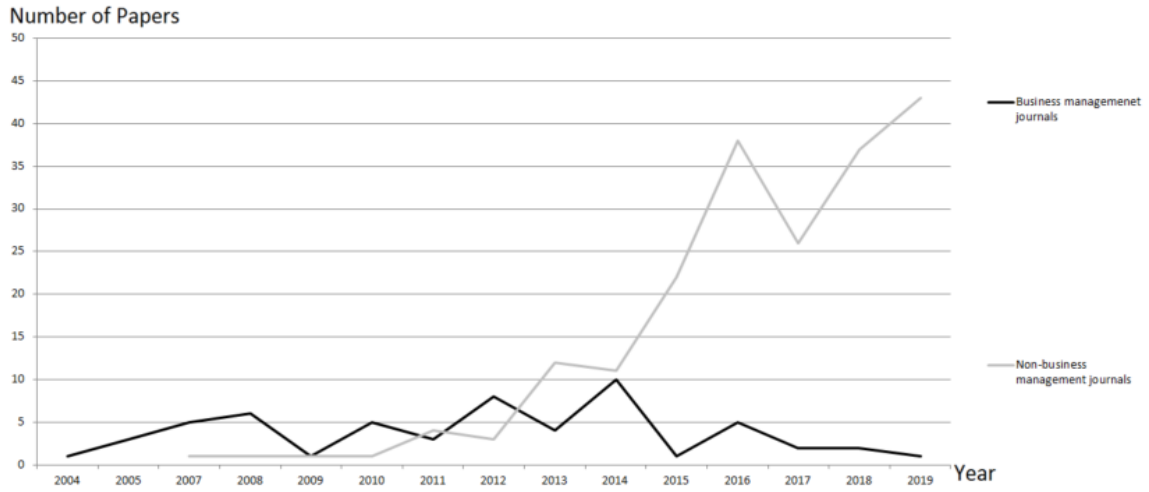

Figure 5.9: Comparison of TDABC publications in business and non-business management journals

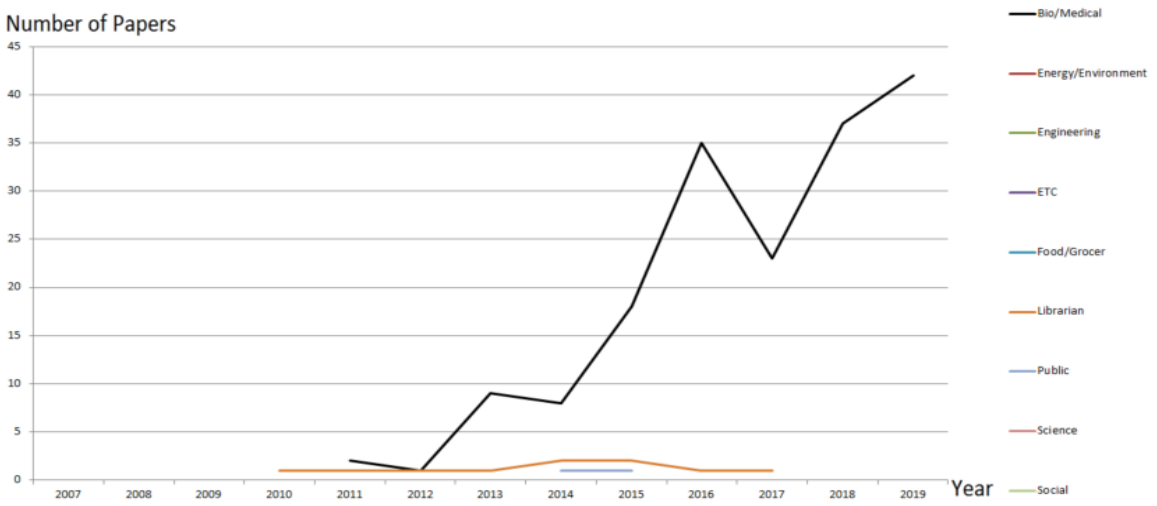

Figure 5.10: Number of TDABC publications in non-business management fields

The publication of TDABC papers started in business management journals in 2004 and has since spread mainly in business management journals. TDABC articles have been published steadily in business management journals, although fewer than 10 papers a year have been published nearly every year until 2019. In contrast, the number of TDABC publications in non-business management journals exploded in the 2010s. Considering that most non-business management journals are bio/medical journals, the surge in the number of TDABC publications is mainly due to the spread of TDABC in bio/medical journals.

The number of publications can be subdivided according to the characteristics of each journal, which can be seen in Figure 5.11, which demonstrates the number of publications in academic versus practitioner journals.

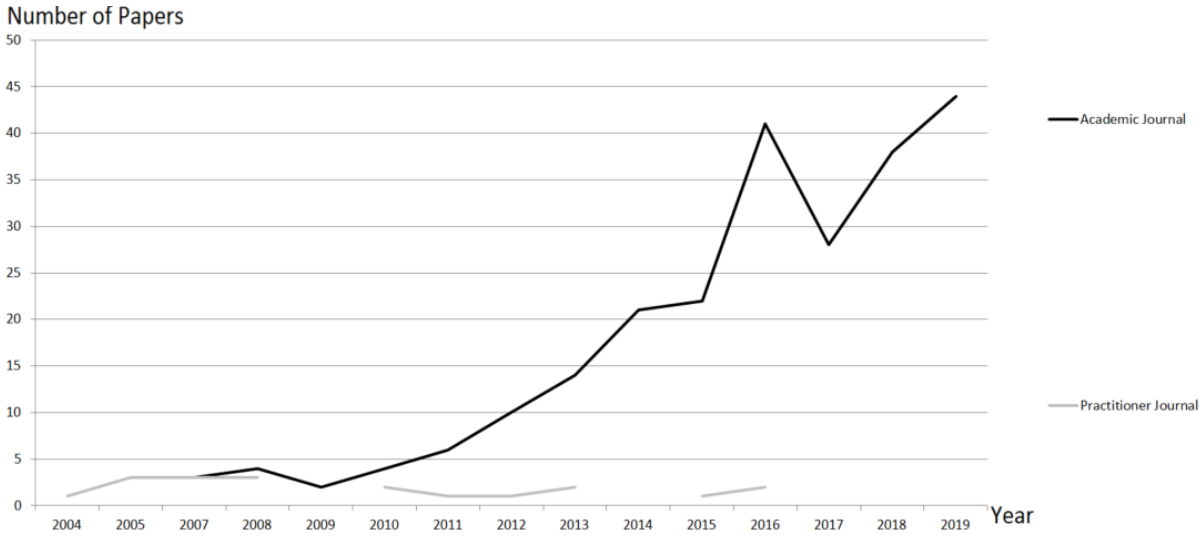

Figure 5.11: Number of TDABC publications in academic and practitioner journals

By comparing Figure 5.4 with Figure 5.11, a big difference between ABC and TDABC publication trends can be seen. In the case of ABC, at the time of its appearance, numerous articles were published in business management journals. Practitioner journals were the most active at first, but a number of papers were subsequently published in academic journals. In other words, the role of practitioner business management journals was the most important in the spread of ABC. TDABC diffusion, however, was completely different from ABC diffusion. Although TDABC appeared in practitioner business management journals, the role of business management and practitioner journals in the diffusion do not explain the explosion of publications in non-business management journals, among which almost all the journals were academic. This is due to the fact that bio/medical journals are almost all classed as academic.

In terms of the ranking of academic journals among business management journals, 30 of the 57 TDABC articles (53%) were published in journals with a ranking of higher than 1 star. By rankings, among the star-rated academic business management journals, 1 paper (3% of TDABC academic business management papers) was published in a 4-star journal, 14 (47%) a 3-star journal, 10 (33%) in a 2-

star journal and 5 (17%) in a 1-star journal. In the case of ABC, it was covered in major journals in the early stages of its spread, but TDABC has not been covered in major journals so far. This is because most TDABC papers are being published in bio/medical journals, not business management journals.

5.3.1.3 Results of Journal Characteristics Analysis

The introduction and diffusion of the concept of ABC was led by practitioner management accounting journals in the field of business management. During this period, ABC papers mainly focussed on ABC itself and on the encouragement of its application. Since that time, the main stream of ABC publishing has changed from management accounting journals to general accounting and management journals. Then, the use of ABC—such how ABC is applied and whether it can coexist with other accounting and management techniques—was the main focus rather than ABC itself. After 2010, the number of papers in non-business management journals exceeded that in business management journals.

The emergence and diffusion process of TDABC has been distinctly different from that of ABC. ABC began to spread mainly in business management accounting practitioner journals; then, it spread to general accounting and management academic journals. Last, it spread to non-business management academic journals. ABC was developed for its ease of application, and TDABC, which uses time as a driver of ABC's basic concept, was developed to suit this application. According to empirical analysis, most successful cases of TDABC application have been reported in organisations where the measurement and management of the service time of HR are important. TDABC is spreading intensively in the field of biomedicine, which suits the characteristics of TDABC.

In the analysis of the ABS ratings, the impact of academic journals publishing about ABC and TDABC is declining. From the 1990s to the 2000s, ABC publications were mainly published in major journals, with star ratings of 3 to 4 stars; however, in 2010, they were mainly published in non-major journals, with less than 2 stars. Similar trend is observed in TDABC, which was published mainly in non-major journals of less than 2 stars.

These findings support the results of previous studies. According to Gosselin (2006), ABC papers published from 1995 to 2000 covered topics such as the procedure and software used in ABC application and the combination of ABC with other management tools. Another feature of this period is that papers highlighting ABC application were published in specific industries. In particular, ABC was discussed in the practitioner journals of each industry. According to Lawson (2005), since the mid-1990s, many academics have emphasised the potential benefits to healthcare organisations of the adoption of ABC (Chan, 1993; Ramsey, 1994; Udpa, 1996). According to him, these proposals were not ignored and gradually spread from health maintenance organisations to hospitals to insurers. This study's literature analysis confirmed Lawson's observations, more noticeably even in the trends of TDABC. Since 2010, many bio/medical journals have published papers on TDABC (e.g., Lim et al., 2011; Lee and Enzmann, 2012; Öker and Özyapici, 2013; Huang et al., 2014; Chen et al., 2015; Yun et al., 2016). The spread of ABC and TDABC in non-business management fields has seen an active and slightly upward trajectory.

5.3.2 Authorship Aspect

Table 5.4 shows the results of the authorship aspect analysis. The ABC findings are explained first, followed by those of TDABC.

Table 5.4: Total number of ABC and TDABC articles surveyed in author analysis

	ABC			**TDABC**			**Total Academic Author**	**Total Consultant Author**	**Total Practitioner Author**
	Academic Author	**Consultant Author**	**Practitioner Author**	**Academic Author**	**Consultant Author**	**Practitioner Author**			
Business Management Journal	**560.1**	**267.6**	**69.4**	**46.8**	**8.3**	**1.8**	**606.9**	**275.9**	**71.2**
Academic Journal	392.4	18.5	14.2	36.7	3.0	1.3	429.1	21.5	15.5
Practitioner Journal	167.7	249.1	55.2	10.1	5.3	0.5	177.8	254.4	55.7
Non-Business Management Journal	**188.0**	**60.7**	**471.3**	**39.4**	**2.6**	**158.0**	**227.4**	**63.3**	**629.3**
Academic Journal	172.8	15.1	320.1	38.9	1.4	155.7	211.7	16.5	493.8
Practitioner Journal	15.2	45.6	151.2	0.5	1.2	2.3	15.7	46.8	153.5
Total	**748.1**	**328.3**	**540.7**	**86.2**	**10.9**	**159.8**	**834.3**	**339.2**	**700.5**

5.3.2.1 The Authorship Aspect (ABC)

In this section, authors whose positions were unclear were assumed to be in a position that agreed with the type of content they published (e.g., an author writing consultant content was assumed to be a consultant). Also, if there were authors in several positions who contributed to the same paper, the number of papers was divided by the number of author positions.

Academic authors published more papers (748.1; 46%) than did consultant authors (328.3; 20%) or practitioner authors (540.7; 34%). The publishing of ABC papers was led by academic and consultant authors until the late 1990s. However, the number of papers published by academic and consultant authors decreased sharply after 1998, and since the mid-2010s, practitioner authors began to lead the other two in terms of number of publications. By the mid-2000s, all three author types had similar descent publishing patterns, but since then, the practitioner authors again increased in their number of publications, as opposed to the other two author types. This is because the authors of bio/medical papers, which make up the bulk of the non-business management fields, are mainly medical doctors who use ABC to calculate the cost of surgery. The number of publications by authorship is shown in Figure 5.12.

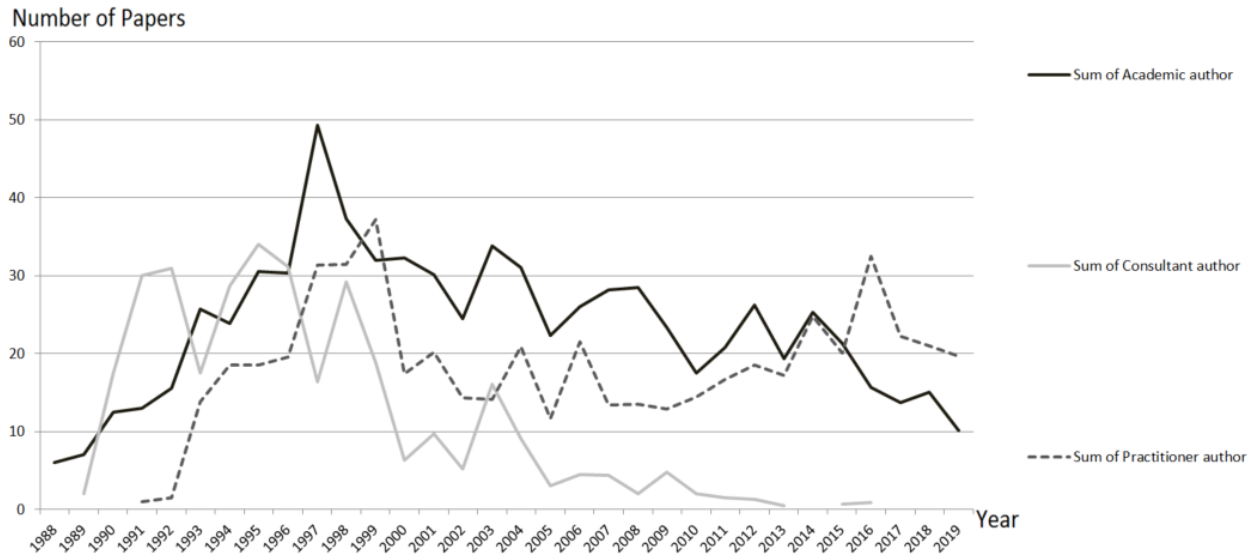

Figure 5.12: Number of ABC publications by authorship

When looking at the publication fields (i.e., business management versus non-business management journals), ABC authorships exhibited the following

characteristics. In the field of business management, consultant authors published more ABC papers than did academic or practitioner authors until the mid-1990s, but since then, the number of publications has decreased sharply. From the late 1990s, the number of publications by all three authorships has steadily decreased. This can be seen in Figure 5.13.

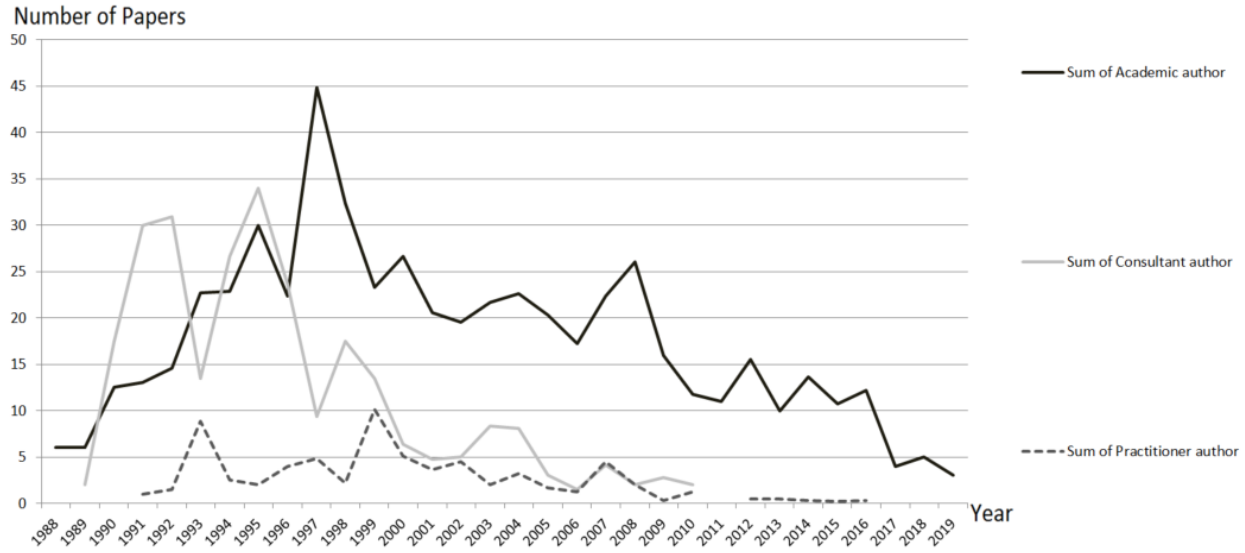

Figure 5.13: Number of ABC publications by author type in the business management field

The non-business management field is different than the business management field. The overall number of ABC publications by practitioners has been decreasing since the late 1990s. However, since the 2000s, while the number of publications by practitioners has decreased in the business management field, this number has steadily increased in the non-business management field. This is due to publication in the non-business management field, particular in the bio/medical field. This can be seen in Figure 5.14.

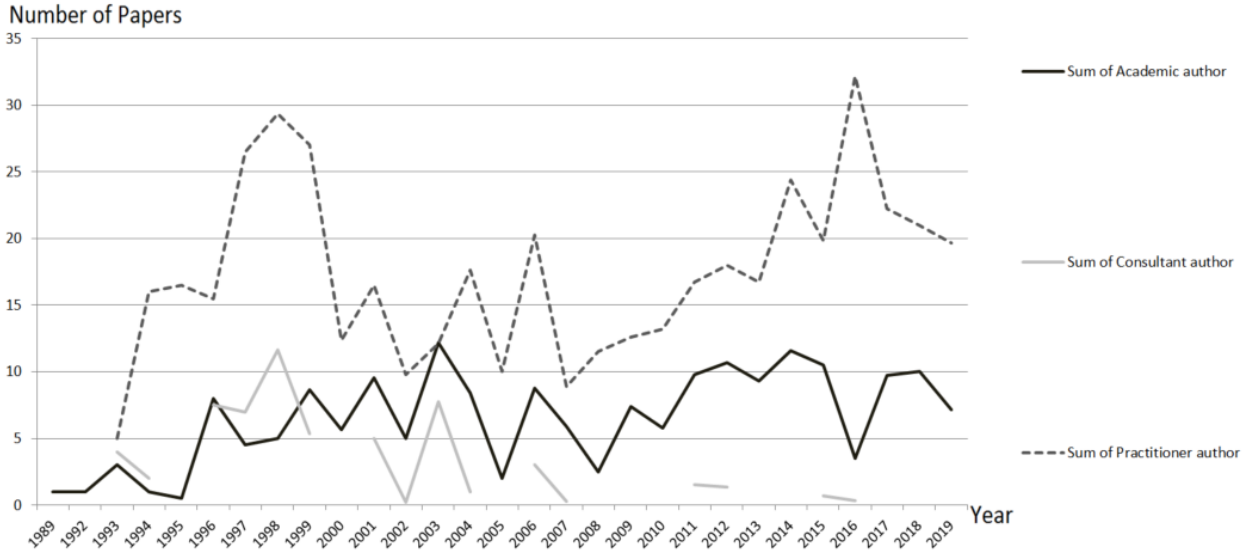

Figure 5.14: Number of ABC publications by author type in the non-business management field

From the analysis of the nature of the journals, it can be seen that the number of ABC publications in academic journals began to surpass those in practitioner journals in the year 2000. The reason for this may be that the academic authors who previously published in practitioner journals moved to academic journals. It may be also explained that academics have been encouraged to publish in academic rather than practitioner journal due to academia paying-off mentality and journal lists fetishism (e.g. Willmott, 2011; Gendron, 2015; Hussain, 2015; Hussain et al., 2020).

Figure 5.15 shows the authors' positions for each type of journals. The number of articles by academic authors published in academic journals steadily increased starting in 1991 but stopped increasing in the mid-2000s. The number of papers by practitioner authors published in practitioner journals during the same period increased sharply after the beginning of 1988 but then dropped sharply after 1998. The number of papers by academic authors published in practitioner journals has decreased gradually since 1997. After 2000, academic authors have published in practitioner journals at the level of less than 10 papers per year, and after 2007, academic authors have rarely published in practitioner journals. In contrast, the number of papers published by practitioner authors in academic journals has been steadily increasing since 1992.

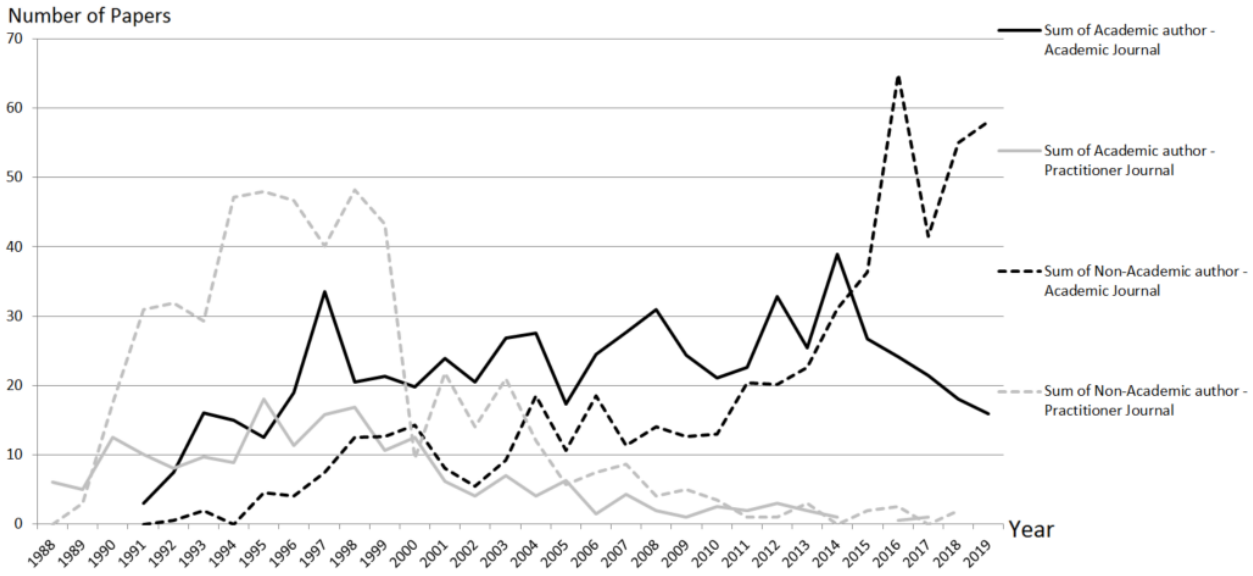

Figure 5.15: Number of ABC publications according to type of author and journal

As a result, there were publications by both academic and practitioner authors in academic journals, but on the contrary, there were few publications by both academic and practitioner authors in practitioner journals. The number of publications by practitioner authors in academic journals has increased. The reason for this is that, among the non-business management journal articles that have been published since the late 2000s, the authors of bio/medical journal articles—which make up the majority of the non-business management journals—are practitioners such as medical doctors, and bio/medical journals are classified as academic journals.

5.3.2.2 The Authorship Aspect (TDABC)

Practitioner authors have published more TDABC papers (159.8; 62%) than have academic authors (86.2; 34%) or consultant authors (10.9, 4%). This can be seen in Figure 5.16.

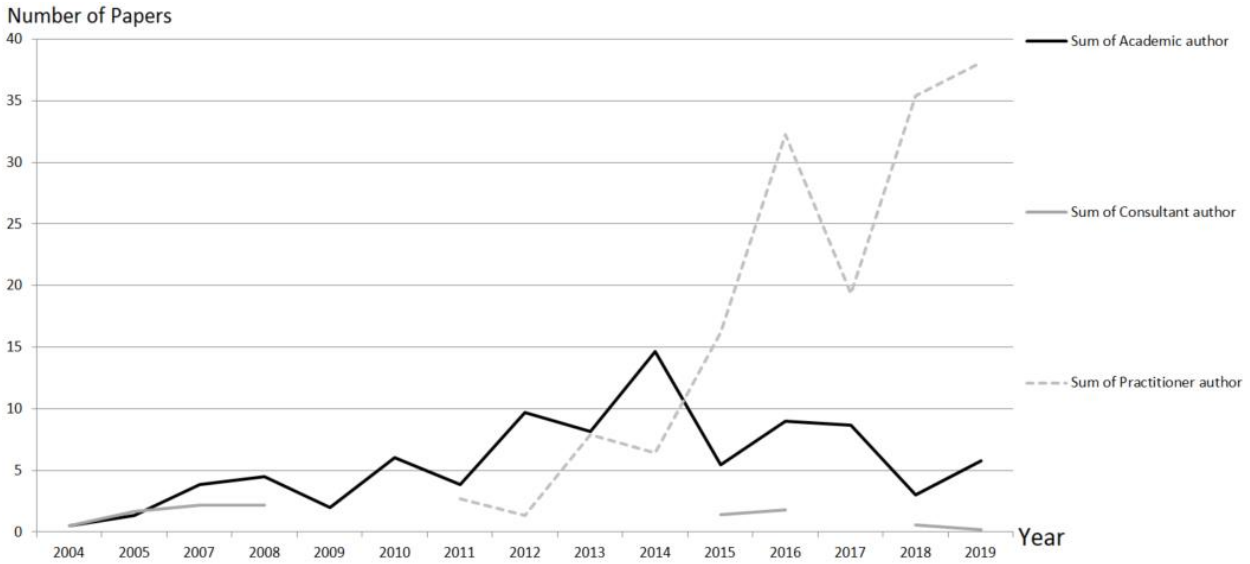

Figure 5.16: Number of TDABC publications by authorship

In terms of the publishing field (i.e., business management versus non-business management journals), TDABC authors showed different characteristics than did ABC authors. In the field of business management, consultant and practitioner authors had a very small number of publications, and most publications were led by academic authors. This can be seen in Figure 5.17. However, the total number of publications was very low compared with the number of publications of the non-business management field, which will be described next.

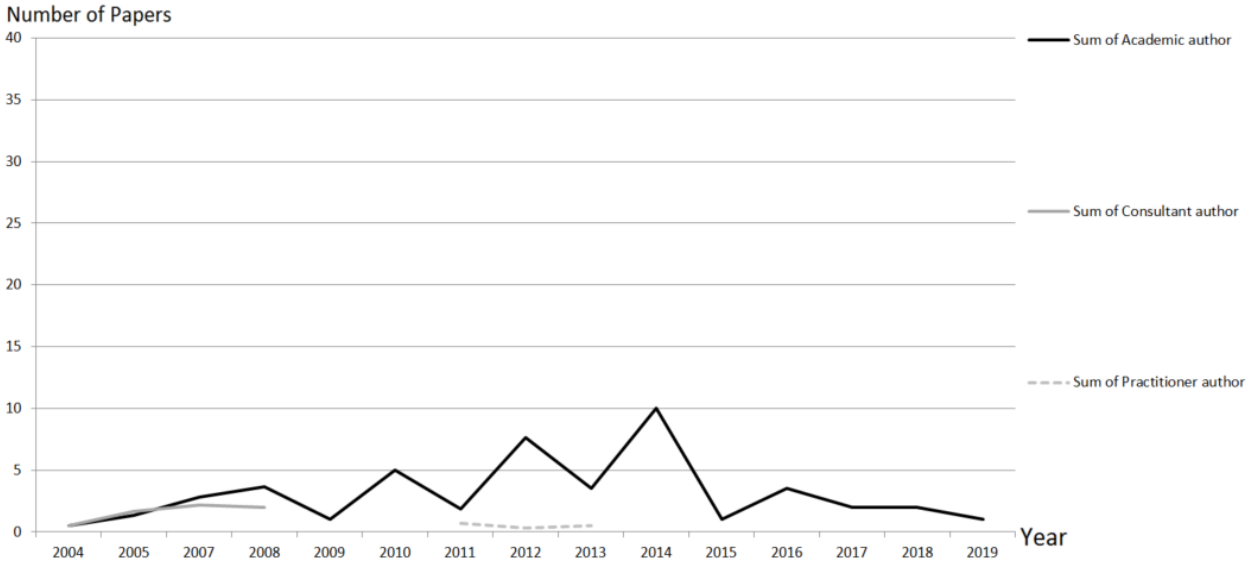

Figure 5.17: Number of TDABC publications by author type in the business management field

The trends in the non-business management field were different from those of the business management field. The number of publications of academic and practitioner authors has continued to increase in publications in the non-business management field; in particular, the number of publications by practitioner authors sharply increased in the 2010s. The number of consultant authors was very low in both the business management and non-business management fields. This seems to be due to the bio/medical field, in which practitioner medical doctors were the most common authors in terms of TDABC publications. This can be seen in Figure 5.18.

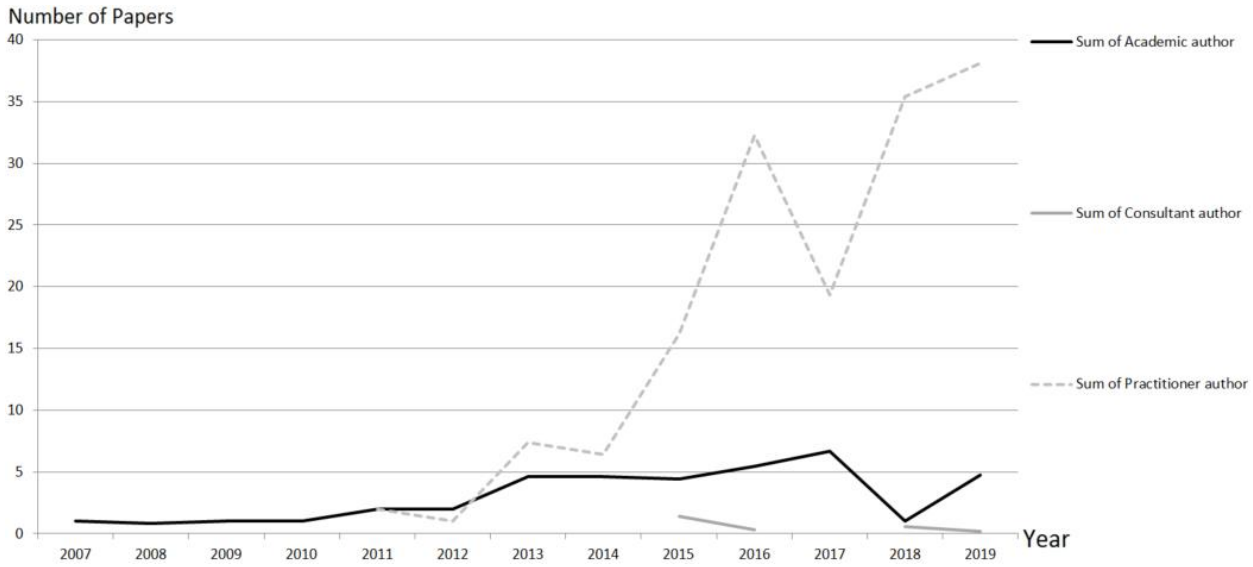

Figure 5.18: Number of TDABC publications by author type in the non-business management field

5.3.2.3 Comparing the Authorship Aspect (ABC versus TDABC)

Following an analysis of ABC and TDABC together, the number of academic, consultant and practitioner authors published in academic journals and practitioner journals is shown in Figure 5.19 and Figure 5.20 below. In the case of practitioner journals, the number of publications by consultant and practitioner authors has decreased rapidly since 1998, as described below. This number steadily decreased from 2000 to 2019, with only three papers being published per year after 2010. The number of publications by academic authors in practitioner journals has also steadily declined since 1997, with up to five papers per year being published since the mid-

2000s. The number of publications in practitioner journals by both academic and practitioner authors has also decreased. This can be seen in Figure 5.19.

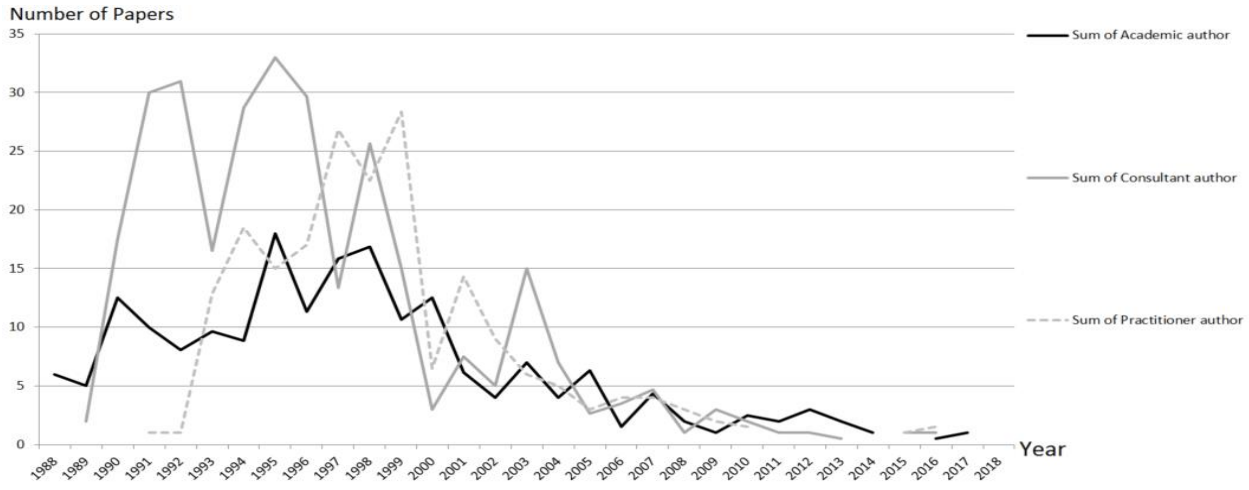

Figure 5.19: Number of publications in practitioner journals by both academic and practitioner authors

However, in comparison with practitioner journals, the opposite was true in the case of the academic journals. For consultant authors, unlike practitioner authors, the number of publications in academic journals was very small. The number of publications by academic authors in academic journals has steadily increased since 1989, with around 25 publications per year from the mid-2000s. The number of publications by practitioner authors in academic journals has also increased steadily since 1991 to more than 30 publications since 2014. The number of publications in academic journals by both academic and practitioner authors has also increased. This can be seen in Figure 5.20.

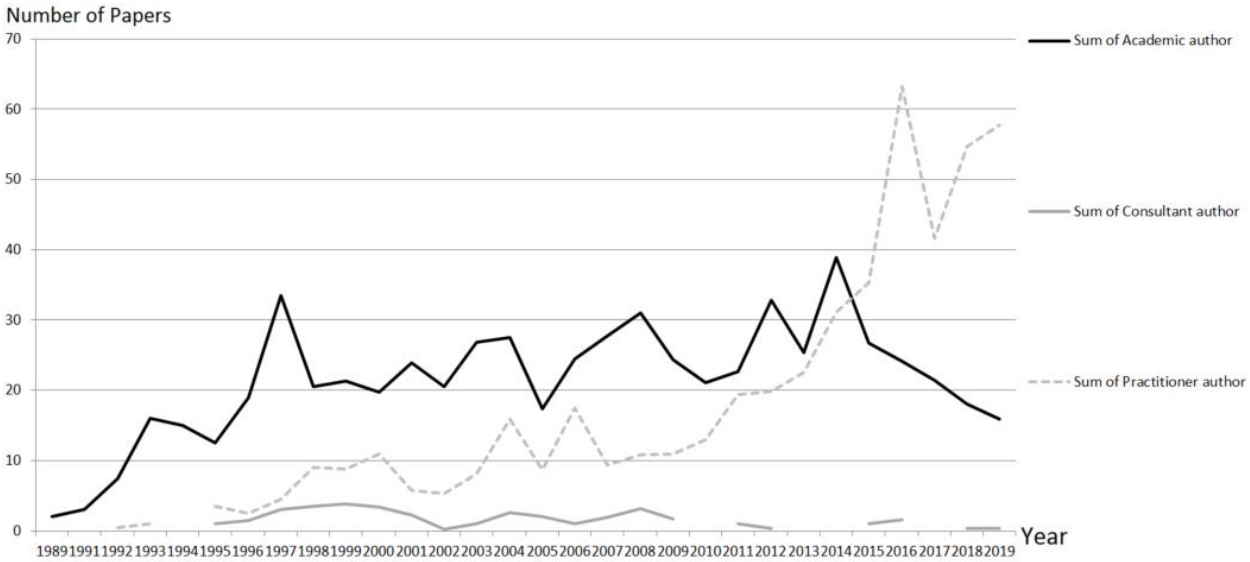

Figure 5.20: Number of publications in academic journals by both academic and practitioner authors.

In addition, publications about TDABC, unlike those about ABC, were mostly published in bio/medical journals. The analysis demonstrated that there were three prominent TDABC diffusion champions: Kaplan (29 articles) and Anderson (7 articles), the founders of TDABC, as well as Feeley (15 articles). Feeley is a Senior Fellow at Harvard Business School and Professor Emeritus at the University of Texas MD Anderson Cancer Center. Since Kaplan and Anderson introduced the concept of TDABC, Kaplan has worked with Feeley in almost all of his papers. As Kaplan publishes with Feeley, the diffusion of TDABC in the bio/medical field is continuing to develop.

5.3.2.4 Summary of the Authorship Aspect

Many articles were published by consultants in the early stages of ABC development, and many papers by consultant authors were published in practitioner journals, including those promoting the application of ABC. However, as has been verified in many papers in the 2000s, the practical application of ABC has not been as popular as expected, and ABC has often been abandoned after its adoption. After that, consultant authors gradually stopped publishing articles about ABC, but academic authors steadily expanded the concept of ABC, developed it, applied it to other fields and kept publishing ABC papers. Since the mid-2000s, there has been an increase

in the number of ABC publications by practitioners because the main authors of bio/medical articles were medical doctors, who are practitioners.

It is not clear whether it was because consultants' interest in ABC declined, but the number of publications by consultant authors was very small when TDABC was first introduced. In terms of its diffusion, TDABC differs from ABC. In the case of ABC, Kaplan and Cooper worked extensively with practitioner journals and with various academics, consultants and practitioners to diffuse ABC (e.g., Cooper and Kaplan, 1988; Cooper, 1989a, 1989b), but the results were not as expected. However, TDABC, which was created to overcome the shortcomings of ABC, differs in the way it was diffused. Instead of a large number of papers being published by consultants in practitioner journals, TDABC articles have been published by practitioners in the fields in which TDABC is most often applied—notably, by medical doctors in the bio/medical field. In fact, the founders of TDABC, Kaplan and Anderson, each contributed to more than 13 articles in bio/medical journals. This was different from the ABC propagation method used by Kaplan and Cooper.

The results of this analysis indicate that the publishing trends related to ABC and TDABC have shifted from an academic/consultant focus to a practitioner focus. Bjørnenak and Mitchell (2002) studied the authors of ABC articles for the period from the advent of ABC to 2000 and found that 60% of the authors were academics, 25% were consultants and 15% were practitioners. According to Lukka and Granlund (2002), the main authors of ABC's consulting research papers were well-respected members of the academic accounting society.

Although academics and consultants were seen to have published more in these existing studies published in 2002, the findings of this current study—including extended data through 2019—show that practitioners are now publishing ABC and TDABC content most often.

5.3.3 The Content Aspect

The findings related to this aspect are shown in Table 5.5. The findings for ABC are explained first, followed by those for TDABC.

Table 5.5: A glance at the total number of ABC and TDABC articles surveyed in terms of content

	ABC			**TDABC**			**Grand Total**
	Academic Journal	Practitioner Journal	ABC Total	Academic Journal	Practitioner Journal	TDABC Total	
Academic Content	504	80	584	59	4	63	647
Consultant Content	88	388	476	31	14	45	521
Practitioner Content	341	216	557	147	2	149	706
Grand Total	**933**	**684**	**1,617**	**237**	**20**	**257**	**1,874**

5.3.3.1 The Content Aspect (ABC)

Regardless of the authors' positions, the articles were divided according to their content and nature, including academic, consultant and practitioner content. 'Academic content' includes articles written for academic purposes, such as analysing, explaining and understanding ABC/TDABC from a value-neutral standpoint. In addition, the case of action research is included in the academic content category, as are papers that take the position of critiquing ABC/TDABC. 'Consultant content' involves articles explaining to readers how to promote the spread of ABC/TDABC and promoting the merits of ABC/TDABC, rather than being value neutral to ABC/TDABC. These articles often do not follow any specific research methodology and describe the content without using a scientific approach; instead, they are openly prescriptive in nature. 'Practitioner content' refers to content that is neither academic nor consultant content but rather describes the advantages and disadvantages of ABC/TDABC use from the standpoint of users. This content is often seen in papers using ABC/TDABC technology as a research method. Articles featuring the opinions of ABC/TDABC practitioners in practitioner journals are also classified as practitioner content.

In the case of ABC papers, the publication of consultant-content papers increased rapidly until the early 1990s. A total of 160 consultant-content papers were written over the course of six years, up to 1993. Since then, the publication of consultant-content papers steadily declined until 2019. Since 1990, the number of publications of academic-content papers increased every year until the late 1990s. It began to decline gradually in the 2000s, continuing to decline until 2019. A practitioner content paper was published for the first time in 1991, and the number of publications of practitioner-content articles increased annually until the late 1990s, similar to academic-content papers. This content type then showed a gradual decline from the late 1990s to the late 2000s, but it started to rise again after the late 2000s and is now increasing year by year. This seemed to be due to the rise in the number of publications in bio/medical journals that introduced ABC technology to bio/medical industries. There are some articles on ABC technology itself in bio/medical journals, but most of these ABC articles were on the analysis of bio/medical technology prices using ABC, and most authors in bio/medical journals welcomed ABC technology. These trends can be seen in Figure 5.21.

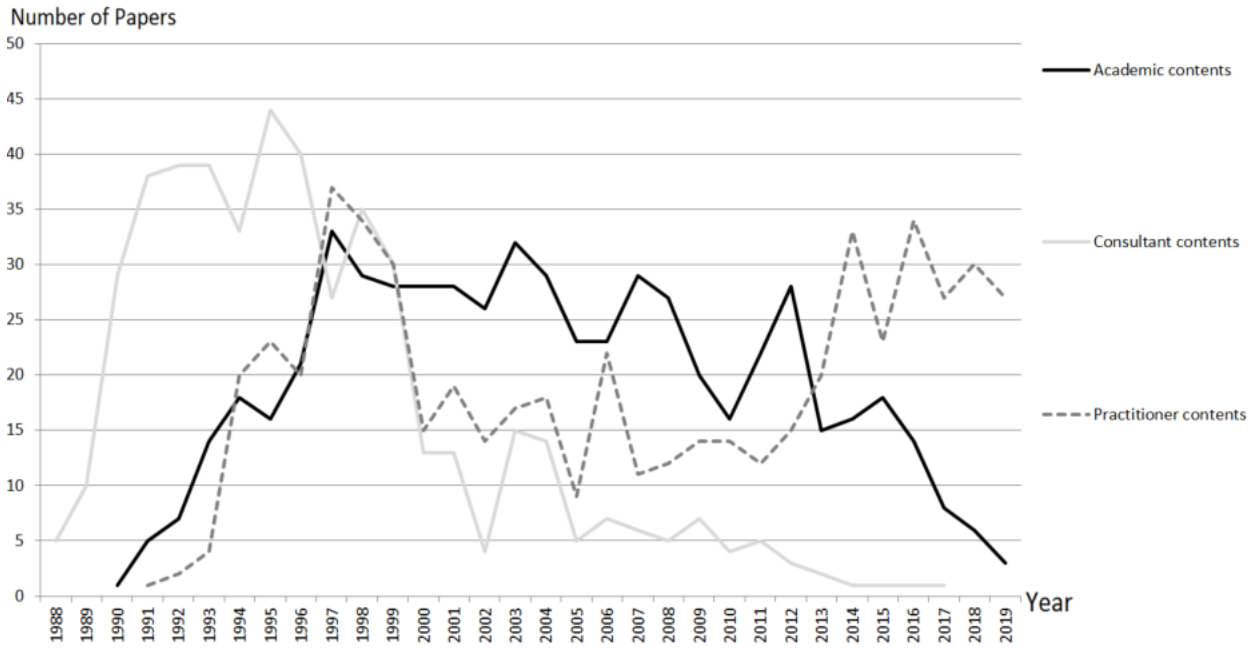

Figure 5.21: Number of ABC publications according to content

In the case of academic journals, academic-content articles were published the most. Of the total 933, the number of academic-content articles was 504 (64%), of

consulting-content articles was 88 (9%) and of practitioner-content articles was 341 (37%). Conversely, more than half of the articles in practitioner journals featured consulting content. Among the 684 papers in practitioner journals, 80 (12%) were academic-content articles, 388 (57%) consulting-content articles and 216 (31%) were practitioner-content articles. As the publication of practitioner-content papers decreased, the number of publications of consulting content also decreased. Although the number of practitioner-content articles decreased due to the decrease in publication in practitioner journals, the number of practitioner-content articles has risen again since the late 2000s, a period when a lot of practitioner-content articles were published in academic journals. This can be seen in Table 5.6.

Table 5.6: Number of ABC publications according to content and type of journal

	Academic Journal				Practitioner Journal			
Year	**Academic Content**	**Consultant Content**	**Practitioner Content**	**Total**	**Academic Content**	**Consultant Content**	**Practitioner Content**	**Total**
1988				0	1	5		6
1989		2		2		8		8
1990				0	1	29		30
1991	3			3	2	38	1	41
1992	5	3		8	2	36	2	40
1993	12	5	1	18	2	34	3	39
1994	15			15	3	33	20	56
1995	11	2	4	17	5	42	19	66
1996	16	6	1	23	5	34	19	58
1997	28	6	7	41	5	21	30	56
1998	22	7	4	33	7	28	30	65
1999	21	9	4	34	7	21	26	54
2000	20	8	6	34	8	5	9	22
2001	22	3	7	32	6	10	12	28
2002	21	1	4	26	5	3	10	18
2003	23	3	10	36	9	12	7	28
2004	27	6	13	46	2	8	5	15
2005	18	4	6	28	5	1	3	9
2006	22	3	18	43	1	4	4	9
2007	27	2	7	36	2	4	4	10
2008	27	5	9	41			3	3
2009	20	3	12	35		4	2	6
2010	15	2	13	30	1	2	1	4
2011	22	4	11	37		1	1	2
2012	28	1	14	43		2	1	3
2013	14	1	19	34	1	1	1	3
2014	16		33	49		1		1
2015	18	1	22	41			1	1
2016	14	1	33	48			1	1
2017	8		27	35		1		1
2018	6		29	35			1	1
2019	3		27	30				
Total	**504**	**88**	**341**	**933**	**80**	**388**	**216**	**684**

5.3.3.2 The Content Aspect (TDABC)

For TDABC, consulting papers first appeared in 2004. Then, until 2011, there were fewer than five consulting and academic articles published each year. However, since the 2010s, the most prominent feature has been the surge in practitioner-content papers, with 4 articles published in 2014, 13 in 2015 and 37 in 2019. This is because most articles in bio/medical journals feature practitioner content.

The diffusion pattern of TDABC papers was very different from that of ABC papers. In the case of ABC, the papers including the initial consulting content played a major role in the spread of ABC in its early stages. However, in the case of TDABC, consulting-content papers did not play an important role in its spread. Instead, practitioner-content papers have overwhelmed the number of publications with other types of content. This can be seen in Figure 5.22.

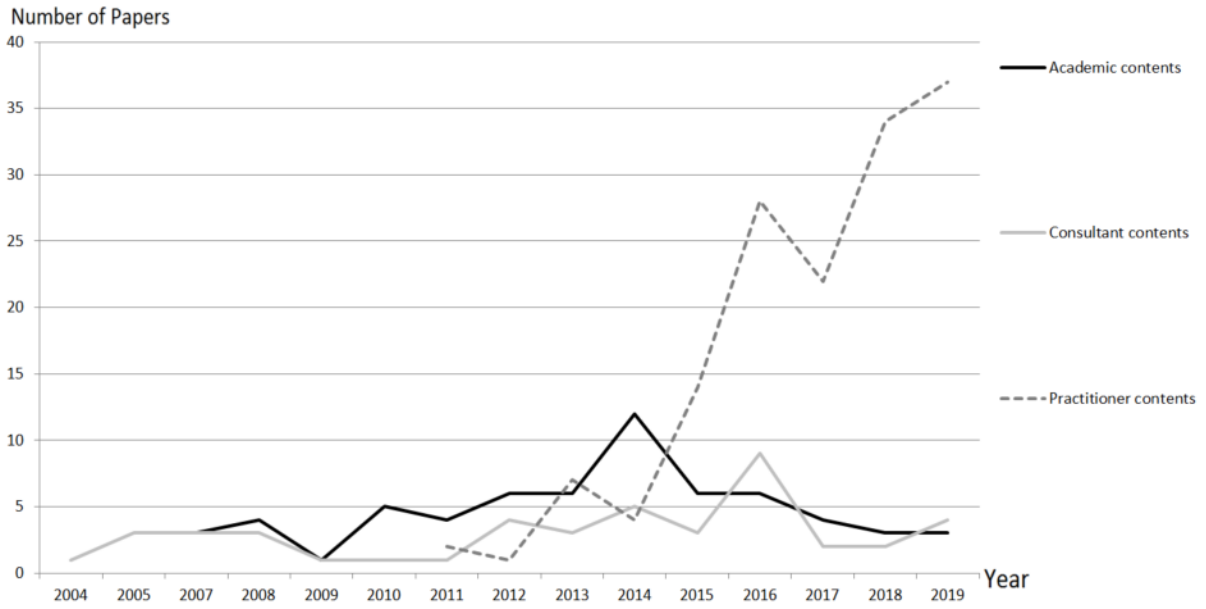

Figure 5.22: Number of TDABC publications according to content.

In terms of the nature of the journal, most articles published in academic journals featured practitioner content, unlike in the case of ABC. Of the total of 237 articles published in academic journals, 59 (25%) were academic-content articles, 31 (13%) were consulting-content articles and 147 (62%) were practitioner-content articles. Conversely, almost all the practitioner journal articles featured consulting content. In TDABC, the number of practitioner-content articles published in academic journals

was large, which is probably because the articles of bio/medical journals were mostly practitioner-content articles. This can be seen in Table 5.7.

Table 5.7: Number of TDABC publications according to content and journal type

	Academic Journal				Practitioner Journal			
Year	**Academic Content**	**Consultant Content**	**Practitioner Content**	**Total**	**Academic Content**	**Consultant Content**	**Practitioner Content**	**Total**
2004				0		1		1
2005				0		3		3
2006				0				0
2007	2	1		3	1	2		3
2008	3	1		4	1	2		3
2009	1	1		2				0
2010	4			4	1	1		2
2011	4		2	6		1		1
2012	5	4	1	10	1			1
2013	6	2	6	14		1	1	2
2014	12	5	4	21				0
2015	6	2	14	22		1		1
2016	6	7	28	41		2		2
2017	4	2	22	28				0
2018	3	2	33	38			1	1
2019	3	4	37	44				0
Total	**59**	**31**	**147**	**237**	**4**	**14**	**2**	**20**

5.3.3.3 Summary of the Content Aspect

Based on the analysis of the articles' content, it was seen that early consulting-content papers about ABC led to its spread, and later, academic-content papers played a leading role. According to Bjørnenak and Mitchell (2002), when ABC first appeared, consulting content was dominant among the related literature, with more neutral content about ABC gradually increasing thereafter. However, the prevalence of academic-content papers gradually declined. Since 2013, practitioner-content articles were published the most, and this number is still rising. In contrast to the case of ABC, for TDABC, although its initial appearance was in consulting content, neither consulting nor academic content played a major role in its initial diffusion. Practitioner-content articles have surged, and this trend is likely to continue.

For both ABC and TDABC, practitioner-content journals accounted for the largest percentage of publications, as both ABC and TDABC were introduced in non-manufacturing industries. This is because ABC and TDABC have been published by non-manufacturing practitioners, and they are publishing their own ABC papers rather than publishing consulting-content papers. This is significant for the spread of ABC and TDABC. In the case of technology that does not fit into an organisation, there is a certain limit to promoting its diffusion; however, in the case of technology that is suitable for organisations, spreading itself by necessity even if there is no special promotion. In other words, in the case of ABC, academics and consultants spread ABC intentionally, and in the case of TDABC, practitioners led TDABC more proactively.

5.3.4 The Research Method Aspect

The findings related to the research methods used in ABC research are first explained in detail, followed by those of TDABC.

Table 5.8: Summary of total number of ABC and TDABC articles in the research method aspect

	ABC			**TDABC**			**Grand Total**
	Academic Journal	**Practitioner Journal**	**ABC Total**	**Academic Journal**	**Practitioner Journal**	**TDABC Total**	
Case Study	181	93	274	35	1	36	310
Experiment	19		19	3	2	5	24
Interview	11	21	32	1	1	2	34
Literature	60	9	69	9		9	78
Math & Statistical Analysis	34	2	36	2		2	38
Prescriptive & Practitioner View	400	478	878	172	14	186	1,064
Survey	100	18	118			0	118
Theoretical	128	63	191	15	2	17	208
Grand Total	**933**	**684**	**1,617**	**237**	**20**	**257**	**1.874**

5.3.4.1 The Research Method Aspect (ABC)

The number of ABC papers published in academic journals was 938, of which 585 (62%) used specific research methods other than a prescriptive/practitioner view. The remaining 353 articles were published in academic journals but assumed a prescriptive/practitioner view, were consulting-based in nature, were from ABC users or were conference papers. The research methods that were used in academic journals included the case study method in 208 papers, theoretical method in 144 papers and survey method in 103 papers.

The number of ABC papers published in practitioner journals was 687, of which 223 (32%) used specific research methods other than the prescriptive/practitioner view. The percentage of papers that employed a particular research method in practitioner journals was about half that in academic journals. The research methods used in practitioner journals included the case study method in 96 papers, theoretical method in 78 papers, interview method in 20 papers and survey method in 19 papers. Overall, these rates were similar, but academic journals featured more surveys, while practitioner journals featured more interviews. The case study method was the dominant method in both academic and practitioner journals. In the case of academic journals, the proportion of literature or theoretical research was higher than the incidence of the case study method at the beginning of ABC's diffusion, but since 2000, the case study method has become the most popular research method. In contrast, practitioner journals made the most of the case study method in the early 1990s, but since the late 1990s, the use of this research method gradually decreased. Details can be found in Table 5.9.

Table 5.9: Number of ABC publications according to research method used

	Academic Journal									Practitioner Journal							
Year	Case study	Theoretical	Survey	Literature	Experiment	Math & statistical	Prescriptive & Practitioner	Interview	**Total**	Case study	Theoretical	Survey	Literature	Math & statistical	Prescriptive & Practitioner	Interview	**Total**
1988									0		1				5		6
1989							2		2						8		8
1990									0		1				29		30
1991		3							3	3	2	1	1		32	2	41
1992	3	2		2				1	8	2	1	1	1	1	34		41
1993	3		3	6		4	2		18	12	1		2		24		39
1994	4	5		5		1			15	13	2	2			38	1	56
1995	1	1	3	4		1	6	1	17	12	4	2	1		46	1	66
1996	3	5	3	4		1	7		23	10		2	2		40	4	58
1997	6	9	8	2	2	3	10	1	41	12	1	5			32	6	56
1998	6	8	5	2	1		11		33	7	9				48	1	65
1999	7	8	5		1	3	10		34	4	7	1			37	5	54
2000	11	5	3	2		2	11		34	2	6	1		1	12		22
2001	9	8	2	1	2	2	8		32	5	5	1			17		29
2002	9	4	4	3			5	1	26	1	6				11		18
2003	11	4	4	2	1	1	13		36	2	10		2		14		29
2004	11	5	5	4		3	18		46	1	2	1			10	1	15
2005	9	4	5		1		9		28	3	3				3		9
2006	5	10	2	1	2	1	21	1	43	2					7		9
2007	9	7	9		1	1	9		36		2				8		10
2008	11	2	5	4	3		12	4	41						3		3
2009	7	5	4	4		1	13	1	35	1					5		6
2010	7	4	1	2		1	15		30			1			3		4
2011	8	5	5	1	1	3	14		37						2		2
2012	11	7	5	2	2	2	14		43						3		3
2013	4	4	2	3	1	1	19		34	1					2		3
2014	3	4	6	2	1		33		49						1		1
2015	8	4	4	2			23		41						1		1
2016	8	2	3	1			34		48						1		1
2017	3	2	1			1	27	1	35						1		1
2018	3	1	2			1	28		35						1		1
2019	1		1	1		1	26		30								
Total	**181**	**128**	**100**	**60**	**19**	**34**	**400**	**11**	**933**	**93**	**63**	**19**	**9**	**2**	**478**	**21**	**684**

Figure 5.23 illustrates the research methods used in the analysed studies (including the prescriptive consultant method, practitioner view method, literature/theoretical method, case study/survey/interview method and analysis/experiment method). As can be seen from the graph, the prescriptive consultant method was used in a large proportion of studies from the beginning of 1988 to the late 1990s. From the mid-1990s, the number of papers employing the practitioner view method began to increase, and it then gradually decreased in the early 2000s. However, in the 2010s, the share of papers using this method rapidly increased due to the publication of bio/medical articles. The use of the literature/theoretical method increased from the early 1990s to the late 1990s, but it then steadily declined until 2019. The case study, survey and interview method has been in use since the early 1990s, and it was especially prominent in the late 1990s. Since then, this method has been used consistently, and even after 2010, about 10 articles of this kind have been published each year. Papers employing the analysis/experiment method are published annually, but its usage is not widespread.

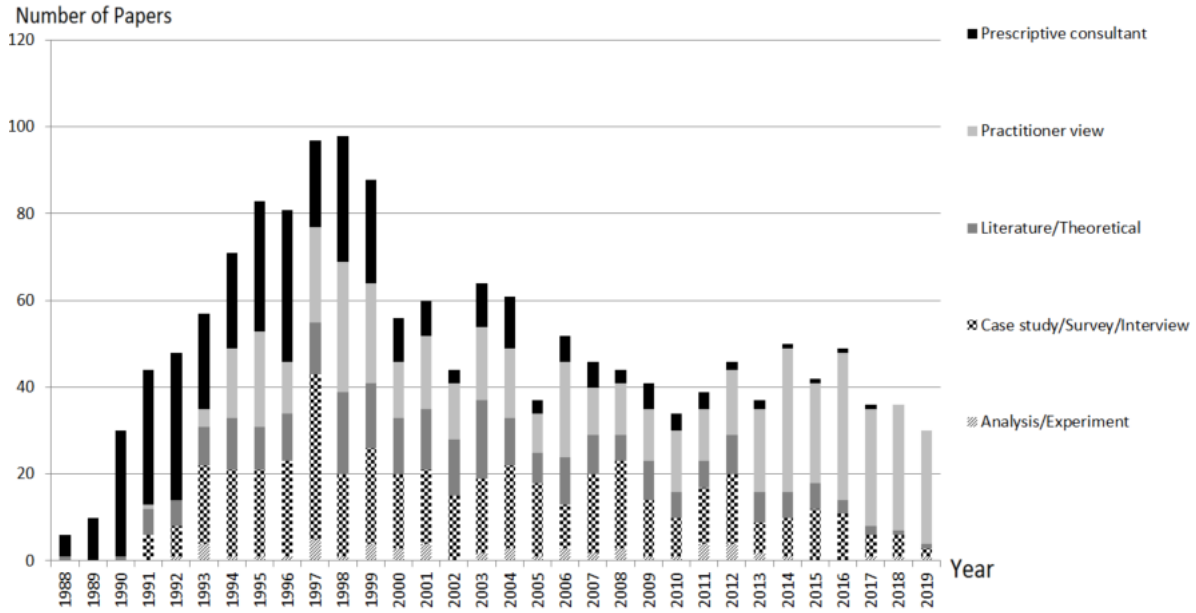

Figure 5.23: Comparative view of ABC publications by research method

5.3.4.2 The Research Method Aspect (TDABC)

Among the 237 total academic journal articles related to TDABC, 147 (62%) employed the practitioner view method. Conversely, 12 of the 20 practitioner journal articles used the prescriptive consultant method. There was no use of the survey

method in either academic or practitioner journal articles. While the ABC literature was focussed on the spread of ABC—and there were many papers examining the number of companies that have applied ABC—the TDABC literature does not feature such papers. There have been no papers examining the application of TDABC in the whole 15 years since its development.

The graph of the research methods (including the prescriptive consultant method, practitioner view method, literature/theoretical method, case study/survey/interview method and analysis/experiment method) used in the TDABC papers by year is shown in Figure 5.24. As mentioned earlier, although the prescriptive consultant method was used early in the diffusion of TDABC, its usage rate was very small compared to the same method in the ABC literature. The most prominent method used in the TDABC articles was the practitioner view method. Its use has been soaring since 2013, and since 2015, it has had more papers than all other methods combined. This is because TDABC features widely in physician-led papers, and these are categorised as using the practitioner view method.

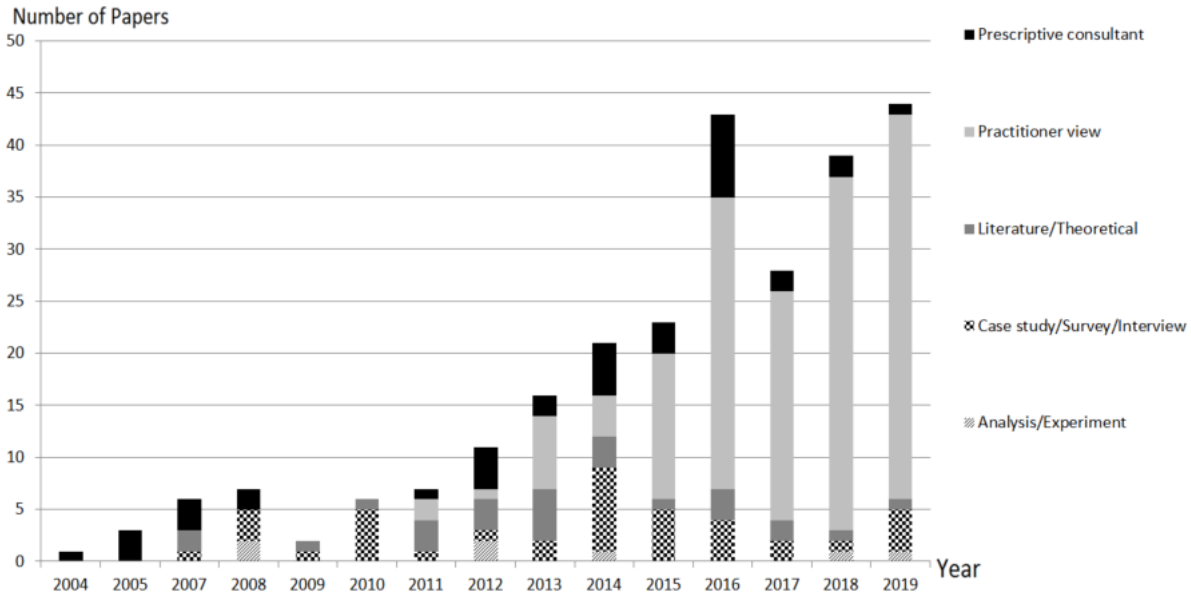

Figure 5.24: Comparative view of TDABC publications by research method

5.3.4.3 Summary of the Research Method Aspect

The most commonly used research method in both ABC and TDABC papers was the case study method. According to Lukka and Granlund (2002), case studies were the primary data collection method in ABC papers, and this remained the case until 2019 (where our study ended). In the case of ABC—about which many papers were published in the beginning—ABC was spread by several practitioner journals, which had been publishing case studies since the early 1990s. However, most academic journals tended to publish case studies later in the spread of ABC. In both ABC and TDABC articles, the use of the case study method increased rapidly about 10 years after the introduction of each concept. In ABC, there were more surveys in academic journals and more interviews in practitioner journals. According to a study by Bjørnenak and Mitchell (2002), surveys were mainly used in the ABC papers of business management journals until 2000. In contrast to the steady use of surveys (in 122 ABC papers) throughout ABC's diffusion, there were no papers that used surveys when publishing about TDABC. This is because the concept of ABC was expected to gain popularity when it emerged, and the occurrence of the 'ABC paradox' generated further investigation using survey research. However, following the introduction of TDABC, its propagation tended not to occur in major journals—as had been the case with ABC—but rather in publications of the target markets (e.g., bio/medical journals). In addition, TDABC did not require any further studies about a 'TDABC paradox' or about its spread.

5.3.5 The Geographical Aspect

The findings related to this aspect (in terms of ABC first, followed by TDABC) are outlined in Table 5.10. The analysis in this section does not focus on the use of ABC or TDABC in various countries but on the countries in which the empirical analysis of each concept has been conducted. The large number of empirical analysis studies published in a certain country does not mean that ABC or TDABC is commonly used in that country.

Table 5.10: Summary of total number of ABC and TDABC articles surveyed in relation to the geographical aspect

	ABC	TDABC	Total
North America	216	8	224
Europe	136	22	158
Asia	41	3	44
Australia	33	2	35
Africa	15		15
South America	8	2	10
North America + Europe	8		8
Europe + Australia	2		2
Europe + Asia	1		1
North America + Asia	1		1
Total	**461**	**37**	**498**

5.3.5.1 The Geographical Aspect (ABC)

In the case of ABC, 461 (29%) of the 1,617 papers conducted empirical studies in a specific geographical area. Of these 461 papers, 210 were in published in the US, followed by more than 57 in the UK, 29 in Australia and 13 each in Canada and Finland (see Figure 5.25). In terms of continents, North America is the most frequent and earliest continent for ABC empirical studies. Empirical studies of ABC began in North America in 1989, and 236 empirical articles have been published up to 2019. Following North America, Europe is the second-most frequent location for ABC empirical studies. In Europe, from 1990, 155 articles have been published containing empirical analyses. In Australia, empirical studies were conducted in 38 articles, from 1992. In Asia, ABC empirical studies have been conducted in 46 articles, from 1996. Details can be found in Table 5.11.

Figure 5.25: ABC publications containing empirical analysis, by country

Table 5.11: Number of ABC publications containing empirical analysis, by continent

Continentals of Empirical Studies											
Year	Africa	Asia	Australia	Europe	Europe + Asia	Europe+ Ausralia	North America	North America + Asia	North America + Europe	South America	**Total**
1989							2				2
1990				3			6				9
1991				2			5				7
1992			1	4			6				11
1993				2			17				19
1994				7			14		1		22
1995			1	6			12				19
1996		1		4			19				24
1997				8			31		1		40
1998			1	4		1	13	1	1		21
1999		1		4			17		1		23
2000		2	2	5			9				18
2001		3	5	3			7			1	19
2002		1	1	4			8		1		15
2003		1	3	8			7				19
2004	1	1	3	8			7			1	21
2005		2	1	7			6		1	1	18
2006	1	2		6			3			2	14
2007	1	2	4	8			3		1		19
2008	1	4	1	7			8			8	21
2009	1	1	1	7			4				14
2010		2		3			2		1	1	9
2011	2	2	1	4	1		2				12
2012	1	3	2	8			2				16
2013	2	2		2			1				7
2014	2	1	1	2			2			1	9
2015		5		4			2			1	12
2016	1	3	2	4							10
2017	2		1				1				4
2018		1	2	2							5
2019		1				1					2
Total	**15**	**41**	**33**	**136**	**1**	**2**	**216**	**1**	**8**	**8**	**461**

5.3.5.2 The Geographical Aspect (TDABC)

In the case of TDABC, 37 (14%) of the 257 papers featured empirical studies conducted in a specific area. Belgium had the largest number (11), followed by the US and Turkey with 4 each (see Figure 5.26). It is unusual that Belgium is the only country with more empirical studies on TDABC than empirical studies on ABC. Of the 11 articles published there, 5 were from library science journals, 3 were from business management journals and the remaining were from transportation, bio/medical and public service journals. In the case of TDABC, Europe was the continent with the most empirical studies. The earliest empirical study on TDABC was conducted in Europe in 2007, and since then, 22 articles on TDABC have been published in Europe. North America, Asia and Australia have conducted 8, 3 and 2 studies, respectively. Details can be found in Table 5.12.

Table 5.12: Number of TDABC publications containing empirical analysis, by continent

Continent						
Year	Asia	Australia	Europe	North America	South America	**Total**
2007			1			1
2008			2			2
2009			1			1
2010		1	4			5
2011				1		1
2012	1					1
2013			2			2
2014	2	1	4	1		8
2015			3	2		5
2016			1	2	1	4
2017			2			2
2018				1		1
2019			2	1	1	4
Total	**3**	**2**	**22**	**8**	**2**	**37**

Figure 5.26: TDABC publications according to country

In the case of TDABC, unlike ABC, the most research has not been conducted in the US but in Europe, followed by the US, Asia and Australia. The reason for the lack of TDABC research in the US is that most of the papers published in the US are not empirical studies on TDABC but rather outline medical doctors' opinions about the use of TDABC in hospitals.

5.3.5.3 The Geographical Aspect (ABC and TDABC over the Years)

In the graph showing the publishing trends of ABC and TDABC by continent shown in Figure 5.27, it can be seen that a large number of empirical studies were conducted in the American continent from the late 1980s to the early 2000s; since 2003, however, empirical studies have most often been conducted in Europe. The early empirical studies were conducted in North America and Europe; subsequently, they were conducted in Australia and Asia. The sequence of continents in which the empirical analysis of ABC and TDABC took place is as follows: North America, Europe, Asia, Australia, Africa and South America. In the case of TDABC, no empirical analysis has yet been conducted in Africa (Table 5.10).

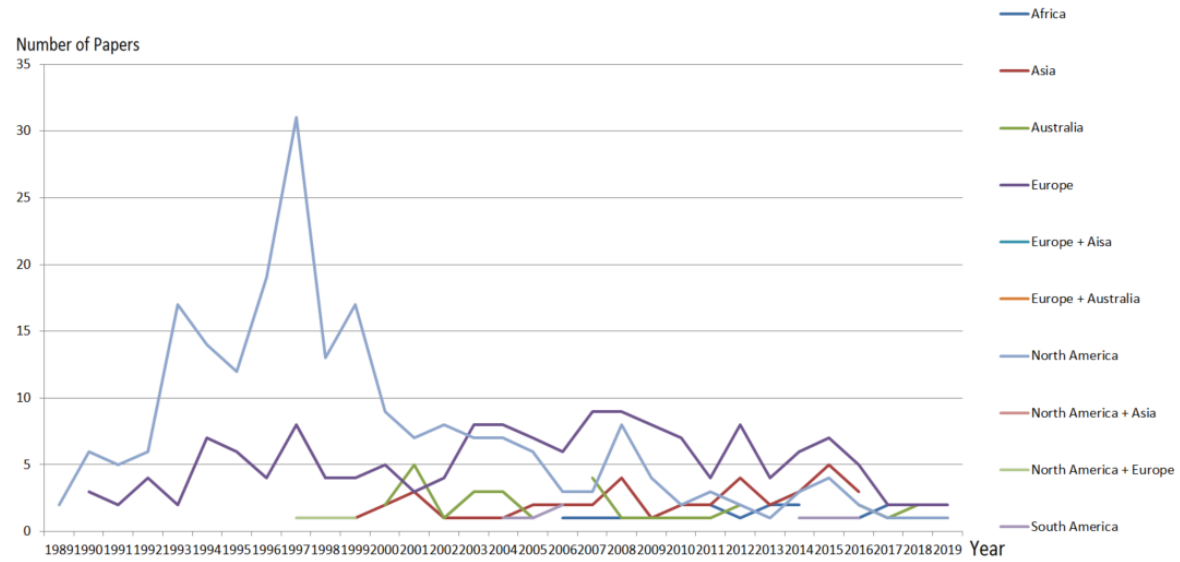

Figure 5.27: Number of ABC and TDABC papers published by geographical location over the years

The following maps provide a flow analysis of the geographical aspects of management accounting trends with regard to ABC and TDABC. In the preceding analysis, it was shown that there were many ABC and TDABC publications in business management journals from 1988 to 1997, and these then moved to non-business management journals. In addition, since 2008, there have been more publications in the non-business management field than in the business management field. Based on this analysis, the researchers analysed the flow of management accounting in three periods. The analysis of the cumulative publishing flow is divided into the first half of 1997, the middle of 2007, and the second half of 2019. The results are as follows.

Figure 5.28: Chronological view of ABC and TDABC publications (1988–1997, 1988–2007 and 1988–2019, respectively)

5.3.5.4 Summary of the Geographical Aspect

After analysing the published research by geography over time, it was found that before the early 2000s, most of ABC and TDABC studies were carried out in Western countries. Among these, the empirical analysis of the two systems began in the US in 1989; then, the research was carried out in Northern and Western Europe and, gradually, in Eastern European countries. According to Lukka and Granlund (2002), ABC papers containing empirical analysis were first published in the US, and studies in non-US regions were conducted subsequently. In Eastern countries and regions, empirical analysis was conducted first in Japan in 1996, and then in the Middle East, China, India, Thailand and Taiwan. Since the early 2000s, empirical analysis has been conducted in countries where research on the topic of ABC and TDABC has not progressed much. Most of the countries that have conducted field studies of one or two papers by 2019 have begun their research since early 2000.

In the case of ABC, the surge in ABC publications showed a definite enthusiasm for the topic. In the early days of ABC in the US, many papers were published; then, the fever cooled, and research continued in Europe. ABC spread first in the US, followed by (in order), Europe, Australia, Asia, South America and Africa. In the case of TDABC, unlike ABC, not much research has been conducted in the US. The most active study area has been Europe, followed by the US, Australia and Asia, in that order. The reason for the lack of US TDABC research is that most of the papers published in the US were not empirical studies on TDABC but rather featured medical doctors' opinions about the use of TDABC in US hospitals. The research flow is centred on English-speaking countries such as the US, Europe, and Australia, and then spread to Asia, South America, and Africa.

5.4 Summary of the Research Findings from the Systematic Literature Analysis

According to the results of the above systematic analyses, the diffusion patterns of ABC and TDABC are characterised by three aspects. First, the nature and field of the journals in which papers on ABC and TDABC are published differ. ABC was common in management accounting practitioner journals at first. It then spread to general accounting and management academic journals and, last, to non-business

management academic journals. However, TDABC was introduced in business management practitioner journals, but most of the following diffusion occurred in academic bio/medical journals. The publishing trends of ABC and TDABC have shifted from general management fields to non-business management fields such as biomedicine. Unlike ABC, the majority of TDABC papers were published in bio/medical journals.

Second, the author types of ABC and TDABC articles tend to be different. In the case of ABC, various academics, consultants and practitioners have spread ABC, even though it has not been applied as widely as it may have been expected. However, TDABC articles have been published by practitioner authors—especially medical doctors in the bio/medical field. Since 2015, ABC, like TDABC, has had a higher proportion of practitioner authors.

Last, the content of ABC and TDABC papers differs. The early consultant-content articles led to the diffusion of ABC, while later, academic-content articles played a leading role. After that phase, the number of academic-content papers declined and that of practitioner-content articles increased. In contrast, the initial TDABC articles featured consultant content, but consultant and academic content did not play a major role in the diffusion of TDABC. The number of practitioner-content articles has increased, and it is still rising.

In this chapter, the first research objective of this study—to examine the ABC paradox and identify the diffusion patterns of ABC and TDABC—was fulfilled. The three research questions for this research objective are as follows:

- In the course of the development of ABC and TDABC, are there specific fields that are more prone to implementing ABC and TDABC?
- In the course of the development of ABC and TDABC, who are the key players and how do they lead the diffusion of ABC and TDABC?
- What are the characteristics of and differences between the diffusion patterns of ABC and TDABC?

The answers found in this study are as follows.

The ABC paradox was observed in business management fields. However, the analysis of non-business management fields showed different results. There are certain industries in which ABC and TDABC are spreading well, and the primary field in which this is the case is the bio/medical field. In recent years, practitioners have been leading the diffusion of ABC and TDABC, rather than consultants or academics. In the early days of ABC, consultant and academic content mainly dominated the research stream, but since the 2010s, practitioner content has dominated for both ABC and TDABC. In other words, the centre of current ABC and TDABC diffusion is the bio/medical field, and in the bio/medical field, practitioner authors, such as medical doctors, are spreading ABC and TDABC via practitioner content.

The diffusion pattern of ABC focussed mainly on the manufacturing industry, in which consultants and academics published consultant- and academic-content papers. However, the diffusion pattern of TDABC focussed on the bio/medical industry, in which practitioners published practitioner-content papers. In other words, the direction of the diffusion of ABC that suppliers spread to practitioners has changed since TDABC appeared practitioners have shifted towards attracting the spread.

In this chapter, the results of the systematic literature analysis provided an opportunity to examine the ABC paradox and the overall diffusion pattern of ABC and TDABC. Based on these results, the next chapter presents a comparative analysis between hospitals (which are marked by good TDABC diffusion) and manufacturing companies (which are relatively less diffused), through multiple case studies. Also, the process of diffusion from suppliers to demanders, the factors affecting TDABC diffusion and the dynamics between suppliers and demanders will be identified.

Chapter 6. Findings of the Multi-Case Study

6.1 Introduction

The aim of this chapter is to compare, in the South Korean context, the hospitals where findings from chapter 5 suggest that TDABC is proliferating well, with the manufacturing industry—in which TDABC is not proliferating well to identify why and how these differences in diffusion occur. To this end, based on the results of the previous chapter, a comparative analysis of the spread of TDABC in manufacturing and hospitals is conducted,[5] focussing on the supply side, the demand side and the dynamics between the two in each industry.

In the section 6.2, an analysis of the diffusion process on the side of the suppliers of TDABC in both the manufacturing and hospital industry is first given. The characteristics of TDABC's spread in the manufacturing industry are then compared with the characteristics of TDABC's diffusion in hospitals. The diffusion process described here relates to the initiation phase among Al-Sayed and Dugdale's (2016) generic stages (i.e., initiation, implementation and integration).

In section 6.3, an analysis of the diffusion factors and other contexts affecting the spread of TDABC on the demand side is given on the basis of manufacturing companies and hospitals. The content described here relates to the implementation stage of Al-Sayed and Dugdale's (2016) generic stages. Case studies of manufacturing company A (which used TDABC), manufacturing company B (which gave up on the application of TDABC after considering it) and five hospitals (which used TDABC) are then described and compared.

In addition, the dynamics between the suppliers and demanders of TDABC in both the manufacturing and hospital industry are described in section 6.4. The results of manufacturing and hospital industry obtained are compared to each other. This part of the analysis relates to the implementation stage, which is the stage in which the

[5] Researcher tried to find an organisation that is using or used both ABC and TDABC, but all hospitals are using TDABC, and manufacturers applied ABC too long ago, so it was not possible to source interviewees with experience of the ABC application in manufacturers. So this study focuses on the manufacturers and hospitals for the application of TDABC.

TDABC system is set up and implemented, and the integration stage, which is the stage in which the TDABC system is developed (as a time point after the application is complete).

The explanation of the diffusion of TDABC in manufacturing and hospitals is based on interviews with TDABC suppliers (i.e., consultants and academics) and demanders (i.e., practitioners) in each industry.

6.2 Findings about the Diffusion Process on the Supplier Side

This section describes the diffusion process related to consultants and academics, which are the suppliers of TDABC. The analysis investigates the initiation stage—which involves awareness and interest—among the three stages of diffusion (i.e., initiation, implementation and integration), based on Al-Sayed and Dugdale's (2016) generic stages model. However, academics did not have a significant influence on the diffusion of TDABC, and the reason for this is explained first.

6.2.1 The Limited Role of Academics in the Diffusion of TDABC

In the case of TDABC in South Korea, Korean academics were found not to have contributed significantly to its diffusion. Based on the interviews, the main reasons were the limited number of TDABC projects resulting from high SAP (an ERP system) dependency among manufacturers, and the consequential limited role for academics. In a study by Kim and Oh (2002), a survey of 169 Korean manufacturers found that 46% of Korean manufacturing companies were using SAP ERP including costing module, suggesting that SAP is widely adopted in South Korea. According to Kim et al. (2016), SAP including costing module is the ERP most used by Korean manufacturing companies. The three interviewed professors with more than twenty years of experience, who were aware of the diffusion of ABC and the subsequent introduction of TDABC in South Korea, explained the following:

> In terms of the manufacturing industry, most Korean manufacturing companies use SAP and cost calculation using the SAP CO module (a costing system) to use a system with guaranteed stability and safety. Relatively few manufacturing companies use ABC, and small and medium-sized manufacturing companies rely on traditional costing with SAP, which is more common than ABC. Small and medium-sized businesses actually feel that there is no significant difference between ABC or TDABC and the traditional costing.

> Rather, they feel the burden of applying new techniques such as ABC or TDABC... Manufacturing companies borrow some of ABC's concept, make a simpler version of ABC and introduce cost management systems other than SAP. As such, the cost management system of 'SAP + α' is set up, and there are not many companies that realise the need for TDABC. (University Professor A)

> Since TDABC has not been adopted so much, instead, they use SAP a lot in the manufacturing industry; there is no participation in the TDABC project. . . . I don't think any other university professors in Korea have participated in the TDABC project in the manufacturing industry. I haven't heard. (University Professor C)

> Most hospitals do not use SAP. It was difficult to apply the information of a hospital OCS [order communication system] and EMR [emergency medical system] to SAP or Oracle, which are manufacturing-based ERPs. Instead, since the late 1990s, hospital consulting companies' hospital-only ABC packages have been used. Since the TDABC concept is applied to the existing ABC package, there are literally no new projects that professors can participate in. (University Professor B)

> Some Korean professors wrote TDABC papers, but most of them did not actually participate in the project but merely introduced the concepts. The papers use some industries' data to introduce the calculation process or effects of TDABC. Therefore, the actual participation of professors in projects is low. I have never heard of it, and even if it is, the role will be very limited. The domestic TDABC diffusion was 100% led by consultants. (University Professor C)

> In the undergraduate curricula, TDABC is not actively being dealt with, and in fact, it is at the level that it is briefly explained as a sub-chapter of ABC in one or two cost accounting textbooks in Korea. As such, there is a lot of lag in the field of work and the academic world. In post-graduate courses, since 2007, it has been taught to the extent of introducing the concept of TDABC with a thesis. The fact that most of the professors related to ABC in Korea do not favour TDABC may be the reason for the slow application. (University Professor A)

> It is not actively dealt with in the university's cost curriculum. Neither do I mention TDABC specifically in the cost accounting class. (University Professor C)

In summary, the number of TDABC diffusion projects in which academics take on a role was very low. Because most manufacturing companies use SAP, their needs for TDABC were not strong, and in the case of hospitals, the TDABC function was added to the existing ABC system. As such, academics played a small role in the spread of TDABC in both manufacturing companies and hospitals.

In the case of the diffusion of TDABC, unlike that of ABC, the role of academics was not important. For the spread of TDABC, the role of consultants was more important than that of academics. ABC occupies a chapter in most university textbooks and is

taught as being an important system, while TDABC is not considered important in most university textbooks. This is in line with the assertion by some interviewees that many South Korean professors recognise TDABC as a sub-genre of ABC. In other words, it is not new or different, as revealed in the *ex ante* interviews.

6.2.2 Findings on the Diffusion Process of Consultants in the Manufacturing Industry

As mentioned above, the main suppliers of TDABC in South Korea were consultants. Here, the initiation stage of Al-Sayed and Dugdale's (2016) generic stages model is described. In the initiation phase, the process of diffusion of TDABC by consultants is divided into the four stages of Abrahamson's (1996) framework (i.e., creation, selection, processing and dissemination). However, the creation stage was not included because consultants did not create TDABC. Also, because the characteristics of TDABC in the selection and processing steps are the same, the two steps are explained together in this study.

The characteristics of TDABC diffusion in the manufacturing industry found in the selection and processing stages (i.e., the process in which consultants select and develop the rhetoric of TDABC) and in the dissemination stage (i.e., the spreading process of TDABC) are next described. The first reason why consultants selected TDABC—and the advantage of TDABC that has been rhetorically emphasised—is the possibility it affords for profitability analysis. In manufacturing companies, consultants selected and spread TDABC because TDABC enables transaction unit costing, which enables an analysis of profitability by transaction:

> Profitability analysis by customer and transaction is the biggest advantage of TDABC. In other cost systems, profitability analysis by customer and transaction was not analysed at the time of report, so customers with high sales were considered to be good customers. That's why profitability analysis was explained to potential customers as TDABC's greatest strength. The profitability analysis by customer has a great influence on corporate decision making, which stimulated the interest of companies at the time. (CEO of Consulting Firm A)

Consultants also stressed that TDABC is a lighter and faster system than is ABC. This is because potential users were worried about ABC:

> As well as the strength of being able to analyse the profitability of each product by product through transaction unit cost calculation, it was also effective that the companies can operate easily, and the calculation is fast. Through the cost equation, the acceptability according to the situation has increased, and corrections have been made quickly and easily. It was important that it was a simple and lightweight system compared to the complex and heavy ABC. (Managing Director of Consulting Firm A)

Next, the characteristics of the TDABC diffusion process in the dissemination stage were as follows. First, there is no community in which the practitioners of manufacturing companies can share their opinions and experiences of TDABC implementation. South Korean manufacturers tend to pay a lot of attention to information protection and are conscious of their competitors. Because managers from different companies do not have their own community, they cannot share their opinions and experiences about a management system. As will be explained later, in the case of hospitals, there is a definite community of hospital management departments, and they share their opinions and experiences about the management systems they use. The absence of a potential customer community makes it difficult for consultants to spread TDABC:

> Because there is no community, TDABC was introduced only to existing customers or companies introduced through them. We also tried to spread it using a limited number of public community activities such as conferences and seminars. (Managing Director of Consulting Firm A)

> Most consulting firms work again with existing customers or with referrals. Sales through a personal community are more effective. (Managing Director of Consulting Firm B and Director of Consulting Firm C)

In addition, TDABC consultants did not focus on specific manufacturing companies but indiscriminately contacted various types of manufacturers and those in other industries, attempting to spread the technology by creating universal packages applicable to various industries. In contrast to this, as will be explained in section 6.2.3, there are hospital-specific TDABC packages:

> The manufacturing industry was not targeted from the beginning. It tried to spread TDABC not only to the manufacturing industry but also to the logistics and service industries, but it was not easy. In the manufacturing industry, it is difficult to spread among companies because the products manufactured by each company are different and their tendencies are different. (CEO of Consulting Firm A)

> The TDABC package was imported from the company founded by Anderson and applied. There were no special modifications to suit the manufacturing industry. (Managing Director of Consulting Firm A)

To summarise, the characteristics of the TDABC diffusion process by consultants as suppliers in the manufacturing industry are as follows:

- Consultants considered strengths of TDABC to be that it is easy and fast to use when undertaking profitability analysis by customer and transaction. Consultants have promoted these strengths to their clients.
- Due to a lack of a community amongst their manufacturing clients, consultants had to rely on existing customers and human networks when promoting and spreading TDABC. As a result, they tended to promote general-purpose TDABC packages to various industries—not just manufacturing.
- TDABC needs to be tailored for each company, which means that it is difficult for firms to learn from each other.

6.2.3 Findings on the Diffusion Process of Consultants in the Hospital Industry

In this section, the initiation stage of Al-Sayed and Dugdale's (2016) generic stages model is described in relation to TDABC diffusion in hospitals, and the initiation phase is divided into the four stages outlined by Abrahamson (1996). The characteristics of TDABC diffusion in the hospital industry are given in relation to the selection and processing stages (i.e., in which consultants select and develop the rhetoric of TDABC) and the dissemination stage (i.e., in which the spreading of TDABC occurs) of Abrahamson's (1996) model.

The first reason why consultants selected TDABC for application in hospitals is that TDABC is a system suited to the fee-for-service (FSS) payment model. This is the advantage for which TDABC was rhetorically emphasised.

In the case of hospitals, consultants selected and spread TDABC because TDABC is a more suitable system for South Korean hospitals covered by the FFS model, which is the basic medical billing system in South Korea. It is also the system through which the government (i.e., the National Health Insurance Service) pays medical

expenses, by setting a certain value for every medical treatment. Because hospital sales are calculated for each medical activity, the cost for each activity is required:

> FFS is a system that pays medical fees by setting the price of each service for each medical service provided by medical personnel at a medical institution by the Health Insurance Review and Assessment Service. In the FFS system, thousands of (about 9,000) medical practices are established, and cost calculations are required for each activity. Accurate costing is difficult with ABC alone. In order to upgrade the cost system, we introduced the concept of TDABC. (CEO of Hospital Consulting Firm D)

> The most important part of hospital cost is analysing profitability by medical practice. (CEO of Hospital Consulting Firm E)

Consultants also stressed that the TDABC system enables accurate performance evaluations for each medical doctor. While manufacturers use TDABC to conduct performance evaluations by sector and department, in hospitals, TDABC assists in the tracing of the time and cost of treating patients by doctor to conduct profitability and performance evaluations for individual doctors:

> The reason why hospitals are interested in TDABC and accept it easily is to calculate the cost corresponding to the FFS model in terms of management, and for doctors to evaluate their fair and accurate performance. (CEO of Hospital Consulting Firm D)

> When spreading TDABC, we emphasised that TDABC enables accurate costing for fair performance evaluation, and that the costing process is easy to verify. The justification of the costing process is important from the perspective of the performance evaluation targets, medical doctors. For example, if cost is allocated by the number of patients, it is judged that there is no justification for costing because the severity is different for each patient and the time spent is different. TDABC spread from these needs. (CEO of Hospital Consulting Firm E)

The characteristics of the TDABC diffusion process at the dissemination stage for hospitals are as follows. First, there is very clear community of potential customers in hospital industry. The purpose of the community's establishment is to seek hospital development by sharing cost management work and research among member hospitals, and to contribute to a reasonable FFS rate decision reflecting the management reality of medical institutions.

The community of cost managers at South Korean hospitals would exchange information and share experiences about each hospital cost. Also, in the community, practitioners discussed management systems periodically, and consultants gathered

practitioners' opinions to improve TDABC. The presence of a community of potential customers made it more efficient for consultants to spread TDABC:

> Hospitals, unlike manufacturing, actively interact with competitive hospitals in management. Information on management systems is shared, and human exchange is also active. So, if consultants gain some trust in the industry and have word of mouth, they can steadily work in the hospital community. After that, we held conferences and seminars, bringing together existing and potential customers, such as hospital cost officials, to explain in detail the merits and necessity of the TDABC system. (CEO of Hospital Consulting Firm)

> The propagation of hospital management systems such as TDABC comes primarily from relationships with existing consultants. In addition, they receive introductions while exchanging information in the hospital community. In the hospital industry, consultants are also leading the hospital community by acting as leaders in the hospital community. In other words, the human network through the hospital community is very effective. (Chairman of Korean Hospital Cost Association and Head of Planning Team of Hospital C)

> At regular conferences and seminars hosted by consultants, consultants provide training and hospitals present cases. They grow together by exchanging examples of what the management issues were and how they responded. The consultant's role in the hospital cost community is very large. In that respect, conferences and seminars are very effective in spreading TDABC. (Manager of Costing Part in Hospital A)

> The hospitals are close to each other and have many exchanges. When a consultant and a new management system gain trust in one advanced hospital, information quickly spreads to other hospitals and is easy to apply to other hospitals. Even if some hospitals are dubious about the system, this closed channel works because it tends to blindly follow the system used by large hospitals. (CEO of Hospital Consulting Firm E)

Second, in the case of the manufacturing industry, consultants did not focus on a specific area, and the basic functions of TDABC were provided in a general-purpose TDABC package. However, in the case of hospitals, consultants created a hospital-specific TDABC system package suitable for the hospital environment and focussed on the spread of TDABC within the hospital industry:

> In the early 2000s, hospitals were not very interested in management systems, and there was no need for cost information. At that time, I managed based on FFS sales. At that time, the hospital industry was a wasteland for the cost system. Then, in the mid-2000s, the computer systems of domestic hospitals were upgraded, and management systems such as OCS were introduced. In addition, hospital information systems such as EMR were improving significantly. From this time on, as management/information systems for hospital activities developed, an environment in which the cost system could be used was created, and the possibility and importance of cost management began to spread in the industry. We had a management system that could spread here, and we could see a vast

> land (i.e., the hospital industry) in which it could spread. At the time, it was difficult to apply the SAP or Oracle ERPs to the hospital industry. It was difficult to apply the information of hospital OCS and EMR to SAP or Oracle, which are manufacturing-based ERPs. Accordingly, we were able to spread the creation of a hospital-specific package that utilises the hospital's management system information. (Managing Director of Hospital Consulting Firm D)

> I thought that the only cost system suitable for the hospital environment was TDABC. TDABC uses working hours as drivers, and the evidence for the process is clear. In hospitals, most actions can be measured by the working hours of human resources, and hospitals required accurate cost calculations and proof of a clear calculation process for performance evaluation. I learned the concept of TDABC when I was working for Oracle, and since then, I thought it was suitable for hospital costs, so I set up a hospital-only TDABC consulting company. (CEO of Hospital Consulting Firm E)

To summarise, the characteristics of the TDABC diffusion process in relation to consultants as suppliers in the hospital industry are as follows:

- Consultants designed and promoted TDABC systems specific to FFS model, which allowed cost and time to be traceable to individual medical doctors. Therefore, it also enabled the accurate performance evaluation of each medical doctor.
- When promoting and spreading TDABC, there was clear community of potential customers in the hospital industry, which made the TDABC proliferation of consultants efficient, with a hospital-specific TDABC system package suitable for the hospital environment.

6.2.4 Comparison of the Diffusion Process on the Supplier Side in Both Industries

In the previous two sections, the process of TDABC diffusion on the supplier side in the manufacturing and hospital industries was described. Initially, this process was divided into four stages (i.e., creation, selection, processing and dissemination), but the creation stage was not included because consultants did not create TDABC. Also, because the TDABC characteristics in the selection and processing steps were the same, the two steps are explained together in this study. A summary of this is shown in Table 6.1.

Table 6.1: Summary of characteristics of the diffusion process on the supply side in both the manufacturing and hospital industries

	For manufacturers	For hospitals
Reasons for choosing TDABC and highlights in the selection and processing stages	• Possibility of profitability analysis • Lighter and faster system than ABC	• System suited to FFS • Accurate performance evaluation for each medical doctors
Characteristics of industry on the spread of TDABC in dissemination stage	• No community of manufacturing customers • Absence of specific target industries and universal packages of TDABC	• Clear community of potential customers in hospital industry • Concentration on the hospital industry and hospital-only packages of TDABC

In summary, in the case of manufacturing, when suppliers spread TDABC, they emphasised the advantages of TDABC itself rather than that the function of TDABC fits the characteristics of the manufacturing industry. In the case of hospitals, it was emphasised much more that the function of TDABC fits the characteristics of the industry. Also, in the case of manufacturing, there was no community of potential customers, and TDABC was not specifically spread to the manufacturing industry from the beginning. However, in the case of hospitals, a hospital community existed, and TDABC could be spread by targeting the industry from the beginning; consultants were also able to provide a system more suitable for the environment of the hospital industry using a dedicated TDABC package for hospitals.

In other words, the reason why TDABC spread more in hospitals than in manufacturing—as was found when analysing the spread of TDABC from the supplier side—is that TDABC is a system that suits the environment of the hospital industry better, and by utilising the clear customer community and offering a dedicated package, the spread of TDABC by consultants could be focussed on hospitals.

The next section explains the TDABC diffusion factors and the significant contextual influences on the spread of TDABC on the demand side in the manufacturing and hospital industries.

6.3 Findings from the Demand Side

This section explains the diffusion factors related to TDABC and the significant contextual elements affecting its spread on the demand side in the implementation stage in the manufacturing and hospital industries. In the next section, the characteristics of the demand side of TDABC in the manufacturing and hospital industries are described. After examining the factors influencing the diffusion of TDABC in each industry and the contextual reasons affecting its spread, the characteristics of the demand side of TDABC diffusion in the two industries are compared.

6.3.1 Findings from the Demand Side in Manufacturing

This section describes the diffusion factors of TDABC and the contextual aspects affecting its diffusion in the manufacturing industry. First, an overall description of manufacturing company A, which uses TDABC, is given, followed by that of manufacturing company B, which declined to use TDABC after considering its application. After that, the diffusion factors and significant contextual factors affecting its spread in these manufacturing companies are explained. Then, the differences between the two companies in the application of TDABC are delineated.

6.3.1.1 Background of Manufacturing Company A (Company Applying TDABC)

First, an analysis of manufacturing company A, which uses TDABC, is provided. Specifically, an overall description of the manufacturing company and the TDABC application process that occurred in the company are given from the perspective of both the supply side and the demand side. After that, the company is analysed in comparison manufacturing companies that do not apply TDABC.

Manufacturing company A using TDABC ranks as one of the top 10 foundries in the semiconductor industry in South Korea. Operating from two wafer fabrication facilities, the company meets the needs of fabless ventures (i.e., companies that

focus on product planning and development without owning their own factories) around the globe. Accordingly, the company continues to maintain close relations with customers.

The group to which manufacturing company A belongs (group A) initiated an extensive feasibility assessment and preparation process that led to the establishment of manufacturing company A in 1953. Group A strengthened its business actively by executing a strategic alliance with Toshiba of Japan and Texas Instruments of the US with regard to technology transfer and product supply, and by merging with another South Korean semiconductor in 2002. An overview of manufacturing company A is given Table 6.2.

Table 6.2: Information overview of manufacturing company A

Listed/Unlisted	Listed
Industry	Semiconductor manufacturer (Foundry business that performs wafer consignment production and sales, Brand business that designs and sells display driving and sensor)
Establish	1953
Size	Medium
Number of employees	Over 2,000
Profitability (net profit ratio)*	15.05%
EPS* (Earnings Per Share)	1.58 (£)
PER* (Price Earning Ratio)	6.90
BPS* (Book-value Per Share)	7.02 (£)
PBR* (Price Book-value Ratio)	1.65
Use of ABC/TDABC	ABC used in the past, TDABC currently used
Ownership of Cost Systems	Management support team

Note: £1 (pound sterling; GBP) = ₩1,500 (South Korean won; KRW). * Average over the last five years.

Manufacturing company A's monthly capacity is 130,000 wafers. This company produces more than 40 types of semiconductor products and produces individual products with specifications that meet each customer's needs on a consignment basis. The financial information and organisation of manufacturing company A are as follows (see Table 6.3 and Figure 6.1).

Table 6.3: Sales, net profits, total assets, return on assets (ROA) and return on equity (ROE) of manufacturing company A

Year	Sales (£)*	Net Profit (£)*	Total Assets (£)*	ROA (%)	ROE (%)
2016	515.4	58.9	657.9	8.96	29.65
2017	453.1	73.5	662.7	11.13	27.62
2018	446.2	57.9	711.0	8.43	17.12
2019	539.1	84.3	799.8	11.16	18.45

Note: £1 (pound sterling; GBP) = ₩1,500 (South Korean won; KRW). * In millions. Source: Financial Supervisory Service of Korea.

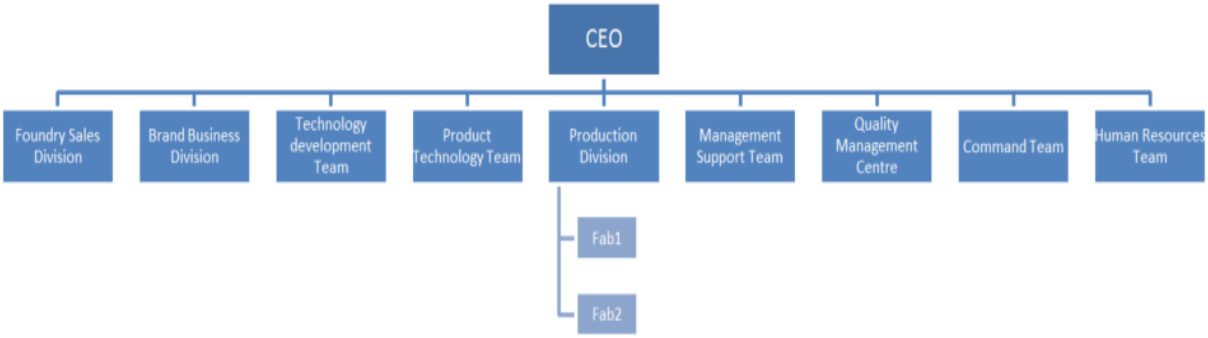

Figure 6.1: Organisational chart of manufacturing company A

Because manufacturing company A is a semiconductor contractor (involving multi-category, small-volume consignment production), its relationship with its customers is very important. Due to the nature of this type of company, the production volume varies greatly from month to month. Because each customer's monthly order quantity and order characteristics are different, the ability to conduct profitability analyses by customer is very important.

In addition, the semiconductor industry is a process industry—that is, an industry in which production is enabled by installing various large-scale facilities as production means. Depreciation costs for many expensive semiconductor production facilities are incurred. Due to the nature of manufacturing company A's business model (i.e., semiconductor consignment production or contract manufacturing), each facility is a general-purpose facility for the production of several types of products, rather than a dedicated facility for a particular product. For this reason, there is a strong need for a more advanced cost system.

Manufacturing company A currently uses TDABC. In the past, it used the ABC capabilities of the SAP controlling (CO) module, but due to the nature of the

semiconductor business of the process industry, SAP could not complete the complex overhead allocation process. Therefore, TDABC was introduced and used as a replacement for SAP's costing function.

Manufacturing company A has been using TDABC since 2011. SAP is being used as the company’s basic ERP system, and TDABC is replacing the CO module (a management accounting module). The ABC system had been operated on the existing CO module, but ABC cost calculation was impossible due to the complexity of the semiconductor product manufacturing process. Therefore, the TDABC package is now being operated in conjunction with SAP. The company’s TDABC system uses the data extracted from SAP and subsequently sends it back to SAP. Using TDABC data, the following functions are performed: cost calculation and profitability analysis by product/transaction, budgeting, performance evaluation, future forecasting, strategy establishment and unused capacity analysis.

6.3.1.2 Background of Manufacturing Company B (Company Not Applying TDABC)

An example of a company that rejected TDABC after its initial consideration, food manufacturing company ‘B’ has steadfastly led the Korean food market for the past 60 years since its establishment in 1958. In the 1960s, ‘B’ manufacturing company established the first sanitary facilities and began mass-producing quality ice cream in South Korea.

Table 6.4: Information overview of manufacturing company B

Listed/Unlisted	Listed
Industry	General food manufacturer
Establish	1958
Size	Large
Number of employees	Over 2,200
Profitability (net profit ratio)*	3.19%
EPS* (Earnings Per Share)	29.60 (£)
PER* (Price Earning Ratio)	15.59
BPS* (Book-value Per Share)	479.96 (£)
PBR* (Price Book-value Ratio)	0.91
Use of ABC/TDABC	ABC in use, rejected TDABC after review
Ownership of Cost Systems	Management planning/support team

Note: £1 (pound sterling; GBP) = ₩1,500 (South Korean won; KRW). * Average over the last five years.

In 1960, manufacturing company B was the first to begin producing and selling margarine, and it was also the first to develop chocolate oil in South Korea. In 1987, this company introduced the 'P' brand in the market, South Korea's first pasteurised milk using the low heat process used for baby food and yoghurt to promote healthy digestion. Manufacturing company B built its business portfolio on a solid foundation, as it included ice cream, oil, processed dairy and other food items. Manufacturing company B has grown through seven acquisitions since the 2000s. In each merger and acquisition, manufacturing company B expanded its product line. As a result, the company has 10 factories in addition to the head office, and the company includes 8 major businesses; it is now engaged in the edible oil and food ingredients business; meat processing and meat business; pasteurised milk business; ice cream business; food service business; food business; lunch box business; and coffee business. Each division has launched and operated several brands and produces and sells various product lines for each brand. The financial information and organisation of manufacturing company B are as follows (see Table 6.5 and Figure 6.2).

Table 6.5: Sales, net profits, total assets, ROA and ROE of manufacturing company B

Year	Sales (£)*	Net Profit (£)*	Total Assets (£)*	ROA (%)	ROE (%)
2016	1,174.9	38.8	890.8	4.43	6.34
2017	1,212.4	63.4	814.5	7.43	11.82
2018	1,207.2	28.3	805.5	3.5	6.31
2019	1,192.1	25.0	833.2	3.05	5.38

Note: £1 (pound sterling; GBP) = ₩1,500 (South Korean won; KRW). * In millions. Source: Financial Supervisory Service of Korea.

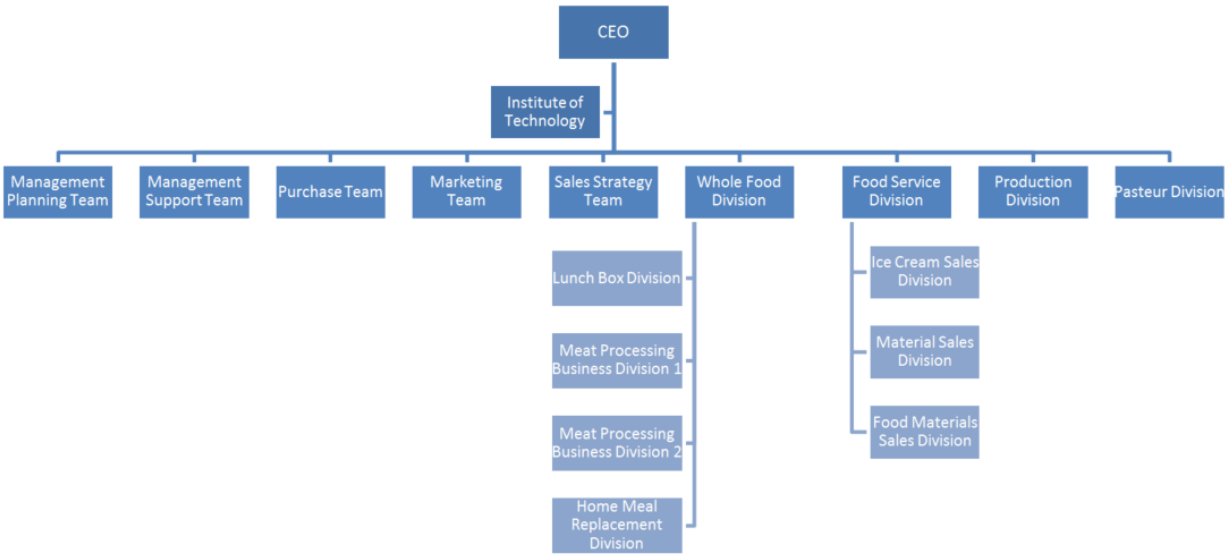

Figure 6.2: Organisational chart of manufacturing company B

Manufacturing company B delivers its products to end consumers through multiple distribution channels. There is no customisation required for each consumer, and the target is produced every month and distributed to the food market. Manufacturing company B is a leading food manufacturing company in South Korea. Due to the nature of the business, the proportion of overhead costs is not high, but the proportion of direct material costs is large and important. In addition, as the company has expanded its business divisions through several mergers, each business division has its own production line factories in different regions, and most of the overhead costs are physically separated. As a result, the overhead costs are as easy to track as are the direct costs.

Manufacturing company B uses ABC. Specifically, the ABC function of the SAP CO module is used, and the company has no problem operating the system because the nature of the overhead required for allocation is not complicated. In 2003, manufacturing company B introduced an in-house ERP made by an SI (System Integration) company within the group to which it belongs (group B). Since 2005, the ABC function has been added to the ERP and used. Subsequently, several companies were merged with the company, and there was a discussion bout upgrading the cost system. In 2012, TDABC was reviewed, but as it was decided to introduce SAP, and TDABC was not applied. With the ABC function of the SAP CO module, it could be operated faster than the existing in-house ERP's ABC system. The proportion of overhead costs for products was lower than that of other manufacturing industries and was not complicated, so it was possible to calculate the cost using ABC at a satisfactory level.

6.3.1.3 Diffusion Factors and Contextual Reasons for Diffusion in Manufacturing Companies

This study investigates whether the ABC diffusion factors identified in the existing ABC diffusion factor studies are relevant to the TDABC diffusion in the case studies. First, the scores on the extent to which the TDABC factors affect the spread, from 8 interviewees (consultants and practitioners from 2 manufacturing companies), are shown in table 6.6 below.

Table 6.6: Influence of factors on the diffusion of TDABC in the manufacturing industry

Diffusion Factor in the Manufacturing Industry	Score*
Top management support	4.88
Importance of cost information	4.75
Champion support	4.63
Observability	4.63
Trialability	4.50
Competition	4.25
Compatibility	4.13
Complexity	4.13
Relative advantage	4.13
Culture (competitive)	4.13
Culture (tight control)	4.00
Size	4.00
Cost	3.88
Environmental uncertainty	3.75
Coercive pressure	3.75
Mimetic pressure	3.50
Normative pressure	3.00

Note: Scored on a 5-point Likert scale; 1 = not applicable at all; 5 = highly applicable.

Overall, in the manufacturing industry, it was confirmed that the diffusion factors affecting ABC also affect the spread of TDABC. All elements scored at least three points. The top three factors in the manufacturing industry were the same as the top three in the hospital industry (see Table 6.13 and section 6.3.2.2).

To find out more about the diffusion factors that have particularly affected manufacturing compared to the hospital industry, the Mann–Whitney–Wilcoxon test[6] was applied to test the difference in the diffusion factors between the two industries. The results of this test are shown in Table 6.7.

Table 6.7: Mann–Whitney–Wilcoxon test comparing diffusion factors between the two industries

Diffusion Factor	P-value
Relative advantage	0.4521
Compatibility	0.7337
Complexity	0.2142
Trialability	0.0423*
Observability	0.1615
Cost	0.0230*
Size	0.7060
Top management support	0.3143
Champion support	0.9581
Culture (competitive)	0.2216
Culture (tight control)	0.4088
Competition	0.1824
Environmental uncertainty	0.7413
Coercive pressure	0.2491
Mimetic pressure	0.0395*
Normative pressure	0.0098**
Importance of cost information	0.8638

* Significant at the 5% level. ** Significant at the 1% level.

[6] The Mann–Whitney–Wilcoxon test is used to test the difference between two groups; the assumptions were that the dependent variable was ordinal or continuous, whereas independent variables should consist of two categorical, independent groups.

According to the Mann–Whitney–Wilcoxon test, there were a total of four TDABC diffusion factors that are characteristically different between the two industries. These were trialability (p-value < 0.05), cost (p-value < 0.05), mimetic pressure (p-value < 0.05) and normative pressure (p-value < 0.01). The reasons why the four factors differ between the two industries are explained below.

First, trialability had a more important effect on the spread of TDABC in the manufacturing industry than it did in the hospital industry, while mimetic pressure and normative pressure were less important for the spread of TDABC in the manufacturing industry compared to the hospital industry. This is due to the presence or absence of a demander community. In the case of hospitals, as explained earlier, there is a strong customer community. After trust in a certain management system was gained by some advanced hospitals in this community, most other hospitals would subsequently adopt the same system. In other words, if the initial diffusion is good, the subsequent diffusion is easy.

In contrast, in the manufacturing industry, there is no demand-side community, and sales for the application of TDABC are based on a one-to-one relationship between consultants and potential customers. For this reason, the proof-of-concept (POC) pilot test is very important, and if the company's standards are not met, TDABC cannot be applied. From the standpoint of companies, as there is no (or very little) exchange with other companies, there is not much information available, so the company must make a decision by verifying its effectiveness on its own:

> In the case of companies that applied ABC in the past, only people in the cost department are interested, and the first users of TDABC have little knowledge about this and get information on TDABC from consultants. The company did not have much information about TDABC, so there were doubts. (Managing Director of Consulting Firm B)

> After the POC work, the company's doubts about TDABC have decreased a lot. (Managing Director of Consulting Firm A)

Second, mimetic pressure and normative pressure had less influence in the manufacturing industry than they did in the hospital industry. Because there is no demand-side community in the manufacturing industry, it is difficult for companies to imitate one another even if there are other manufacturing companies using TDABC. Also, as there is little exchange between manufacturing companies, normative pressure had less influence on the spread than it did among hospitals:

> In the case of the manufacturing cost system, competitors operating the same business rarely have exchanges, and companies operating other businesses have different characteristics and generally use systems such as SAP, so there is little normative pressure on the use of TDABC. (CEO of Consulting Firm A)

> Most manufacturers want to imitate what big companies like Samsung and Hyundai do. However, in the case of TDABC, no other companies have ever heard of it because there is no application among advanced companies. (Director of Consulting Firm C)

Cost also influenced the spread of TDABC more in the manufacturing industry than it did in the hospital industry. This is the difference depending on the presence or absence of a substitute. In the case of hospitals, unlike manufacturing industry, there is no ERP exclusively for hospitals, so based on TDABC, users can obtain the necessary information for overall hospital management to enable them to conduct management activities. Accordingly, the sensitivity to price is low. However, in the case of manufacturing, all companies considering the application of TDABC will compare prices and performance with costing function of SAP. Because of this, manufacturers are more sensitive to the cost required to apply and maintain TDABC:

> The absolute price of TDABC is not high, but companies are not willing to pay a lot of money for non-SAP systems. They hated the big cost because they think of SAP as the main system and TDABC as the subsystem. (CEO of Consulting Firm A)

> When we considered the introduction of TDABC, we compared it with SAP in terms of costing. (Head of Financial Team of Manufacturing Company B)

In addition, among the factors influencing the spread of TDABC to manufacturing companies, a new factor in TDABC diffusion was identified: TDABC success stories. It was found that this factor affected not only manufacturing but also hospitals:

> In the case of manufacturing, the success cases of advanced companies are important because of their conservative attitude toward the cost system. Many manufacturing industries have given up on diffusion due to the domestic situation, which has no success stories to imitate. (CEO of Consulting Firm A)

> In a situation where there is no success story, if a company adopts TDABC and the accuracy of the cost made with TDABC is less than the cost made with SAP, there may be a situation in which the responsible employee is responsible. For this reason, it is difficult for corporate employees to bravely insist on adoption. (Managing Director of Consulting Firm A)

> I think there are few manufacturing companies that apply TDABC. Because of this, there was nothing to learn from other companies, and the decision making was forced to be more careful. (Depute Manager of Costing Part of Manufacturing Company A)

In summary, the existing factors affecting ABC diffusion have all affected the diffusion of TDABC in the manufacturing industry. Among them, top management support, champion support and the importance of cost information are the factors that most affect the diffusion, as is also the case in hospitals (see Table 6.8 and 6.13). The factors that have a greater influence on the spread of TDABC in manufacturing than in hospitals are trialability and cost. Because of the lack of knowledge and experience on the demand side of TDABC, and the presence of alternatives such as SAP, both factors have a greater impact in manufacturing than in hospitals. In contrast, mimetic pressure and normative pressure had less impact in the manufacturing industry than they did in hospitals, as there are no demand-side communities or companies to imitate in manufacturing. In addition, this study revealed a new diffusion factor in the spread of TDABC: TDABC success stories. In the absence of successful cases of TDABC's spread by advanced manufacturing companies, other manufacturing companies hesitated or struggled with the application of TDABC.

In addition to the TDABC diffusion factors described above, there were circumstantial elements that influenced the application of TDABC. These were the presence of alternatives from the company's point of view and the degree of interest in TDABC among employees. In the case of manufacturing companies, there are already well-known and proven ERP systems such as SAP and Oracle, and there is a costing module provided by these systems. As a result, the new TDABC system always had to compete with these costing modules of ERP systems to be applied:

> Most manufacturers are reluctant to apply other systems because they rely heavily on the SAP system. (CEO of Consulting Firm A)

> In the past, there was a problem with the ABC implementation in SAP, and many companies stopped using it, or the activity standard was simplified and used. However, after that, in recent years, I heard that SAP improved the data processing speed, removing some obstacles to the use of ABC compared to the past. Therefore, the need for companies to be interested in new systems has decreased. (IT Team Director of Manufacturing Company A)

In addition, practitioners other than the those in the cost accounting departments of manufacturing companies had little interest in or knowledge about TDABC. In the case of manufacturing companies, because tasks and evaluations are not performed individually but are instead conducted by departments, practitioners are less interested in how the application of a new system such as TDABC directly affects them. Therefore, most practitioners, except for a small number of cost accounting staff, had low levels of interest and knowledge in TDABC. As will be mentioned later, in the case of hospitals, performance evaluation is carried out by doctors, and budget-based activities such as the purchase of surgical instruments and assignment of nurses are based on these performance evaluations, meaning there is a lot of interest in TDABC among multiple practitioners:

> Compared to the past, there is awareness of TDABC, but departments other than accounting or IT are not very interested in TDABC. (Deputy Manager of Costing Part of Manufacturing Company A)

> Even within the financial team, the concept of TDABC is known, but many other employees do not know the concept of TDABC. In addition, most employees are not interested in the cost system because performance evaluation is conducted by departments rather than by individuals. (Head of Financial Team of Company B)

In summary, in the case of manufacturing companies, there are well-known cost management system alternatives already available, such as SAP, so when a new system such as TDABC is introduced, competition with SAP may occur. In addition, non-financial practitioners are less aware of TDABC because the impact of the application of TDABC on individuals is low.

In this section, the factors and circumstances affecting the diffusion of TDABC from the demand side of the manufacturing industry have been described. The following section explains the difference between a firm in the manufacturing industry in which TDABC was applied and one in which TDABC was rejected. After the next section, there is a description of the case from the hospital industry, and a comparative analysis of the manufacturing and hospital industry.

6.3.1.4 Comparison of Elements Affecting the Adoption and Rejection of TDABC

In the previous section, the characteristics of the diffusion of TDABC in manufacturing companies, as revealed through the analysis of two manufacturing

companies, were described. This section compares the situation of the semiconductor company (A), which applied TDABC, with that of the food company (B), which chose not to apply TDABC after considering its application. In addition, the reasons for differences in TDABC application among companies within the manufacturing industry are analysed.

The difference in the application choices of the two companies with regard to TDABC is due to the differences in the specific business segments of which they are a part. The characteristics of certain segments and industries may or may not fit well with TDABC; however, as described above, it is not easy to apply TDABC in most companies in the manufacturing industry. Nevertheless, the semiconductor company (A) described here did apply TDABC in the manufacturing industry in South Korea.

The semiconductor business segment involves a very large number of processes due to its nature. In the case of manufacturing company A, products are usually manufactured through about 600 manufacturing processes. These processes are operated by semiconductor manufacturing facilities, and the number of such facilities is also very large; the resulting overhead costs are higher than those of other manufacturing segments. Because the overhead costs are so high, distributing overhead costs by product is an important part of costing. In addition, because each company's manufacturing method is different, the proportion of overhead costs is different, and accordingly, there is a difference in the application of TDABC.

In addition, manufacturing company A produces semiconductors using the 'contract manufacturing' method. The types and specifications of products requested by customers are all different, and accordingly, there is no dedicated production line, and all are common production lines. Tracking and calculating cost is therefore complicated, as processes for hundreds of thousands of different products are performed in one facility. TDABC was applied because of the complexity of this process and the difficulty of tracking costs. In the case of advanced semiconductor companies such as Samsung Electronics, indirect costs were directly incurred by setting up a separate system to track all facilities and products for the purpose of calculating costs. However, this is a limited solution that has only been applied in some large, advanced companies. Due to the characteristics of the semiconductor

segment, the application of TDABC has many advantages that do not apply for companies in other segments:

> As it is basically a device industry, the proportion of depreciation costs is large. In our case, all the mechanical devices and utility facilities of the production lines are common facilities, so distribution by product is very important. However, as we did not have a separate system to track the movement and suspension of machinery like Samsung, the depreciation cost for each facility could not be directly found, and for this, the introduction of TDABC was required. (IT Team Director of Manufacturing Company A)

> Advanced domestic semiconductor companies such as Samsung Electronics developed their own tracking system to distribute facility depreciation costs, resulting in direct indirect costs. However, in the case of company A, there was no such system, and the implementation of TDABC was possible due to the dissatisfaction of the existing SAP costing system. (Managing Director of Consulting Firm A)

> Although it is a manufacturing industry, foundry semiconductor companies are not very different from service companies in that the products we offer are different each time. As the specifications required by each customer are all different, it is a manufacturing industry, but the product range is close to the service industry. Companies with a small number of product lines can do it with SAP. Because we are a consignment producer, the company cannot predict the amount of production, and customer needs are constantly changing. It seems that manufacturers do not have to use TDABC unless it is a special situation like ours. (Deputy Manager of Costing Part of Company A)

A semiconductor manufacturing company operating in the foundry segment is a company that manufactures the number of semiconductors required by a semiconductor design company (i.e., it is fabless). Each product has different specifications, and the number of steps, the number of processes and the duration of the semiconductor manufacturing process are different. In addition, because the manufacturing period usually takes more than a month and requires hundreds of manufacturing processes and other processes, the procedure is very complicated.

Because of this characteristic, the cost calculation in the SAP CO module caused the system to be overloaded—resulting in slow calculation speeds or errors—or caused the system to go down entirely. In the case of manufacturing company A, inaccurate costs were derived using the ABC method in the existing SAP, and the speed was too slow, so it was not possible to close the monthly settlement on time:

> When costing with the existing SAP CO module, the system was down, and the profit or loss by product was not accurately calculated. In addition, an error occurred in which the cost of each period did not correspond to the sales of each period, and the sales profit

> margin was jagged every month. TDABC, which can solve these errors, became our alternative. (Deputy Manager of Costing Part of Company A)
>
> The existing SAP CO ABC system was incurring inaccurate costs due to the heavy (demand on the) system, and a lot of labour was involved in collecting and updating ABC data. Also, ABC's process was too slow. After the introduction of TDABC, the process time (cost driver) is updated every month, and there is an average of more than 1 million transaction data points per month, and the time data can be updated every month in 10 minutes. The total data update for the entire TDABC system could be completed in an hour. (IT Team Director of Company A)

These interview quotations illustrate that it was difficult to maintain the ABC system due to the uniqueness of the semiconductor segment, and accordingly, TDABC was introduced.

Meanwhile, in the case of food manufacturing company B, the application of TDABC was rejected following a period of consideration. The company was able to cost its products effectively enough using SAP's ABC function. Due to the nature of the food manufacturing segment, the direct material costs are high, while the manufacturing overhead costs are not high. Each product line has a production line and manufacturing facilities, but some parts are directly traced. Because the share of overhead expenses is not large, the importance of the distribution of overhead expenses is reduced.

It should also be noted that company B is a large company among food manufacturers. It is a company that manufactures various product lines and was formed by merging several companies. As such, each product division has its own independent production line in different regions. In other words, there is a dedicated line for each product, and accordingly, the calculation of the manufacturing overhead cost is not that complicated:

> Because the scale of common or indirect costs is not relatively large, and most of them can be traced like direct costs, the amount of indirect costs divided by setting a distribution standard is small. In addition, because it was a company created by merging more than five companies, each division has its own production line in different regions, and physically, overhead costs were classified as the primary, so it was easy to trace to products like direct costs. (Head of Financial Team of Manufacturing Company B)
>
> With the merger of several companies, the amount of data to be processed became vast, and it was difficult to derive results with the company's own ABC system that was used in

> the past. The system slowed down, and doubts were raised about the accuracy of the cost. The purpose was to accurately obtain the profits and losses of each division, but the size of the overhead costs and importance of the overhead costs were low, so ABC was simplified. We reduced the number of cost centres and simplified the drivers, changing to a simpler and lighter ABC system. (Manager of Costing Part of Manufacturing Company B)

If there is a burden on the operation of an ABC system due to complicated manufacturing processes, and if the importance of the overhead cost is low, the issue can be solved by simplifying the ABC structure and operation. Due to the characteristics of food manufacturing companies, satisfactory calculation results were obtained at company B through the simplification of ABC rather than the application of TDABC. When considering the cost system upgrade, TDABC was rejected in favour of the ABC function of the SAP CO module. The company was already applying SAP's financial accounting (FI) module, so it was decided to apply the SAP CO module as well:

> While using the simple version of ABC developed by the company itself, several companies merged and considered the introduction of TDABC and SAP. As a result of the review, there were not many general-purpose facilities, and the amount of common overhead was small, so it was possible to use the SAP CO module. The company first introduced the SAP FI module in 2010 to respond to the introduction of IFRS [the International Financial Reporting Standards] in 2011 and the merger situation that has continued since 2009. After that, there was a review of TDABC in 2012, but it was decided to introduce the full SAP package by adding the SAP CO module. (Head of Financial Team of Manufacturing Company B)

Table 6.8, below, summarises the comparison between the two companies provided in this section.

Table 6.8: Comparison between the company that is TDABC and the company that rejected TDABC

	Company using TDABC	**Company that reject TDABC**
Overhead ratio	High	Low
Production mode	Contract manufacturing (Variable product types)	General manufacturing (Fixed product type)
Facility/line type	Common facilities/lines	Dedicated facilities/lines
Cost system load	Heavy	Light
Organisational structure	Centralised	Decentralised

As such, it can be seen that the application of TDABC varies according to differences within segments in the manufacturing industry, as in some areas, it is difficult to apply TDABC. Among the manufacturing segments, the semiconductor consignment segment, which has similar characteristics to the service industry, has the potential to apply TDABC successfully; however, other general manufacturing segments lack the motivation to introduce TDABC because of the characteristics of those segments. In addition, TDABC diffusion is challenged in some cases because there is a strong competitor such as CO module of SAP.

So far, the demand side of TDABC diffusion in the manufacturing industry has been explained. The next section analyses the demand side of TDABC diffusion in the hospital industry. After that, the characteristics of the diffusion of TDABC in manufacturing and hospitals are compared.

6.3.2 Findings from the Demand Side in Hospitals

This section describes the factors and significant contextual aspects affecting the diffusion of TDABC in the hospital industry. First, the overall descriptions of five hospitals that are applying or using TDABC are explained. After that, the diffusion factors and significant contextual aspects affecting the spread of TDABC in these five hospitals are explained. Last, the difference in the diffusion of TDABC on the demand side in the manufacturing and hospital industries is compared.

6.3.2.1 Background of Five Hospitals Applying TDABC

6.3.2.1.1 University Medical Centre A

Following its foundation in 1931, university medical centre A was re-developed in 2005 as a new hospital building to cope with rapid changes in the medical environment and provide high-quality medical services (see Table 6.9). The new hospital, with 4 basement levels, 13 floors above ground and a total floor area of 85,687m^2, is equipped with state-of-the-art medical equipment and computerised systems. There are 33 medical departments, 879 beds and 11 specialty healthcare centres. More than 430 doctors are working in university hospital A, which is a private hospital.

Table 6.9: Sales, net profits and total assets of hospital A

Year	Medical Revenue (£)*	Net Profit (£)*	Total Assets (£)*
2016	175.4	3.6	135.9
2017	178.7	-0.4	144.6
2018	204.5	1.3	159.5

Note: £1 (pound sterling; GBP) = ₩1,500 (South Korean won; KRW). * In millions. Source: Korea Health Industry Development Institute.

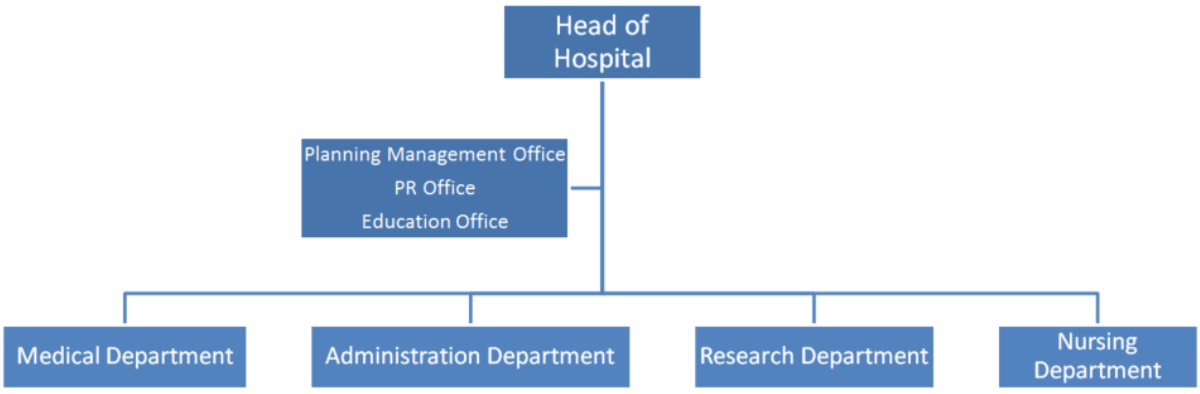

Figure 6.3: Organisational chart of hospital A

At hospital A, 33 medical departments are the profit centres, as the revenue and expenses are aggregated for each department (Family Medicine, Infectious Medicine, Department of Health, Endocrine Metabolism, Rheumatic Medicine, Anaesthesiology and Pain Medicine, Radiation Oncology, Pathology and Urology, Obstetrics and Gynaecology, Plastic Surgery, Paediatrics, Gastroenterology, Neurology, Neurosurgery, Renal Medicine, Cardiovascular, Internal Medicine, Ophthalmology,

Department of Radiology, Surgery, Emergency Medicine, Otolaryngology [Head and Neck Surgery], Clinical Pharmacology, Rehabilitation Medicine, Department of Mental Health Medicine, Orthopaedics, Tumour Haematology, Diagnostic Testing, Dentistry, Dermatology, Nuclear Medicine, Respiratory Allergy and Thoracic Surgery). Performance evaluations are conducted by departments and doctors. This process is conducted in other hospitals as well.

6.3.2.1.2 Hospital B

Hospital B was founded in 1885 as Korea's first modern hospital. Hospital B includes specialised hospitals such as the Cancer Hospital, Rehabilitation Hospital, Cardiovascular Hospital, Eye Hospital, Children's Hospital and Dental Hospital. Hospital B is currently operating 2,452 beds. The total number of doctors is about 1,110. There are 137 medical departments, including 37 departments of Hospital B and 100 departments of the affiliated hospitals. Hospital B is a private hospital (see Table 6.10).

Table 6.10: Sales, net profits and total assets of hospital B

Year	Medical Revenue (£)*	Net Profit (£)*	Total Assets (£)*
2016	798.8	-4.8	784.1
2017	864.7	-7.1	837.3
2018	920.2	-20.5	926.4

Note: £1 (pound sterling; GBP) = ₩1,500 (South Korean won; KRW). * In millions. Source: Korea Health Industry Development Institute.

6.3.2.1.3 Hospital C

The establishment of Hospital C was decided through the initiative of the residents, and it was the first time this had happened in South Korea. Located on the former site of a city hall, the hospital is 24,711m^2—spread over 4 floors below ground and 9 floors above ground. The hospital plans to have a total of 513 beds, 24 medical departments and 9 specialised centres. The hospital is scheduled to open in 2020. Hospital C is a government hospital. Unlike the other hospitals in this study, Hospital C is not currently in operation, but it is being set up to use the same cost system as other hospitals.

6.3.2.1.4 University Hospital D

Since its foundation in 2006, university hospital D is an East–West medical convergence hospital. Hospital D is an 800-bed university hospital with 14 floors above the main building. Hospital D is divided into a general hospital, oriental medicine hospital and dental hospital; these hospitals have 29, 19 and 7 medical departments, respectively. Hospital D is a private hospital (see Table 6.11).

Table 6.11: Sales, net profits and total assets of hospital D

Year	Medical Revenue (£)*	Net Profit (£)*	Total Assets (£)*
2016	133.8	4.5	120.1
2017	145.0	3.7	125.1
2018	161.1	3.3	134.2

Note: £1 (pound sterling; GBP) = ₩1,500 (South Korean won; KRW). * In millions. Source: Korea Health Industry Development Institute.

6.3.2.1.5 Hospital E

In 1994, hospital E was established by Group S, a major conglomerate in South Korea. Hospital E has about 1,309 doctors, 2,421 nurses, 171 researchers and 2,800 pharmacists and medical technicians. Hospital E has 1,989 beds and an area of 354,319m^2. The main building and annex are currently being renovated, and a new hospital building is under construction, which will be developed into an intelligent hospital in the future. It has 38 medical departments, more than 30 specialty centres and more than 100 clinics. Hospital E is a private hospital (see Table 6.12).

Table 6.12: Sales, net profits and total assets of hospital E

Year	Medical Revenue (£)*	Net Profit (£)*	Total Assets (£)*
2016	740.1	-23.5	641.7
2017	805.3	-40.4	636.3
2018	880.7	-18.4	641.5

Note: £1 (pound sterling; GBP) = ₩1,500 (South Korean won; KRW). * In millions. Source: Korea Health Industry Development Institute.

Hospitals have characteristics similar to manufacturing companies in that there is a very wide product range and a deep product mix. However, performance evaluation is conducted for each product line—that is, each medical department of the hospital. A medical department in a hospital corresponds to a business division in manufacturing.

A number of medical departments in each hospital are the profit centres, where revenue and expenses are aggregated for each department. Hospitals also maintain a system in which revenues and expenses are aggregated and evaluated by each doctor in each department. This is a big difference from the general manufacturing setting.

In the next section, the diffusion factors and contextual aspects of TDABC are analysed in relation to the above five hospitals (i.e., hospitals A–E).

Table 6.13: Summary of 5 hospitals

Hospital	**A**	**B**	**C**	**D**	**E**
Year Established	1931	1885	2020	2006	1994
Number of Beds	879	2,452	513	669	1,989
Number of Doctors	430	1,110	69	260	1.309
Private/Public	Private	Private	Public	Private	Private
Performance Evaluation	By Doctor	By Doctor	By Doctor	By Doctor	By Doctor

6.3.2.2 Diffusion Factors and Contextual Aspects Affecting TDABC in Hospitals

This study investigates whether the ABC diffusion factors identified in the existing ABC studies can also be applied to TDABC's diffusion. First, the average scores indicating the extent to which the TDABC diffusion factors identified in the five hospitals affect its spread, according to 10 interviewees, are shown in Table 6.14 below.

Table 6.14: Influence of factors on the diffusion of TDABC in the hospital industry

Diffusion Factors in the Hospital Industry	**Score***
Top management support	5.00
Importance of cost information	4.70
Champion support	4.60
Mimetic pressure	4.60
Culture (competitive)	4.50
Relative advantage	4.30
Culture (tight control)	4.30
Normative pressure	4.30
Compatibility	4.20
Observability	4.20
Size	4.10
Competition	3.80
Complexity	3.80
Trialability	3.75
Environmental uncertainty	3.70
Coercive pressure	3.40
Cost	2.70

Note: Scored on a 5-point Likert scale; 1 = not applicable at all; 5 = highly applicable.

Overall, in the hospital industry, it has been confirmed that most of the diffusion factors affecting ABC also affect the spread of TDABC. All elements except cost

scored at least three points. The top three of these factors were the same as the top three in the manufacturing industry. An explanation of these scorings in comparison with the factors affecting TDABC spread in the manufacturing industry will be given later. In addition, the reasons why the cost factor did not have a significant impact on the diffusion of TDABC in the hospital industry will be discussed, along with the four TDABC diffusion factors that were characteristically different between the two industries. As mentioned earlier, according to the Mann–Whitney–Wilcoxon test, there are a total of four TDABC diffusion factors that were characteristically different between the two industries. These were trialability (p-value < 0.05), cost (p-value < 0.05), mimetic pressure (p-value < 0.05) and normative pressure (p-value < 0.01).

First, trialability had a less important effect on the spread of TDABC in the hospital industry than it did in the manufacturing industry, while mimetic pressure and normative pressure were more important for the spread of TDABC in the hospital industry compared to the manufacturing industry. This is due to the presence or absence of a demander community. In the case of manufacturing industry there is no (or at least a reduced) demand-side community, and sales for the application of TDABC are based on a one-to-one relationship between consultants and potential customers as mentioned earlier. For this reason, the POC pilot test for trialability is very important in the manufacturing industry. However, in the case of hospitals, as explained earlier, there is a strong customer community. Most hospitals easily adopt the management system adopted by advanced hospitals. As the management system gains trust in the hospital community, the company's interest in trialability diminishes. Hospitals already believe that the management system has been verified in advanced hospitals and is applied without great resistance:

> Because it has already been verified by advanced hospitals, the factor of trialability was not very important. (Leader of Costing and Planning Team of Hospital D)

> We have used ABC in the past, and we have had a trust in consultants and the systems they provide, so trialability wasn’t very important in our adoption decisions. (Manager of Costing Part of Hospital B)

Second, mimetic pressure and normative pressure had a greater influence in the hospital industry than they did in the manufacturing industry. Because there is a clear demand-side community in the hospital industry, many hospitals get information from

one another and share opinions about new management systems in the community. When some advanced hospitals introduce a new system, mimetic pressure and normative pressure naturally assert an influence over other hospitals. Hospitals share cost information with each other, so it is natural for smaller hospitals to follow the management methods of advanced hospitals in the community:

> In the manufacturing industry, confidentiality between competitors is fierce and there is no exchange, whereas hospitals are the concept of friends who run homogeneous businesses. While conducting business by jointly responding to regulatory groups such as the Ministry of Health and Welfare and the Review and Assessment Service, various associations have been created to speak up against regulatory groups. In other words, since the community is strong and exchanges are active, it may be difficult to settle the cost system in the beginning, but once it is settled, it quickly spreads within the hospital community. (CEO of Hospital Consulting Firm D)

> Basically, the hospital cost teams know each other well. For joint response to FFS, accurate cost data from each hospital is required. If the price is set low on the FFS model, it needs to be revised. Therefore, the government may request actual cost data from each hospital, and each association or conference may respond to this. In addition, as most other hospitals have adopted the TDABC package, direct comparison is impossible if our hospital does not introduce TDABC. (Manager of Costing Part in Hospital A)

In contrast, cost influenced the diffusion of TDABC more in the manufacturing industry than it did in the hospital industry. This difference is caused by the presence or absence of a substitute. In the case of manufacturing, all companies considering the application of TDABC would compare its price and performance with other ERP systems, such as SAP. However, in the case of hospitals, there is no ERP system built exclusively for hospitals, so when hospitals consider the application of TDABC, they only need to obtain the necessary information about the overall hospital management and conducting management activities. Hospitals needed a system that would integrate management systems such as their OCSs and EMRs, and according to this need, consultants supplied TDABC to hospitals. Hospital management tended to think that the cost of TDABC was not large, and because it was a necessary system anyway, they did not pay much attention to the cost. For this reason, cost was evaluated as the only insignificant factor—with less than three points—among the diffusion factors that have affected the diffusion of ABC in the past:

> TDABC is not expensive to apply and maintain compared to other systems, and because there are many functions necessary for hospital management, the price is not important. (Director of Costing Part in Hospital E)
>
> As there are no alternatives to TDABC, price considerations were not high. (Leader of Costing and Planning Team in Hospital D)

In addition, among the factors influencing the diffusion of TDABC to hospitals, a new factor affecting TDABC diffusion was identified. As mentioned before, this factor is TDABC success stories. It was found that this factor affects not only manufacturers but also hospitals. Many hospitals considered the application of TDABC after hearing about application cases in advanced hospitals[7] in the hospital community. Many hospitals and consultants have used success stories of TDABC to influence its diffusion, as was the case in manufacturing:

> Some advanced hospitals were already considering or applying the TDABC package, and their evaluation of TDABC was good. The reason for choosing the TDABC package was that it was a hospital-only package by hospital consultants, so it fit well in the hospital situation. TDABC packages were selected because advanced hospitals were using them, and their evaluation was good. I thought that if other hospitals used it and their evaluation was good, it would surely be effective in our hospital. (Leader of Costing and Planning Team of Hospital D)
>
> Many hospitals participate in conferences, seminars and education. Here, discussions of TDABC and other advanced management systems take place. All of four Korea's leading advanced hospitals are using TDABC. In this situation, many other hospitals also want to use TDABC, which most advanced hospitals use. (Head of Cost Analysis Part of Hospital B)

In summary, except for the cost factor, the existing factors affecting ABC diffusion all affected the diffusion of TDABC in the hospital industry. Among them, top management support, champion support and the importance of cost information affected the diffusion the most, as was the case for manufacturers. The factors that had less influence on the spread of TDABC in hospitals than in manufacturing companies were trialability and cost. In contrast, mimetic pressure and normative pressure had a greater impact in the hospital industry than they did in the manufacturing industry, as there were clear demand-side communities and advanced hospitals to imitate. In addition, the diffusion factor newly revealed for

[7] Large hospitals with excellent number of beds, medical staff, and medical quality (in this study, hospitals B and E are included)

TDABC was that of TDABC success stories, as was the case in manufacturing companies. Because there were successful cases of TDABC application in advanced hospitals, other hospitals considered and applied TDABC in turn.

In addition to the TDABC diffusion factors described above, there were circumstantial elements that influenced the application of TDABC in hospitals. These were the presence of alternatives from the company's point of view and the degree of interest among employees in TDABC, as mentioned in the manufacturer analysis. Hospitals were in need of a system that used hospitals' OCS or EMR information. ERP systems such as SAP and Oracle were suitable for use in manufacturing but not in hospital situations. For this reason, the application of TDABC in hospitals was relatively easier than in the manufacturing industry.

Further, practitioners in hospitals had more interest in and knowledge about TDABC than did practitioners in manufacturing companies. Unlike the manufacturing industry, where performance is evaluated by department, in hospitals, performance evaluation is performed for each doctor, and based on this, hospital management activities such as budgeting for each department to which doctors belong or assigning new doctors and nurses take place. As such, more practitioners have a high interest in and knowledge of TDABC:

> In terms of performance evaluation, hospitals are more sensitive to cost systems. Manufacturers evaluate each department by division, but doctors pursue accurate performance evaluation because individual doctors' profitability comes out. In this process, if users are persuaded of the computational consistency of the package, it spreads better. (CEO of Hospital Consulting Firm D)

> For hospitals, not only the costing result but also the costing process is important. From the perspective of doctors who are subject to performance evaluation, the justification of the costing process is important. For example, if cost is allocated based on the number of patients, it is judged that there is no justification because the severity and time spent are different for each patient. In response to these needs, TDABC using a time driver, a fair standard, has enabled its spread. . . . It should be understandable to everyone, should be free from disputes and should be somewhat similar to the performance evaluations felt by doctors. TDABC was procedurally fair and produced results similar to physicians' performance reviews, which physicians self-evaluate. (CEO of Hospital Consulting Firm E)

> Hospital practitioners are actively interested in TDABC. It is the doctors who are most affected by management decisions. When convincing doctors, the adequacy of the distribution standard is important. TDABC is interesting because physicians must

> understand the adequacy of the distribution criteria to accept performance evaluation. (Chairman of Korean Hospital Cost Association, Head of Planning Team of Hospital C)
>
> The advantage of TDABC was that it was the most suitable for hospital activities, and accordingly, fair and accurate performance evaluation was possible. (Leader of Costing and Planning Team of Hospital D)
>
> Doctors check costs for themselves and their departments and use them to improve or modify surgery or treatment processes. Monthly income and expenses per doctor are notified by an amount/percentage. It affects doctors' direct performance evaluation or compensation. It is also used for the number of beds or for selecting nurses in all departments. I am always interested, as doctors can see the cost of the injuries they have treated, and TDABC is used for their performance evaluation. (Doctor, Vice Chair of Hospital D)
>
> Regularly, doctors gather in departments to hear explanations of costs for each activity [and to] discuss profit margins and sales. There is a high interest in TDABC because such information is used to evaluate the performance of doctors. It is also important because it is an important indicator for increasing doctors, investing in facilities and securing bed space. With the information of TDABC, doctors want to improve the cost of medical treatment and provide effective treatment. (Head of Cost Analysis Part of Hospital B)

Another characteristic of hospital TDABC diffusion was that the hospital business and TDABC are very well matched. Hospitals had to find the cost for each medical practice corresponding to the FFS payment, and time is the most suitable driver for calculating the cost of medical treatment. For this reason, the situation in which hospitals operate and the characteristics of TDABC matched well:

> The application of TDABC in manufacturing may be optional, but I think it is essential in hospitals. Manufacturers may use ABC, as there are so many drivers available, but hospitals' only driver is time. (Consultant in Consulting Firm C)
>
> In the past, ABC drivers were different for each medical practice. It should always be updated. When the treatment pattern changes, the rate needs to be readjusted again through a survey, and if a lot of time is spent on modifying the driver, the results are unbelievable. (Leader of Costing and Planning Team of Hospital D)
>
> TDABC is indispensable in order to compile costs by medical practice corresponding to the FFS model. This advantage was that it was very effective because it required more advanced FFS-specific costing from the cost of each doctor and department. (Manager of Costing Part of Hospital B)
>
> In the past, ABC was used to collect costs by doctors and departments. In the past, hospitals could not calculate the cost per FFS payment. After that, in order to cope with the FFS model, TDABC was introduced, and the cost was collected by the FFS system. In addition, in the case of non-payment surgery (if the FFS payment is not determined,

> the hospital can arbitrarily charge a price) where hospitals set the price of surgery, the fee for the surgery can be calculated only by knowing the cost. (CEO of Hospital Consulting Firm E)
>
> From the perspective of practitioners, interest in TDABC has increased. This is because the entire hospital is very interested in the cost of each FFS payment. (Head of Cost Analysis Part of Hospital B, and Director of Costing Part in Hospital E)

In the case of hospitals, there was no suitable alternative to TDABC. In addition, practitioners and doctors in hospitals were very interested in TDABC to respond to FFS payments and to evaluate individual doctors' performance. In addition, the purpose of the hospital (i.e., to accurately and fairly calculate the cost of each FFS payment) and the characteristics of TDABC were well matched. These characteristics represent the difference between the diffusion of TDABC in the manufacturing and hospital industries.

So far, the diffusion of TDABC on the demand side of hospitals has been explained. In the next section, the characteristics of TDABC diffusion on the demand side of the manufacturing and hospital industries are compared.

6.3.3 Summary and Comparison of the Demand Side of TDABC Diffusion

In the previous two sections, the factors and contextual elements affecting TDABC diffusion in the manufacturing and hospital industries were described. A summary of this is shown in Table 6.15.

Table 6.15: Summary of the demand side of TDABC diffusion in both industries

	In Manufacturing Companies	**In Hospitals**
ABC diffusion factors affecting the diffusion of TDABC	• All factors	• All factors except cost
The most influential diffusion factors	• Top management support • Importance of cost information • Champion support	• Top management support • Importance of cost information • Champion support
Diffusion factors particularly influential in each industry	• Trialability • Cost	• Mimetic pressure • Normative pressure
Newly identified TDABC diffusion factor	• Success stories • No success stories	• Success stories • Success stories exist
Alternatives such as SAP	• Presence	• Absence
Practitioners' interest in and reasons for using TDABC	• Low • Performance evaluation by TDABC is conducted by departments	• High • Performance evaluation by TDABC is conducted by individual doctors
Motivation for using TDABC according to industry characteristics	• None in particular • Application is optional	• Costs per FFS payment must be collected • Application is essential

As shown in the summary table above, the characteristics of the diffusion of TDABC in manufacturing and in hospitals were different. However, the three factors that most influenced the spread of TDABC and the newly identified factor affecting TDABC

diffusion were the same for both industries. These factors are described in greater detail here.

The importance of cost information is a diffusion factor of ABC that has been identified in several previous studies (e.g., Anderson, 1995; Krumwiede, 1998; Alsayed, 2010). According to Anderson (1995), the need in organisations for accurate cost information for strategic decisions and cost reduction can influence the adoption of ABC. Krumwiede (1998) also found a positive relationship between the importance of cost information and ABC adoption. Alsayed (2010) found that the importance of cost information was associated with and a significant predictor of the adoption of activity-based techniques (ABTs). Naturally, this factor was also important in both the manufacturing and hospital industries in South Korea.

The importance of top management support and champion support, which are representative organisational support factors of ABC diffusion, and of success stories, which is an additional factor affecting TDABC diffusion identified in the present study, can be explained in part by the cultural characteristics of South Korea. The influence of top management support and champion support have been confirmed in existing ABC diffusion studies (e.g., Malmi, 1997; Krumwiede, 1998; Anderson and Young, 1999; Brown et al., 2004; Alsayed, 2010), and the relevance of the factors have been found to be closely related to the cultural characteristics of South Korea. As mentioned earlier, in South Korean culture, there is a cultural characteristic of exhibiting strong loyalty to leaders in organisations, such as the top management and champions. According to Song and Meek (1998), in South Korea, employees tend to respect senior staff and to obey leaders' orders or decisions, showing deep loyalty to the bosses and leaders.

In addition, the fact that success stories were found to be an important factor affecting the spread of TDABC in both industries is related to the cultural characteristics of South Korea. According to Lee et al. (2013), Confucianism and the collectivist culture of South Korea affect the adoption rate of ABC in relation to the interactions between early adopters and future adopters. In addition, in a study by Chang (2003), South Korea's valuing of conformity and imitation, based on the

Confucian tradition, can elicit collective action; as a result, once the spread of an innovation began, it would spread very quickly and effectively.

Choi and Geistfeld (2004) showed that South Korean culture tends to place more importance on others' suggestions and experiences when making decisions. Therefore, word of mouth and referrals are thought to be effective in the diffusion of innovations in South Korea. Operating within these cultural characteristics, manufacturing companies and hospitals will be more likely to apply TDABC if they have heard success stories about it. In the manufacturing industry, in which there are no success stories, companies are reluctant to apply TDABC, and most manufacturers tend to use ERP systems such as SAP or Oracle. However, in the case of hospitals, advanced hospitals have already applied TDABC, making it more likely for other hospitals to apply TDABC.

The characteristics of TDABC diffusion on the demand side of the manufacturing and hospital industries described so far are as follows. First, most of the existing ABC diffusion factors have an important influence on the diffusion of TDABC. However, cost is not an important factor in the diffusion of TDABC in the hospital industry, where there are no suitable alternatives to TDABC. Second, among the TDABC diffusion factors, the most influential factors are top management support, champion support and the importance of cost information, in both industries. Along with this, success stories, which is a newly identified TDABC factor, is related to the cultural characteristics of Confucianism and the collectivist culture in South Korea.

Among the diffusion factors of TDABC, trialability and cost are particularly influential in manufacturing, while mimetic pressure and normative pressure have more influence in hospitals than in manufacturing. Of these, trialability, mimetic pressure and normative pressure are related to the presence or absence of a community of potential customers in the industries. In addition, cost is less of an influencing factor in hospitals because in the manufacturing industry, there is competition in the form of alternatives such as costing module of SAP, traditional costing and ABC. However, because there is no alternative in the hospital industry, the spread of TDABC is relatively easy.

Further, manufacturers have no specific motive for applying TDABC; it is not necessary to use TDABC, as there are several possible cost drivers. Because the performance evaluation of practitioners is carried out by departments in manufacturing, individual practitioners are less directly affected by TDABC. Therefore, practitioners' interest in TDABC is low except in financial departments. However, in hospitals, it is essential to apply TDABC because of the need for costing for the FFS system. In addition, the performance evaluations of doctors, which affect hospital management in various ways, are performed by individual doctors. As such, hospital practitioners and individual doctors are highly interested in TDABC, as hospital bed assignments, medical device purchases, new hires and nurse assignments are determined according to the outcomes of performance evaluations.

So far, the characteristics of the demand side of TDABC diffusion in the manufacturing and hospital industries have been explained. The next section explains the dynamics between the supply side and the demand side in manufacturing companies and hospitals.

6.4 Findings Related to the Dynamics between Suppliers and Demanders

This section describes the dynamics between the supply side and the demand side in the implementation stage and integration stage in the manufacturing and hospital industries. According to Ax and Bjørnenak (2007), dynamics consist of two elements: technical and rhetorical modifications. However, during the interviews, consultants and practitioners insisted that the two types of modifications are similar concepts that occur simultaneously in TDABC diffusion in the industries. Accordingly, dynamics were not distinguished by type but were interpreted as meaning 'modifications that occurred during the diffusion processes'.

In the next section, the dynamics between the supply side and the demand side in the manufacturing and hospital industries are described.

6.4.1 Findings Related to the Dynamics between Suppliers and Demanders in Manufacturing

First, the characteristics of the dynamics between the supply side and the demand side in the implementation stage during the TDABC diffusion process in manufacturing are described. In terms of the technical and rhetorical changes that occurred in the implementation stage in the manufacturing industry, modifications related to the connection of the TDABC system to the existing management system occurred, without requiring any special modifications to the TDABC system itself:

> The advantages of TDABC, which manufacturers have previously recognised, were verified in the POC pilot test. The company wanted to see TDABC's computational speed, and the results were satisfactory. There were no modifications to the TDABC system itself in the subsequent application process. (Managing Director of Consulting Firm B)

> In the TDABC application stage, after consultation with practitioners, it was decided to simply add a connection system that receives SAP information, calculates it and sends it back to SAP. (CEO of Consulting Firm A)

> For a stable connection with existing systems, key values were assigned to the data of each system to map between the systems. (Managing Director of Consulting Firm A)

Second, the characteristics of the dynamics between the supply side and the demand side in the integration stage during the TDABC diffusion process in manufacturing are described. At this stage, the technical and rhetorical changes that occurred mainly related to the scalability of the information obtained from TDABC:

> For the scalability of the information obtained from TDABC, the system has been modified to generate and provide data to upgrade the inventory management system at the request of the company after the application of TDABC. Also, for the convenience of practitioners, the UI [user interface] of the TDABC system has been improved. (Managing Director of Consulting Firm A)

> After the TDABC set-up process, a contract for repairs and modifications was made for one year. During this period, newly obtained information from TDABC was sent to other systems to maximise the output from the TDABC system. (IT Team Director of Company A)

To summarise, the characteristics of the dynamics between the supply side and the demand side in manufacturing were as follows:

- Modifications that focussed on connectivity between the TDABC system and existing systems in the implementation stage

- Modifications that focussed on the scalability of the information from the TDABC system rather than modifications to the TDABC system itself in the integration stage

In the manufacturing industry, the TDABC dynamics did not involve any functional improvements to the TDABC system itself. In both the implementation stage and the integration stage, the modifications focussed only on harmonisation and collaboration with the information provided from company's existing management system; no changes involved functional modifications to the TDABC system.

The next section explains the dynamics between the supply side and the demand side in hospitals. After that, the differences in the TDABC diffusion dynamics between manufacturing companies and hospitals are compared.

6.4.2 Findings about Dynamics between Suppliers and Demanders in Hospitals

Similar to the dynamics in manufacturing, the technical and rhetorical changes in the implementation stage in hospitals involved only simple customisation for each hospital's management system and environment, with no special modifications being made to the TDABC system itself. The TDABC system to be applied to hospitals was already configured to suit the hospital business environment, so no modifications were required in that respect:

> There was a foreign solution package in the 2000s, but it was impossible to customise, so there were many limitations, and it was very expensive for domestic hospitals to apply. Accordingly, we developed the TDABC package so that can be customised to suit the management environment of each hospital, and this customisation helped a lot in the diffusion of TDABC. (CEO of Hospital Consulting Firm D)

> Because each hospital has a different system, such as OCS and EMR, and regulations, such as different sales recognition points, OCS and EMR information transplantation and customisation are essential when introducing the system. (Manager of Costing Part in Hospital A, and Director of Costing Part in Hospital E)

> It was customised in consideration of the company's management activities and other activities and processes. (Leader of Costing and Planning Team in Hospital D, and Leader of Management Innovation Team in Hospital B)

Meanwhile, the technical and rhetorical changes that occurred in the integration stage in hospitals played a very important role in the spread of TDABC. In the case

of manufacturing, the main modification was to send information from the TDABC system to other systems. However, in the case of hospitals, the TDABC function was modified from simple costing, performance evaluation and profitability analysis to include management decision-making solutions, performance management, budgeting, a physician performance compensation system, a municipal subsidies measurement system, other hospital benchmarking systems and statistical programs; this allowed the hospitals to maximise their utilisation of the TDABC system's information. This process usually started with constant communication between consultants and hospitals through a Voice of the Customer (VoC) system:

> In the first TDABC package in the application phase, there were only tools for profitability analysis for costing and performance evaluation by department and doctor. However, while responding to the VoC and the hospital business environment, management decision-making solutions, performance management, budgeting, professional performance compensation systems, local government subsidies measurement systems and decision-making UIs were developed and applied. Due to this continuous exchange with practitioners, consultants were able to move in concert with the hospital industry and respond sensitively to changes in the industry environment, and they upgraded various additional functions required by hospitals every year. This continuous improvement has greatly helped the spread of TDABC. (CEO of Hospital Consulting Firm D)

> As a consultant has a lot of hospital data, it provides benchmarking consulting among hospitals of similar sizes. This additional service had a positive impact on the use of TDABC, as detailed comparison analysis was possible with similarly sized advanced hospitals from the manager's point of view. (Manager of Costing Part in Hospital A)

> In addition to the existing advantages of TDABC itself, there are many other advantages such as comparison with other hospitals to assist decision making. This is the positive part. (Manager of Costing Part in Hospital B)

> Using the TDABC system, daily profitability analysis per patient has become possible. Detailed analysis from the hospitalisation date to the discharge date is possible, allowing the adjustment of the number of hospitalisation days, allowing for more detailed improvement. These functions were not known when applying TDABC, but they were an effect obtained by adding the functions of TDABC to assist in making various decisions about hospital management. With these advantages, system utilisation has increased. (Director of Costing Part in Hospital E)

To summarise, the characteristics of the dynamics between the supply side and the demand side in hospitals were as follows:

- Modifications that focussed on customising the TDABC system for each hospital's management system and environment
- Modifications that focussed on maximising the utilisation of the TDABC system information through continuous communication with practitioners

In the next section, the characteristics of the dynamics between the supply side and the demand side of TDABC in the manufacturing industry and hospital industry that have been discussed so far are compared.

6.4.3 Comparison of Dynamics in TDABC Diffusion

In the previous two sections, the dynamics in TDABC diffusion between the supply side and the demand side in the manufacturing and hospital industries were described. A summary of this is shown in Table 6.16.

Table 6.16: Summary of the characteristics of the dynamics in the two industries

	Manufacturer Dynamics	**Hospital Dynamics**
The characteristics of the dynamics in the implementation stage	• No modification in function • Modification for connection with existing systems	• No modification in function • Customisation considering the existing systems and business environment
The characteristics of the dynamics in the integration stage	• Sending information from the TDABC system to other systems	• Expanding the functions of the TDABC system to various fields such as costing, budgeting, performance evaluation and decision-making solutions

In summary, there were no specific technical or rhetorical changes made in the implementation stage to the TDABC functions in the manufacturing companies or hospitals. While applying TDABC, a simple modification was made to the connection with the existing management system, or it was customised to suit the business environment.

However, in the integration stage—in which the system is used after it has been applied—the two industries differed in the TDABC modifications made. In

manufacturing, rather than modifying and adding TDABC functions, modifications were made to send new information from the TDABC system to other management systems. The purpose was to maximise the use of TDABC information and upgrade the functions of other new systems. In the case of hospitals, consultants continuously communicated with hospital practitioners and received VoCs in real time to quickly respond to changes in the hospital management environment, modifying and adding functions to the TDABC system. When hospitals explained their new needs to consultants, the consultants modified and added tools to analyse the information of the TDABC system from various angles, which became a primary strength of TDABC in hospitals. Meanwhile, hospital consultants regularly held conferences and seminars to listen to practitioners' opinions about the use of TDABC, to provide training and to respond to new needs.

In other words, the reason why TDABC has spread better in hospitals than it has in manufacturing, as identified in analysing the dynamics between suppliers and demanders, is the ongoing contact between TDABC suppliers and users. Even after the application of TDABC, consultants and practitioners in hospitals continued to exchange opinions in the community, at conferences or seminars, through training or through the VoC system. This constant contact made it possible for TDABC suppliers and demanders to modify the system together to meet their needs, and as a result, the usefulness of TDABC increased, helping it to spread.

The following section summarises and compares the supply-side process of TDABC diffusion, the demand-side characteristics of TDABC diffusion and the dynamics between the supply- and demand-side in the two industries.

6.5 Summary of the Research Findings from the Case Studies

In this chapter, the second research objective of this study—to compare an industry in which ABC and TDABC are spreading well and one in which they are not, and to determine how and why the difference in diffusion occurred in these fields—was answered. The two research questions for this research objective were the following:

- What are the differences in the diffusion processes between industries in which TDABC spreads well and those in which it does not?

- Do ABC diffusion factors also apply in the case of TDABC diffusion? Are there other TDABC diffusion factors besides ABC diffusion factors?

According to the results of case studies of suppliers and demanders related to the spread of TDABC in the manufacturing and hospital industries, the answer to the first research question, related to the differences in the diffusion of TDABC in the two industries, is as follows.

First, there are differences between the two industries in terms of the diffusion process on the supply side. In the case of manufacturing, consultants emphasised that TDABC's inherent strengths of profitability analysis by customer and transaction are possible and that it is a lighter and faster system than ABC. However, in the case of the hospital industry, the consultants emphasised that the advantages of TDABC are well suited to the management environment of hospitals and that accurate and fair performance evaluation by doctors is possible using TDABC, which was of particular interest to hospitals. In other words, the consultants emphasised that the characteristics of the industry and TDABC complemented one another.

Also, in the manufacturing industry, there is no community of manufacturing companies. As a result, there was no clear market in which suppliers could focus the dissemination, and their product—the TDABC package—was a common package to be used by all segments within the manufacturing industry. However, in the hospital industry, there was a clear community of hospitals. In other words, there was a clear market in which suppliers could focus the dissemination, and they created a hospital-specific TDABC package and focussed on spreading it only to hospitals. To summarise, due to the nature of the manufacturing industry, suppliers could not concentrate their capabilities by creating a specific TDABC package for the manufacturing industry; in contrast, due to the characteristics of the hospital industry, suppliers were able to concentrate their capabilities specifically on the hospital industry.

Second, there is a difference between the two industries in the dynamics of the supply side and the demand side. Especially in the integration stage—the stage after application in which the system is used—the two industries differed in the TDABC

modifications they employed. In manufacturing, rather than modifying and adding TDABC functions, modifications were made to send new information from the TDABC system to other management systems. The purpose was to maximise the use of TDABC information and upgrade the functions of other new systems.

However, in the case of hospitals, consultants continuously communicated with hospital practitioners and received VoCs in real time to quickly respond to changes in the hospital management environment, modifying and adding functions of TDABC to maximise the utilisation of TDABC system information and include functions such as management decision-making solutions, performance management, budgeting, a physician performance compensation system, a municipal subsidies measurement system, other hospital benchmarking systems and statistical programs. When hospitals explained their new needs to consultants, the consultants modified and added tools to analyse the information of the TDABC system from various angles, which became the strength of the TDABC system itself. Meanwhile, hospital consultants regularly held conferences and seminars to listen to practitioners' opinions about the use of TDABC, to provide training and to respond to new needs.

Based on this analysis, the reason why TDABC has spread better in hospitals than it has in manufacturing, according to the dynamics of suppliers and demanders, is the ongoing contact between the TDABC suppliers and users. In the hospital industry, even after the application of TDABC, consultants and practitioners continued to exchange opinions in the community, at conferences or seminars, through training or through the VoC system. This constant contact made it possible for TDABC suppliers and demanders to modify the system together to meet their needs, and as a result, the usefulness of TDABC increased, helping it to spread.

Third, there is a difference in the demand side of TDABC diffusion in the manufacturing and hospital industries. In both industries, success stories were found to be an important factor influencing TDABC proliferation. The difference is that in the case of manufacturing, there were no success stories. Thus, most manufacturing companies were reluctant to apply TDABC, and they tended to use ERP systems such as SAP or Oracle, which had been successfully implemented by other manufacturing companies. However, in the case of hospitals, there was a success

story. Some advanced hospitals decided that TDABC was suitable for the environment of the hospital industry and applied TDABC first, and other hospitals were then more willing to apply TDABC, in turn.

The presence or absence of alternatives such as SAP is another reason for the difference in TDABC application between the two industries. In the manufacturing industry, there are strong alternatives to TDABC such as SAP, traditional costing and ABC. However, because there is no alternative in the hospital industry, TDABC could spread relatively easily. Also, manufacturers have no specific motive for applying TDABC. For manufacturers, TDABC application is not essential, and several companies are satisfied with traditional costing rather than ABC, using ABC only to assist in the process. In addition, because the performance evaluation of practitioners in manufacturing is carried out at the department level, individual practitioners are less directly affected by TDABC. Therefore, practitioners' interest in TDABC is relatively low in this industry. However, in hospitals, it is necessary to apply TDABC because of the need for costing by FFS payment. In addition, the performance evaluation of doctors is performed by individual doctors, meaning that hospital practitioners and individual doctors are highly interested in TDABC. This is intensified by the fact that performance evaluation plays an important role in hospital management. In other words, the presence or absence of success stories, the presence or absence of substitutes, the differences in practitioner interest in TDABC and the motivation for TDABC application based on the characteristics of the industry each account for the differences in the spread of TDABC in the two industries. A summary of these findings is shown in Table 6.17.

Table 6.17: Summary of the differences in TDABC diffusion between the industries

Difference	In the Case of Manufacturers	In the Case of Hospitals
TDABC features highlighted by suppliers	• Possibility of profitability analysis • Lighter and faster system than ABC	• System suited to FFS model • Accurate performance evaluation for individual medical doctors
Community where suppliers can focus the spread of TDABC	• No community of manufacturing customers	• Clear community of potential customers in hospital industry
TDABC package type	• General package	• Hospital-specific package
Dynamics between supplier and demander during diffusion	• Sending information from TDABC to other systems	• Expanding the functions of TDABC to various fields such as costing, budgeting, performance evaluation and decision-making solutions
Success stories	• No success stories	• Success stories exist
Alternatives	• Presence	• Absence
Practitioners' interest in and reasons for TDABC application	• Low • Performance evaluation with TDABC is conducted by departments	• High • Performance evaluation with TDABC is conducted by individual doctors
Motivation for using TDABC according to industry characteristics	• None in particular • Application is optional	• Costs per FFS transaction must be calculated • Application is essential

The answer to the second research question is that in both the manufacturing and hospital industries, it is confirmed that most of the diffusion factors of ABC also affect the spread of TDABC. All the elements scored at least three points (indicating a medium influence) in the manufacturing industry, and except elements except the cost factor scored at least three points in the hospital industry. This difference was due to the absence of a substitute in the hospital industry; there is no ERP

exclusively for hospitals that they can consider as an alternative to TDABC. Hospitals needed a system that integrates management systems, and accordingly, consultants supplied TDABC to them. Hospitals also found the cost of TDABC to be reasonable, and because it was a necessary system, they did not pay much attention to the cost.

Four factors were found to affect TDABC diffusion differently between the two industries: trialability, cost, mimetic pressure and normative pressure. Trialability and cost were more important in the manufacturing industry. This is due to the characteristics of the industry: there is no demand-side community in the manufacturing industry, and sales for the application of TDABC are based on one-to-one relationships between consultants and potential customers. As such, the POC pilot test is very important in the manufacturing industry. Meanwhile, in the hospital industry, mimetic pressure and normative pressure were more important; this is likely due to the fact that hospitals share cost information with each other in a hospital community, and it is natural for smaller hospitals to apply the same management methods as those used by advanced hospitals in the community.

In addition, a newly discovered factor in this TDABC diffusion study is that of success stories. In the manufacturing industry, there was an absence of successful cases of TDABC application by advanced manufacturing companies, and as a result, other manufacturing companies hesitated or struggled to apply TDABC. Conversely, many hospitals considered the application of TDABC after hearing stories of its successful application in advanced hospitals in the hospital community.

So far, the question of why and how the spread of TDABC differs between the manufacturing and hospital industries has been analysed according to various aspects. The next chapter will present a discussion and summary of the research findings that have emerged from the systematic literature analysis and the case studies.

Chapter 7. Discussion and Conclusion

7.1 Introduction

The two previous chapters presented a comparison of the diffusion patterns of ABC and TDABC across several fields, as well as various aspects of the diffusion process of TDABC in the manufacturing and hospital industries. This chapter summarises and discusses the findings of the systematic literature review and multi-case study to fulfil the research objectives and answer the research questions. This chapter begins with a reiteration of the research objectives of this study. Then, section 7.3 provides a comprehensive overview of the diffusion patterns of ABC and TDABC over time and a discussion of the antecedents of these diffusion patterns; within this discussion, different opinions about the ABC paradox are also presented. The findings from the case studies are then discussed, along with the reasons for the differences between TDABC diffusion patterns in manufacturing companies and hospitals. Here, the characteristics of South Korean culture and the management accounting aspects of the hospital industry are discussed in relation to the patterns. A summary of all the findings of this study is then given, and the contributions of the study to the body of knowledge and the implications of the research findings are explained. Last, the limitations of this study and some suggestions for further research are provided.

7.2 Research Objectives

This study aimed to provide a greater understanding of ABC and TDABC diffusion patterns and to analyse why and how TDABC spreads in specific industries. To do this, the researcher first examined the overall spread of ABC and TDABC from 1988 to 2019 in both business management and non-business management industries through a survey of journal publications. This survey identified the prominence and characteristics of ABI diffusion in certain industries. The underlying reasons why and how ABI diffused in particular industries were gained through in-depth interviews with suppliers and demanders of ABI diffusion. Therefore, the main objectives of this study were as follows:

1. to examine the ABC paradox and identify the diffusion patterns of ABC and TDABC from the advent of the innovations to their most recent uses, and

2. to compare the industries in which ABC and TDABC are spreading with those in which they are not to find out how and why these differences occur, in the context of South Korea.

To address the above objectives, a management fashion theory, dynamic theory and a DI theory were employed in order to build a theoretical framework to identify the TDABC diffusion processes of suppliers and demanders and the TDABC diffusion factors (Chapter 3). A mixed-methods approach using a systematic literature review and case studies was undertaken to collect data (Chapter 4). The results of the systematic literature review (Chapter 5) were outlined, followed by those of the case studies, in which interviews with suppliers and demanders of TDABC were conducted to explain the detailed diffusion process of TDABC (Chapter 6).

The following section summarises the findings of the systematic literature review. This summary indicates in which fields ABC and TDABC spread and who led this diffusion. In addition, new findings that have not been presented in the existing diffusion pattern literature are explained, and a different view of the ABC paradox is discussed.

7.3 Conclusion and Discussion of Macro Analysis

This section includes a comprehensive overview of ABC and TDABC diffusion patterns over time. In addition, discussions related to the antecedents of ABC and TDABC diffusion and different opinions about the ABC paradox are presented. First, however, a reiteration of the research objectives, research questions and findings is presented.

The first research objective of this study was to examine the ABC paradox and identify the diffusion patterns of ABC and TDABC. The three research questions related to this research objective were as follows:

- In the course of the development of ABC and TDABC, are there specific fields that are more prone to implementing ABC and avoiding the ABC paradox?
- In the course of the development of ABC and TDABC, who are the key players and how do they lead the diffusion of ABC and TDABC?

- What are the characteristics and differences between the diffusion patterns of ABC and TDABC?

7.3.1 Major Findings of the Systematic Literature Review

According to the results of the systematic literature review analysis, the diffusion patterns of ABC and TDABC are characterised differently. First, the nature and field of the journals in which papers on ABC and TDABC were published differed. ABC was initially common in management accounting practitioner journals, and it then spread to general accounting and management academic journals; finally, it spread to non-business management academic journals. However, TDABC was introduced in business management practitioner journals, but most of the following diffusion occurred in bio/medical academic journals. ABC and TDABC publishing trends have both shifted from general management fields to non-business management fields, such as the bio/medical fields. Unlike ABC, the majority of TDABC papers were published in bio/medical journals.

In addition, the author type of ABC and TDABC articles was different. In the case of ABC, various academics, consultants and practitioners have spread ABC, even though it has not been applied as widely as it may have been expected. However, TDABC articles have been published by practitioners—especially medical doctors in the bio/medical field. Since 2015, ABC, like TDABC, has gained a higher proportion of practitioner authors.

Last, the content of ABC and TDABC papers differed. ABC's early consultant-content articles led to the diffusion of ABC, while later, academic-content articles played a leading role. After that phase, the number of academic-content papers declined and that of practitioner-content articles increased. In contrast, the initial TDABC articles featured consultant content, but neither consultant nor academic content played a major role in the diffusion of TDABC. Practitioner-content articles have increased in number, and their prevalence is still rising.

In summary, the answer to the first research question is as follows. The ABC paradox was identified in the business management field. However, this analysis showed different results when extended to the non-business management field showed

different results. As such, it was determined that there are certain industries—primarily in the bio/medical field—in which ABC and TDABC are spreading well.

The answer to the second research question is as follows. In recent years, practitioners have been leading the diffusion of ABC and TDABC, rather than consultants or academics. In the early days of ABC, consultants and academic content mainly dominated, but since the 2010s, practitioner content has dominated for both ABC and TDABC. In other words, the centre of current ABC and TDABC diffusion is the bio/medical field, and in the bio/medical field, practitioner authors such as medical doctors spread ABC and TDABC using practitioner content.

The answer to the third research question is as follows. ABC was mainly intended to be spread to the manufacturing industry by consultants and academics using consultant- and academic-content papers. However, TDABC was spread by practitioners, mainly to the bio/medical industry using practitioner-content papers. In other words, the direction of the diffusion has evidently changed, as ABC was spread from suppliers to practitioners, whereas TDABC diffusion has been led by practitioners.

7.3.2 Discussion of Major Findings from the Systematic Literature Review

In the articles studied in the systematic literature review, especially those related to non-business management, an interesting twist from the origins of the ABC paradox was observed. The failure of companies to apply ABC was confirmed by several academics, in line with the ABC paradox (e.g., Gosselin, 1997; Kennedy and Affleck-Graves, 2001). However, previous studies on the scope of ABC use were limited to studies of a small number of large or listed manufacturers (e.g., Gosselin, 2006; Al-Sayed and Dugdale, 2016). The current research shows that the ABC paradox can be rebutted when considering non-business management journals. A resurgence of ABC occurred when the bio/medical field became interested in ABC, along with other industries that align well with the characteristics of ABC. The introduction of modern ABC technology, which is easy to use, may provide evidence of the possibility of ABC's continued revival.

Practitioners—who are the users of innovation—can themselves be a source of innovation (Van der Boor et al., 2014) and can be considered co-producers of innovation (Gallouj and Weinstein, 1997; Drejer, 2004). Diffusion can also be explained by the dynamics of and interactions between players (Alcouffe et al., 2008). The increase in ABC and TDABC publications, as clearly indicated by this study's findings, was mainly due to practitioners' diffusion of TDABC in the bio/medical field and in the hospital industry, which are driven by the need to identify the costs of providing public health services. For example, government-funded hospitals are exposed to increased financial risk due to differences between the agreed-upon payment rates and the actual treatment costs under the policy of diagnosis-related group (DRG)–based hospital payment systems (Scheller-Kreinsen et al., 2011). Hospitals in the US are also actively adopting strategic cost management strategies in the face of a cost-based and fixed-grade payment system (Hsu and Qu, 2012). Cardinaels and Soderstrom (2013) also said that management decisions, such as changing a hospital's accounting system, are affected by a complex institutional environment. For this, TDABC is becoming a standard system through which to achieve better cost accuracy, understand healthcare resource allocation, reduce waste and improve transparency (da Silva Etges et al., 2020). Such external demand is considered a catalyst for practitioners actively pursuing innovation (Liu et al., 2008; Nemet, 2009; Matei and Bujac, 2016).

It takes a long time and a lot of effort for innovations to actually be reflected in practice. The life cycle of innovations extends over a number of years, during which time they can be adapted or reconstructed to suit changing internal and external environments (McLaren et al., 2016), or they can find a place in new contexts. The rapid decline in the diffusion of ABC since the late 1990s almost resulted in the abandonment of ABC, before the advent of the more practitioner-friendly TDABC. Since then, ABC and TDABC have continued to spread together, regaining the attention of practitioners. This shows that the longevity of such an MAI requires some collaborative efforts from academics, consultants and practitioners.

7.3.3 Discussion on True Product Cost and Different Views of ABC Paradox

As mentioned earlier, the increasingly complex manufacturing process has contributed to the difficulty of obtaining true product costs. Due to factory automation and technological advancement, the proportion of manufacturing overhead has increased (Kaplan and Cooper, 1998). Allocating overhead using traditional costing methods has led to greater inaccuracy in final product costs. ABC/TDABC has been regarded as providing finer costing information, which is assumed to get closer to the true cost (Kocakulah, 2007). Several scholars argue that ABC is adopted as a result of the desire to improve costing accuracy of products and services, or to understand better the true costs, so ABC gets closer to true cost and true profitability (e.g., Evans and Ashworth, 1995; Gunasekaran, 1999; Desti, 2015). Charles and Hansen (2008) argued that ABC qualifies as a more accurate product-costing system, and that the true product cost is identified under an idealised ABC structure when all cause-and-effect relationships are identified and used in assigning costs. As such, it is believed that ABC is superior to the traditional costing method in getting closer to a true cost.

However some scholars question the claim of ABC’s superiority in practice of approaching true product cost on the basis of ABC's inherent imperfections. Datar and Gupta (1994) classify the errors in ABC as follows: specification errors by using the wrong cost driver, aggregation errors by putting together heterogeneous resources into cost pools, and measurement error by practical difficulty in identifying costs with a particular cost pool, or in measuring the specific units of the resources consumed by various activities. Even if these kinds of errors have been resolved, Christensen and Demski (1995) expect that the use of multiple cost pools (i.e., less aggregation) may not necessarily lead to more accurate product costs as measurement error may increase. Meanwhile, Bromwich and Hong (1999) reveal prerequisites for making ABC a success, namely non-joint technology, locally separable inputs, homothetic cost pool, linearly homogeneous cost drivers, definition of activity in separated technology, perfect market, linear homogeneous price. They reckon that without these prerequisites the cost system could provide false signals in making decisions such as pricing, product portfolio changes, purchasing or outsourcing decisions, and cost management. These inherent imperfections in ABC may indeed be the reasons for practitioners to abandon their original search for true

product costs using ABC. The ABC paradox as claimed by academics may not be all attributable to lack of pursuit of true costs by practitioners.

According to the view of institutional theorists, scholars should not be overly concerned about the comparison of management accounting practices and theoretical 'ideal'. Rather, it is necessary to focus more on the study of management accounting practice itself (Scapens, 1994).

Looking at the two manufacturers participating in this study, company B selected ABC after evaluating TDABC, being fully aware of pros and cons of both TDABC and ABC. Existing surveys also reveal that many companies still use traditional costing methods. The institutional theorists who study management accounting practice view this phenomenon as natural, as they reckon that it is the way that institutional processes in which habits and routines evolve in order to make a theoretical ‘ideal’ work in practice (Scapens, 1994; McLaren et al, 2016). In other words, ABC paradox is not a false phenomenon, but a natural one. The underlying reason for the ABC paradox seems to be the rational choice of organisations to complement their capabilities and diverse business environments (i.e. organisational information, incentives, structure, and strategy). The question of the superiority of ABC/TDABC versus the traditional costing method can be considered a condition in which individual organisation situates. As such institutional theorists attribute ABC paradox to a lack of understanding of the business environment in which practitioners are faced and the way they behave related to their management. Academics do not try to eliminate these gaps, but place more efforts to understand the management methods that practitioners are needed in a given context. Thus ABC/TDABC should not be regarded as superior to all other management alternatives, rather it is just one of several options that can produce more rational results in certain circumstances.

7.4 Conclusion and Discussion of Micro Analysis

This section summarises the results of the comparison of the spread of TDABC in the hospital industry, where the diffusion of ABC and TDABC is active, with that in the manufacturing industry, where it is not. In addition, discussions of the environment surrounding the hospital industry in which TDABC is particularly active

and the cultural characteristics of South Korea are presented. First, a reiteration of research objectives, research questions and findings related to the micro analysis is presented.

The second research objective of this study was to compare the industries in which ABC and TDABC are spreading well with those in which they are not, and to determine how and why the difference in diffusion occurs in these fields. The two research questions for this research objective were as follows:

- What are the differences in the diffusion processes of industries in which TDABC spread well and those in which it does not?
- Do ABC diffusion factors also apply in the case of TDABC diffusion? Are there other TDABC diffusion factors besides ABC diffusion factors?

The following conclusions were drawn from the interview findings, based on Abrahamson's (1996) framework, the diffusion factors confirmed in the existing ABC literature and the dynamics framework, with respect to the second objective of this study.

7.4.1 Findings in Abrahamson's Fashion-Setting Process Framework

According to the fashion-setting model of Abrahamson (1996) used in this study, the diffusion of an innovation is led by fashion setters, and it goes through a four-step process (i.e., creation, selection, processing and dissemination). The creation phase of TDABC was conducted by Kaplan and Anderson, as they created TDABC through a series of publications, the findings of which were revealed in the macro analysis. The case studies involved in this part of study focussed on the next three steps: the selection, processing and dissemination phases. While the factors associated with the selection and processing stages were distinguished from one another in the interview questions, the interviewees did not clearly distinguish between the two stages, as they perceived the processes and characteristics of the two stages to be similar.

The differences in the selection and processing steps in the manufacturing and hospital industries for the diffusion of TDABC were as follows. In the case of

manufacturing, the reason for choosing TDABC and the strengths emphasised by consultants to the demand side were that it is lighter and faster to apply and maintain than is ABC, and it is possible to analyse profitability with TDABC. This is a basic characteristic of TDABC, and there is no explanation for why TDABC suits the manufacturing industry. In contrast, in the case of the hospital industry, consultants determined that TDABC was suitable for hospitals' unique management environment, and hospitals accepted TDABC because it fulfilled their specific needs.

This is a primary factor governing the difference between the spread of TDABC in the two analysed industries: the characteristics of the organisations to which TDABC was spread (i.e., the demand side) were clearly distinguished by the supply side. Consultants targeting manufacturing companies did not clearly identify the aims of TDABC in the industry. In addition, there are many different product lines in the manufacturing industry, and because manufacturing methods vary greatly depending on the product group, the cost calculation method suitable for each product may be different. In addition, consultants attempted to spread not only to manufacturing but also to industries other than manufacturing, such as financial and service industries. They chose TDABC based on "possibility of profitability analysis" and "lighter and faster system than ABC," which are the most basic features of TDABC, and introduced them as the strengths of TDABC to companies to be spread.

Meanwhile, hospital consultants had a clear, focussed potential demander group. The consultants judged that TDABC was suitable for hospitals' unique business environment and, accordingly, introduced it to hospitals. Hospitals needed a cost system that responded to the FFS model, and TDABC suited that need. In addition, in the case of the hospital industry, which evaluates doctors individually, there is a high interest in TDABC, in which practitioners apply fair standards that anyone can evaluate (see section 7.4.4). According to Moore and McKenna (1999), one of the important strategies for distributing innovation is to focus on specific markets suitable for the innovative technologies. It is more effective to focus on a single industry (e.g., hospitals) rather than to attempt to spread an innovation to a wide range of industries or fields (e.g., manufacturing companies in general).

The difference between TDABC diffusion at the dissemination stage in the manufacturing and hospital industries was the presence or absence of a demand-side community. In the case of manufacturing, there is no community in which potential customers can share their opinions and experiences. Therefore, in order for consultants to spread TDABC, they must contact each company individually and introduce TDABC. Also, as mentioned above, because there is no clear target industry or segment, consultants tried to create and spread TDABC using a general package that could be applied to various industrial environments, in order to respond to an unclear and wide range of potential customers.

In contrast, in the case of the hospital industry, there is very clear community of potential customers. A community of cost managers at South Korean hospitals exchange information and share experiences about each hospital's costs. This made it easy for consultants to get into their community and spread TDABC. After spreading TDABC to some advanced hospitals, other hospitals easily obtained information about TDABC and applied TDABC accordingly. This seems to reflect the characteristics of South Korea's organisational culture, which is explained in section 7.4.5. In addition, they created a hospital-only package and successfully spread TDABC with functions suitable for the hospital business environment.

As such, the difference in the spread of TDABC between the two industries in the fashion-setting process is clear. First, the process at the stage in which the supplier consultants choose TDABC and introduce it to potential customers was different. In the case of manufacturing, the consultants tried to make customers understand the advantages of TDABC in general, compared to ABC, while in the case of the hospital industry, the consultants explained that it is a management technique suitable for the management situation of the hospital industry. Also, the method was different in the dissemination stage. In the case of manufacturing, without a customer community, there is no information exchange between companies, and individual diffusion was necessary. In the case of the hospital industry, however, because there was an active customer community, information and opinions about TDABC were exchanged quickly, and the spread of TDABC was made easy.

Based on the fashion-setting process described in Abrahamson's (1996) model, the characteristics of the two industries were distinctly different right from the beginning of the dissemination process, when the consultants opted to spread TDABC in a certain industry and explained their reasons for doing so. This already created an environment favourable or unfavourable for diffusion. In addition, it was confirmed that the behaviour of suppliers who understand the characteristics of an industry and select and spread the appropriate MAI for the industry is an important factor in the spread of MAIs.

As aforementioned, Abrahams' fashion-setting process theory used in this study has provided a theoretical framework for examining the process of how suppliers of innovation select and supply the innovation to be diffused.

This theory has also helped the researcher to study the behaviours of suppliers in sequence by dividing the process from selection to dissemination of innovations. However Abraham's process theory does not explain the motivations of suppliers. This is why research on demanders help shed some lights on the why. In addition, this theory does not include the process for suppliers to listen to feedback from consumers and correct it in the process of diffusion through communication with demanders. In this research this gap in theory was filled by the use of dynamics theory.

7.4.2 Findings from Diffusion Factors Confirmed in the Existing ABC Literature

In this study, 16 factors that had been identified in existing ABC diffusion studies and found to have an effect on the spread of ABC were analysed to investigate whether they also affected the diffusion of TDABC. These factors were taken from diffusion theory, contingency theory and institutional theory. TDABC, as an improved version of ABC, was expected to be affected by the ABC diffusion factors. In the case of manufacturing, it was found that all the factors affect the spread of TDABC more than average (i.e., more than three on a five-point Likert scale). However, in the case of hospitals, the cost factor had a low impact (i.e., less than three on a five-point Likert scale). Kaplan and Anderson compared TDABC to a 'free lunch' and argued that the maintenance cost of TDABC was lower than that of ABC and that the

function was enhanced; as such, TDABC's low maintenance cost is one reason that cost was not a significant diffusion factor in the hospital industry. However, the bigger reason is that there was no alternative to TDABC in the hospital industry.

Comparing the factors influencing the manufacturing and hospital industries, trialability and cost were less important in hospitals than in manufacturing, while mimetic pressure and normative pressure were more important in hospitals than in manufacturing. As explained above, the reason why these four factors differed in significance in the spread of TDABC in the two industries was due to the presence or absence of a demand-side community and a substitute system.

In particular, the existence of a demand-side community influenced various aspects in this study, which could be linked to South Korean culture (as explained in section 7.4.5). In South Korean culture, in which a lot of attention and deference is paid to other people, the existence of a community may assist companies and individuals in making decisions, as the opinions of the community may be a criterion for evaluating an innovation. In other words, in South Korean culture, a community may have more influence in various aspects of an organisation, based on institutional theory.

In addition to the ABC diffusion factor, the existence of success cases was cited as a factor affecting the spread of TDABC. Because manufacturing companies do not know which specific systems other companies use, they feel a sense of stability when using SAP, which is known to be commonly used. In contrast, most hospitals accept TDABC, without doubting its appropriateness, because advanced hospitals have already applied TDABC. In addition, as explained in the interview results, POC testing was very important in manufacturing companies, but the importance of POC testing was low among hospitals because TDABC had already been verified in other hospitals. As such, the existence of a community and of clear success cases had a great influence on the spread of TDABC in the hospital industry. This can be cited as evidence of the influence of reference groups on organisational decision-making in South Korean culture. It is thus concluded that the existing ABC diffusion factors all influenced the spread of TDABC, except for the importance of low impact of cost factor in the hospital environment (in which there are no TDABC substitutes).

These findings in diffusion factors are as expected since TDABC is similar in concept to ABC and is designed to address the shortcomings of ABC. Factors that did not affect the spread of ABC were excluded from this study. There could be more findings if not only the influential factors that were confirmed in the spread of ABC, but also other less influential factors were studied together.

7.4.3 Findings in Dynamics Framework

In dynamic perspective of the diffusion of MAIs, the interaction between the supply side and demand side of innovation diffusion processes plays an important role. In the process of applying TDABC, these interactions contribute to the spread of TDABC by improving/modifying it to suit the demand-side situation. In the results of this study, the dynamics between the supply side and the demand side were seen to influence the diffusion of TDABC. In the case of manufacturing, no special modifications were made in the application of TDABC. Only the function of sending information obtained from the TDABC system to other systems was added at the request of the demand side.

However, in the case of hospitals, consultants (i.e., TDABC suppliers) and hospitals (i.e., TDABC demanders) constantly communicated with each other to recognise the needs of hospitals and expand the functions of TDABC to include not only costing but also budgeting, performance evaluation and decision-making solutions. The reason why such communication was possible was the existence of a hospital community. TDABC consultants participated in the hospital community, constantly updating the TDABC system to suit the hospitals' needs. In addition, the consultants actively held conferences and seminars in this community to discuss and present TDABC. This communication enabled the continuous improvement of TDABC, and as a result, many hospitals successfully applied and used TDABC. The difference in the dynamics between the manufacturing and hospital industries was due to the existence of a demand-side community—a place to communicate.

Using this theory, it was possible to find modifications and supplements to the diffusion between suppliers and demanders during the diffusion process. As a result, these modifications have had a large impact on the spread. However, the content of

this modification covers the process from the demanders' decision-making stage to the subsequent process. Used in conjunction with Abrahams' theory, this was supplemented by addressing the content of the supply side's selection/processing of innovation. On the other hand, if modifications considering the situation of Korean hospitals and manufacturing industries are proposed, the starting point of this dynamics theory research can be determined as the stage of selection/processing the technology that the supplier intends to spread. Suppliers and demanders can exchange their opinions in any form and make modifications in advance before they are spread within the demanders' companies.

So far, the research framework, using fashion-setting process theory, diffusion theory, and dynamic theory to examine the phenomena in this study, has been described. The use of the three theories is to support examination of phenomena to a greater extent. The fashion-setting process theory has helped to unveil how suppliers chose TDABC, selected the market, and how they spread to business practices. Meanwhile, the difference in diffusion factors between the two industries was found through diffusion theory. The underlying causes of the difference, namely the difference in communication and modification between suppliers and consumers in the two industries were found through dynamic theory. Through this study, a theoretical framework suitable for each subject was used to achieve the objectives of the study to see the overall picture. This study is a study of unpacking a multi-layered subject by examining several players involved in the spread of TDABC in a Korean setting. In the study of Korean setting, the community of demanders, especially according to the cultural characteristics of Korea, played an important role. The exchange of opinions between suppliers and demanders and demanders of different organisations had a great impact on the spread of TDABC, and it was necessary to use several theories together for a study from various angles. Rather than simply grasping the current status of TDABC diffusion through survey, interviews were conducted with each supplier and demanders to analyse why and how TDABC was accepted by players in a specific industry. Based on each theory, interview questions were constructed to examine the process of diffusion of each object of diffusion in detail. In order to study the various research subjects surrounding the diffusion of TDABC, the use of various theories for each subject was effective.

To suggest modifications in the cultural setting of health care and manufacturing in South Korea for the overall research framework used in this study, the point of view of actor network theory (ANT) is used together. A more in-depth understanding is possible if the spread of TDABC is studied by considering not only the relationship between the supplier and the consumer, but also the effects of the past ABC experience, the emergence of TDABC, or the existence of a competitor such as SAP, on each player.

In addition, modifications to each theory used in this study are proposed. First, in light of Korean cultural setting where relationships are of equal or more importance, further research in fashion-setting process theory could be done by studying the relationship between suppliers such as consultants and existing consumers. This is due to the fact that suppliers tend to preferentially spread to existing consumers at the initial stage of dissemination, and they constantly revise themselves at the time of supply through various exchanges of opinions. Second, further modifications to the theory of diffusion factors are studies related to the knowledge they possess from past experiences. The factors of diffusion of TDABC may be different between consumers who experienced failure of ABC application and those who did not. Finally, to propose modifications in the Korean healthcare and manufacturing culture environment for the dynamic theory used in this study, the starting point of this dynamics theory research can be determined as the stage of selection/processing the technology that the supplier intends to spread. Suppliers and demanders can exchange their opinions in any form and make modifications in advance before they are spread within the demanders' companies.

7.4.4 Discussion of the Environment Surrounding the Hospital Industry in South Korea

In South Korea, with the introduction of the medical insurance system in 1977, the healthcare system began to develop in earnest. In 1989, a majority of people were included as health insurance subscribers to meet their need for medical coverage (Lee and Park, 2017). In the early 1990s, the medical market exceeded the supply of medical services, resulting in various social problems caused by hospital bed shortages. To address this, the government launched a policy to provide financial

support and increase the medical supply (Wang, 2019). Since then, the supply of hospital beds has, at times, exceeded the medical need, leading to competition among medical institutions to attract patients. The government's policy to expand the supply led to the entry of large corporations into the medical market, which coincided with the emergence of large hospitals. The emergence of such medical institutions triggered the involvement of large capital in the medical market and competition of scales (Lee et al., 1997).

In addition, medical services that have traditionally been community-based services now have improved access to metropolitan-area medical institutions due improved traffic conditions and to the opening of Korea Train eXpress (KTX, South Korea's high-speed rail system) in 2003. Following this, patients could travel long distances with ease to seek quality medical services. As such, local medical institutions have had to compete with regional medical institutions to prevent the outflow of patients to metropolitan areas (Park, 2017). The medical service is a labour-intensive and capital-intensive industry that requires a high proportion of human services and high labour costs, and that requires investment in expensive medical equipment and facilities (Shortell and Kaluzny, 1994). In particular, the share of labour costs or labour costs in the medical expenditures for the production of health services is relatively high compared to other sectors and is almost fixed (Wang, 2019). In general, the competition situation increases the efficiency of the organisations and reduces the cost, but competition in the healthcare market is also increasing the costs to hospitals (Joskow, 1980; Robinson and Luft, 1985). This means hospitals must increase their investment in medical facilities and equipment and provide high-quality medical services to secure their competitiveness in the market. Excessive investment also has a negative impact on the performance of medical institutions, which in turn increases the financial burden on medical institutions, affecting profitability.

The basic medical billing system in South Korea uses the FFS model, which is a system that pays medical expenses by setting a certain value for every medical treatment provided by medical personnel. However, from the hospitals' point of view, the medical costs set by the government are very low. As such, some hospitals that

felt this economic difficulty tried to overcome it by making more diagnoses than necessary. In 2013, the South Korean government introduced the DRG system. The DRG system pays a predetermined amount for medical expenses calculated by combining the FFS costs set by the government for the required medical treatment for each disease group (or patient group), depending on the disease for which the patient is hospitalised.

Currently, South Korea is developing a system that extends the DRG system. According to Wang (2019), on average, the medical cost preservation ratio for insured medical practice is about 80%, which means that each time a medical service is provided to a specific patient, the medical institution provides the medical service at a loss of 20%. Under the low-fee system, medical institutions were forced to make up for the lack of fiscal balances for uninsured (or uncovered, non-payment) items, which are not covered by medical insurance and can be priced by hospitals. However, in 2017, the South Korean government announced a new policy that insures previously uninsured medical items essential to treatment. This government policy was expected to be a major threat in the financial and operational aspects of medical institutions (Park, 2017). Prior to this recent policy, the issue of low compensation had been raised in relation to both the FFS and DRG systems. In other words, interest in the costs of medical treatments has been steadily increasing. For this reason, South Korean medical institutions are very interested in medical costs.

It is also notable that in hospitals, the revenue/cost of each doctor/medical department is announced, and it is based on this that performance evaluations are performed and compensation is determined; as such, doctors are much more interested in the cost system than are practitioners in general companies. In addition, South Korean hospitals allocate budgets based on each doctor’s performance evaluation when budgeting for the next fiscal year. As such, if a doctor’s profitability is high, that doctor can buy new medical equipment or assign more beds. In addition, these performance evaluations are vital because new doctors and nurses are assigned according to their results. For this reason, TDABC’s fair distribution standard of ‘time’ is appropriate to reduce organisational conflict and make doctors

understandable. As mentioned in the interview results, the reason doctors are interested in the TDABC management system is that it directly affects their performance evaluations. Not only doctors but also hospital staff members are interested in TDABC because the direction of the overall hospital management changes according to doctors' performance evaluations.

In addition to the influence of the hospital community, TDABC spread well within hospitals due to the necessity of costing according to the FFS and DRG systems, and because of the need for fairness in doctors' performance evaluations within hospitals. As such, more research is needed to understand how the unique environment surrounding hospitals affects the diffusion and use of TDABC and other management systems.

7.4.5 Discussion of Cultural Aspects of South Korea

As mentioned earlier (sections 1.3 and 2.8), the cultural characteristics of South Korea are ground in Confuciusims and collectivism. This means that South Korean values strong loyalty and harmonious relationships between in-group members. In addition, South Korean culture tends to pay attention to objective evaluation from others rather than subjective evaluation, and to imitate the decision making of others (Choi and Geistfeld, 2004; Lee et al., 2013). The effect of imitation (e.g., valuing subjective norms and word of mouth) in South Korean culture is that innovations tend to be evaluated through the opinions of others who have already introduced an innovation, not self-evaluation (Lee et al., 2013).

In this study, the word 'community' was mentioned often by suppliers and demanders when listing the various factors that have influenced the diffusion of TDABC. Communities within individual industries can function a meeting place for TDABC demanders to share information and opinions about TDABC, and to constantly communicate with suppliers. Moreover, in the cultural context of South Korea, these communities are also a place to meet with a reference group that can be imitated.

Manufacturing companies do not have such a community in which they can meet with advanced companies they want to imitate. This may be a reason why they rely on SAP or Oracle, which most South Korean companies use. Even if they are

interested in TDABC, they cannot hear information or opinions about it from other companies, and they must be introduced to it through a one-to-one relationship with a consultant and struggle alone in applying it. However, according to Chang (2003), the innovations are more effectively disseminated in South Korea when an organisation with a sufficiently high ranking (i.e., a large organisation) drives the innovation. In other words, it is difficult to venture to use a new innovation, such as TDABC, without having information about its use from advanced companies, as the reference groups. For this reason, many manufacturers rely on an ERP such as SAP, which is a secure and proven system.

In contrast to the manufacturing industry, hospitals have a community of practitioners that communicate (whether regularly or irregularly) to share and discuss information on management techniques. According to Chang (2003), South Korea's valuing of conformity and imitation, based on the Confucian tradition, tends to elicit collective action, and as a result, once an innovation begins to spread, it spreads very quickly and effectively. Choi and Geistfeld (2004) showed that South Korean culture tends to place more importance on others' suggestions and experiences when making decisions. Therefore, a word-of-mouth or referral process might be effective in the diffusion of innovation in South Korea. In this cultural context, once TDABC is applied to some advanced hospitals, its spread to other hospitals is easy. In addition, in this study, in an interview with a consultant, it was found that many hospitals wanted to benchmark the use of TDABC in advanced hospitals, so they added a comparison function between hospitals by providing information about their TDABC usage to other hospitals within the limits allowed by the advanced hospitals.

The management environment of the hospital industry, which has such a clear and active community, is in accordance with the characteristics of South Korea's cultural context. For the acceptance of an MAI, such as TDABC, it is important to harmonise the cultural characteristics of the innovation demanders with the cultural characteristics of the business environment. In interviews with manufacturing company practitioners, it was found that two manufacturing companies had used ABC in the past: one manufacturing company used ABC within SAP, and it became difficult to use; the other created its own ABC concept system within the company. In

an interview with an academic, it was determined that most of the manufacturing companies in South Korea are using ABC within SAP or are discontinuing its use.

If, during the initial spread of ABC, a major ABC consultant had applied ABC to various companies, had enough experience and had maintained active communication with a community of manufacturing companies, then ABC would have spread more than it has to date. Also, if there had been continuous communication between suppliers and consumers through such a community, and if improvements have been made to customise the system, ABC may not have fallen into effective disuse in the manufacturing industry, as it has now. The existence of a community capable of communicating with the reference group in the cultural context of South Korea has been shown to be a very important factor, which is a vital consideration in relation to the spread of MAIs in South Korea in the future.

Another diffusion factor of TDABC diffusion was identified in this study: the existence of a success story. In the case of the hospital industry, when the information was shared that one hospital had applied TDABC and was using it well, new demanders applied TDABC, with full confidence in the experience and decision of the predecessor. In the case of manufacturing industry, there were no success stories, so companies hesitated to use TDABC. This is another type of information that can be shared through the demand-side communities. Based on these findings, it is concluded that the existence of a community in the cultural context of South Korea is just as important as innovation itself.

7.5 Summary of the Findings

The overall purpose of this study was to identify how ABC and TDABC have spread since their emergence in 1988 and 2004 respectively, and to determine whether, why and how ABC and TDABC are spreading well in certain industries and not in others. For this, the diffusion patterns of ABC and TDABC were first studied through macro analysis. In the existing studies, the spread of ABC before the advent of TDABC was studied, and the ABC paradox was evaluated, mainly in the manufacturing sector and among listed companies. A systematic literature analysis of published articles relating to ABC and TDABC was also conducted, from the initial appearance of ABC

to the present—which included the emergence and integration of TDABC into the industry category under review. As a result of the macro analysis, it was found that ABC/TDABC spread very well in the bio/medical industry but not in the manufacturing industry.

To find out why and how these differences in diffusion occurred, micro analysis was performed in the hospital industry, where ABC and TDABC spread well, and the manufacturing industry, where ABC and TDABC did not spread well. To achieve this objective, a multi-case study was conducted with consultants, academics and practitioners involved in the spread of TDABC in both industries. Semi-structured interviews were conducted with a total of 3 academics, 4 consultants related to manufacturing, 6 practitioners from 2 manufacturing companies, 3 consultants related to the hospital business and 10 practitioners from 5 hospitals.

In recent years, practitioners have been leading the diffusion of ABC and TDABC, rather than consultants or academics. In the early days of ABC, consultant and academic content mainly dominated the literature, but since the 2010s, practitioner content has dominated for both ABC and TDABC. The centre of current ABC and TDABC diffusion is the bio/medical field, and in the bio/medical field, practitioner authors such as medical doctors spread ABC and TDABC using practitioner content. ABC was mainly intended to be spread to the manufacturing industry by consultants and academics using consultant- and academic-content papers. However, the diffusion pattern of TDABC was spread by practitioners mainly to the bio/medical industry using practitioner-content papers. In other words, the direction of the diffusion of ABC (with suppliers spreading ABC to practitioners) has changed since TDABC appeared, as practitioners have become the ones leading the spread of TDABC.

On the other hand, as a result of micro analysis, there were differences between the process of spreading TDABC in manufacturing and hospital industries, and these differences changed the outcome of the diffusion. First of all, from the standpoint of TDABC suppliers, manufacturing TDABC consultants did not have a community of manufacturing demanders who were targets to spread TDABC. For this reason, TDABC was introduced by contacting potential demander companies directly.

However, due to the lack of a community capable of communicating with advanced companies, as an important reference group in Korean culture, most manufacturing companies hesitated to apply TDABC and chose ERP, such as SAP, which is a strong alternative. However, in the case of the hospital industry, the consultants decided that TDABC would respond well to the hospital's business environment. In other words, TDABC was not introduced as an advantage, but as a management technique best suited to the hospital industry, which requires a cost corresponding to FFS and requires fairness that everyone can understand when evaluating performance. In addition, there was a clear hospital community, where potential demanders shared information and opinions on TDABC and easily accepted TDABC applied following advanced hospitals. In addition, it focused on spreading only to the hospital industry, and supplied hospital-specific TDABC package.

From the perspective of TDABC practitioners, the TDABC diffusion factors were mostly the same as those of ABC. However, the cost factor was not very important in the hospital industry. The low cost of applying and maintaining TDABC is one reason for this, but a bigger reason is that there was no substitute for it in the hospital industry. In contrast, in the manufacturing industry, which had alternatives, the importance of cost was high. In addition, it was found that success stories are an important factor in the spread of TDABC due to the characteristics of South Korean culture; diffusion in the reference group makes diffusion more likely in the organisations that look to it.

In TDABC dynamics, the presence or absence of a demand-side community in the two industries once again made the difference. In the hospital industry, where continuous communication between suppliers and customers through the community was possible, modifications/improvements to the application and use of TDABC were steadily carried out. As a result, suppliers were able to accurately know the needs of demanders and to immediately reflect those needs in the TDABC solution, having a positive effect on the diffusion of TDABC.

In the end, the reason why TDABC was able to spread more easily in the hospital industry than in the manufacturing industry was that, first, the management characteristics of the hospital industry itself matched well with TDABC. TDABC was

well suited to this, as there was a need for costing to respond to the FFS model and for doctors to be able to perform their own performance evaluations. Second, there was an active exchange of opinions between hospitals through the hospital community, and other hospitals easily accepted TDABC because of hearing success stories of advanced hospitals' application of it. Third, the manufacturing industry had a substitute for TDABC, while the hospital industry had no substitute.

The findings of this study are summarised as follows. From the 1980s, ABC diffusion has been led by several academics and consultants, but following some initial success, the ABC paradox appeared. However, looking at various industries together, it can be seen that ABC and TDABC have been steadily spreading in certain industries, counter to the ABC paradox. The primary industry in which they have spread is the bio/medical industry. When investigating why and how ABC/TDABC spread well in this industry, the characteristics of the hospital industry itself (e.g., the FFS system and performance evaluation system) matched well with TDABC. Due to these characteristics, doctors in the hospital industry are publishing a lot of articles about conducting costing through TDABC, and the number of publications has increased rapidly since 2010.

Unlike in the case of ABC, for TDABC, practitioners felt its necessity and became subjects of TDABC spreading. In addition, the community of hospitals was well developed, so information and opinions about TDABC were exchanged actively. The practitioners shared their experiences with TDABC through conferences and seminars as well as through publishing, and they grew together by sharing opinions and benchmarking the management systems of advanced hospitals. The constant communication between TDABC suppliers and demanders in the community helped to spread TDABC. Suppliers were able to receive feedback on the TDABC system from demanders, and based on this, the system was further modified and developed to suit the needs of the demanders. This matching between the supply and demand sides eventually drastically increased the spread of TDABC. The findings of this study reaffirmed the basic fact that the spread of MAI can be realised only when MAI suppliers meet the needs of demanders through continuous communication.

7.6 Implications of the Findings

The findings of this study carry several implications. This study provides a holistic view of the evolution of ABC and TDABC and presents a detailed story of the diffusion of TDABC. These might benefit various stakeholders.

This study sheds light on the length of time it took for ABC, as an MAI, to be picked up by academics and consultants, and for it to be promoted and discussed by practitioners. The life cycle of an innovation can extend over a number of years, and during this time it may be adapted or reconfigured to the changing internal and external environments (McLaren et al., 2016); alternatively, it may find its place in a new context, as found in the case of TDABC. This demonstrates that ensuring the longevity of an MAI may require some concerted efforts by academics, consultants and practitioners alike. Therefore, this finding can inform how to succeed in promoting an innovation.

This suggests a place for longitudinal research that tracks an innovation in longer term. One of ABC's suppliers, Kaplan, first promoted TDABC in 2004 and helped spread it to hospitals partly to overcome the low practical use of ABC and to make it easier and more convenient for practitioners to use. According to Abrahamson (1996), in order for a fashion to be created, fashion suppliers must understand the needs and preferences of demanders, and create and supply the fashion for them. Suppliers' initial creations may not be as successful, as evident in Kaplan's initial ABC idea. However, through trial and error, a fuller understanding of a technological-enabled business solution was realised by Kaplan in TDABC, as he worked with Anderson (a consultant) and demanders closely. Suppliers of business solutions—both academics and consultants—need to work closely with demanders for the solutions to be successful.

In its early stages, ABC was promoted as an MAI, acting as a replacement for traditional cost accounting methods in all industries. However, the advent of the ABC paradox posed the threat that ABC could disappear altogether—that it would have been a mere management fad. With the introduction of TDABC, inherent shortcomings of ABC were corrected and tailored to specific industries. TDABC was

able to reverse the decline of ABC. Practitioners are now leading the spread of ABC and TDABC, using a similar approach to that described by Moore and McKenna (1999). They suggested that when the spread of an innovation is blocked, it is necessary to focus on a specific market and make that market the base for the diffusion of the innovation in order to spread it to other fields. ABC uses TDABC to target a specific market: the hospital industry. More success in the hospital industry may result in the spread of TDABC to other industries.

The results of this study provide meaningful implications for suppliers of MAI. When selecting and supplying MAIs, it is important to match the characteristics of the MAI with the characteristics of the industry to which it is intended to be supplied. It has been seen that the active diffusion of ABC in the past has failed. Suppliers require not only knowledge of MAIs but also an understanding and consideration of the business environments of various industries. In addition, communication with practitioners is important. Even after the application of an MAI, by continuously communicating and improving the innovation, the function of the supplier's package can be further developed to suit the needs of the market, and it can grow further due to increased demander satisfaction.

In addition, the results of this study provide meaningful implications for the community of MAI demanders. It is advantageous for consumers to communicate among themselves to a degree that does not affect the information protection of each company. In the case of hospitals, they are facing the same external demands and do not always operate in a competitive environment, which allowed them to establish such a community. Thus, communities sharing best practices can be an effective catalyst for the spread of TDABC. Through a community of demanders, information about advanced management techniques can be obtained and benchmarked in the extended channels. In addition, continuous communication with the suppliers of MAIs is helpful to practitioners. Prior to the acceptance of an MAI, information about various MAIs can be obtained, and the MAI can be continuously modified and improved to meet the needs of the organisation through communication with suppliers at the post-application stage. In the application of an MAI, there is not

just one short stage of acceptance; there are important post-application stages to ensure the successful and long-term use of an MAI.

7.7 Limitations of the Research and Recommendations for Future Research

This study has fulfilled its objectives. Like any other study, however, it is subject to a number of limitations that may, as a consequence, present opportunities for future research. Some specific limitations of this study are follows.

First, the researcher was limited by the databases in which relevant publications are included. Prior surveys have used either a selection of business management journals (Bjørnenak and Mitchell, 2002) or have focussed on specific research (Gosselin, 2006). The approach applied in this study was used to ensure the inclusion of ABC articles from a wide range of disciplines. Hence, the databases selected were chosen accordingly.

The second limitation may be derived from the selection of the case study subjects. The original design was to include companies that had applied ABC in the past but that currently use TDABC. It was intended to enable a direct comparison between ABC and TDABC; however, it was difficult to find such a company. It was evident during the initial search for case companies that there were no documents containing relevant practitioners or information due to the long period of application of ABC in the past. If such information be available about the application of ABC and TDABC, and the companies and practitioners that had applied, meaningful results could have been obtained.

The third limitation was the relatively small number of personnel surveyed in the case studies. In this study, the interviewees were surveyed about the diffusion factors of ABC/TDABC. A large-scale survey was not possible due to access issues, as permissions were only granted to a limited number of interviewees in relation to TDABC. If a large-scale survey were possible before the interviews, more reliable and meaningful results could have been obtained.

Fourth, this study was conducted in South Korea to ascertain the impact of cultural characteristics. In the future, comparative studies in countries with different cultures

would allow for an in-depth study of the effects of cultural characteristics on the spread of MAI.

Fifth, the findings of this study were drawn from two industries—one in which TDABC proliferated well and one in which it did not. As such, the findings may not be representative of other industries. In future MAI diffusion studies, various industries could be studied to draw out the common characteristics that are suitable for MAI diffusion.

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Appendices

Appendix A: Time equations model of TDABC

Order processing time equation depends on number of time drivers (X_1, X_2 and so

on). Time drivers may depend on number of lines (X_2) or number of price quotes (X_3) that need to be prepared. Other time drivers (X_1, X_4...X_6) take the value of 1 or 0 depending on the case.

First, we need to identify various groups of resources. For example, there is sales department as one cost group (step 1). The sales department costs £ 30,000 per month (step 2). The actual time capacity of the resources invested in the sales department's business should be sought. That is, the total available time for sales staff obtained. If there are 3 employees in a sales department and 8 hours a day per person and 20 days a month, the total time available to the sales department is 28,800 minutes per month (3 * 8 * 20 * 60). However, if 20% of the available time is spent on rest, training, education, etc., the practical working time is 23,040 minutes (28,800 * 0.8) (step 3). The sales department consumes £1.30 of resources per minute (30,000 / 23,040) (step 4). The sales department is doing the tasks of X_1 to X_6, and the time required for each task is 5, 2, 5, 3, 6, 1 minute (step 5). The company has received an order from a new customer with 3 line items (X_1), requiring 4 price quotes (X_2), in the case of no stocks, same day delivery required. Such order will be processed in 42 minutes (2 + 5 + 2 * 3 + 5 * 4 + 3 + 6 +0). The cost of this order is £54.60 (42 * 1.3).

Order processing time (minutes) = $2 + 5X_1 + 2X_2 + 5X_3 + 3X_4 + 6X_5 + 1X_6$, where:

X_1 = 1, if new customer, otherwise 0

X_2 = number of line items

X_3 = number of price quotes

X_4 = 1, if no stocks, otherwise 0

X_5 = 1, if same day delivery required, otherwise 0

X_6 = 1, if credit on hold, otherwise 0

Appendix B: Cross-reference list

	Topics	Sources			Related to Previous Literature Research
		Person	Questions	Documents	
Process of fashion setting	process of Creation stage takes place in a fashion setter position	Interview to Consultant or Academics	1. What is the significant difference between TDABC and other management techniques? 2. Explain how you have created or modified TDABC in the Korean context.	Internal TDABC consulting decision making documents	Ax and Bjørnenak (2007) 'management fashion setters -management gurus, consultancy firms, business school/universities- pursue purposeful and active plans in order to achieve widespread diffusion of management fashions. Fashion setters have self-interest in a widespread diffusion of management fashions since their own success in terms of profitability, status, legitimacy, public image and career, depend on the outcome.' Abrahamson (1996) 'Innovations are significant departure from the state of the art in management at the time they first appear…It does not have to be an improvement or be more technically efficient than management techniques in use at the time of its introduction, it must only differ significantly from them... Alternatively, certain fashion setters may invent, rediscover, or reinvent the management technique they attempt to launch into fashion.' Ax and Bjørnenak (2005) 'In order to popularise administrative innovations, it is important that supply side actors make those innovations compatible with the society into which they are being diffused.'
	process of Selection stage takes place in a fashion setter position	Interview to Consultant or Academics	3. How did you get to know TDABC? 4. Why did you choose TDABC to consult the manufacturer/hospital? 5. Was the choice affected by the preferences or demand of the practitioners? Please explain it.		Abrahamson (1996) 'In the selection stage, fashion setters select the techniques they attempt to launch into fashion from a broad variety of new, recently created management techniques, as well as from a bevy of old, forgotten management techniques...there exists a reciprocal relation between what fashion setters select and what fashion consumers prefer and demand.'
	process of Processing stage takes place in a fashion setter position	Interview to Consultant or Academics	6. When you consulted the manufacturer or hospital, what features and strengths of TDABC did you focus on? 7. Is there a specific reason for emphasising this to the manufacturer? Please explain it.	Internal TDABC consulting method or meeting documents	Abrahamson (1996) 'In the processing stage, fashion setters develop rhetoric that can convince fashion followers that a management technique is both rational and at the forefront of management progress.' Jung and Kieser (2012) ' Consultants not only label a practice with a buzzword, but also feed the fashion discourse with the basic goals, principles, and advantages of a fashionable concept, and market this concept as a frame for potential consulting projects…the number of client organisations following the fashion and the volume of their investments into it - depends very much on the rhetoric with which the fashion is communicated.'

	process of Dissemination stage takes place in a fashion setter position	Interview to Consultant or Academics	8. How did you find potential customers and contact with potential customers when you were trying to spread TDABC? 9. Why did you choose these channels to spread TDABC?	Document about channels such as handout of conference/seminar or any publications	Abrahamson (1996) 'In the dissemination stage, fashion setters use rhetoric inorder to launch management techniques into the management fashion market…the rhetoric developed is transferred back to the managerial actors…there are number of channels that fashion setters use to communicate their rhetoric to managers.'
	process of all fashion stage takes place in a fashion follower position	Interview to senior managers	10. In what way did you find out about TDABC? Through what channel did you learn about TDABC and why? 11. Do you think the spread of TDABC through such a channel is effective? 12. What rhetoric about TDABC was there and how did that rhetoric affect TDABC choice? 13. What are the reasons for using assistance from consultant for TDABC? 14. In the application of TDABC, how did you get help from the consultant? Please describe in detail the collaboration with consultants involved in applying TDABC in chronological order.	Organisations' internal documents of decision making and consultant meeting minutes	Bjørnenak (1997) 'the majority of the firms that had implemented ABC or currently were implementing ABC used assistance from the supply side such as consultants indicating that they played an essential role in these diffusion processes. Clark (1984) 'when every potential adopter of an innovation did not have equal access to an innovation, supply factors might be considered as an important influencing factor in the diffusion.'
Process of dynamics between supplier and demanders	process of changes of design characteristics	Interview to Consultant or Academics	15. In applying TDABC to the companies, to increase applicability of diffusion, did you modify and apply the "technical elements of TDABC" in consultation? 16. For what purpose did you modify and apply? 17. What effect did this change have on TDABC application? Please explain this in detail.	Meeting minutes from consulting firm	Ax and Bjørnenak (2007) 'Design characteristics represent the technical specifications of an innovation…design characteristics in the case of ABC are cost objectives, activity hierarchies and cost drivers...design characteristics can be changed added, combined. Redesigned innovations can differ from what their originators had in mind...the interaction between the demand side and the supply side of diffusion processes is important in a dynamics perspective on the diffusion of management accounting innovations. In this perspective, the innovation is seen as flexible and not a fixed technical solution...both adopters and propagators change the design characteristics to make the innovation more attractive...the dynamic perspective is potentially important in understanding how and why some innovations are more successful than others.

	process of changes of rhetorical elements	Interview to Consultant or Academics	18. In applying TDABC to the companies, to increase applicability of diffusion, did you modify and apply the “effect of TDABC application" in consultation? 19. For what purpose did you modify and apply? 20. What effect did this change have on TDABC application? Please explain this in detail.		Ax and Bjørnenak (2007) 'Rhetorical elements represent the alleged benefits of an innovation…Rhetorical elements are used to persuade an audience of managers about the value of an innovation to their organisations...rhetorical elements can be changed added, combined. Redesigned innovations can differ from what their originators had in mind...the interaction between the demand side and the supply side of diffusion processes is important in a dynamics perspective on the diffusion of management accounting innovations. In this perspective, the innovation is seen as flexible and not a fixed technical solution...both adopters and propagators change the rhetorical elements to make the innovation more attractive...the dynamic perspective is potentially important in understanding how and why some innovations are more successful than others.
	process of changes of design characteristics	Interview to senior managers, line managers and medical doctors	21. In applying TDABC to the companies, to increase applicability of diffusion, did you modify and apply the “technical elements of TDABC” in consultation? 22. For what purpose did you modify and apply? 23. What effects did this change have on TDABC application? Please explain this in detail.	Meeting minutes from companies	Ax and Bjørnenak (2007) 'Design characteristics represent the technical specifications of an innovation…design characteristics in the case of ABC are cost objectives, activity hierarchies and cost drivers...design characteristics can be changed added, combined. Redesigned innovations can differ from what their originators had in mind...the interaction between the demand side and the supply side of diffusion processes is important in a dynamics perspective on the diffusion of management accounting innovations. In this perspective, the innovation is seen as flexible and not a fixed technical solution...both adopters and propagators change the design characteristics to make the innovation more attractive...the dynamic perspective is potentially important in understanding how and why some innovations are more successful than others.
	process of changes of rhetorical elements	Interview to senior managers, line managers and medical doctors	24. In applying TDABC to the companies, to increase applicability of diffusion, did you modify and apply the “effect of TDABC application" in consultation? Please explain it. 25. For what purpose did you modify and apply? 26. What effect did this change have on TDABC application? Please explain this in detail.		Ax and Bjørnenak (2007) 'Rhetorical elements represent the alleged benefits of an innovation…Rhetorical elements are used to persuade an audience of managers about the value of an innovation to their organisations...rhetorical elements can be changed added, combined. Redesigned innovations can differ from what their originators had in mind...the interaction between the demand side and the supply side of diffusion processes is important in a dynamics perspective on the diffusion of management accounting innovations. In this perspective, the innovation is seen as flexible and not a fixed technical solution...both adopters and propagators change the rhetorical elements to make the innovation more attractive...the dynamic perspective is potentially important in understanding how and why some innovations are more successful than others.
Diffusion factors	Perceived Attributes of Innovation	Interview to Consultant or Academics And senior managers, line managers and	27. What are the relative advantages of TDABC that you and TDABC adoption (consider) companies think? Does the relative benefit have a positive impact on the application of TDABC?		Rogers (2003) 'diffusion of innovations is affected by the perceived attributes of innovations. The perceived attributes of an innovation are one important explanation of the rate of adoption of an innovation. From 49 to 87 percent of the variance in innovation diffusion can be explained by those five attributes: Relative advantage, compatibility, complexity, trialability, and observability.' Anderson (1995) 'Technological factors -complexity of use, compatibility with existing accounting systems and the relative improvement over the existing cost systems- were from the beginning, critical

		medical doctors	28. Do you and TDABC adoption (consider) companies think that TDABC is appropriate enough to be compatible with the values, experiences and needs of companies? Does the compatibility have a positive impact on the application of TDABC? Please explain it.		elements in the implementation of ABC.' Alsayed (2010) 'There was evidence of all ABT attributes (level of the perceived relative advantage, compatibility, ease, image, result demonstrability and trialability of using ABT) were strongly correlated with ABT adoption.'
			29. Do you and TDABC adoption (consider) companies think that TDABC is difficult to apply? Does this complexity negatively affect the application of TDABC? Please explain it.		
			30. Do you and TDABC adoption (consider) companies test before applying TDABC? Does this trialability have a positive impact on the application of TDABC? Please explain it.		
			31. Do you and TDABC adoption (consider) companies think that the results of TDABC application can be easily observed? Does this observability have a positive impact on TDABC application? Please explain it.		
			32. Do you and TDABC adoption (consider) companies think that the cost of TDABC application is reasonable? Does cost of TDABC have an impact on TDABC application? Please explain it. 33. Can you tell me about benefits vs the costs, and about the budget for implementation and whether this was exceeded?		Tornatzky and Klein (1982) 'Cost of using an innovation is found to be negatively related to its rate of adoption.' Alsayed (2010) 'Perceived cost of using ABT was found to be negatively associated with ABT adoption.'

	Characteristics of Adopters	Interview to Consultant or Academics And senior managers, line managers and medical doctors	34. Do you think that the larger the TDABC adoption (consider) companies have a positive impact on the TDABC application? Please explain it.		Moores and Chenhall (1994) 'Size is one of the most important influencing factors in the adoption of innovation.' Innes and Mitchell (1995) 'Larger organisations have relatively greater access to resources to experiment with the introduction of more sophisticated accounting system such as ABC.' Alsayed (2010) 'Demand for ABT for planning, control and coordination of activities is greater in larger organisations.'
			35. Do you think the top management of TDABC adoption (consider) companies has a positive impact on TDABC application? Please explain it		Brown et al.(2004) 'Top management support can make adoption easier by decreasing the risk and uncertainty through easy access to resources and resolving issues across organisational boundaries...ABC adoption is positively correlated with top management support' Alsayed (2010) 'Top management support was strongly correlated with ABT adoption and found to be a significant predictor of ABT adoption.'
			36. Do you think the champion support of TDABC adoption (consider) companies has a positive impact on TDABC application? Please explain it.		Brown et al.(2004) 'Champion is needed to drive any ABC project and facilitate communication within the organisation as ABC projects tends to cut across internal organisational boundaries...the initial interest in ABC and its adoption decision are both significantly positively associated with the existence of internal champion support.' Prescott and Conger (1995) 'Internal champion support is positively associated with innovation adoption and implementation.'
			37. Do you think that the outcome orientation or tight control organisational culture of TDABC adoption (consider) companies has a positive impact on the application of TDABC? Please explain it.		Baird et al. (2004) 'Outcome orientation is associated with the extent of the adoption of Activity Analysis (AA), Activity Cost Analysis (ACA) and Activity based costing (ABC)...business units with an outcome orientation culture are likely to be attracted to practices, such as activity management, that claim to facilitate improvements in processes and to enhance performance and competitiveness... tight versus loose control is associated with all the three levels of activity management.'
	Characteristics of Environment	Interview to Consultant or Academics And senior managers, line managers and medical doctors	38. Do you think that the competitive business environment of the TDABC adoption (consider) companies has a positive impact on the application of TDABC? Please explain it.		Cooper (1988) 'more sophisticated and accurate costing system such as ABC is needed in highly competitive markets. In other words, under these conditions, competitors are more likely to take advantage of any costing errors by managers who rely on inaccurate cost information to make decisions regarding costing and pricing,' Malmi (1999) 'We would expect that units faced with intense competition find ABC more useful than units facing only moderate competition… The proxy used instead is the proportion of exports (%) in turnover. This variable is based on the assumption that exporting units face more competition than units selling on the domestic market. A related proxy used is the change in competition. The results indicated that both a high proportion of exports and perceived change in competition are correlated with ABC adoption.'
			39. Do you think that the uncertain business environment of the TDABC adoption (consider) companies has a positive impact on the application of TDABC? Please explain it.		Kwon and Zmud (1987) 'Innovation researchers have proposed and found positive association between perceived environmental uncertainty and innovation adoption as organisations, in uncertain environments, tend to seek to `survive and grow' via adopting innovations.' Malmi (1997) 'To reduce uncertainty, top management made cost accounting interactive by adopting ABC.'

	Factors on Pressure and Need	Interview to Consultant or Academics And senior managers, line managers and medical doctors	40. Are TDABC adoption (consider) companies forced to apply TDABC from other organisations (government, parent company, stakeholder, etc)? Please explain it.	Government guidelines, Parent company proposals	DiMaggio and Powell (1983) 'The coercive pressures are defined as formal or informal pressures exerted on organisations by other organisations upon which they are dependent.' Teo et al. (2003) 'Dependence in terms of resources allows dominant actors to control the organisations that are dependent on them. Consequently, dependent organisations are more likely to comply with decisions taken by the dominant actor.' Abrahamson (1991) 'Innovation- adopting organisations could have no free choice in deciding to adopt or reject an innovation as they would experience pressure from organisations outside their own social group.' Alsayed (2010) 'There was evidence of coercive pressure from parent companies both through dictating and recommending that business units adopt ABT.'
			41. Do TDABC adoption (consider) companies try to follow other leading companies? Please explain it.		DiMaggio and Powell (1983) 'Mimetic pressures may cause an organisation to evolve over a period of time to become more similar to other organisations in its environment...The imitation of the actions of other similar organisations is motivated by the need to acquire status- conferring legitimacy or social fitness in a wider social structure.' Teo et al. (2003) 'when the organisational decision is related to uncertain solutions, decision makers are likely to comply with mimetic pressures from the environment to economize on search costs, minimize experimentation costs, or to avoid risks that are borne by first-movers.' Abrahamson (1991) ' innovation adoption could occur when organisations within a group imitate other organisations within that group.' Alsayed (2010) 'There was evidence of coercive pressure from parent companies both through dictating and recommending that business units adopt ABT. There was evidence of mimetic pressure as business units were influenced by other units in the same group.'
			42. Do TDABC adoption (consider) companies apply TDABC due to normative pressures? Please explain it.		DiMaggio and Powell (1983) 'Normative pressures are associated with professionalization.' Teo et al. (2003) 'Sharing these norms through relational channels among members of a network facilitates consensus which in turn increases the strength of these norms and their potential influence on organisational behaviour...in an innovation adoption context, normative pressures could facilitate or hinder the adoption of an innovation.' Alsayed (2010) 'There was evidence of normative pressure from major customers. Correlation was strong between this factors and ABT adoption and the impacts could be clearly seen.'
			43. Do you think when TDABC adoption (consider) companies consider the precise costing to be very important for the purposes of accurate pricing, stock valuation, and other decision making and planning, it has a positive impact on the application of TDABC? Please explain it.	Organisations' internal documents reporting need of accurate cost information	Krumwiede (1998) 'There was positive relationship between the degree of decision usefulness of cost information and ABC adoption. In cases where cost data are considered an essential factor in the decision making process, decision makers will try to adopt cost management systems that fulfil such needs.' Anderson (1995) 'The need in organisations for accurate cost information for strategic decisions and cost reduction can influence the adoption of ABC.' Alsayed (2010) 'There was evidence of decision usefulness of cost information. Correlations were strong between this factor and ABT adoption.'

Open	Culture	Interview to Consultant or Academics And senior managers, line managers and medical doctors	44. Describe how the characteristics of organisational culture in Korea affected the diffusion of TDABC.		Brewer (1998) 'The countries of high-power-distance / collectivist cultures in Hofstede's taxonomy were better conditions for ABC application and execution.' Hofstede and Hofstede (2005) 'South Korea is a society with high collectivism, large power distance, less tolerance of uncertainty, high masculinity, and long-term orientation.' Hignett (2001) 'The organisational structure in hospitals is also different to that of other industrial sectors. There will be at least three managerial lines: a clinical line for the management of the patient; a professional line (e.g.for nursing staff); an administrative line for each service area (e.g. surgery). The three-way hierarchy adds to the complexity with respect to accountability, authority and power.'
	Context	Interview to Consultant or Academics And senior managers, line managers and medical doctors	45. Describe how the internal and external context of the organisation affected the diffusion and use of TDABC.		Latour (1987) 'Context is considered as a constituent element of innovation rather than a source of explanation.'
	Perception	Interview to Consultant or Academics And senior managers, line managers and medical doctors	46. Describe the interest or perception of the practitioners in TDABC.		Liu (2002) 'The focus is placed on understanding the design of an ABB process, assessing whether or not ABB suits individual organisational.needs in a variety of areas (e. g. the users' actual experience in the use of an ABB system in accomplishing their tasks; and users' perceptions concerning the ABB system'

Appendix C: Interviews Cover Letter

Dear Sir/Mam

I am a third year PhD student under the aegis of the Newcastle University (UK) business school. My research topic is entitled “Supply and Demand for Management Accounting Innovations: Multidimensional Analyses of the Diffusion of Activity-Based Costing and Time-Driven Activity-Based Costing”. The overarching research objective is to identify Activity-based Innovation (ABI) diffusion patterns and to comprehensively understand why the spread of ABI is prominent in a particular field and what roles ABI diffusion players played in the process.

Here, TDABC means 'any management accounting practice that uses the concept of' time of activities 'as its hard core'. That is, the cost is distributed based on the time required for the activity.

My initial search of ABC and TDABC publications reveals some interesting features:

1. Major diffusion fields changed from general management to bio-medical fields.
2. The author types in ABC and TDABC articles differ that ABC articles are published extensively by academics, consultants, and practitioners but TDABC articles tend to be published by practitioner especially medical doctors in the bio-medical fields.
3. The driver (content) of the diffusion turned from propagating and academic content to practitioner content.

As a result, TDABC was reported to be mainly adopted in hospitals, as evidence of increasing pull in diffusion.

I therefore hope to investigate these features in Korean context. The empirical aspect of my research requires undertaking interviews with key personnel of consultants, academics and practitioners. Each interview session lasts no more than an hour. The main interview questions are:

1. In your view what factors have led to TDABC’s spread in Korea? Why?
2. How was TDABC developed, modified, selected, and spread to hospitals and manufacturers?
3. What dynamics did the TDABC diffusion process have between the supplier and the adopter?

Information provided will be treated confidentially and anonymously. Anything that I write in my thesis or publications will not enable the company to be identified (unless the company wishes otherwise). Moreover, if you are willing in interview participation, you will be kept anonymous and your information will not be provided for the third party without yours agreement.

If you have any questions or concerns regarding this study please feel free to contact me at one of the email addresses or office addresses provided below.

I am very grateful of your participation, which is also crucial to the completion of this study.

Sincerely Yours

Yoonki Rhee, Ph.D. Candidate

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Appendix D: Interview Questions

Interview Questions for Consultant – A

Section 1 Opening remark & Background information

1) Name
2) About the research project
3) Confidential issue/ not judge or threaten/ record
4) Would you please give me a brief summary of your career history?
   (e.g. working experiences, position held, period in)
5) Would you please give me detail of the nature of your work now?
6) From the consultant's perspective, when did TDABC start spreading in Korean organisations?

Section 2 Process of fashion (Creation/Selection/Processing/Dissemination) and dynamics (Design characteristics/Rhetorical elements) in diffusion in manufacturers (if applicable)

1) I will ask you about the creation process. What is the significant difference of TDABC from other management techniques? Please explain how have you created or modified TDABC in Korean context. <Q1,2>
2) I will ask you about the selection process. Please explain how you got to know TDABC. Why did you choose TDABC to consult the manufacturer? Was the choice affected by the preferences or demand of the practitioners? Please explain it. <Q3,4,5>
3) I will ask you about the processing process. When you consulted the manufacturer, what features and strengths of TDABC did you focus on? Is there a specific reason for emphasising this to the manufacturer? <Q6,7>
4) I will ask you about the dissemination process. How did you find potential customers and contact with potential customers when you were trying to spread TDABC? (e.g. conferences, seminars, advertisements, publications, meetings with affiliates, etc.) Why did you choose these channels to spread TDABC? <Q8,9>
5) I will ask you about changes of design characteristics. In applying TDABC to the manufacturer, did you modify and apply the “technical elements of TDABC” in consultation with the manufacturer for the applicability of diffusion? For what purpose did you modify and apply? What effect did this change have on TDABC application? Please explain this in detail. <Q15,16,17>
6) I will ask you about changes of rhetorical elements. In applying TDABC to the manufacturer, did you modify and apply the “effect of TDABC application" in consultation with the manufacturer for the applicability of diffusion? For what purpose did you modify and apply? What effect did this change have on TDABC application? Please explain this in detail. <Q18,19,20>

Section 3 Process of fashion (Selection/Processing/Dissemination) and dynamics (Design characteristics/Rhetorical elements) in diffusion in hospitals (if applicable)

1) I will ask you about the creation process. What is the significant difference of TDABC from other management techniques? Please explain how have you created or modified TDABC in Korean context. <Q1,2>
2) I will ask you about the selection process. Please explain in what way you have known TDABC. Why did you choose TDABC to consult the hospital? <Q3,4,5>
3) I will ask you about the processing process. When you consulted the hospital, what features and strengths of TDABC did you focus on? Is there a specific reason for

emphasising this to the hospital? <Q6,7>

4) I will ask you about the dissemination process. How did you find potential customers and contact with potential customers when you were trying to spread TDABC? (e.g. conferences, seminars, advertisements, publications, meetings with affiliates, etc.) Why did you choose these channels to spread TDABC? <Q8,9>
5) I will ask you about changes of design characteristics. In applying TDABC to the hospital, did you modify and apply the “technical elements of TDABC” in consultation with the hospital for the applicability of diffusion? For what purpose did you modify and apply? What effect did this change have on TDABC application? Please explain this in detail. <Q15,16,17>
6) I will ask you about changes of rhetorical elements. In applying TDABC to the hospital, did you modify and apply the “effect of TDABC application" in consultation with the hospital for the applicability of diffusion? For what purpose did you modify and apply? What effect did this change have on TDABC application? Please explain this in detail. <Q18,19,20>

Section 4 Features and differences in diffusion in manufacturers and hospitals (if applicable)

1) Why did your company designate manufacturers (hospitals) as targets for TDABC? Under the fashion setting process (creation, selection, processing, and dissemination), explain how your organisation made that choice?
2) From the standpoint of consultants and professors, do you think there is a difference in application/use in TDABC spread between manufacturers and hospitals? If so, please explain in detail what differences may exist.
3) Compared to ABC in the past, is demand or interest in TDABC more active? If you think it's more aggressive, for what reasons do you think this is happening? Or if there is not a big difference in demand or interest, what kind of efforts are the consultants and scholars doing for this?

Section 5 Diffusion factors. Please Indicate how much of the following factors affect the application of TDABC (1= Not at all, 5 = to a great extent) and please explain in detail.

Factors	**No at all**				**To a great extent**
1. Perceived Attributes of Innovation					
I. Relative advantage (the degree to which an innovation is perceived as better than the idea it supersedes by a particular group of users)	1	2	3	4	5
II. Compatibility (the degree to which an innovation is perceived as being consistent with the existing values, practices past experiences and needs of potential adopters)	1	2	3	4	5
III. Complexity (Ease of use) (the degree to which an innovation is perceived as	1	2	3	4	5

	difficult to understand and to use)					
IV.	Trialability (degree to which an innovation can be experimented with on a limited basis)	1	2	3	4	5
V.	Observability (the degree to which the results of an innovation are observable and visible to others)	1	2	3	4	5
VI.	Cost	1	2	3	4	5
2. **Characteristics of Adopters**						
I.	Size	1	2	3	4	5
II.	Top management support (the degree to which the top management support the organisational active and open promotion that upper level executives, such as the Chief Executive Officer or the Chief Financial Officer, give to an innovation)	1	2	3	4	5
III.	Champion support (someone within the organisation becomes a special advocate for the innovation, taking actions to raise the possibility of successful adoption and implementation)	1	2	3	4	5
IV.	Culture (Competitive/Tight control) (Competitive is to the extent to which business units emphasise action and results, have high expectations for performance, and are competitive.	1	2	3	4	5
	Tight versus loose control relates to the extent to which an organisation places emphasis on the control of activities and costs)	1	2	3	4	5
3. Characteristics of Environment						
I.	Competition	1	2	3	4	5
II.	Environmental uncertainty	1	2	3	4	5

	(top managers' perceived inability to predict an organisation's external environment accurately)					
4. Factors on Pressure and Need						
I.	Coercive pressure (Forced-selection) (consequence of organisations experiencing formal or informal pressures from another organisation or entity to which are dependent on)	1	2	3	4	5
II.	Mimetic pressure (Fad) (inclination to model themselves on other organisations within their environment where they deem to be successful and legitimate)	1	2	3	4	5
III.	Normative pressure (professionalization that organisations, that belong to the same professional network tend to share the norms and values of that network)	1	2	3	4	5
IV.	Importance of cost information	1	2	3	4	5

Among the factors not covered above, what are the positive/negative factors that you and TDABC adoption (consider) companies think?

Section 6 Extra open question

1) Describe how the characteristics of organisational culture in Korea affected the diffusion of TDABC. <Q44>
2) Describe how the internal and external context of the organisation affected the diffusion and use of TDABC. <Q45>
3) Describe the interest or perception of the practitioners in TDABC.<Q46>

Interview Questions for Academics – B

Section 1 Opening remark & Background information

1) Name
2) About the research project
3) Confidential issue/ not judge or threaten/ record
4) Would you please give me a brief summary of your career history?
   (e.g. working experiences, position held, period in)
5) Would you please give me detail of the nature of your work now?
6) From the standpoint of academics when did TDABC come to Korea and started teaching in textbooks?
7) Have you participated in a project related to the application of TDABC?

Section 2 Process of fashion (Selection/Processing/Dissemination) and dynamics (Design characteristics/Rhetorical elements) in diffusion in manufacturers (if applicable)

1) I will ask you about the creation process. What is the significant difference of TDABC from other management techniques? Please explain how have you created or modified TDABC in Korean context. <Q1,2>
2) I will ask you about the selection process. Please explain how you got to know TDABC. Why did you choose TDABC to consult the manufacturer? Was the choice affected by the preferences or demand of the practitioners? Please explain it. <Q3,4,5>
3) I will ask you about the processing process. When you consulted the manufacturer, what features and strengths of TDABC did you focus on? Is there a specific reason for emphasising this to the manufacturer? <Q6,7>
4) I will ask you about the dissemination process. How did you find potential customers and contact with potential customers when you were trying to spread TDABC? (e.g. conferences, seminars, advertisements, publications, meetings with affiliates, etc.) Why did you choose these channels to spread TDABC? <Q8,9>
5) I will ask you about changes of design characteristics. In applying TDABC to the manufacturer, did you modify and apply the “technical elements of TDABC” in consultation with the manufacturer for the applicability of diffusion? For what purpose did you modify and apply? What positive effect did this change have on TDABC application? Please explain this in detail. <Q15,16,17>
6) I will ask you about changes of rhetorical elements. In applying TDABC to the manufacturer, did you modify and apply the “effect of TDABC application" in consultation with the manufacturer for the applicability of diffusion? For what purpose did you modify and apply? What positive effect did this change have on TDABC application? Please explain this in detail. <Q18,19,20>

Section 3 Process of fashion (Selection/Processing/Dissemination) and dynamics (Design characteristics/Rhetorical elements) in diffusion in hospitals (if applicable)

1) I will ask you about the creation process. What is the significant difference of TDABC from other management techniques? Please explain how have you created or modified TDABC in Korean context. <Q1,2>
2) I will ask you about the selection process. Please explain how you got to know TDABC. Why did you choose TDABC to consult the hospital? Was the choice affected by the preferences or demand of the practitioners? Please explain it. <Q3,4,5>
3) I will ask you about the processing process. When you consulted the hospital, what features and strengths of TDABC did you focus on? Is there a specific reason for emphasising this to the hospital? <Q6,7>
4) I will ask you about the dissemination process. How did you find potential customers and contact with potential customers when you were trying to spread TDABC? (e.g. conferences, seminars, advertisements, publications, meetings with affiliates, etc.) Why did you choose these channels to spread TDABC? <Q8,9>
5) I will ask you about changes of design characteristics. In applying TDABC to the hospital, did you modify and apply the “technical elements of TDABC” in consultation with the hospital for the applicability of diffusion? For what purpose did you modify and apply? What effect did this change have on TDABC application? Please explain this in detail. <Q15,16,17>
6) I will ask you about changes of rhetorical elements. In applying TDABC to the hospital, did you modify and apply the “effect of TDABC application" in consultation with the hospital for the applicability of diffusion? For what purpose did you modify and apply? What effect did

this change have on TDABC application? Please explain this in detail. <Q18,19,20>

Section 4 Features and differences in diffusion in manufacturers and hospitals (if applicable)

1) Why did your company designate manufacturers (hospitals) as targets for TDABC? Under the fashion setting process (creation, selection, processing, and dissemination), explain how your organisation made that choice?
2) From the standpoint of consultants and professors, do you think there is a difference in application/use in TDABC spread between manufacturers and hospitals? If so, please explain in detail what differences may exist.
3) Compared to ABC in the past, is demand or interest in TDABC more active? If you think it's more aggressive, for what reasons do you think this is happening? Or if there is not a big difference in demand or interest, what kind of efforts are the consultants and scholars doing for this?

Section 5 Diffusion factors. Please Indicate how much of the following factors affect the application of TDABC (1= Not at all, 5 = to a great extent) and please explain in detail.

Factors	**No at all**				**To a great extent**
1. Perceived Attributes of Innovation					
I. Relative advantage (the degree to which an innovation is perceived as better than the idea it supersedes by a particular group of users)	1	2	3	4	5
II. Compatibility (the degree to which an innovation is perceived as being consistent with the existing values, practices past experiences and needs of potential adopters)	1	2	3	4	5
III. Complexity (Ease of use) (the degree to which an innovation is perceived as difficult to understand and to use)	1	2	3	4	5
IV. Trialability (degree to which an innovation can be experimented with on a limited basis)	1	2	3	4	5
V. Observability (the degree to which the results of an innovation are observable and visible to others)	1	2	3	4	5
VI. Cost	1	2	3	4	5
2. **Characteristics of Adopters**					

I.	Size	1	2	3	4	5
II.	Top management support (the degree to which the top management support the organisational active and open promotion that upper level executives, such as the Chief Executive Officer or the Chief Financial Officer, give to an innovation)	1	2	3	4	5
III.	Champion support (someone within the organisation becomes a special advocate for the innovation, taking actions to raise the possibility of successful adoption and implementation)	1	2	3	4	5
IV.	Culture (Competitive/Tight control) (Competitive is to the extent to which business units emphasise action and results, have high expectations for performance, and are competitive.	1	2	3	4	5
	Tight versus loose control relates to the extent to which an organisation places emphasis on the control of activities and costs)	1	2	3	4	5
3. Characteristics of Environment						
I.	Competition	1	2	3	4	5
II.	Environmental uncertainty (top managers' perceived inability to predict an organisation's external environment accurately)	1	2	3	4	5
4. Factors on Pressure and Need						
I.	Coercive pressure (Forced-selection) (consequence of organisations experiencing formal or informal pressures from another organisation or entity to which are dependent on)	1	2	3	4	5
II.	Mimetic pressure (Fad) (inclination to model themselves on other organisations within their environment where they deem to be	1	2	3	4	5

	successful and legitimate)					
III.	Normative pressure (professionalization that organisations, that belong to the same professional network tend to share the norms and values of that network)	1	2	3	4	5
IV.	Importance of cost information	1	2	3	4	5

Among the factors not covered above, what are the positive/negative factors that you and TDABC adoption (consider) companies think?

Section 6 Extra open quesiton

1) Describe how the characteristics of organisational culture in Korea affected the diffusion of TDABC. <Q44>
2) Describe how the internal and external context of the organisation affected the diffusion and use of TDABC. <Q45>
3) Describe the interest or perception of the practitioners in TDABC.<Q46>

Interview Questions for Practitioner (Manufacturers - C / Hospitals - D)

Section 1 Opening remark & Background information

1) Name
2) About the research project
3) Confidential issue/ not judge or threaten/ record
4) What kind of business are you doing? What is your business goal? If so, what are key success factors?
5) Would you please give me a brief summary of your career history?
(i.e. working experiences, position held, period in)
6) Would you please give me detail of the nature of your work now?
7) When did you first review the application of TDABC?
8) If you have applied, how long have you been applying TDABC?
9) Could you please describe the scope of the use of TDABC and the form of use?
10) (For hospitals) What type of hospital and/or type of activities for which TDABC is being used?

Section 2 Fashion, Dynamics aspects

1) In what way did you find out about TDABC? Through what channel did you learn about TDABC and why? <Q10>
2) Do you think the spread of TDABC through such a channel is effective? <Q11>
3) What rhetoric about TDABC was there and how did that rhetoric affect TDABC choice? <Q12>
4) What are the reasons for using assistance from consultant for TDABC? <Q13>
5) In the application of TDABC, how did you get help from the consultant? Please describe in detail the collaboration with consultants involved in applying TDABC. <Q14>
6) I will ask you about changes of design characteristics. In applying TDABC, did you modify

and apply the “technical elements of TDABC” in discussion with the consultants for the applicability of diffusion? For what purpose did you modify and apply? What effect did this change have on TDABC application? Please explain this in detail. <Q21, 22, 23>

7) I will ask you about changes of rhetorical elements. In applying TDABC, did you modify and apply the “effect of TDABC application" in discussion with the consultants for the applicability of diffusion? For what purpose did you modify and apply? What effect did this change have on TDABC application? Please explain this in detail. <Q24, 25, 26>

Section 3 Diffusion factors. Please Indicate how much of the following factors affect the application of TDABC (1= Not at all, 5 = to a great extent) and please explain in detail. <Q27-43>

Factors	**No at all**				**To a great extent**
1. Perceived Attributes of Innovation					
I. Relative advantage (the degree to which an innovation is perceived as better than the idea it supersedes by a particular group of users)	1	2	3	4	5
II. Compatibility (the degree to which an innovation is perceived as being consistent with the existing values, practices past experiences and needs of potential adopters)	1	2	3	4	5
III. Complexity (Ease of use) (the degree to which an innovation is perceived as difficult to understand and to use)	1	2	3	4	5
IV. Trialability (degree to which an innovation can be experimented with on a limited basis)	1	2	3	4	5
V. Observability (the degree to which the results of an innovation are observable and visible to others)	1	2	3	4	5
VI. Cost	1	2	3	4	5
2. **Characteristics of Adopters**					
I. Size	1	2	3	4	5
II. Top management support (the degree to which the top management support the organisational active and open promotion that upper level executives, such as the Chief Executive Officer or the	1	2	3	4	5

	Chief Financial Officer, give to an innovation)					
III.	Champion support (someone within the organisation becomes a special advocate for the innovation, taking actions to raise the possibility of successful adoption and implementation)	1	2	3	4	5
IV.	Culture (Competitive/Tight control) (Competitive is to the extent to which business units emphasise action and results, have high expectations for performance, and are competitive.	1	2	3	4	5
	Tight versus loose control relates to the extent to which an organisation places emphasis on the control of activities and costs)	1	2	3	4	5
3. Characteristics of Environment						
I.	Competition	1	2	3	4	5
II.	Environmental uncertainty (top managers' perceived inability to predict an organisation's external environment accurately)	1	2	3	4	5
4. Factors on Pressure and Need						
I.	Coercive pressure (Forced-selection) (consequence of organisations experiencing formal or informal pressures from another organisation or entity to which are dependent on)	1	2	3	4	5
II.	Mimetic pressure (Fad) (inclination to model themselves on other organisations within their environment where they deem to be successful and legitimate)	1	2	3	4	5
III.	Normative pressure (professionalization that organisations, that belong to the same professional network tend to share the norms and values of that network)	1	2	3	4	5

IV. Importance of cost information	1	2	3	4	5

Among the factors not covered above, what are the positive/negative factors that you and TDABC adoption (consider) companies think?

Section 4 Features in diffusion in your organisation (manufacturers / hospitals)

1) Do you think there are important features in application/use in TDABC in manufacturers (hospitals)? If so, please explain in detail what features may exist.
2) Compared to ABC in the past, is demand or interest in TDABC more active? If you think it's more aggressive, for what reasons do you think this is happening?

Section 6 Extra open questions

1) Describe how the characteristics of organisational culture in Korea affected the diffusion of TDABC. <Q44>
2) Describe how the internal and external context of the organisation affected the diffusion and use of TDABC. <Q45>
3) Describe the interest or perception of the practitioners in TDABC.<Q46>