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MEASURING THE IMPACT OF INFORMATION SYSTEM CAPABILITIES ON FIRM PERFORMANCE

PhD Dissertation

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We hereby recommend that the dissertation prepared under our supervision by **Arafat Salih AYDINER** entitled **"Measuring the Impact of Information System Capabilities on Firm Performance"** be accepted in partial fulfillment of the requirements for the Doctor of Philosophy Business Administration .

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ABSTRACT

MEASURING THE IMPACT OF INFORMATION SYSTEM CAPABILITIES ON
FIRM PERFORMANCE

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PhD in Management and Organization

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Information systems and technologies have an influence on every aspect of companies' business performance. Extensive studies have been conducted to determine the relations between information system (IS) capabilities and firm performance, with contradictory results. This research investigates and explores, in a combined way, the antecedent factors affected by IS capabilities. The combination of resources and competencies that comprise IS capabilities is demonstrated using the resource-based view (RBV). In order to apply RBV in this research, the main IS paradigm, the mid-range theory, is adopted. The findings show that infrastructure capability (IC), human resource capability (HRC), and administrative capability (AC) are components of IS capabilities in an integrated approach. Based on the theory, a number of hypotheses are formulated to examine the impact of IS capabilities on decision making performance (DMP) and business process performance (BPER) through the application of the serial multiple mediation model. Each of the constructs' direct and indirect relationships are determined, and the overall model fit is measured to understand their impact using a structural equation modeling (SEM) methodology. The survey was conducted with 204 firms which operates in Turkey. The statistical analysis supports the proposed serially mediated model and the indirect relationship between IS capabilities and firm performance (FP), with a causal link through DMP and BPER. The research also demonstrates that multiple casual links are required for IS capabilities to have an impact on FP. The study's approach to the IS paradigm provides a theoretical and practical perspective to resolve the paradoxical results regarding IS capabilities and FP. This assessment indicates the need to shift IS from a static to a dynamic position in the firm.

Keywords: Information System Capabilities, Decision Making Performance, Business Process Performance, Firm Performance, Mid-Range Theory, Resource Based View,

ÖZET

BİLİŞİM SİSTEMLERİ KAPASİTESİNİN FİRMA PERFORMANSINA ETKİSİNİN ÖLÇÜMÜ

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Bilişim sistemleri ve teknolojileri, işletmelerin performanslarını her yönü ile etkilemektedir. Firma performansı ve bilişim sistemlerinin kabiliyetleri arasındaki ilişkinin tespiti konusunda çelişkili sonuçlar ortaya koyan çalışmalar yapıla gelmiştir. Bu araştırma, bilişim sistemleri kabiliyetlerinin temel faktörlerini araştıran ve ortaya koyan özlü bir yapı önermektedir. Kaynak temelli bir yaklaşımla bilişim sistemleri kapasitesinin, kaynak ve kapasite birleşimi sonucu ortaya koyulmuştur. Kaynak temelli teorinin uygulanması için bilişim sistemleri olgusu olan Orta-Aralık teorisi adapte edilmiştir. Bulgular, altyapı, insan kaynakları ve yönetimsel kabiliyetlerinin, bilişim sistemleri kapasitesi ile entegre olduğunu ortaya koymuştur. Seri çoklu arabuluculuk modeli üzerinden bilişim sistemleri kapasitesinin etkisi, karar verme ve işletme süreçleri performansı aracılığı ile araştırılmıştır. Her yapının direk ve endirek ilişkisi ve modelim uygunluğu ölçülerek yapısal eşitlik modellemesi (SEM) yöntemi ile etkisi anlaşılmaya çalışılmıştır. Araştırma Türkiye'de faaliyet gösteren 204 firma üzerinde uygulanmıştır. İstatistiki sonuçlar, seri çoklu aracılık metodunu ve bilişim sistemleri ile firma performansı arasındaki ilişkinin, karar verme ve işletme süreçleri performansı arasında oluşan nedensel ilişkiyi desteklemektedir. Bu çalışma aynı zamanda bilişim sistemleri kapasitesi ile firma performansı arasında çoklu nedensel ilişkinin olduğunu göstermektedir. Bilişim sistemleri kapasitesi ile firma performansı arasındaki çelişkili olguya bu çalışma hem teorik hem de pratik olarak bir açılım sağlamaktadır. Bu sorgulama firma içerisindeki bilişim sistemlerin statik bir konumdan dinamik bir konuma dönüşmesini sağlar.

Anahtar Kelimeler: Bilişim Sistemleri Kapasitesi, Karar Verme Performansı, İşletme Süreçleri Performansı, Firma Performansı, Orta-Aralık Teorisi, Kaynak Temelli Teori

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ABBREVIATION

AGFI   : Adjusted Goodness of Fit Index

AVE   : Average Variance Extracted

CAIC   : Akaike Information Criterion

CFA   : Confirmatory Factor Analysis

CFI   : Comparative Fit Index

CMV   : Common Method Variance

CR   : Composite Reliability

EFA   : Exploratory Factor Analysis

EP   : Explanation and Prediction

ERP   : Enterprise Resource Planning

EU   : European Union

FO- SRW   : First Order Standardized Regression Weight

GFI   : Goodness of Fit Index

IP   : Internet Protocol

IS   : Information System(s)

IT   : Information Technology

JAD   : Joint Application Development

KOSGEB   : Turkish Small Business Administration

RAD   : Rapid Application Development

RBV   : Resource Based View

RMSEA   : Root Mean Square Error of Approximation

SEM   : Structural Equation Modeling

SME   : Small and Medium Enterprises

SRW   : Standardized Regression Weight

TLI   : Tucker Lewis Coefficient

TOBB   : Union of Chambers and Commodity Exchanges of Turkey

TUIK   : Turkish State Institute of Statistics

1. INTRODUCTION

This chapter provides an introduction to the study (the terms 'study' and 'research' are used interchangeably) and provides a general perspective regarding the concept. At the same time, it explains the approach to the field of study and the differences. The section explaining the motivation for the dissertation describes the reasons why this research is being conducted. In this chapter, our research rationale is mentioned, and the key research issues are stated. Furthermore, this section describes the purpose and the intended contribution of the study, and then concludes with an explanation of the structure of the dissertation.

1.1 STUDY BACKGROUND

Since the first Industrial Revolution, firm performance has continuously been a major research interest. The revolution started with changes in science-based technology. These changes have led to urbanization, as well as social, economic, and political revolutions. The pioneers of this Industrial Revolution, such as Taylor, Fayol, and others, helped to create the management field of inquiry, but they all ignored information. The importance of information was realized after the arrival of digital computers. This information awareness exposed the Second Industrial Revolution and led to the beginning of the information age. This concept was accepted after the Princeton economist, Fritz Machlup, drew attention to increasing number of knowledge workers in the workforce. In 1973, Daniel Bell of Harvard published an extensive analysis of what he called 'the coming of post-industrial society', in which the crucial resource is no longer capital, but knowledge (Checkland & Holwell, 2005, p. 4).

During the period of computerization, many of us have experienced the reality that the knowledge that is being created has changed the quality of our lives. The expectation is that the digital world will produce better results, but this does not necessarily always happen. During the early development of the emerging field, it was considered and

recognized as the field of information technology (IT), because technology was its sole concentration. Even though there have been significant studies about different issues in this field, there are two reasons to examine the relationships between IS and firm performance. First, IT and firm performance relations are studied as valuable resources, and IS and business enterprises have not been considered together with respect to the creation of business value. The second reason to study this relation is the cumulative results regarding IT and firm performance, which have been varied in the prior research (Ravinchandran & Lertwongsatien, 2005). In light of the IS field, this study focuses on investigating the persistently high impact of IS on firm performance outcomes, and at the same time, aims to resolve the contradictory results of past studies regarding the relation between IS and firm performance.

1.2 MOTIVATION FOR THE DISSERTATION

The practical implication of information system capabilities is the improvement in business value in order to compete with rivals. Many IS/IT projects have been implemented since the information age began. A comprehensive study revealed by McKinsey & Company that half of IS/IT projects exceed their budgets. This study stated that in the calculation of all of their aspects, large IS/IT projects overrun their budgets by 45 percent, have 7 percent overtime, and provide 56 percent less value than predicted. In addition, 17 percent of IS/IT projects are managed so poorly that they may jeopardize the existence of the company (Bloch, Blumberg & Laartz, 2012). However, there are still companies that do and will use IS/ IT capabilities in order to have successful results, regardless of the high number of failures. Thus, these implemented IS capabilities need to be checked to determine whether or not they are the causes of such failures. Likewise, the theoretical approaches and prior research studies have provided mixed results regarding the impact of IS capabilities on firm performance. The previous studies have considered either the direct effects or the indirect effects within one business dimension. For instance, some have claimed that there is a direct effect of IT on firm performance, while other research has claimed that this relation is mediated by innovation or learning. For that reason, the integration of more than one dimension would clarify the scattered picture provided by these findings. Most of the work that has been done on IT has focused

on the technological perspective. If its business value is not considered, IT will stand still. Therefore, IS and its capabilities are taken into account in this study to reveal the facts regarding performance, which have been overshadowed by pessimistic numbers. The inspiration for this research stems from the aforementioned failures.

1.3 COMPARING THE DESCRIPTIONS OF INFORMATION SYSTEMS (IS) AND INFORMATION TECHNOLOGIES (IT)

At the beginning of the IT field's development, companies allocated their resources to acquiring IT-related products such as hardware and telecommunication equipment in order to achieve economic returns (Radhika & Hartono, 2003). However, IT is regarded as the collection of the practices, techniques, and devices concerned with collecting, storing, processing and distributing data or information. There is no sharp definition of IT, but Checkland and Holwell mentioned Kemper (1987) in their book, who describes IT:

> *"coined to mark the convergence of two technologies that had traditionally been separate: computing and communication* (Checkland & Holwell, 2005, p. 9).*"*

The book of Checkland and Holwell talks about Zuboff (1988) who explained the convergence through several streams of developments:

> *"Microelectronics, computer science, telecommunications, software engineering, and system analysis* (Checkland & Holwell, 2005, p. 9).*"*

Most of the time, the definitions of IT and IS are overlapping, and can even be used interchangeably. Nevertheless, the organizational need to manage the use of IT in relation to an organization's activities and intentions is the key distinction between the two terms. Boland and Hirschheim (1985) describe the field of IS in Checland and Holwell` book:

> *"A combination of two primary fields: computer science and management, with a host of supporting disciplines e.g. Psychology, sociology, statistics, political science, economics, philosophy, and mathematics. The IS is concerned not only with the development of new information technologies but also with questions such as: how they can best be applied, how they should be managed, and what their wider implications are* (Checkland & Holwell, 2005, p. 10).*"*

The information system clears away the multiple perspectives and ambiguities in organizations. Hence, in our study, we focused on IS, rather than IT. The reason is that the information system functions, helps, and supports people in taking action in the real world (Checkland & Holwell, 2005).

The organizational perspective of the IS literature is not well defined. The model that is commonly used in the literature is based on rational decision making in pursuit of goals. A goal-seeking framework creates better managerial creativity and better defined IS. Therefore, in IS, the bureaucratic model of organizational theory is the model that is primarily implemented. The information system literature offers the mechanistic model or the rational decision making model in pursuit of goals, which, as argued by Simon (1960) in Checkland and Holwell`s book, supports the bureaucratic model of organizations. It is argued that an alternative interpretation is needed for IS according to an organizational view; although the pursuit of goals remains the same, IS serves different managerial levels for which the organizational models of firms must re-designed (Checkland & Holwell, 2005). The consideration of the perspective regarding IS in this study opens an avenue to evaluate new approaches.

1.4 PURPOSE OF THE STUDY

The IS field has a definite effect on real world activities. The common view in works regarding IS creates an assumption that organizations are goal seeking. In line with this assumption, the organizational activities considered are decision making and business processes that require information. Some hypotheses claim that sophisticated computer implementations would lead to better strategic management (Checkland & Holwell, 2005). Therefore, there have been significant numbers of studies on the effects of IS on firm performance. The impact of IS on business process performance, firm performance and decision making has often been called the 'productivity paradox' (Gu & Jung, 2013). Some of the research has mentioned that sophisticated computer support would lead to 'better' management practices. However, some other studies have contradicted this idea (Checkland & Holwell, 2005). Thus, there is little consensus on how to measure the effects of IS on organizations. Despite the wide body of research, the results contain

inconsistencies (Gable, Sedera & Chan, 2008). Yet with respect to investments in IS, there is significant concern about whether or not the anticipated value is being achieved in firms (Henderson & Venkatraman, 1993). Some research has pointed out that an information system does not directly affect organizational performance, even though some others have found that IS does have a direct impact on firm performance (Kharuddin, Mohd Ashhari & Md Nassir, 2010). Thus, these paradoxical implications have created significant interest among academicians and practitioners regarding the impact of IS on firm performance.

This study combines two of the most effected aspects of firms: decision making performance and business process performance. The purpose is to combine these different types of individual productivity measures to examine not only IS itself, but also the effect of its capabilities on overall firm performance. This way, we hope to shed light on the contradictory results regarding the effect of IS in the field. This study is aimed at determining whether the common view, i.e. that IS has a direct effect on decision making performance and business process performance, is accurate in the Turkish context. In trying to resolve the questions arising from the aforementioned contradictory results regarding the relation between IS capabilities and firm performance, we chose to implement the mid-range theory, with the resource-based view (RBV) as the guiding principle for our research.

1.5 CONTRIBUTIONS OF THE STUDY

This study is intended to contribute to the information system field from a management perspective. The methodology of the study is one of gain for the IS field. Serial multiple mediation modeling creates a new perspective that is designed to look at decision making efficiency and business process performance together to measure firm performance in the IS field. These capabilities are the complex routines that define the efficiency of the inputs and outputs of firms. IS capability is defined as the routines that enable IT services within organizations (Ravinchandran & Lertwongsatien, 2005). However, our approach, i.e. considering IS with its capabilities, will provide an important contribution, because the RBV helps us to distinguish between resources and capabilities. Thus, in our research, IS

capability creates a broad view of the ability of the combinations of resources in firms to promote superior performance (Bharadwaj, Sambamurthy & Zmud, 1999). One of the premises of this study is that IS capabilities are not merely routine, but also are value added combinations of resources for firms. With respect to firm performance, the IS literature suggests different results. The literature has defined the effects of IS on firm performance as direct positive, direct negative, indirect, and no effect (Wade & Hulland, 2004). The difference in our research is that we propose that both direct and indirect effects are possible between IS and firm performance. The consideration of firm performance, together decision making and business process performance, are the necessary relations that are indirectly impacted by IS capabilities. The adoption of this approach in this study offers an important contribution to the IS field. Our proposition creates a distinct epistemology, because of our consideration of the multiple serial designed model in this research. Furthermore, the aggregation of IT resources, assets, and management principles under IS capabilities is expected to add significant value to the IS and business fields.

1.6 STRUCTURE OF THE DISSERTATION

The first chapter starts with the introduction, which begins with the background of the study. The study background explains the general perspective adopted regarding the subject. Further, the motivation of the study is described and some 'why is?' questions are explicated. Later, the discussion of the research purpose is aimed at clarifying the reasons for the study. In addition, the contribution and positioning of the study are also discussed to provide the realistic perspectives and promises of this research.

The second chapter focuses on the entire theoretical perspective and approach. It starts with a theoretical justification of the study. Two main theories are discussed regarding the extent to which they consider both the IS and management context. The theoretical foundation and the core assumptions of the study are debated in line with the concepts of the study. First, the IS phenomenon and its theoretical approaches are explained, and then the implemented theory and its relation with IS are discussed. Following the discussion of the theory, the conceptual structure of the constructs is debated, along with the

supporting literature. First, the information system capabilities (ISCAP) sub-constructs are built, and later, each of the constructs and their relations are assembled to develop the framework and the hypotheses. Moreover, the model is proposed in this chapter.

Chapter three discusses the research methodology for the main empirical part of the study. The chapter starts with the sample and data collection, as well as the research procedures. Next, the operationalization of the relevant variables is provided, along with the survey methodology. Lastly, the descriptions of the structural equation modelling and the serial mediation processes are explicated.

Chapter four focuses on the quantitative statistical results. Following the assessment and validation of the measurement model, a reliability analysis is performed. The structural model is formed and tested in this chapter. The technical details of the statistical analysis are provided. All of the hypotheses are tested regarding whether they are supported. The fit of the model is also measured in this chapter. Further, the control variables are tested, and their effects are explained.

The last chapter, i.e. chapter five, discusses the details of the results and the implications. It starts by recapitulating the results. The theoretical contributions, as well as the managerial and policy implications, are set forth in detail. At the end of the chapter, the limitations and insights are discussed to offer potential avenues of research for future studies.

2. LITERATURE REVIEW

This chapter contains the theoretical foundation of our research. First, the theoretical justification that is related to the study is explained. This chapter also describes the theory and its integration with the information system literature. Next, the IS literature is reviewed, and the main arguments are conceptualized. Later, the hypotheses are built and explained. Finally, the conceptual framework is postulated.

2.1 THEORETICAL JUSTIFICATIONS

This part explains the main theoretical approaches in the information system field, as well as their development. The theory regarding IS is explained, and the mid-range theory is described. Lastly, a theoretical adaptation is made through the definition of the resource-based view.

2.1.1 Types of Theories in the IS Literature

The characteristics of information systems are different from those in other fields. The IS field addresses the use of artifacts in the human-machine system. This means that IS not only examines the technological systems, but also the social systems and their integration. In order for IS to be understood, the field should be investigated with the natural world, the social world, and the artificial world of human construction (Gregor, 2006). It has also been defined as 'an integrated user-machine system' to support the operations, management, and decision making of an organization. Different combinations of systems have caused the IS field to be a 'fragmented adhocracy', making the field diverse and weakly coherent as stated by Banville and Landry in 1989 which is stated in Checkland and Holwell`s (2005) book.. Multiple elements of IS work provide the notion of organizational transformation (Checkland & Holwell, 2005).

Checkland and Holwell (2005) claimed that the concepts in IS theory can be separated into two schools of thought. One of them is called the hard approach, and the other

proposed a soft approach. The hard concept of thought was built upon Simon's (1960) model of decision making. Simon's definition and approach to the theory of problem solving mainly explained the management of complex systems. Simon and his followers' main aim was to establish a true science of administrative behavior and executive decision making. This method makes it easier for firms to implement goal-seeking behavior. He created three levels to establish the theory. The levels are described as problem identification and data collection, the definition of alternative solutions and their results, and choosing the right solution and following up on it. It is clear that the hard approach that was discussed by Simon requires different types of information supported by information systems with different characteristics. This methodology excluded the effect of human and organizational behavior. Even though this is a common approach to IS, alternative methods have also been proposed, which are described as the soft approach (Checkland & Holwell, 2005).

The other school of thought is the soft approach, which was offered by Vickers (1974). He refuted the goal-seeking model of human behavior. This approach is also called the interpretive approach. Vickers claimed that the goal-seeking approach narrowed the richness of the lives that we live. Therefore, instead of seeking goals, the maintenance of relationships was the basis of the system he proposed. In this approach, standards are set rather than goals. Vickers's theory has been used less frequently in the IS literature, but it is a process for understanding computers and cognition together. According to Checkland and Holwell (2005) stated that Ciborra (1987) also defended the humanistic approach as an alternative to the conventional wisdom. He stated that organizations should be accepted as networks of communicative exchanges. An information system is a tool that makes these exchanges easier. He clashed with the conventional approach, stating that:

> *"Information systems are either tend to a data view of organizations, or, in the case of those most influenced by business needs, to a decision making view. These two ways of looking at the problems of computerization are so widely accepted and have been so much taken for granted that they can be said to form the conventional wisdom of today* (Checkland & Holwell, 2005, p. 49).*"*

There is still confusion in the IS field, and thus, substantial theory for the field has not yet been elaborated. Even the different schools of thought that have been defined do not

provide a common perspective regarding IS. Therefore, the research continues to be based on positivist, interpretative, and integrated approaches in the IS field.

Another theoretical perspective was envisioned by Shirley Gregor in 2006. During theory building in the IS field, a mixed combination of systems created an iterative process for the theories regarding information systems. In her study, it was proposed that the classification of theories distinguishes their attributes. In building the theories, the primary goals are discerned. According to these primary goals, five types of theories were established. The goal of the classification is to help IS research to identify the composition of a theory in a general sense and to compare the components of IS theories and other theories. In the literature, for example, Fawcett and Downs (1986), Livari (1983), Cushing (1990), Markus and Robey (1988), Lee, Barua and Whinston (1997), different taxonomy methods are proposed to explain IS theories; however, Gregor (2006) classified all of these approaches in the IS research under five types of theories. Gregor's proposed taxonomy classified the following types of theories: analysis, explanation, prediction, explanation and prediction, and design and action (Gregor, 2006). These types are explained as follows:

Theory for Analysis (Type 1): This theory asks 'what is'. This is a very basic type of theory that does not explain causality or make any generalizations. This theory is used for a phenomenon about which very little is known. One of the theories mentioned by Fawcett and Downs was descriptive theory, which falls within this definition. The expectation for this type of theory to satisfy the criteria is that it will be able to assess the contribution that research makes to knowledge (Gregor, 2006).

Theory for Explanation (Type 2): This type of theory addresses 'how' and 'why' questions. However, it does not make any predictions with any precision. The primary focus is to understand of how things are, or why they are as they are. This type of theory does not have testable propositions. It can be considered as a process-type theory. DiMaggio (1995) described this type of theory as one of enlightenment, because it does not make generalizations. Structuration theory falls into this type of theory and explains the world as shared relationships between actions and social structures. The case study also provides an illustration of this type of theory, which provides a good understanding of what to do. A case study involving IS can be given as an example of a theory in process.

The methodology used to establish this type of theory includes case studies, surveys, and ethnographic, phenomenological and hermeneutic approaches, as well as interpretive field research (Gregor, 2006).

Theory for Prediction (Type 3): This type of theory provides predictions, asking the question of 'what will be' and 'what'. However, they do not ask 'why'. They have testable propositions. These are the type of theories that predict a set of explanatory factors. They do not address the causal links between dependent and independent variables. Hence, this leaves these theories in a black box. This type of theory does not exist in the IS field. Statistical techniques, such as correlational or regression analysis and data mining, are among the related approaches (Gregor, 2006).

Theory for Explanation and Prediction (EP Theory-Type 4): The explanation and prediction type of theory commonly shares a similar view of both the natural and social sciences. The main theoretical questions in this approach are 'what is, how, why, where, and what will be'. The theory is also labeled as EP theory. EP theory indicates an understanding of underlying causes and predictions; in addition, it describes the theoretical constructs and the relationships between them. Grand theories, such as the general system theory and the related information theory, are considered as theories for explaining and predicting. General theory delivers a high level of thinking regarding open systems that of are interest in the IS field. Another example that can be given of this type of theory is the representation theory, which establishes the intended properties of information systems. The technology acceptance model and the dynamic model of information success also aim to explain and predict. The expectation-disconfirmation theory depends on causal thinking, using change, and determining and mentioning a process model (Gregor, 2006). The resource-based view also falls within this type of theory. RBV consists of an explanation of resources and looks at the causal reasoning for IS properties.

Theory for Design and Action (Type 5): This type of theory explains how to do things. Such theories provide the principles of the forms, functions, methods, and justification of the theoretical knowledge that is implemented in IS development processes. Design theory primarily explains this type of approach. It focuses on IS development and its

processes. Decision support systems, structured system analysis, and relational data bases are some of the methodologies that fall within design theory (Gregor, 2006).

After the foregoing review of all of these types of theories, it is clear that a mix of theory types is the best suited for the IS field of research. The fourth theory approach covers wide perspectives and research questions. Therefore, it combines both the process and variance aspects. Hence, most of the published IS theory falls within the fourth type of theory. When all of its aspects are comprised, the explanation and prediction type of theory falls within the same category as the mid-range theory (Grover & Lyytinen, 2015). As it uses a mix of approaches, adopting and borrowing their implementation, the mid-range theory is the best suited for application in this research to provide an IS theoretical perspective.

2.1.1.2 Mid- Range theory

Theories are abstract entities. In order to maintain the abstraction within a phenomenon, interactions and causation stand at the center of a theory. The mid-range theory is one that is moderately abstract, with a limited scope; it supports testable hypotheses, and thus, is suitable for practical disciplines (Gregor, 2006).

An information system is a semiotic and sociotechnical system. The main obstacle is the integration of IT with human enterprises. The IS discipline helps such enterprises to orient, arrange, and behave in ways that create this integration. This integration can be achieved by imposing theory and empirical approaches together. The interrelation of theory and empirical approaches creates a theory-based approach that classifies, explains, and predicts the IS phenomena using what Gregor (2006) defined as the fourth type of theoretical IS approach. Within this perspective, the adaptation and borrowing of processes from a reference theory, along with its functions, creates the mid-range theory. Grover and Lyytinen (2015) defined the mid-range theory as the 'enactment of a family of epistemic scripts that adapt and borrow grand(er) social theories originating within reference disciplines, such as economics, psychology, and sociology' (p. 272).

The mid-range theory is the combination of the reference theories within the IS context. This combination represents technology as an investment and a perception, or it resides

in the background. The IS field benefits from using the mid-range theory based on this representation. The mid-range theory is primarily defined, in the IS field, as the domestication of higher level abstract theory to a specific IS context by the restriction of its conceptual range. The theory creates advantages for theoretical logic and advanced methodical accuracy. The mid-range theory sits between high level abstractions, which have been described as an ocean, and the purely data driven context, where it creates IS phenomena (Grover & Lyytinen, 2015). The representation of the theory is shown in Figure 2.1.

Figure 2.1: Mid-Range theory graphical representation
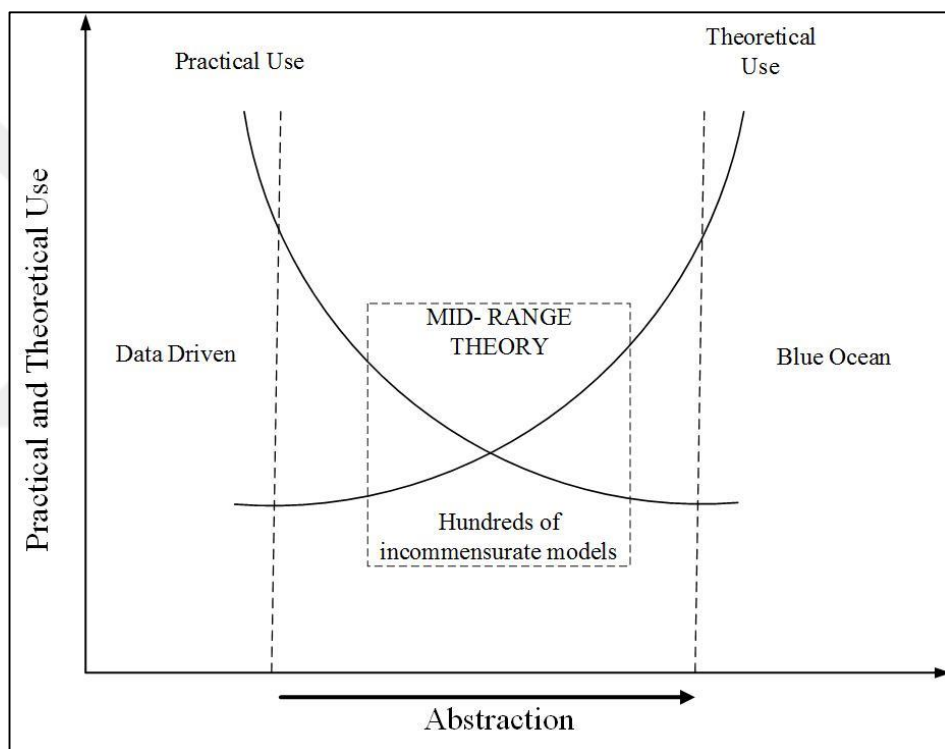
Source: Grover & Lyytinen (2015). *New State of Play in Information Systems Research: The Push to the Edges* MIS Quarterly, *p. 285.*

The implementation of the mid-range theory is common in the IS field. During the domestication process, first, the type of study is defined, and later, the IS components and artifacts that are included from the theory that was borrowed and adapted from the reference theories are determined. With respect to the last stage, the form of theory borrowing is developed throughout several stages. First, whether the borrowing is directly from outside of the field or whether it has been previously adapted in the IS domain is analyzed. The second step is to find out the degree of change in the borrowed theory. The

third stage is to identify the levels of theory borrowing, which are defined as instantiation, modifying, and extension. The instantiation type of theory borrowing means that there are no or limited changes in the constructs, configurations, or logic of the borrowed theory. The modifying level is present when the model modifies the constructs, configurations, and/or logic of the borrowed theory for the IS context. Constructs such as asset specificity, transaction cost economies, and the resource-based view come from outside, but they are modified for the system's specificities. The extending level creates some new constructs with new conceptual relationships. These new concepts are included in the models and the theories in order to extend them. At the end of the borrowing process, the level of abstraction is lowered, and the constructs move closer to the IS phenomena (Grover & Lyytinen, 2015).

Following the foregoing steps for building the mid-range theory, first, the type of study was defined as a quantitative study with a survey methodology. Second, the artifacts were articulated from the IS field studies. At the last stage, the resource-based view was borrowed and adapted to our study from the strategic management field. The RBV was a secondary borrowing, because the theory has already been conceptualized in the IS field. In domesticating the RBV into IS, specific RBV constructs that are related to IS were established using the modifying level of theory borrowing. In this way, the level of abstraction in the RBV was lowered by defining information system capabilities as a main construct in the study.

2.1.2 Resource Based View (RVB)

Resource-based view studies have been influenced by the seminal works of Coase (1937), Penrose (1959), and Wrigley (1970). Peppard and Ward (2004) explained from Penrose defined a firm as 'a collection of human and physical resources bound together in an administrative framework, the boundaries of which are determined by the administrative coordination and authoritative communication' (Peppard & Ward, 2004, p. 173). In addition, there is a different view proposed by Hamel and Prahalad (1994) in which a firm is described as a 'portfolio of competencies' (p.173). The RBV has been affected by Nelson and Winter's (1992) approach, which emphasized the sickness of a firm's resource

abilities and its dependence on learning paths and technological prospects (Peppard & Ward, 2004).

The 'good science is good conversation' approach adopted by McCloskey fits with the resource-based view in management science that is mentioned by Mahoney and Pandian`s (1992) study. The resource-based view (RBV) encourages dialogue between scholars. There are different perspectives regarding the RBV in the management field. The first is incorporated in strategy research. From this perspective, the RBV is concerned with the rate, direction, and performance implications, which are the focus of the strategy field. The second approach to the RBV is organizational economics. The RBV is considered the fifth branch of organizational economics, along with agency theory, property rights, transaction cost economics, and evolutionary economics. The third view of RBV corresponds to industrial organizational analysis (Mahoney & Pandian, 1992).

According to the resource-based view, firms possess resources in order to achieve a competitive advantage and better performance. Specific resources may give the firms an advantage against their rivals, as long as they protect their resources against imitation, transfer, or substitution. According to the theory, a firm's resources have been defined as its competencies, skills, strategic assets, assets, and stocks. In short, they are capabilities that transform inputs into outputs. Therefore, these capabilities comprise skills, managerial abilities, processes, development, integration and infrastructure (Wade & Hulland, 2004). Capabilities can be viewed as the capacity of a team of resources to perform task and activities, and they are often developed in functional and sub-functional areas by combining physical, human, and technological resources (Ravinchandran & Lertwongsatien, 2005, p. 240). In following this theoretical approach, we implemented the view that resources are part of capabilities, and they are combined with its assets, which are both tangible and intangible. The epistemological methodology of this research is that the capabilities are the main resource, because they are repeatable patterns of actions for the use of assets to create, produce, and/or offer products to the necessary environment. The conceptual typology of the RBV is illustrated in Figure 2.2, which is consistent with the theoretical approach above.

Figure 2.2: Resource based view (RBV) typology
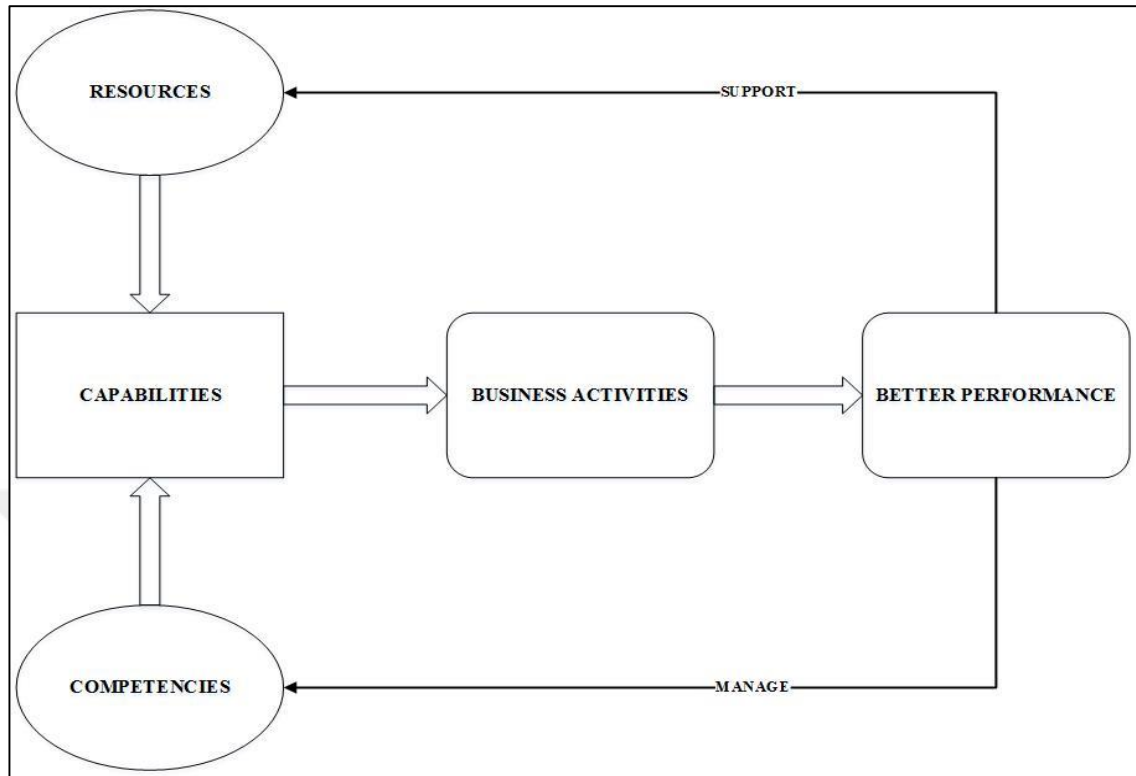
The resource-based view has been implemented since the 90s in the IS field. Since then, most of the studies have focused on either a single IS resource or a bundle of IS resources. In one of the previous studies, Ross et al (1996) separated IS into three categories, combined with IT assets and IT processes that contribute to business value. The study labeled IT assets as human, technological, and relational. The IT processes were decomposed as planning ability, cost effective operations, support, and fast delivery. In Bharadwaj (2000), a modified perspective was defined as IT infrastructure, human IT resources, and IT-enabled intangibles (Wade & Hulland, 2004).

IS resources cannot be considered as only technological assets. Technological assets are assets such as networks and databases, which can easily be reached by all competitors. Instead of looking at assets individually, a combination of assets can create a sophisticated IT infrastructure, which generates the results necessary to meet the firm's needs and priorities. Moreover, skilled human resources, the administrative knowledge of IS, and

the internal and external relationships of the IS department are posited as benefit and profit generators for firms (Ravinchandran & Lertwongsatien, 2005).

There are additional works in the literature that address IS resource categorizations. These categorizations use different terminologies in order to define IS resources. Feeny and Willcocks (1998) defined nine IS capabilities. There are overlapping areas within this definition. These areas are the business and IT vision, the design of IT architectures, the delivery of IS services, and a core set of capabilities, such as leadership and informed buying (Wade & Hulland, 2004, p. 110). Another approach to IT capabilities was presented by Bharadwaj et al (1998), in which six dimensions were validated. These dimensions are the IT/business partnership, the external IT linkages, the business's IT strategic thinking, the IT business process integrations, IT management, and IT infrastructure. Other previous studies have posited two dimensions of IS competencies: transformational and operational competencies. It is claimed that they have a direct effect on firm performance. Wade and Hulland (2004) provided another study conducted by Powell and Dent-Micallef tried to explain information system resources using three categories: human resources, business resources, and technology resources. They specified that these categories affect firm performance (Wade & Hulland, 2004).

Extensive IS literature has indicated that two perspectives of IS can be defined. They are IS assets (technology-based) and IS capabilities (system-based). Nevertheless, from the RBV perspective, the development of capabilities establishes a broad perspective, and at the same time, covers IS assets, since IS assets represent a more fragile resource because of their stagnancy (Wade & Hulland, 2004). The resources are the raw materials for the development of capabilities. A deployed resource generates capabilities (Ravinchandran & Lertwongsatien, 2005). Therefore, information system capabilities become a critical driver for firm performance under the RBV theory (Wade & Hulland, 2004).

According to the Ricardian perspective, the heterogeneity of performance is related to the possession of resources. In contrast, resource selection and resource deployment cannot be separated from each other (Ravinchandran & Lertwongsatien, 2005). Competency is the ability to deploy combination of resources to achieve the task (Peppard & Ward, 2004). As we have seen in the literature, from the RBV perspective, incorporating IS resources and competencies creates better firm performance. Information system

resources and competencies and their deployment are defined as IS capabilities, and based on support from the RBV, they are proposed as a main driver of firm performance in this study.

2.2 CONCEPTUAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

This chapter starts with the explanation of the antecedents of the framework that has been developed. The main antecedents of the model are the information system capabilities, which are defined and whose sub-constructs are discussed in detail in the literature review. Later, each construct is supported based on the perspectives contained in the literature. The associations of each construct are established. At the end of the chapter, the conceptual framework is depicted, which defines all of the variables. Lastly, the hypotheses are developed according to each of the causal links between the constructs.

2.2.1 Conceptual Background on IS Capabilities

Information system capabilities are a core element in order for business capacity to utilize and obtain IT successfully. A constituent of IS capabilities is the combination of a two-way strategy alignment between business and technology. Integrating these two areas may transform the marketing function from a market place to a market space (Feeny & Willcocks, 1998). One of the approaches to IS capabilities is the execution of strategically aligned planning, rapid delivery, and cost effective operations and support (Gu & Jung, 2013). Likewise, IS capability can be defined as way of classifying and providing access to knowledge that is learned and successfully applied. It has been claimed that IS capabilities positively improve organizations' knowledge capacity (Cepeda-Carrion, Cegarra-Navarro & Jimenez-Jimenez, 2012). Thus, every firm has IS capabilities in their business perspective. IS capabilities can be either weak or strong in organizations. If there are weak IS capabilities, the organizational abilities can be affected negatively. However, strong IS capabilities may create value in an organization (Peppard & Ward, 2004). IS capabilities are considered to be the routine processes for the deployment of IT services to organizations (Ravinchandran & Lertwongsatien, 2005). Nevertheless, strong IS

capabilities create advantages in business and quickly respond to changes in the business environment.

Information system capabilities include complex and multidimensional constructs. Different perspectives in the literature have been identified regarding IS capabilities. In their study, Fenny and Willcocks (1998) proposed three perspectives. These three perspectives are the business and IT vision, the design of IT architecture, and the delivery of IS services. Within these perspectives, nine IS capabilities are defined: business system thinking, relationship building, architecture planning, leadership, informed buying, making technology work, contract facilitation, vendor development, and contract monitoring (Feeny & Willcocks, 1998). In addition, the relevant IS capabilities are described in another study as operational efficiency, operational flexibility, planning, and internal and external analysis (Mclaren et al, 2011). Information system capabilities are composed of three attributes that are related to each other. One of them is the combination of business knowledge and IS knowledge. The other is having a flexible IT infrastructure. The effective use of the process is the final attribute of IS capabilities. Some studies have accepted that IS capabilities are related to resources and competencies. Resources are defined as the 'stocks of available factors that are owned or controlled by the firm' (Peppard & Ward, 2004, p. 175). In line with this definition, IS resources represent the IT infrastructure that is owned and controlled by the firm. The competencies are the firm's ability to organize, exploit, and activate these resources. Thus, in some of the literature, IS competencies are composed of six different attributes: formulating strategy, defining the IS contribution, defining the IT capability, exploitation, delivering solutions, and supplying. When IS resources and IS competencies are linked, this indicates that IS capabilities are composed of these domains, which are depicted in Figure 2.3. Thus, IS capabilities become the source of a competitive paradigm that delivers knowledge to organizations to create better performance (Peppard & Ward, 2004).

Multiple prior studies have create a scattered picture of the explanations of IS capabilities. Some of the constructs or elements are continuously intersected with each other and share at least part of their boundaries. Based on the mid-range theory and the resource-based view, the dissertation explains IS capabilities by dividing them into three distinct components that contain both resources and competencies. In light of the literature, in order to simplify complexity of the constructs, the three capabilities are defined as IS

infrastructure capability, IS human resource capability, and IS administrative capability. These domains are elaborated and organized in order to cover IT infrastructure, human abilities, and management and policy factors. Therefore, in the research, these domains are conceptualized as sub-constructs that comprise IS capabilities, and they are interrelated, instead of hierarchically linked, with each other.

Figure 2.3: Information System (IS) capabilities and components framework
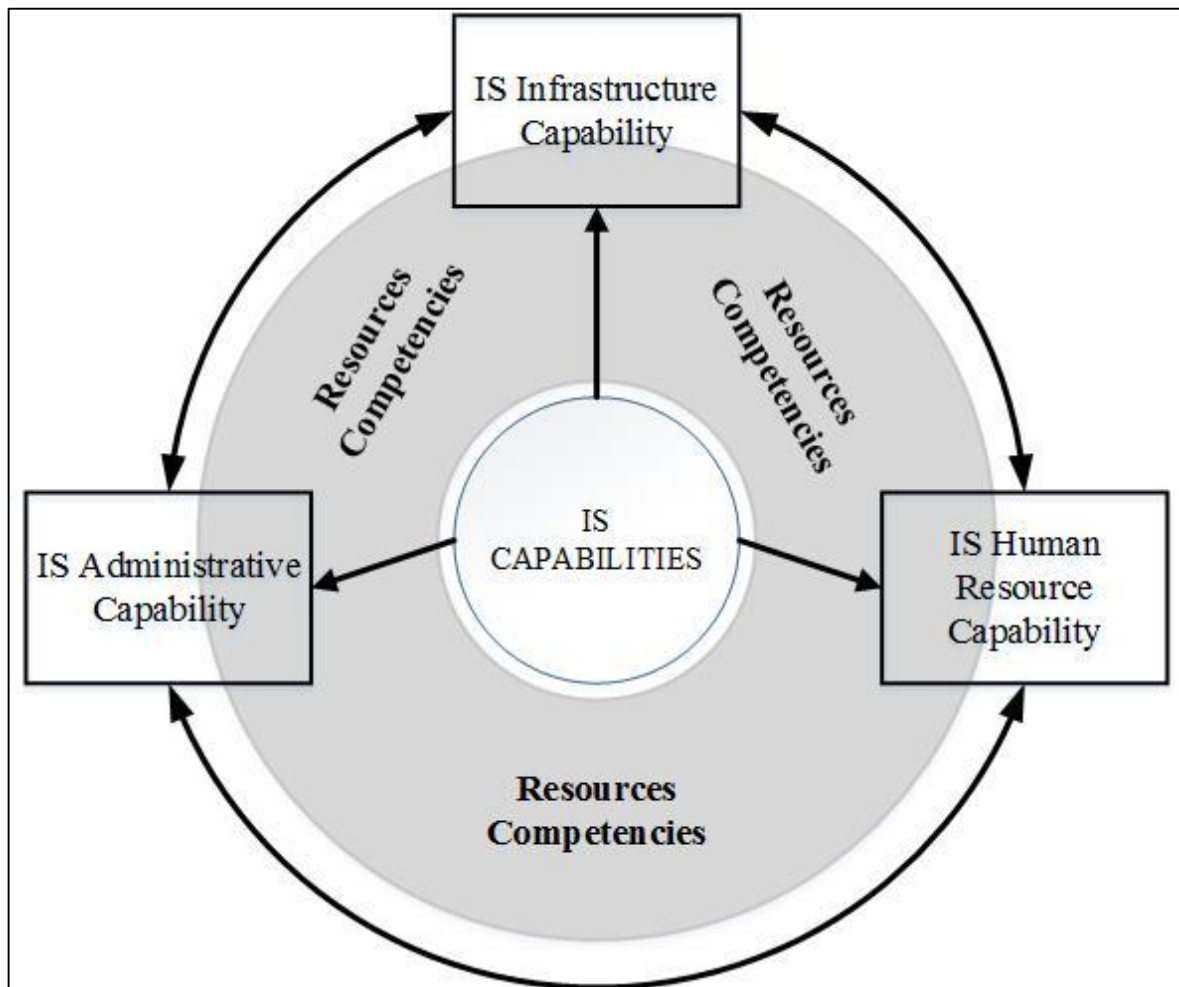
2.2.1.1 IS infrastructure capability (IC)

Infrastructure mainly refers to technology, which is discussed in the information technology section. Therefore, IS/IT are terms that are used interchangeably within the subject of technology. The IT infrastructure is a group of shared technologies, and it is accepted as a firm resource. The infrastructure is the foundation of all business applications and it has become an un-preventable part of a firm's structure. It establishes

the technical platform and the service resources needed to respond rapidly to a business' needs and changes. This is the supply side of IS capabilities (Peppard & Ward, 2004). In addition, the IT infrastructure includes the artifacts, tools and resources that contribute to the acquisition, processing, storage, dissemination and use of information (Pérez-López & Alegre, 2012). Thus, a technical capability has the capacity to affect the performance criteria by speeding up the necessary business initiatives. The infrastructure can be seen as tangible knowledge and skills (Peppard & Ward, 2004).

The IT infrastructure provides easy and fast access to the necessary information and enables knowledge transfer. Certain tasks can be standardized and automated with the right infrastructure. A strong infrastructure helps to transfer tacit knowledge into explicit knowledge (Pérez-López & Alegre, 2012). A flexible IT infrastructure capability positively supports IS capabilities by developing a platform that is ready for new software, which makes these platforms ready to provide easy access to the appropriate data, establishing a network system that can communicate with other systems more rapidly. The provision of data facilitates more cost effective IS solutions for the firm environment; hence, a strong IT infrastructure give IS capabilities more influence over firm performance. A solid, reliable, and flexible IT infrastructure allows firms to be integrated with cutting edge technologies, and it delivers these technologies rapidly, in a cost effective way (Ravinchandran & Lertwongsatien, 2005). All of the firm's units adapt and integrate the IT infrastructure in order to change the business's direction and needs. The infrastructure becomes part of the IS capabilities in order to reach every point and cover the range of the firm's boundaries (Mithas, Ramasubbu & Sambamurthy, 2011).

All rival firms can imitate each other's IT infrastructure, but when the IT is transformed into IS infrastructure capability, which is the distinct capacity to support the IS capabilities, it then becomes a rent-yielding resource for a firm. Therefore, the study proposes IS infrastructure capability as a sub-construct and defines its latent variables in order to cover the necessary resources and competencies. These resources and competencies of infrastructure are refined and applied in the research in order to identify the effects of IS capabilities on firm performance.

2.2.1.2 IS human resource capability (HRC)

Technical operations require a technical skillset in order to achieve certain activities aimed at reaching a particular end (Tippins & Sohi, 2003a). Information system human resource capabilities are designed to disseminate technical capacity and make sure that this capacity works efficiently and effectively (Cepeda-Carrion et al, 2012a). Thus, IS human resource capabilities make an important contribution to the development of IS capabilities. There are two distinct characteristics of IS human capabilities. One is skills, and the other is specificity. Skills refer to the possession of IS personnel of the required technical and business skills. Specificity means that IS personnel understand the culture and the routine of the firm (Ravinchandran & Lertwongsatien, 2005). The technical skills of IS human resources also include programming, system analysis and design, and competencies in emerging technologies (Bharadwaj, 2000). These characteristics of IS HRC enable IS staff to quickly and easily communicate and integrate their knowledge with that of the business staff. IS personnel contribute to complicated and rich IS capabilities by providing rapid troubleshooting when problems occur. Human capabilities also stem from an understanding of the fundamentals of IT. Thus, IS staff can work within a wide range of system environments based on their knowledge of different programming capacities (Feeny & Willcocks, 1998). Strong IS HRC has the capacity to integrate IS and business processes more effectively, develop more reliable and cost effective applications, integrate and communicate with the business departments/units more efficiently, and perform proactively to create future business and innovative new technological infrastructures to develop the value of the business (Bharadwaj, 2000). The development of highly important skills is facilitated through learning by doing. It takes time to improve these skills. For instance, application development skills require more inter-relationships between IS human resources and all of the related parties in the firm, rather than individuals struggling to accomplish them alone. This team work establishes excellent communication among the IS staff and improves their 'learning by doing' over time. Highly sophisticated teams for joint application development (JAD) or rapid application development (RAD) reduce development time and costs. Environmental uncertainty forces firms to change their business' strategic movements. An information system must adapt itself rapidly to the changing environment. Being prepared to change

the capability of an IS system is associated with the availability of skilled IS human resources (Bharadwaj, 2000).

The ability of firms to provide empowerment and autonomy to teams, improve and share tasks, provide a collaborative work environment, and organize and indicate their work practices creates opportunities in which IS personnel can leverage not only their technical skills, but also effectively deliver the assets of the socio-technical networks to the right members of the firms (Bharadwaj, 2000). A firm's ability to gain the most from its benefits is related to the availability of successful IS support, which enables the whole organization to use its competencies (Ravinchandran & Lertwongsatien, 2005). Consequently, IS HRC is one of the paradigms that contributes to the establishment of the IS capability construct as one of the resources and competencies of a firm. Therefore, IS human resource capability defined as one of sub-constructs of IS capabilities in this research.

2.2.1.3 IS administrative capability (AC)

The administrative capability of IS is the main driver of the identification and development of the IS capabilities that are the most directly associated with a business' needs and value (Feeny & Willcocks, 1998). The idea of administration within IS introduces the factors that explain the quality of IS practices, the ability to develop the proper processes needed to sense, gather, organize and disseminate information, and to instill the anticipated information behaviors and value (Mithas et al, 2011). The administrative approach is mainly related to performance monitoring, information management, asset management, human resource management, planning, and resource allocation (Zwass, 1997). In order to accomplish these administrative duties, leadership is necessary for the performance of these activities. The administrative capability sets the goals and the direction for each of the IS resources and competencies. The way in which work is done in IS is determined by the administrative capability. The policies and rules of engagement, the strategic perspective, and security are part of the administrative concepts within IS (Feeny & Willcocks, 1998). IS planning is the main stream of management activity that ensures that IS goals and initiatives are aligned with a business' strategies and plans. This convergence enables IS capabilities to be implemented

strategically and the value of a business to be improved (Ravinchandran & Lertwongsatien, 2005a). AC should be able to organize the best emerging technologies, assess the need for technologies, and coordinate with external entities when it is necessary (Chen & Wu, 2011). Effective IS AC ensures that there is consistency in the IS policies throughout an organization and decreases duplication and redundancy in a system and organization (Bharadwaj et al, 1999). This capability creates an enterprise architecture perspective, which acts as a planning and piloting instrument that translates strategies into programs and projects (Land et al, 2009).

The greater salience of IS AC in influencing performance measures is considered critical within IS capabilities (Mithas et al, 2011). Hence, our study has conceptualized administrative capability as a sub-construct that is a competitive resource and competency for IS capabilities.

2.2.2 Information System Capabilities and Decision Making Performance

Managing is defined as planning, organizing, staffing, coordinating, directing, and controlling, while decision making comprises the analysis of alternatives. For this reason, a manager is considered to be a problem solver. Problem solving is accepted as a decision-making activity (Checkland & Holwell, 2005). Managers and executives face highly unstructured tasks regarding which they need to make decisions within settings in which there is a high degree of uncertainty (Islei et al, 1991).

Simon (1960) postulated that managers take decisions to solve problems in the pursuit of goals. According to Simon's theory, a decision maker shows limited or 'bounded rationality' in searching for decisions that are good enough within the existing conditions. Simon argued in favor of satisfactory results instead of optimization during decision making. According to Simon, there are three stages of problem solving and decision making. The first stage is to identify the problem and collect the data accordingly. During the second stage, alternative solutions and their results are delineated. Lastly, a satisfactory solution is selected and its application is monitored (Checkland & Holwell, 2005).

In addition to Simon, Mintzberg et al (1976) proposed a sequential and cyclical model for decision making that also includes three levels. The first is the identification level. The

opportunities, problems, and crises are recognized and arouse decisional activity at this level. After the recognition, the necessary information is gathered to explain and clear up the problem about which the decision needs to be made. The development level addresses the second part of decision making. At this level, alternative solutions are determined. If there is an available solution, the suitability of the solution for the problem is ascertained. An appropriate solution is then adopted; otherwise, the solution is modified and then implemented. If none of the existing solutions are suitable, then a new solution is designed. The last level involves a selection process, in which monitoring activity occurs. An evaluation of the decision is made and reviewed. The authorization to make decisions is controlled by the organizational hierarchy. Instead of recognizing a decision-making level, Witte (1972) and Anderson (1983) proposed that a number of decisions are made simultaneously throughout the decision-making processes (Molloy, 1990). Meshing these stages or levels with an information system requires a different type of information, and thus, these types are supported by information systems having different characteristics (Checkland & Holwell, 2005).

Information system capabilities play an important role in making decisions. Nevertheless, in the prior literature, some studies that have claimed that IS capabilities do not have an important impact on decision making. Wildavsky (1983) and King (1985) argued that computer systems are only a way of collecting, retrieving, and storing data. Thus, formal information systems provide structured data, but decision makers also need to have intangible unstructured information to make decisions (Molloy, 1990). However, other significant past studies have supported the positive impact of IS capabilities. For instance, Huber (1984) stated that technology reduces the amount of time that is spent in reviewing information. The information provided enables managers to create their own mental models (Molloy, 1990). Even highly politicized or power-driven organizations need to have analysis in their internal environments. Without using the computerized technology that we call IS capabilities, firms fall behind in their competitiveness compared to their rivals by not making the necessary decisions in a timely way. Thus, IS capabilities increase the effectiveness of managers in the decision making that is needed to reach organizational goals (Huber, 1990). Alloway and Quillar's (1983) study indicated that IS is relevant and appropriate for a large portion of the users of analysis systems (Molloy, 1990). Decision making is also related to the performance of information management,

which is defined in this study as administrative capabilities. Administrative capabilities are a sub-construct of IS capabilities that have been found to have a positive significant relation with performance measures (Mithas et al, 2011).

IS capabilities provide communication benefits with respect to decision making. Through the use of technological infrastructure and related systems, the time and effort that individuals consume in meeting with each other to make decisions can be reduced. Also, a large variety of people can participate in the decision-making process. Some arguments and evidence have suggested that IS capabilities are effective in shortening the duration of meetings. In providing the necessary and timely information to the participants during the meeting period, IS capabilities facilitate effective decision making. Top, middle, and lower level managers are quickly able to obtain detailed information about their local units. Reaching out to obtain lower levels of information throughout the organization helps them to make optimal decisions. The ability to obtain the necessary information from the entire organization using IS capabilities leads to more decentralization in a firm. The impact of IS capabilities is that it is able to transform the organizational structure from a decentralized into centralized system through improving the performance of decision making. One aspect of IS capabilities is its ability to reduce the level of hierarchy in an organization during the decision-making processes. Decision making using IS capabilities leads to the faster and more accurate identification of problems and opportunities. Hence, organizational intelligence, like decision making performance, appears to be more accurate, understandable, timely, and available. The ability to make higher quality decisions and the reduction of the required time to make decisions are affected by IS capabilities (Huber, 1990). The probability that the future expectations of a firm will be captured by accurate forecasting, which is considered to be an aspect of IS capabilities, critically improves the ability to make decisions. IS capabilities improve strategic decision-making performance by enabling resource planning activities. Decision making becomes more transparent as a result of IS capabilities; therefore, managers can concentrate on more critical factors (Islei et al, 1991). All of these effective and efficient decision-making processes are part the concept of decision-making performance.

The premises of the extant literature have indicated that a firm's IS capabilities are composed of a two-way alignment between business and technology. Business is a goal-seeking activity that resolves problems through decision making. Thus, it is evident that

the alignment of business and technology through IS capabilities has a positive effect on decision-making performance.

Hypothesis 1: Information system (IS) capabilities are positively associated with decision making performance.

2.2.3 Decision Making Performance and Business Process Performance

Decision-making performance affects the choices that organizations make. The choices made by management identify the viable courses of action for a firm (James & Mark, 1996). Business settings are powerful factors in business decisions. Therefore, five cognitive steps are taken during decision making in order to produce better performance. First, attention is given to a problem or an opportunity, and the second, information is collected. The third step is the development of the necessary options. The fourth and the fifth steps involve the measurement of the expected costs and benefits. Finally, the best options can be chosen. By following these steps, good decision-making performance directs business processes toward the adoption of successful new products and services. An efficient decision-making process helps to integrate business processes with new technologies. It improves business models so that firms can compete better against their competitors. Good decision-making performance enables economies of scale and knowledge synergies in different organizational combinations. Accordingly, good decision-making performance by firms facilitates the exploitation of opportunities in both dynamic and non-dynamic environments. For instance, the prediction of market behavior may ignite organizational learning in business processes and may change performance behaviors (Baum & Wally, 2003). Occasionally, optimal decision making is the solution that is necessary in order to select the correct time to begin the processing of a product and to determine whether to turn off a machine, whether it is idle or not (Liu et al, 2014).

Business processes include operational and organizational capabilities. Organizational capabilities are defined as the basic functional activities of a firm. Operational capabilities describe the way a firm operates its production or services. Business process performance measures the financial and non-financial flexibility, reliability, responsiveness, and costs/assets of organizational and operational capabilities (Bernhard et al, 2006). Likewise, business processes examine operational performance in order to make design and potential model improvements. A holistic approach is used to consider these

improvements. Since business processes involve multidisciplinary and complex situations, they draw knowledge from different resources, such as information systems and their capabilities, decision-making performance and operations management. The intervention of different disciplines improves business processes and performance by analyzing interactions and identifying potential improvements in support of decision makers. In line with this consideration, the operational performance criteria should be consistent with a firm's objectives and should offer ongoing support for decision making and setting strategies (Stefania & Armando, 2016).

Business processes are mainly aimed at transforming strategies and decision-making performance into operational results, organizational diagnoses, and the creation of plans for engagement. There are three decision making paths that are related to business processes. The path of realism, the axiomatic (perspective) path, and the constructivist method are indicators of business process performance that deal with decision-making activities. The realism path explains the existence of mathematical or economic models in order to describe which process should be managed. Thus, decision makers accept the model as a real representation, and the model is considered to be a pure indicator of the processes as the decisions are made. On the other hand, the axiomatic and constructivist approaches are built on the decision makers' perceptions. The axiomatic method generates the knowledge for the initiator to delineate the situation and recommend solutions for better business processes. The constructivist method is aimed at creating the knowledge necessary for decision makers to understand the consequences of their decisions within the processes. All of these models are aimed at facilitating activities in business processes that will enable better performance in decision making (Oliveira et al, 2016). It is observed that there is a positive link between decision-making performance and business process performance.

Hypothesis 2: Decision making performance is positively associated with business process performance.

2.2.4 Information System Capabilities and Business Process Performance with the Mediating Effect of Decision Making Performance

Measuring the contribution of information system capabilities in business process performance has generated wide research interest. In the field of IS, studies have indicated that successful IT investments lead to substantial changes within business process performance. The performance indicators affected by IS capabilities should be consistent with the management objectives and business plans. Some IS research has claimed that IS helps firms to create business value because it has a direct impact on business processes. The impact of IS capabilities can be seen as the improvement of the efficiency and effectiveness of business processes. Business process performance includes the enhancement of operational efficiency and effectiveness (Elbashir, Collier & Davern, 2008). There are six process areas within the value chain that can be measured to determine business process performance. These areas are process planning and support, supplier relations, production and operations, product and service enhancement, sales and marketing support, and customer relations. It is expected that IS capabilities support and improve these six areas within a firm's core business values, which are market access, and integrity-related and functionality-related values (Gu & Jung, 2013). Gun and Jung (2013) found that IS capabilities directly and indirectly impact business process performance. This result is consistent with the RBV literature, which has indicated that resources and capabilities, and the development of better organizational capabilities, are the main source of a competitive advantage. Operational efficiency, efficient order fulfillment, consumer expectations, and customer intimacy are part of the organizational capabilities that comprise business process performance. The integration of IS capabilities with business capabilities leads to better process performance in a firm. However, this type of change and the resulting enhanced performance can be accomplished not only by implementing IS capabilities, but also through their combination with other resources, such as decision-making activity. IS capabilities support superior business process performance indirectly by applying and leveraging the other resources and capabilities of a firm. Superior business process performance includes not only individual, but also operational, customer service efficiency and product/service development. Operational efficiency is aimed at developing and delivering efficient and effective products/services across all channels. At this point, IS capabilities create

opportunities to reach these channels by using different methodologies, such as websites, enterprise software, or communication utilities. Customer intimacy posits the creation of customer value. Creating customer value is related to the possession of distinctive market knowledge and sense, as well as customer relations, and then, integrating these elements with internal processes. Business intelligence and customer resource management systems, which are part of IS capabilities, are the main resource in achieving the creation of customer value. Firms with IS capabilities are more conscious of emerging market opportunities and are able to offer new products/services according to their customers' needs. A prior study that defined organizational capability as operational efficiency, customer efficiency, and product development reached the conclusion that IS capabilities are both directly and indirectly related to business process performance attributes (Luo, Fan & Zhang, 2012). Embedding IS into products and services improves decision-making performance and business processes. Efficient manufacturing operations indicate that integrated IS capabilities have an impact on business process performance. This impact improves process flexibility and the speed of key business activities. Thus, it helps to develop new products and services, and to redefine the scope of a business. The identification and entry of new markets are decision-making activities that are possible as a result of integrated IS capabilities; such decisions are of a magnitude that they can cause changes in the course of business processes and performance (Ravinchandran & Lertwongsatien, 2005). One practical study was implemented regarding emergency medical services in Italy. The research results reported that the successful employment of IS capabilities assisted in the evaluation of the current business process performance and improved decision-making performance by enhancing the existing processes. The study proved that business processes benefited from IS capabilities, resulting in an increase in the quality of the services delivered and the exploitation of limited, expensive resources (Aringhieri, Carello & Morale, 2016). Prior studies have revealed that there have been mixed approaches to the impact of IS capabilities on business processes. The results and studies have indicated that there are direct and indirect links between them Therefore, it is conceivable to say that decision-making performance creates an indirect relation between IS capabilities and business process performance.

Hypothesis 3: Decision making performance positively and fully mediates the influence of IS capabilities on business process performance.

2.2.5 Information System Capabilities and Firm Performance: Serially Mediated Approach with Decision Making Performance and Business Process Performance.

Many past studies have explained the relationship between IS and firm performance. Some studies have considered IS from an IT perspective and have found a direct link between IT and firm performance. Nevertheless, there is still a need to conduct research on the issue to determine the underlying mechanisms that define the relations. On the other hand, the relation between IT and firm performance has a managerial effect on firm productivity, profitability, and consumer surpluses. Furthermore, past studies have implemented a structure using the behavior performance model of industrial structure economics, but there is a need to focus on internal factors, along with the structure. Internal factors have been studied using the resource-based view in order to determine the relations between IS capabilities and firm performance (Ravinchandran & Lertwongsatien, 2005). Therefore, firm performance-related studies have used RBV to differentiate the performance indicators. The effects of individual and firm-specific resources can have a significant role in firm performance. Resources that are valuable and exceptional provide a competitive advantage. In the management literature, a firm's performance metrics are commonly defined as share growth, return on investment, return on assets, market share, sales and profit (Wade & Hulland, 2004). Ravinchandran and Lertwongsatien (2005) measured firm performance by distinguishing two dimensions. One dimension was defined as operational performance, which consists of profitability, productivity and financial performance. The second dimension was defined as market-based performance, which assesses the success of the firm in entering new markets and creating new products and services. Firm performance is a multi-dimensional approach that can have different aspects. Most of the dimensions have definitions that are similar to those used in the literature. For instance, customer-focused performance includes customer satisfaction. Financial and market performance deal with revenue, profits, market positions, cash-to-cash cycle time, and earnings per share. Human resource performance, which covers employee satisfaction and organizational effectiveness, focuses on innovation and flexibility (Mithas et al, 2011). In this research, firm

performance is constructed to embrace all of the dimensions that are defined in the literature.

Information system-related resources and competencies, which are called IS capabilities, can influence business value, and they construct the relations between functions and departments. The result is that they generate a superior competitive position and firm performance. Previous studies have argued that considering IS by aggregating all of its dimensions with other firm resources provides strategic benefits. Powell and Dent-Micallef (1997) stated that the use of IS capabilities ultimately leads to superior firm performance. However, they claimed that IS capabilities are not able to contribute directly to sustaining firm performance. In the research discussion, it was proposed that IS capabilities must interact with other organizational resources to reach long-term firm performance. The reason why there must be integration with other organizational resources is that firm performance is also influenced by the commitment of top management, decision-making performance, corporate culture, and business process performance. Hence, strong evidence from some research streams has found that IS capabilities have an indirect role on firm performance (Wade & Hulland, 2004). One of the theoretical perspectives from the literature is that organizational capabilities are a mediator between IS capabilities and firm performance. According to the studies, success in firm performance requires attention aimed at the integration of IS capabilities and business resources, capabilities, strategies, decision making and actions in firms (Sambamurthy, Bharadwaj & Grover, 2003). There are inconsistent findings about the relations between IT and firm performance. Some have claimed that there is a positive relation, and some have posited that there is no significant relation between them. A combination of assets and structures is embedded into the IS capabilities in the products and services, efficient business process performance, improved decision making performance, and dynamic organizational structure, which influences firm performance. Feeny and Willcocks (1998) claimed that the IS capabilities that were defined by their research directly affected firm performance (Ravinchandran & Lertwongsatien, 2005). Although IS capabilities have a significant direct effect on firm performance, the underlying mechanisms are unknown, and thus, additional research is required (Bharadwaj, 2000). Limited work has been done so far on the indirect impact of IS capabilities on firm performance through the core business capabilities. One of the

empirical studies found that tangible and intangible IS resources, which were modeled as IS capabilities, are an important factor for firm performance. The results showed that these IS capabilities do not affect firm performance directly (Ravinchandran & Lertwongsatien, 2005). Other prior research has suggested that IS and firm performance can only be measured by investigating the indirect effect on some intervening organizational capability (Tippins & Sohi, 2003). Previous studies have proven that IS capabilities have a sustained impact on firm performance, and the RBV framework approach is theoretically robust in the IS literature. Correspondingly, a firm's financial performance is improved as a result of this impact (Radhika & Hartono, 2003).

Consequently, all of the discussions and results in the literature have indicated that IS capabilities and firm performance are indirectly linked. However, most of the studies have focused on only one effect or different mediation effects. Based on our understanding from the literature, there should be more than one mediation impact on firm performance in order to have sustained and improved firm performance. Thus, the serial mediation of decision-making performance and business process performance can cause IS capabilities to have a positive impact on firm performance.

Hypothesis 4: Decision making performance and business process performance positively and serially mediate the influence of IS capabilities on firm performance.

2.2.6 Information System Capabilities and Firm Performance with the Mediation Effect of Decision Making Performance.

Past studies have claimed that decision making is negatively related to firm performance if the business environment is unstable. Actions that are supportive for the decision makers can improve decision-making performance, along with firm performance (James & Mark, 1996). Providing IS capabilities to the decision makers, along with the necessary accurate information, data, forecasting ability, decision models, and more reliable information, will increase their effectiveness in fulfilling the purpose of the organization (Huber, 1990). The integration of IS capabilities and decision making helps to accomplish the purpose of the organization by improving firm performance (Baum & Wally, 2003).

Comprehensiveness produces fast, effective, and efficient decision making, depending upon the environment. Fast decision making can sometimes result in bad decisions and performance if the necessary information or knowledge cannot be collected. Nevertheless, generally, comprehensive decision making leads to better performance in decision making (Baum & Wally, 2003). IS capabilities provide the necessary information and knowledge to achieve comprehensive decision making. Therefore, with IS support, better decision-making performance influences better firm performance.

Hypothesis 5: Decision making performance positively and fully mediates the influence of IS capabilities on firm performance.

Figure 2.4 shows the theoretical framework that depicts the nexus of the relationships between the main constructs discussed above. Following the existing theory, decision-making performance (DMP) and business process performance (BPER) serially mediate the indirect relationship between information system capabilities (ISCAP) and firm performance (FP), and additional associations are illustrated in the proposed theoretical framework model. It should be noted that a summary of the existing studies reviewed in this research is provided Appendix B

Figure 2.4: Theoretical framework

Hypotheses

H1= γ_1 H2= β_1 H3= $\gamma_1\beta_1$ H4= $\gamma_1\beta_1\beta_2$ H5= $\gamma_1\beta_3$

η_1
Decision Making Performance

η_2
Business Process Performance

η_3
Firm Performance

β_1

β_2

β_3

γ_1

γ_2

γ_3

ξ
Information System Capabilities

Infrastructure Capability

Human Resource Capability

Administrative Capability

Controls
Firm Age
Firm Size
Industry Sector
Ownership
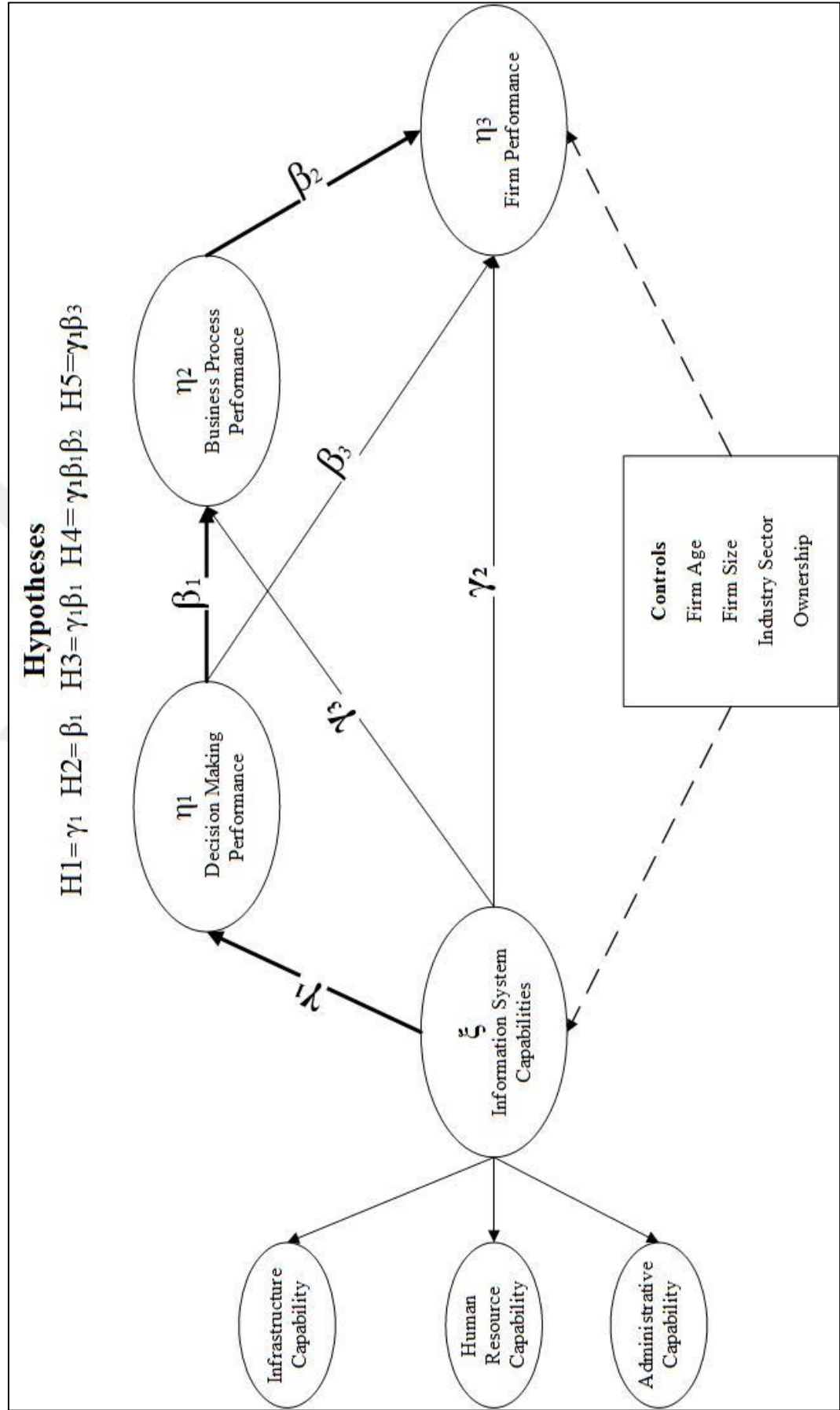
3. RESEARCH METHODS

This chapter defines the methodology in detail. It explains the survey instruments, how the data are collected, how the constructs are measured and in what ways they are measured. The definitions of the structural equation modeling and the serial mediation model and their implementation in the study are described.

3.1 SAMPLE AND DATA COLLECTION

The study's survey instrument was developed to investigate the impact of IS capabilities on firm performance within companies that operate in Turkey. The primary data were collected through a cross-sectional postal survey using a questionnaire. The design, the development of the measurement items and the questionnaire were constructed according to the guidelines that have commonly been mentioned in prior research (Dillman, 2007; Hinkin, 1998). During the development of the survey, the extant literature was examined. The survey was prepared to measure the various dimensions of IS capabilities (ISCAP). These dimensions were identified as infrastructure capability (IC), human resource capability (HRC), and administrative capability (AC). With the help of the reviewed literature, the endogenous constructs were developed: decision-making performance (DMP), business process performance (BPER), and firm performance (FP).

During the process of establishing the survey questionnaire, a pre-test was conducted several times to ensure that the wording, the format and the sequencing of the questions were appropriate. The face and content validity were measured by various academic and business professionals who are subject matter experts in their fields. Based on their suggestions, some of the questions were modified or eliminated in order to enhance the questionnaire's comprehensiveness. In doing this, the necessary steps were taken to have a clearer and better structured survey in order to increase the response rate (Dillman, 2007). After the suggested changes were applied, the face and content validity of the survey were satisfied so that it could be distributed to the main sample. Because the survey was conducted in Turkey, the completed survey design was translated into Turkish

and back translated into English. The translation was controlled by two academicians and one business professional who are highly competent in both languages.

The minimum requirement for the research participant companies was that they must be medium and large companies. Therefore, small size and micro level companies were eliminated. Our criteria for the targeted responders was that they must have sufficient knowledge of the entire company and a high level of involvement in the decision-making process. Hence, senior/executive managers and mid/first level managers were chosen from the targeted companies in order to satisfy these criteria. The participants who did not meet these criteria were eliminated during the data evaluation process.

The targeted companies for the survey were chosen from the members of TOBB (Union of Chambers and Commodity Exchanges of Turkey). TOBB provides data from a variety of different industries and sectors. It contains approximately 40.000 companies that are registered in any of the 10 chambers of industry, 19 chambers of trade, or 64 chambers of industry and trade in Turkey. The names and addresses of these companies are available from the websites of these chambers, which are linked to the website of TOBB. A total number of 800 companies were selected from different sectors through these chambers.

The survey questionnaires were sent to the chosen companies by mail, with a cover letter requesting that a high level manager, with knowledge of their information system capabilities, as well as knowledge of the entire company, complete the questionnaire. After a couple of e-mailed reminders, 236 out of the 800 surveys were returned. The response rate was 29.5 percent. However, after the elimination of missing values, improper responders/companies, and double responders, the remaining number of surveys was 204 companies, which amounted to a response rate of 25.5 percent of the total population. Therefore, the response rate was satisfactory, given the nature of the questionnaire.

Non-response bias may create a threat to the validity and generalizability of findings. Thus, Armstrong and Overton's (1977) method was used to test for non-response bias. The early respondents to the surveys and the late respondents to the surveys were compared. Nearly 50 percent of the surveys were randomly selected, and a t-test was conducted on these selected surveys. The test results indicated that there were no

significant differences between the early and late respondents to the surveys (p>0.05). In addition, a relatively high response rate (25.5 percent) meant that the respondents were likely to provide a reasonable representation of the total sample, which is another solution for non-response bias (Rose, Sidle & Griffith 2007). Therefore, it was concluded that the early and late respondents did not differ from each other in terms of their responses to the relevant questions.

The characteristics of the respondents from the companies are shown in Table 3.1, which indicates that the number of senior/executive managers was greater than the number of middle and first line managers. The sample is primarily composed of large size enterprises, as 54.5 percent of the respondent companies had more than 250 employees. The characteristics of the sample revealed that most of the companies have been operating more than 11 years, and thus, are well established. It was found that more of the respondents were from locally-owned companies than from foreign-owned/partnered companies. The sector segmentation covered both the manufacturing and service industries. The rate of the manufacturing industry was 42.6 percent, and the service industry amounted to 57.4 percent of the survey results. All of the details of the characteristics of the sample and the decomposed segregation of sectors are shown in Table 3.1.

Table 3.1: Characteristics of the sample

Characteristics	Structure	Number	%
Respondent Position	Senior/Executive Manager	106	52
	Middle/First Line Manager	98	48
Number of Employees	Less Than 250	93	46
	251-500	24	12
	501-1000	21	10
	1001-5000	42	21
	More Than 5000	24	12
Years of Operation	Less Than 5 Years	8	3.9
	5-10	26	13
	11-30	107	53
	31-50	33	16
	More Than 50	30	15
Annual Revenue (TL)	Less Than 25 million	34	17
	25 million-99 million	44	22
	100 million-249 million	26	13
	250 million-499 million	19	9.3
	500 and More Than 500 million	81	40
Type of Ownership	%100 Local	160	78
	Foreign Owned	44	22
Industry Sectors	Food and Beverages	16	7.8
	Durables, Consumer Electronics and Machinery	22	11
	Chemicals, Pharmaceutical, and Plastics	15	7.4
	Textile, Leather, and Clothing	26	13
	Other Manufacturing	8	3.9
	Investment, Banking and Finance	22	11
	Transportation, Telecommunication, and Media	15	7.4
	Information Systems and Technology Services	23	11
	Construction, and Real Estate	11	5.4
	Health and Social Services	12	5.9
	Wholesale, and Retail	22	11
	Other Services	12	5.9
N		*204*	

3.2 MEASUREMENT OF VARIABLES

The implemented survey scales were adopted from the extant literature. The following sections give a brief measurement description of the main constructs, mediators, and control variables used in the study. Also, the source of the scales for each construct are provided with the scale measurements.

3.2.1 Main Constructs

This part explains the constructs that define the structural framework model that is proposed in this study in a general way. The measurement scale and the survey methodology are briefly described and presented, along with the literature background.

3.2.1.1 Firm performance (FP)

There is a strong and broad body of literature about firm performance that must be considered. Therefore, it is very difficult to choose a single measure of FP. The measure of subjective relative performance is based on items derived from a number of previous studies using these variables (Bharadwaj, 2000; Dale Stoel & Muhanna, 2009; Glaister, et al, 2008; Mahmood & Soon, 1991; Mithas et al, 2011; Ordanini & Rubera, 2009; Pérez-López & Alegre, 2012; Radhika & Hartono, 2003; Rai, Patnayakuni & Seth, 2006). The respondents were asked to choose their level of agreement about their FP, considering the effect of the information system on the company. The indicated firm performance criteria in the survey are 'return on sales', 'distribution cost', 'market share', 'return on investment', 'administrative expense', 'inventory level', 'staff cost', and 'customer loyalty'. The scale range is implemented as 1 = 'Strongly Disagree', 2= 'Disagree', 3= 'Neutral', 4= 'Agree', 5= 'Strongly Agree', using a Likert scale measurement.

3.2.1.2 Business process performance (BPER)

It is difficult to select a single measure of business process performance. The extant literature has listed several quantitative objectives that have been set to guide BPER (Bayraktar et al, 2009). BPER is core to an organization, and in preparing the survey,

procurement, operational, and information sharing efficiency were included. While implementing this construct and its related factors, several works in the previous literature were reviewed, and their approaches were used in the survey (Bayraktar et al, 2009; Elbashir, Collier & Davern, 2008; Luo et al, 2012; Mahmood & Soon, 1991; Mclaren et al, 2011; Mithas et al, 2011). The subjective approach was used extensively, and the BPER construct included the following: 'customer relationship', 'supplier relationship', 'internal and external coordination', 'purchasing cost', 'delivery time', 'inventory level', 'economies of scale', 'utilization of tools and equipment', 'productivity of labor', 'customer request', 'accessing distribution channels and new markets', 'identifying market trends', and 'differentiated products and services'. The companies' managers were asked 11 questions about BPER. The questions were presented with five Likert scales having the range of 1 ='Strongly Disagree', 2= 'Disagree', 3= 'Neutral', 4= 'Agree', and 5= 'Strongly Agree'.

3.2.1.3 Decision making performance (DMP)

DMP was covered by eight questions. This construct evaluates the efficiency and effectiveness of decision-making performance in a company. The scale for this construct was implemented based on a variety of backgrounds in the literature (Gable, Sedera & Chan, 2008; Huber, 1990; Mclaren et al, 2011; Mithas et al, 2011; Tippins & Sohi, 2003). DMP included the following elements: 'organizational communication for effective decision making', 'culture of long term planning', 'effective decision making', 'speed in analyzing the information', 'time management for decision making', 'reaching accurate and comprehensive information', 'rapid and accurate identification of problems and opportunities', and 'delegation of decision making'. The respondents were asked about their level of agreement with the effects of the information system that is used in their company on DMP. A five point Likert scale was implemented for the measurement. The range of the scale was 1 ='Strongly Disagree', 2= 'Disagree', 3= 'Neutral', 4= 'Agree', and 5= 'Strongly Agree'.

3.2.1.4 Information system capabilities (ISCAP)

ISCAP is considered to be a company's ability to perform routines inside the IS department, enabling the delivery of IS services and creating value for the company (Gu & Jung, 2013). Such capabilities can include skills, such as technical or managerial abilities, or processes, such as system development or integration (Wade & Hulland, 2004). Therefore, ISCAP is explained using three sub-constructs in order to facilitate its purpose in the model. These sub-constructs are defined as infrastructure capability (IC), human resource capability (HRC), and administrative capability (AC) in accordance with the current IS literature perspectives. The measurement of these three sub-constructs was developed using a five-point Likert scale, and the range was 1 = 'Strongly Disagree', 2= 'Disagree', 3= 'Neutral', 4= 'Agree', and 5= 'Strongly Agree'. These components of IS capabilities are explained below.

3.2.1.4.1 ISCAP components

IS Infrastructure Capability (IC): In the survey, there were eight questions to identify the IS infrastructure capability. This IS infrastructure capability includes 'developing customized applications', 'reliability of solutions and products', 'readiness of IS infrastructure', 'response pace for requests', 'network infrastructure competency', 'infrastructure security', 'data sharing', and 'fast and flexible internet-based operations'. The respondents replied whether they agreed or did not agree with these questions on a five scale system. The IC scale was designed in accordance with the previous IS literature (Gable et al, 2008; Mithas et al, 2011; Pérez-López & Alegre, 2012; Ravinchandran & Lertwongsatien, 2005).

IS Human Resource Capability (HRC): Human resource capability creates knowledge-based capacity resources for ISCAP. The survey had seven questions to identify this sub-construct, and they were organized based on several scales in the literature (Bharadwaj, 2000; Cepeda-Carrion, Cegarra-Navarro & Jimenez-Jimenez, 2012; Pérez-López & Alegre, 2012; Ravinchandran & Lertwongsatien, 2005; Tippins & Sohi, 2003). The content of the sub-construct included: 'knowledge of IS', 'expertise of IS', 'ability to learn and apply new technologies', 'skills and knowledge capacity', 'capability of

implementing', 'capability of discovering problems', and 'capability of maintaining'. The respondents were asked the level of their agreement based on a five point scale.

IS Administrative Capability (AC): The administration of IS creates value for companies. IS administrative capability organizes and combines a company's knowledge based on an overall perspective. The survey presented six questions to analyze IS AC using a five point scale. The questions were based on the extant literature (Pérez-López & Alegre, 2012; Ravinchandran & Lertwongsatien, 2005; Yeh, Lee & Pai, 2012). The AC sub-construct survey questions included: 'IS strategy', 'IS management authority', 'IS planning capacity', 'IS adaptation to development process', 'guideline for service requests', and 'IS service quality'. The respondents were requested to indicate their level of agreement regarding these items.

3.2.2 Control Variables

Control variables are implemented to comprise factors other than theoretical constructs to explain the variance in the variables (Ravinchandran & Lertwongsatien, 2005). There are four control variables implemented to analyze the variance in the variables. The control variables are only tested for ISCAP and FP. This section describes the controls that were used in the proposed model.

3.2.2.1 Firm age (AGE)

Firm age is used as a control variable, and it measures how long the companies have been established. In the scale, the minimum years of operation is defined as five or less years, and the maximum years of operation is 50 or more years. The companies that have operated more than 10 years were considered to be well established, and those that have operated more than 20 years were considered to be mature. In the research, the impact of AGE is expected to be significant.

3.2.2.2 Firm size (SIZE)

The number of employees is used as a control variable, and it measures the size of the company. The number of employees is segmented in five different categories. The

minimum number of employees was defined as 250 or less. The maximum number of employees was 5000 or more. The European Union (EU) has noted that companies with less than 250 employees are considered to be small and medium enterprises (European Comission, 2009). In our study, we address large and small enterprises, but large enterprises comprise a greater part of the study sample. It is expected that larger enterprises typically have more stable resources than smaller enterprises.

3.2.2.3 Industry sector (IND)

To examine the control effect of the industry sector, two broad industry categories were created in the study – the manufacturing and service sectors. The manufacturing sector industries comprise the food, beverages, durables, consumer electronics, machinery, chemicals, pharmaceuticals, plastics, textile, leather, clothing, and other manufacturing sectors. The service sector categories are defined as investment, banking, finance, transportation, telecommunication, media, construction, real estate, health, social services, wholesale, retail, and other services. A binary scale is used to measure IND as manufacturing and services.

3.2.2.4 Type of ownership (OWN)

The study addressed two types of ownership in the survey. One of them is 100% local ownership, and the other is firms with partial/full foreign ownership. The type of ownership is measured by dummy variables. The local ownership indicator is defined as a value of 1, and partial/full foreign ownership is measured as a value of 0.

3.3 DATA ANALYSIS

This part gives the details of the procedures used to test the hypotheses. The method chosen for the data analysis, which is structural equation modeling, is explained. The process of the analysis, which is the serial multiple mediator model, is discussed.

3.3.1 Structural Equation Modeling

The method chosen for the data analysis in the study was structural equation modeling (SEM), which is a statistical method for modeling the relations between variables that has been growing in use. There are observed and unobserved modeled and estimated variables. For this reason, SEM has also been called latent variable modeling (Hoyle, 2012). SEM can be considered to be the combination of two unique types of techniques: factor analysis and multiple regression analysis. The three main characteristics that distinguish the SEM model are that it approximates the multiple and interrelated dependence associations, it has the capability to represent unobserved concepts in these associations and comprise the measurement error in the approximation process, and it defines a model to explain the whole set of associations (Hair et al., 2010).

In general, SEM can be described as a generalization, integration, and extension of the conventional and familiar models (Hoyle, 2012). However, the clearest difference between SEM and other multivariate techniques is the usage of discrete relationships for each dependent variable. Basically, SEM evaluates a group of separate, but symbiotic, multiple regression equations simultaneously by specifying the structural model implemented by the statistical programs. Another characteristic of SEM is that it includes latent variables in the analysis. The latent variables are hypothesized and unobserved, though they can be signified by measured and observable variables.

The traditional factor analysis is called an exploratory factor analysis (EFA), and it requires that unique behaviors must be uncorrelated. On the other hand, SEM latent variables are modeled to allow for a wide variety of models that cannot be evaluated through the implementation of EFA. The application of SEM concentrates on the relation between the latent variables and their indicators. This SEM method is labeled as a confirmatory factor analysis (CFA). CFA allows the specification and testing of an extensive array of factor models under explicit conditions with suitable restrictions (Hoyle, 2012).

The application of SEM helps to evaluate the contribution of each indicator variable in representing its related construct and measures the ability of the combined set of indicator variables to represent the construct. The reliability and validity of the data is considered in this way. After the required measurement standards are met, the association between

the constructs can be assessed. Another advantage of implementing SEM is mentioned in Hair et al (2010, p. 637):

> *"SEM "corrects for" or "accounts for" the amount of measurement error in the variables and estimates what the relation would be if there was no measurement error. These are the estimates of casual relationships in the structural model between constructs… So, the relationships are corrected and should be more accurate than those found with simpler approaches. Because the SEM relationship coefficients are connected in this fashion, they will tend to be larger than the coefficients obtained when multiple regression is used."*

A simpler way to understand the SEM model as a model testing method is to decide the goodness of fit between the hypothesized model and the sample data. The procedure for model-fitting is described in equation 3.1. The residual is defined as 'the discrepancy between hypothesized model and observed data' (Byrne, 2010, p. 7).

$$\text{Data} = \text{Model} + \text{Residual} \tag{3.1}$$

Consequently, adopting the SEM methodology in this research is aimed at leveraging the advantages of the SEM technique and reaching more valid and accurate results. In particular, SEM permitted the analysis of complex relations of multiple serial paths among ISCAP, DMP, and BPER with firm performance.

3.3.2 The Serial Multiple Mediator Model

This model is an abandoned method, and the implementation of this mediation is less common. Increasing the number of mediators increases the paths between causes and effects. Thus, the model is able to rapidly grow into a more complex situation. An important difference in the model is that none of the mediators causally influence each another. From this perspective, if two or more mediators are correlated with each other even after correcting the exogenous variable, this means that one mediator impacts the other one. Thus, the serial multiple mediator model investigates the direct and indirect effects of input and output variables. The model's mechanism works following this procedure: The input variable (X) causes the first mediator (M_1), which, in turn, causes the second mediator (M_2), which then causes and effects the output variable (Y) as depicted in Figure 3.1 (Hayes, 2013). The framework model in this research proposes two

serial mediation characters in order to find the causes and effects between the paths of the hypotheses. The presence of more than one mediator may create certain risks. For instance, an indirect effect of X on Y is created by M1 as the mediator in the model. However, while M1 and the other mediators, M2 and M3, are correlated with each other, it is possible that M1 does not mediate between the X and Y constructs. Although the situation does not seem to fit regularly, it generates a more useful multiple mediator model (Hayes, 2013).

Figure 3.1: Two serial multiple mediators model
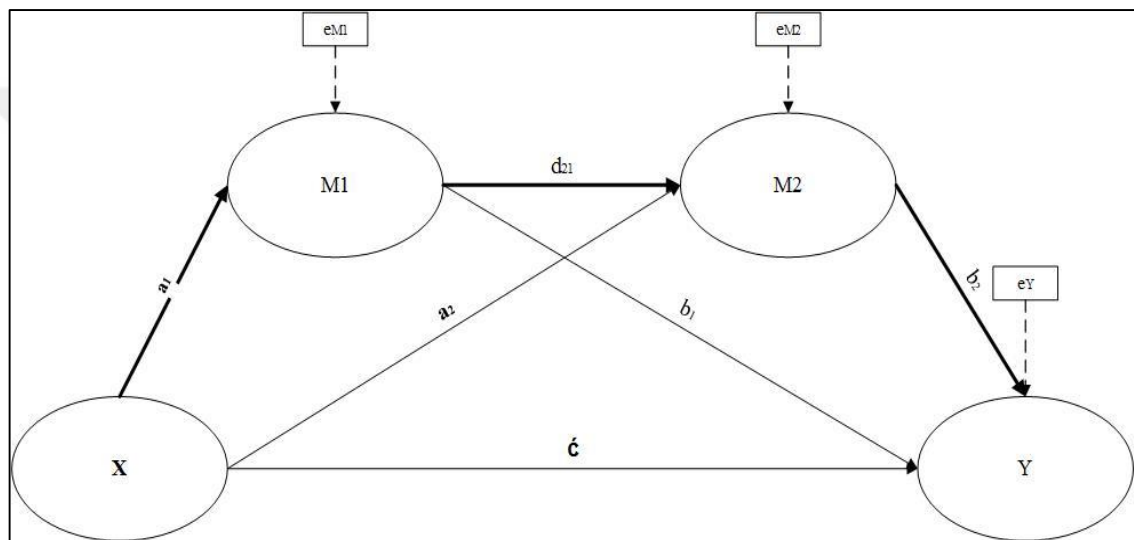
Source: Hayes (2013). *Introduction to mediation, moderation and conditional process analysis,* NY: The Guilford Press, *p.145.*

The statistical transformation of this serial multiple mediation model`s equation is shown in 3.2, 3.3, and 3.4.

$$M_1 = i_{M1} + a_1X + e_{M1} \tag{3.2}$$

$$M_2 = i_{M2} + a_2X + d_{21}M_1 + e_{M2} \tag{3.3}$$

$$Y = i_Y + \acute{c}X + b_1M_1 + b_2M_2 + e_Y \tag{3.4}$$

A consideration of two mediators in the serial multiple model, as proposed in this study, reveals three specific indirect effects and one direct effect. A combination of these three indirect effects is calculated with the product of the regression weights. The result of this

calculation gives the total effect of the input variable on the model, as shown in equation 3.5 (Hayes, 2013).

$$c = \acute{c} + a_1b_1 + a_2b_2 + a_1d_{11}b_2 \qquad\qquad (3.5)$$

A complex model of the serial indirect multiple mediation model is implemented with the SEM method using the AMOS application in this study. The serial mediation model helps to structure the proposed model to investigate the indirect effect of ISCAP on FP through the serially mediated constructs DMP and BPER. The implementation of this model creates a unique understanding of the complex associations between the proposed hypotheses.

4. RESULTS AND DISCUSSION

In order to test and confirm the proposed measurement model, a confirmatory factor analysis (CFA) was adopted. By taking the theory-driven approach as a guide, the data analysis of the proposed relationships, which is illustrated in the theoretical framework model in Figure 2.4, was tested in four stages. First, a reliability analysis was conducted for the latent variables of each of the constructs and sub-constructs. The second stage was the first and second order confirmatory factor analyses (CFA) of the structural equation modeling (SEM) in order to assess the validity of the factorial structure of the study's sub-constructs (Byrne, 2010). At the third stage, the second order was executed to identify the factor loadings among the constructs. Last, a multiple group analysis was applied to define whether the model offers a good fit to the data. The research estimates the relationships between the constructs through a path analysis by considering the serial multiple moderating effect. In the next section, the convergent and discriminant validity, and the common method bias are tested to validate the constructed model. All of these steps are discussed in more detail in the following subsections.

4.1 CONSTRUCT VALIDITY AND RELIABILITY

This part establishes the acceptable level of goodness of fit for the measurement model and measures the internal consistency of the variables representing the latent constructs. The statistical results are given in detail for the reliability and validity analysis to show the study's confidence level.

4.1.1 Reliability Analysis

Reliability is an assessment of the degree of consistency between multiple measurements of a variable. The reliability analysis was done to ensure that the responses were not too varied. The second reason was to check their internal consistency. In this way, the study can ensure that all of the variables measure the same constructs. In order to measure

reliability, the Cronbach's alpha, i.e., the reliability coefficient, of all of the values was checked for each of the constructs' variables. A lower limit of 0.70 is generally accepted in the literature (Hair et al., 2010). In our study, IS capabilities (ISCAP) are measured by three sub-constructs. Each of the sub-constructs' variables were checked, and it was found that the Cronbach's alpha of IC was 0.77, HRC was 0.83, and AC was 0.82. In addition, the Cronbach's alpha values of reliability for the underlying constructs, DMP, BPER and FP, were 0.85, 0.83, and 0.77, respectively. These results indicate that the construct reliability is satisfactory, because the values are greater than the threshold value of 0.70 (Nunnally & Bernstein, 1994). The Cronbach's alpha results that were calculated are shown in Appendix A for all constructs.

4.1.2 Composite Reliability

Composited reliability (CR) and average variance extracted (AVE) estimates were used to confirm the scale reliability. The CR results indicate the internal consistency of a set of measures. The threshold of CR 0.7 indicates sufficient reliability for a construct (Fornell & Larcker, 1981). As shown in Appendix A, the CR measurements are satisfied within the recommended thresholds and each of the constructs in our study is sufficiently reliable.

4.1.3 First and Second Order Analysis

Confirmatory factor analysis tests the measurement model of the variables. In the study, the testing begins with the first order to determine whether the latent variables of each sub-construct define ISCAP. During the analysis, two unrelated latent variables were removed to reach the goodness of fit statistics. The goodness of fit indices for these sub-contracts reveals that $\chi2/d.f. = 1.506$, the goodness of fit index (GFI) = 0.90, the adjusted goodness of fit index (AGFI) = 0.87, the Tucker Lewis coefficient (TLI) = 0.95, and the comparative fit index (CFI) = 0.96, which are satisfactory to accept the first order model. The first order analysis indicates that these three sub-constructs (IC, HRC, and AC) exist; however, we need to process the second order analysis to determine whether these sub-constructs are sufficiently explained by ISCAP.

The second order test was conducted for the three sub-constructs to conceptualize ISCAP. Three latent variables were eliminated because of their inconsistency with the model. The second order analysis revealed that all of the fit indices satisfied the threshold criteria. The results are, $\chi2/df = 1.547$, the goodness of fit index (GFI) = 0.91, the adjusted goodness of fit index (AGFI) = 0.88, the Tucker Lewis coefficient (TLI) = 0.95, and the comparative fit index (CFI) = 0.96; all meet the necessary threshold to satisfy the model fit in the second order analysis. The second order model results illustrate that a higher order latent factor, that is, the overall trait of ISCAP, governs the correlations among the sub-constructs of IC, HRC, and AC (Moon, Yi & Ngai, 2012).

Although both the first and second order results are significant, the efficacy of these two acceptable models needs to be compared. Thus, the Akaike information criterion (CAIC) was checked to compare these two models. Generally, a lower CAIC value reflects better model fit. The CAIC results were checked for both models, which revealed that the CAIC of the second order model (396.44) is lower than that of the first order model (512.27), suggesting that the second order model holds better parsimony (Moon, Yi & Ngai, 2012). As shown in Figure 4.1, all three constructs constituting ISCAP were found to have positive and significant ($p< 0.001$) standardized regression weights. The infrastructure capability, human resource capability and administrative capability for ISCAP reveals that they have high magnitudes regarding their relationship with ISCAP (i.e., $\lambda_{ISCAP\text{->}IC} = 0.94$, $\lambda_{ISCAP\text{->}HRC} = 0.92$, $\lambda_{ISCAP\text{->}AC} = 0.95$). Consequently, in accordance with the literature, our study indicates that ISCAP can be conceptualized as a multidimensional measure consisting of IC, HRC, and AC. Therefore, we accepted the second order model results, and ISCAP is our exogenous variable.

Figure 4.1: First and Second order models
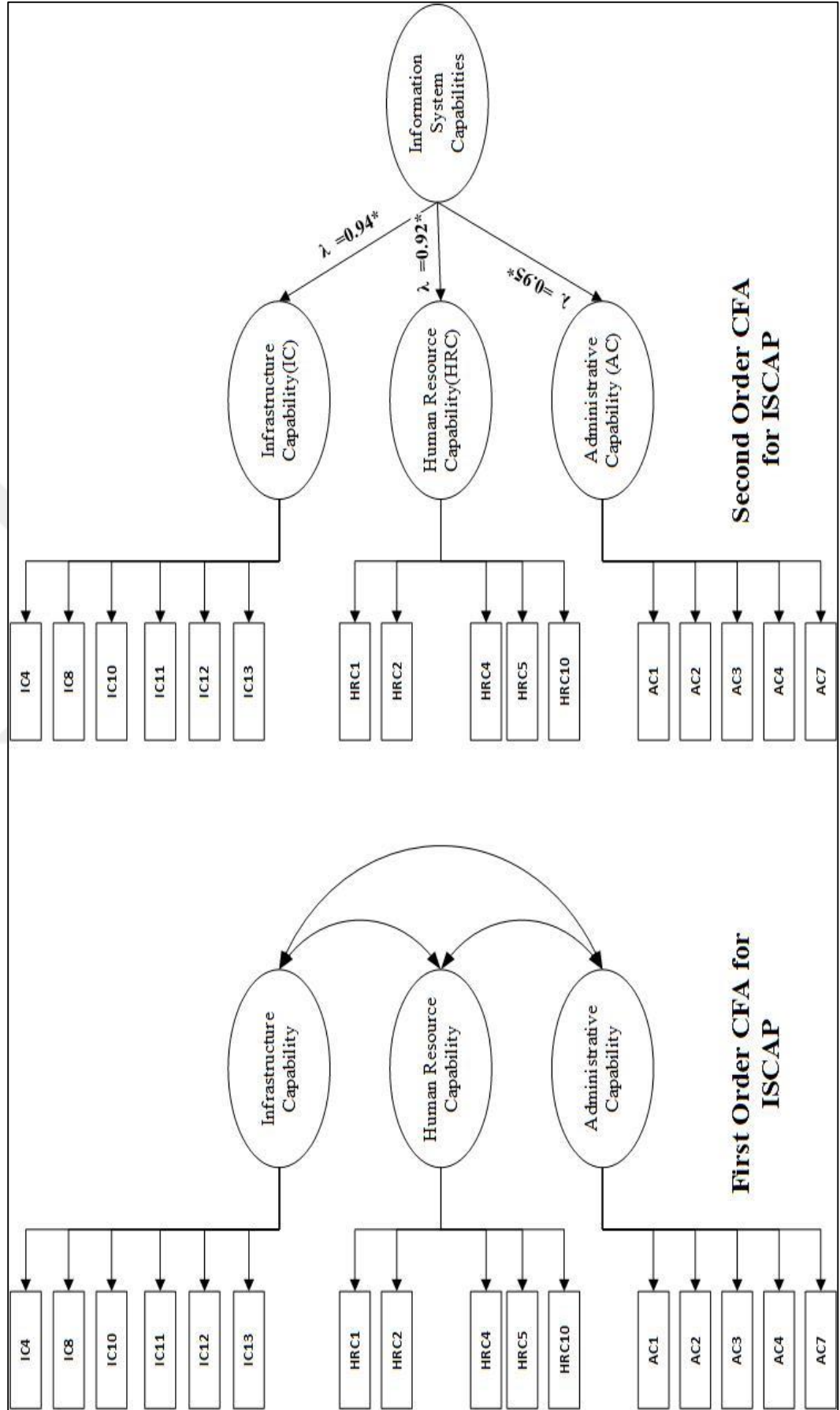
*p<0.001

4.1.4 Convergent Validity

In addition to the confirmatory factor analysis to measure convergent validity, average variance extracted (AVE) estimates were also implemented to confirm the convergent validity and the scale reliability. AVE explains the overall amount of variance in the indicators accounted for by the constructs. The threshold of AVE is 0.5, which indicates sufficient reliability for a construct (Fornell & Larcker, 1981). An AVE score of 0.5 or above means that there is adequate convergent validity (Yusoff, 2011). As shown in Appendix A, the AVE measurements satisfied the recommended thresholds, and each of the constructs in our study is sufficiently reliable. The extracted AVE scores indicate that there is adequate convergent validity for the results.

4.1.5 Discriminant Validity

Discriminant validity describes the degree to which the measures of the different dimensions of all of the constructs and sub-constructs are unique from each other. Table 4.1 shows the results of 12 pairwise tests that were done for discriminant validity. The findings strongly support the discriminant validity of each pair.

Table 4.1: Discriminant validity of the measurement model

Test #	Description	χ^2 model	χ^2 unconstrained model	Difference*
1	IC→HRC	151.93	67.06	84.87
2	IC →AC	136.76	58.74	78.02
3	AC →HRC	144.02	41.55	100.47
4	ISCAP →DMP	407.18	293.77	113.41
5	ISCAP →BPER	552.82	382.52	170.30
6	ISCAP →FP	421.53	276.41	145.12
7	DMP →BPER	210.68	96.74	113.94
8	DMP →FP	190.01	74.20	115.81
9	BPER →FP	264.82	126.53	138.29

*All values are significant at $p<0.001$

4.1.6 Common Method Bias

Common method variance (CMV) is the amount of spurious correlations between variables that are created by using the same method – often a survey – to measure each variable. CMV may lead to erroneous conclusions about the relationships between the variables by inflating or deflating the findings (Craighead et al, 2011). Podsakoff et al (2003) systematically classified the causes of CMV into four categories: the common rater effect, the item characteristic effect, the item context effect, and the measurement context effect. According to the literature, these types of effects differentially influence how the rater responds to the questions, thereby resulting in method bias (Naresh et al, 2006). Compared with other research areas, IS research is less subject to bias as a resulting from the item and measurement context. However, the impact that method biases exerts on the inferences is uncertain (Woszczynski, Whitman & Whitman, 2001). Therefore, CMV biases were investigated to determine whether biases occurred in our research.

The Harman's single factor test was used to investigate CMB in our study. This test is a widely known approach for assessing a single-method research design (Naresh et al, 2006). In this single factor test, all of the items in our study were subjected to an exploratory factor analysis (EFA). The number of factors extracted from the EFA was constrained to one, instead of using eigenvalues. The results revealed that the common method variance was 30.41 percent of the total variance. Thus, the common method bias is not considered statistically significant, because the result is less than the 0.50 threshold.

4.2 HYPOTHESIS TESTING

The descriptive statistics and inter-correlation are shown in Table 4.2. The matrix depicts the significant correlation between each of the constructs and the control variables. The most significant correlations were between ISCAP and DMP, DMP and BPER, and BPER and FP. Further, ISCAP and FP are also significantly correlated with each other. This is evidence of ISCAP's impact on FP. All of the constructs had relatively higher mean scores. The higher mean scores show that the responses to the survey questions have a positive attitude towards the meaning of the constructs. The control variables' significant

performance demonstrates the relationship between ISCAP and firm age, separated from the other control variables that do not confirm the same result.

A structural theory is a conceptual representation of the structural relationships between constructs. These relationships between constructs are also known as a path estimate. At the same time, a structural model is referred to as a causal model, because the relationships meet the conditions necessary for causation. The application of a structural equation model analysis is planned to test two issues: 1- overall and relative model fit as a measure of acceptance of the proposed model; and 2- structural parameter estimates, modeled with a one-headed arrow on a path diagram (Hair et al, 2010).

Testing the theory with SEM indicates that if the model shows good fit and the hypothesized paths are significant, then the model is supported (Hair et al, 2010). The theoretical framework model shown in Figure 2.4 is evaluated based on how well it produces significance and on the direction of the hypothesized paths.

ISCAP is considered to be an exogenous construct in our model. Like an independent variable, ISCAP is used to predict other constructs. DMP, BPER, and FP are accepted as endogenous constructs in our model. Based on the hypotheses, each of the endogenous constructs has the role of outcomes and predictors for the others. Thus, each of the hypotheses are defined as follows: H_1 (γ_1) hypothesis has a positive ISCAP – DMP relationship, H_2 (β_1) hypothesis has a positive DMP – BPER relationship, H_3 ($\gamma_{11} = \gamma_1 \beta_1$) hypothesis has a mediating effect between ISCAP – BPER through DMP, H_4 ($\gamma_{112} = \gamma_1 \beta_1 \beta_2$) hypothesis has a serial multiple indirect effect of ISCAP – FP through DMP and BPER, and lastly, H_5 ($\gamma_{13} = \gamma_1 \beta_3$) hypothesis has a mediating effect between ISCAP – FP through DMP.

Table 4.2: Descriptive statistics and inter-correlations

	Variables	Definition	Mean	S.D.	1	2	3	4	5	6	7	8
1	ISCAP	Information System Capability	4.04	0.57	1							
2	DMP	Strategic Decision Making Efficiency	3.76	0.68	0.55**	1						
3	BPER	Business Process Performance	4.08	0.47	0.45**	0.67**	1					
4	FP	Firm Performance	3.66	0.54	0.28**	0.44**	0.55**	1				
5	AGE	Firm Age	3.25	0.98	0.04	-0.02	0.02	-0.01	1			
6	SIZE	Firm Size	2.41	1.51	0.26**	0.06	0.06	0.13	0.33**	1		
7	IND	Industry Sector	0.42	0.49	-0.16*	-0.05	0.008	0.06	0.09	-0.18**	1	
8	OWN	Ownership	0.78	0.41	-0.18**	-0.03	-0.02	0.04	-0.14*	-0.42**	0.18**	1

*$p<0.05$, **$p < 0.01$

First, the study presents the SEM model fit statistics, which address whether the structural relationships are consistent with the theoretical expectations. Thus, the measurement model's detailed results for the main constructs are shown in Appendix A. The overall fit statistics are given as follows: χ^2 was 873.04 with 638 degrees of freedom (p< 0.001). The goodness of fit indices of the model revealed that $\chi 2/d.f. = 1.368$. The result is in the threshold range, wherein the ratio should be between 0 and 3, where a lower value implies a better fit (Demirbag et al, 2006). Moreover, the goodness of fit index (GFI), the adjusted goodness of fit index (AGFI), the Tucker Lewis coefficient (TLI), and the comparative fit index (CFI) values for the model were highly satisfactory [GFI= 0.858, AGFI= 0.821, TLI = 0.943, CFI = 0.950], because these indices should be closer to 1 in order to have perfect fit (Demirbag et al, 2006). A root mean square error of approximation [RMSEA = 0.043] within the value of 0.05 indicates a close fit of the model. The model parameters are calculated with the maximum likelihood method. For each of the variables, most of the indices are within the acceptable level (Cheung & Rensvold, 2009; Hair et al, 1995; Hooper et al, 2008). These results indicate that the model presents a good fit.

Factor loading is calculated to specify the degree of correspondence between the variables. A higher value of the loadings with significant results means that each variable represents the corresponding factor (Hair et al, 2010). The significance levels of the factor loadings that belong to each of the constructs and sub-constructs were found to be significant (p<0.001), which is shown in Appendix A (Anderson & Gerbing, 1988). In accordance with these results, this study proposes that information system capabilities (ISCAP) are positively related to decision-making performance (H_1). The statistical results provided support for hypothesis H_1, i.e. that ISCAP is positively related to DMP ($\gamma_1 = 0.65$, $p < 0.001$). Hypothesis (H_2), which posited that decision-making performance is positively related to business process performance, received empirical support by providing a significant standardized regression weight in the proposed model ($\beta_1 = 0.83$, p< 0.001). The third hypothesis (H_3) postulated that decision-making performance mediates the relationship between IS capabilities and business process performance. The mediating result of hypothesis (H_3) was supported by the significant results between ISCAP and DMP, and DMP and BPER, and the non-significant relationship between ISCAP and BPER. In order to express full mediation, first, a direct relationship between ISCAP and BPER was tested, and no other interaction was shown. The result was

significant ($\gamma_{\xi \to \eta 2}$ (ISCAP→BPER) = 0.56, p< 0.001). Afterward, the whole model was tested, which demonstrated that the direct relationship between ISCAP and BPER disappeared. An indirect relationship was observed between ISCAP and BPER through DMP. This indirect effect is quantified as the product of the effect of ISCAP on DMP (γ_1) and DMP on BPER for ISCAP (β_1), which is $\gamma_3' = \gamma_{1*} \beta_1$. Thus, the indirect effect result appears to be γ_3'=0.384, as shown in Appendix A (Hayes, 2013). This statistical test proves that there is a full mediation effect in H_3. Furthermore, the Sobel test was implemented to test whether a mediator variable significantly carries the influence of an exogenous variable to an endogenous variable (Baron & Kenny, 1986). The test calculates the z value using the equation 4.1.

$$z \ = \ \gamma 1 \ast \ \beta 1 \ / \sqrt{\beta 1^2 \ast Se\gamma 1^2 + \gamma 1^2 \ast Se\beta 1^2} \tag{4.1}$$

The result of equation z provided significant two tailed probability at the $p < 0.05$ and $p<0.01$ levels, which is shown in Appendix A. Consequently, H_1 and H_2 established the full mediation indirect effect by supporting hypothesis H_3 with a significant outcome.

The assumption is that there is a positive direct relationship between ISCAP and FP, in line with the literature and prior studies. Nevertheless, the projection is that DMP and BPER serially mediate the indirect relationship between ISCAP and FP in proposed research hypothesis H_4 in our model. In order to satisfy with mediation model, first, a direct relationship between ISCAP and FP was tested without any other interaction. The result was significant ($\gamma_{\xi \to \eta 3}$ (ISCAP→FP) = 0.31, p< 0.001). Afterwards whole framework model was tested and H_4 received support from the statistical results for the model, for which structural equation modeling was implemented using the AMOS software. The direct significant relationship between ISCAP and FP disappeared. An indirect effect of information system capabilities (ISCAP) on firm performance (FP) via decision-making performance (DMP) and business process performance (BPER) was found to be significant by applying the products of coefficient test. The test was performed with the following equation 4.2.

$$z = \frac{\gamma 1 \ast \beta 1 \ast \beta 2}{\sqrt{\gamma 1^2 \ast \beta 1^2 \ast Se\beta 2^2 + \gamma 1^2 \ast \beta 2^2 \ast Se\beta 1^2 + \beta 1^2 \ast \beta 2^2 \ast Se\gamma 1^2}} \tag{4.2}$$

In addition, the serial mediation effect was calculated by multiplying $\gamma1 * \beta1 * \beta2 = 0.471$, and the results are shown in Table 4.3 (Taylor & Mackinnon, 2008). The estimate of the $(\gamma_1\beta_1\beta_2)$ indirect effect for serial mediation was statistically significant at the 5 percent and 1 percent significance levels, and thus, hypothesis H_4 was supported. Consequently, the study results reveal that there is no direct relationship between ISCAP and FP in the proposed model.

According to the literature and this study's supported hypothesis (H_1), there is a distinct relation between ISCAP and DMP. It is expected to positively affect DMP by mediating between ISCAP and FP. In order to check full mediation for H_3, the direct relation between ISCAP and FP was controlled without any influence other than these variables. Hence, a positive result was seen for this test. Afterwards, the full model was run to identify the mediation effect of DMP on FP. Although the statistical analysis between ISCAP and DMP was significant (H_1), DMP and FP did not demonstrate any significant effects ($\beta_{DMP \rightarrow FP} = \beta_3 = -0.22$, p = 0.308). Hence, H_5 was not supported because of the non-significant result between DMP and FP.

Overall, the results indicate that influenced decision-making performance mediates the relationship between information system capabilities and business process performance. Moreover, the results appear to provide evidence for the serial mediation model, in which the relationship between information system capabilities and firm performance is consequently mediated by decision-making performance and business process performance. No mediation effect is observed between information system capabilities and firm performance through business process performance. The reason is that it does not have a significant connection between ISCAP and BPER directly. The study also indicates that DMP and FP, and ISCAP and BPER, appeared to have non-significant associations in the model. The proposed framework model is depicted in Figure 4.2, with the results of the SEM model and ISCAP's indirect relations to FP with the serial mediation effect of DMP and BPER. All of the statistical results that prove hypotheses H_1, H_2, H_3, and H_4 are shown in Table 4.3 and Appendix A.

Table 4.3: Analysis results of two serial multiple mediations

Input	Unstandardized Beta	Standard Error	Output	z Score*	Effect	Calculated Standard Error	p<0.05	p< 0.01	Mediation	Mediation
ISCAP on DMP	0.781	0.118	Mediation of DMP between ISCAP and BPER	4.505	0.384	0.0852	YES	YES	**This row is related to full mediation of DMP between ISCAP and BPER**	**These three rows are related to serial mediation of DMP and BPER between ISCAP and FP**
DMP on BPER	0.492	0.08	Mediation of BPER between DMP and FP	3.092	0.603	0.1952	YES	YES		
BPER on FP	1.227	0.343	Serial mediation of DMP and BPER between ISCAP and FP	2.801	0.471	0.1682	YES	YES		
ISCAP on BPER	0.016	0.06	No mediation of BPER between ISCAP and FP	0.265	0.019	0.0738	NO	NO		There is no mediation
DMP on FP	-0.179	0.176	No mediation of DMP between ISCAP and FP	-1.005	-0.139	0.1390	NO	NO		There is no mediation

*If z- score > 1.96 or z- score < -1.96 then significant at 5%, If z- score > 2.576 or z- score < -2.576 then significant at 1%

Figure 4.2: Results of SEM model with two serial multiple mediation effects*+
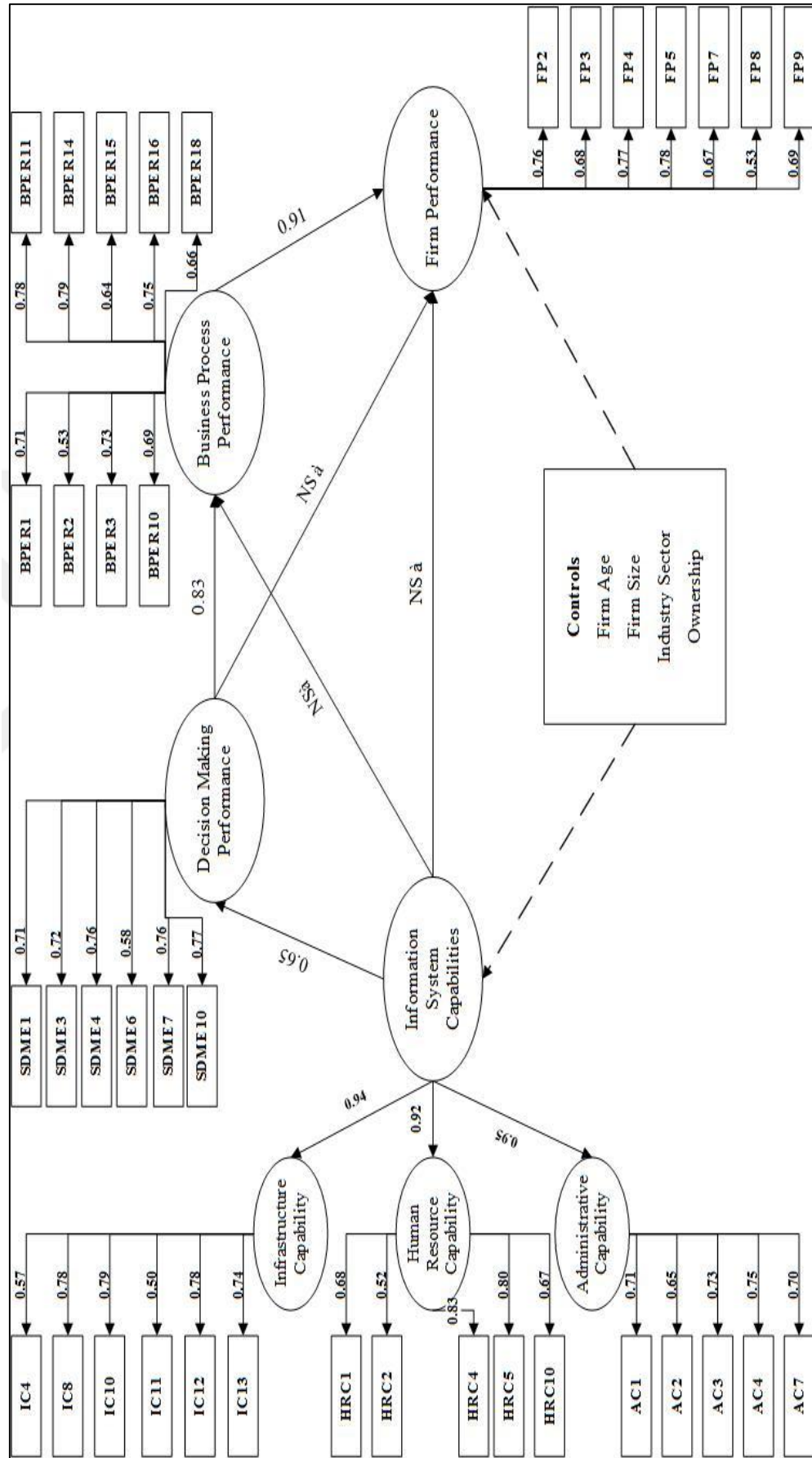
Notes: *All standardized regression weight are significant at p<<0.001; + NS: Not Significant

The study checks the control effects of firm size, industry sector, ownership, and firm age. The results show that some of control variables significantly affect either information system capabilities or firm performance, or both of them at the same time. The control variable firm size (SIZE) significantly influences ISCAP at the 1 percent level; however, there was no observed effect on FP. The industry sector (IND) control variable is defined in two categories, as the manufacturing and service sectors. According to the test results, the service sector significantly influences ISCAP, and the manufacturing sector significantly influences FP at the 5 percent significance level. The ownership (OWN) control variable is categorized into two distinct attributes, which are local-foreign partnership and full foreign or local investment. The local-foreign partnership and full foreign investment statistical results make clear that there is a meaningful positive effect on ISCAP at the 5 percent significance level. However, it is observed that the local and full foreign ownership control variable is the only one that did not indicate any influence on FP. Finally, the effect of firm age (AGE) on firm performance is ambiguous. Sarkars (2000) stressed that the performance of younger firms is higher, because younger firms are likely to have newer assets, relative to mature firms, which are more able to position themselves in the market (Sarkar & Sarkar, 2000). Campbell and Vera (2010) also advocated this perspective. However, the study does not support the literature, finding no impact on ISCAP and FP.

4.3 DISCUSSION OF FINDINGS

The effects of information systems on organizations have been inadequately considered in the theoretical explanations. There has been little interest in the integration and synthesis of the theoretical explanations and practical implementations of IS and organizations (Huber, 1990). The integration of the theoretical base of the study is established by two consequent theories, which created the main approach.

4.3.1 Theoretical Discussion
The field of information systems is a hybrid that impacts all organizational approaches and even cultural perspectives. The field is not only defined by technology, but also by

management and organization theory, sociology, system thinking, and so on (Checkland & Holwell, 2005). In this complex environment, reference theories that resulted in the use of the mid-range theory created a better perspective whereby theories that are outside of the IS discipline could be borrowed and implemented. In the IS context, the mid-range theory signifies a research model that borrows abstract reference theories through concentrating and conveying them into the IS field (Grover & Lyytinen, 2015). Implementing the mid-range theory allowed us to borrow the resource-based view (RBV) and domesticate it into IS to achieve the purposes of this study.

4.3.2 Discussion of the IS Capabilities Construct

The study results support the theoretical model that was implemented through the mid-range approach. Using the RBV in this research helped us to distinguish between resources and capabilities. Tangible and intangible resources are compiled as capabilities in the IS field. A firm's capacity to extensively deploy resources appears and is maintained in the proposed model. Capabilities are seen as the capacity of human and technological resources and the performance of tasks or activities (Ravinchandran & Lertwongsatien, 2005a). Fenny and Willcocks (1998) defined three perspectives: the IT vision, the design of IT architecture, and the delivery of IS services. Under these perspectives, nine IS capabilities are described as business system thinking, relationship building, architecture planning, leadership, informed buying, making technology work, contract facilitation, vendor development, and contract monitoring (Feeny & Willcocks, 1998). Likewise, the relevant IS capabilities are characterized as operational efficiency, operational flexibility, planning, internal and external analysis (Mclaren et al, 2011). In addition, the combination of business and IS knowledge, flexible IT infrastructure, and the effective use of processes are expressed as an underpinning perspective of ISCAP. (Peppard & Ward, 2004). In line with the theory, the proposed framework defines IS capabilities as infrastructure, human, and administrative capabilities, based on the combination of all of the methods in the literature with the attributes. Applying SEM to the model indicates that first order CFA strongly supports the RBV by merging the detailed attributes and segregating them into three categories within the resource and competency approach. The first order CFA analysis results indicate that the model is fit and that it defines each of the sub-constructs with their internal understandings. In this

case, IC, HRC, and AC are discriminated from each other and their sole definitions are explained. This shows that the competencies and resources are integrated under these sub-constructs.

The IS capabilities affect all areas of an organization. The underlying IS competencies and resources regulate IT opportunities, a well-designed and resourced IT infrastructure, IS administration and the quality of IS maintenance. A combination of these regulated attributes is modeled by IS capabilities to the extent that it distributes precise and assessed business benefits from the investment in and utilization of IS. IS capabilities must be successfully implemented through the underlying competencies and resources; otherwise, organizations are not able to continually achieve their goals (Peppard & Ward, 2004). The second order CFA analysis proves whether or not these underlying competencies and resources are represented by IS capabilities. The association of ISCAP with sub-constructs such as IC, HRC, and AC was defined in the model, and whether or not the proposed model is fit was analyzed. The results indicate that the model is fit within the postulated second order framework. The study shows that IS capabilities are significantly conceptualized by the sub-constructs (IC, HRC, AC). This outcome supports the capabilities approach, which comprises skills, managerial abilities, processes, development, integration and infrastructure (Wade & Hulland, 2004). Resources are the raw materials for the development of capabilities, and deployed resources generate capabilities (Ravinchandran & Lertwongsatien, 2005a); this is proven by the second order CFA-SEM analysis in the research. Therefore, information system capabilities are shown to be a critical driver for firm performance under the RBV (Wade & Hulland, 2004).

4.3.3 Discussion of Hypothesis 1

Information systems are an important factor in decision making. Decision making is the foundation of managerial activity in an organization (Checkland & Holwell, 2005). One of the empirical studies stated that IS capabilities support decision making and create better user involvement, aid managers in sharing their ideas with their divisions, increase the judgmental approach, and lead to successful applications. These research findings maintain the support for IS capabilities, which is an evolutionary approach to system development (Islei et al, 1991). One conclusion that can be drawn from the previous

research is that IS capabilities increase both the efficiency and the effectiveness of the decision-making process (Molloy, 1990). Information management performance, which affects decision-making performance, has been found to be significantly related to information management capability, which is related to administrative capability (Mithas et al, 2011). The statistical results indicate that proposed hypothesis H_1 proves the positive relation between ISCAP and DMP. This relation reveals that decision-making performance is affected by the infrastructure, human resources, and administrative capabilities of IS. The connection between ISCAP and DMP provides the necessary communication utilities between departments and units using IS infrastructure such as networks, voice over IP, or e-mail. The establishment of communication makes the necessary data and information available to the entire firm and facilitates effective decision making. The necessary tools help maintain a firm's knowledge inside the organization and build a culture of long-term planning. Today's conventional wisdom of computerization is to consider the data and decision making views together (Checkland & Holwell, 2005). In order to capture this wisdom, decision making needs to be supported with information, which must be analyzed. The application of the necessary IS capabilities supports important managerial activity. Mobile systems that are quickly able to reach data anywhere provide opportunities to manage the time needed for decision making. Although speed predicts performance (Baum & Wally, 2003), sometimes quick decisions may result in negative consequences. However, if a firm makes rapid decisions that are supported by data, its products or services may be the first in the market, rather than those of its competitors. Rapidly obtaining accurate and comprehensive information identifies problems and opportunities through ISCAP, which improves decision-making performance. The ability to delegate the necessary knowledge with the AC of IS to the entire firm positively affects its performance. Managers who gather information and knowledge, and make decisions through the implementation of analytical techniques are more effective than those who do not (James & Mark, 1996). Consequently, hypothesis H_1 confirms that the performance indicator for decision making is the existence of information system capabilities, which corresponds with the previous literature.

4.3.4 Discussion of Hypothesis 5

The insignificant result of H_5 posits that no relations exist between DMP and FP when ISCAP influences DMP. This outcome means that good decision-making performance is not enough to improve a firm's performance indicators, which are the return on sales, the distribution costs, the market share, the return on investment, the administrative expenses, the inventory level, staff costs, and customer loyalty. For instance, the high speed and dynamism of decision making is a part of performance. However, their effect on firm performance has had mixed results in the literature (Baum & Wally, 2003). The environmental situation is an important factor that defines the relations of DMP and FP. One recent study stated that there is a negative relationship between decision making and firm performance in an unstable environment. Positive relations are expected in a stable environment (Fredrickson & Mitchell, 1984). However, none of the results are grasped in this study. It is logical to reach the conclusion that there are no significant relations between DMP and FP, because the provision of the necessary information and knowledge is not enough for decision-making performance to affect FP if it is not implemented in the entire process. The cognitive process is not adequate to activate the firm's performance indicators.

4.3.5 Discussion of Hypothesis 2

Organizational and performance capabilities are defined as business process performance attributes. A practical approach to the effect of decision-making performance on business process performance is depicted in the literature. For example, a machine that is idle produces considerable amounts of substance. Thus, it is preferable to turn off an idle machine. Nevertheless, the process of turning it on and off consumes time and energy. Optimal decisions should be made in order avoid these handicaps. Implementing decision-making performance indicators enriches business process performance by resolving impediments through optimal solutions (Liu et al, 2014). Another argument has been posited that decision makers need to have better understanding to improve process performance (Stefania & Armando, 2016). Therefore, decision-making performance requires the establishment of a culture of strategic planning, analysis of information, and time management in decision making. The identification of problems and opportunities through the delegation of decision making is positively related to economies of scale, the

utilization of tools, production costs, the productivity of labor, and access to distribution channels and new markets, which are part of BPER. The statistical results of the study show that DMP and BPER have a positive and significant relationship in the proposed model. The direct relation between DMP and BPER is a result and an approach that is consistent with those of previous studies. Therefore, the acceptance of H_2 indicates that improved BPER needs to have DMP in order to facilitate goal-seeking activity in an organization.

4.3.6 Discussion of Hypothesis 3

The previous research has argued that there are direct and indirect relations between IS and BPER. One of the studies reached the conclusion that IS has a positive and significant impact on operational performance, since operational performance is considered to be a part of business process performance (Bayraktar et al, 2009). Past studies on the adaptation of IS systems have produced many rich applications and have created factors that affect business process performance. The application that is called business intelligence is an example of decision-making performance that potentially boosts the performance of the business process. The evidence in the prior study indicated that business process performance gains benefits from BI systems, which are drawn from IS capabilities. At the same time, BI systems operate in order for decision-making activity to facilitate both decision making and business process performance. (Elbashir et al, 2008a). Some mixed results and discussions were found in the literature regarding whether or not direct or indirect relations occur between ISCAP and BPER (Gu & Jung, 2013). This study proposes that when ISCAP associates with BPER, without any external intervention, a direct effect on their relations is observed. However, the proposed model creates a mediation effect that explains the influence of ISCAP on BPER through DMP. Even though there is confusion about the direct or indirect effects on BPER, there was consistency between the literature and the results relating to H_3 in this study. The full mediation effect reveals that decision making has an important role, and its performance may create consequences that are necessary for organizations. The implementation of IS capabilities in a firm creates the necessity for improved decision-making performance in order to reach the expected operational and organizational capabilities. An indirect impact of ISCAP in initiating and improving operational and organizational capability is the

delivery of superior business process performance (Luo et al, 2012). One practical research study concluded that statistical modeling, simulation, and mathematical programming supports the evaluation of a firm's current status, and it provided suggestions to improve the emergency ambulance system in Italy. Informed decision makers evaluate a situation and improve the quality of the delivered service. At the same time, scarce resources can be used efficiently and effectively (Aringhieri et al, 2016). On the other hand, one study found that ERP system users' performance does not increase business process performance. However, the extension of ERP with other systems and more experience improves business process performance (Bernhard et al, 2006). It seems that the findings of Bernhard et al (2006) and those of this study contradict each other, but the problem with the ERP study is that the users and the IS capability do not have any association with decision making in order to improve performance. If there was an impact on decision-making performance, the business process level would show more improvement. It is evident that the findings regarding H_3 in this study also support the practical research examples.

4.3.7 Discussion of Hypothesis 4

There has been wide research on the impacts of IS and IT on firm performance. This research considers that IT is a technological infrastructure that has static behavior, which is consistent with Checkland and Holwell's (2005) definition. The IS combines these resources and competencies together and has active involvement in a business. Corresponding to this perspective, ISCAP includes IC, HRC, and AC in this study, which reflects the perception of both IS/IT in the literature (Ravinchandran & Lertwongsatien, 2005a). Therefore, IS capabilities are the combination of resources and competencies that convey business value through decision making and business process performance to firm performance. This argument is supported by the statistical analysis that led to the acceptance of hypothesis H_4 through the serial mediation model in the present study.

Researchers have mentioned that IS/IT may influence firm performance through intermediary organizational variables. Tanriverdi's (2005) study stated that IT is related to firm performance through a mediator variable (Tanriverdi, 2005). Firm and organizational performance are used interchangeably. A similar approach was found in

an empirical study that showed that IS capabilities influence organizational performance through the mediation of business process performance (Elbashir et al, 2008b; Gu & Jung, 2013). Mithas et al (2011) noted the mediation effect between IS management capability and firm performance through organizational capability (Mithas et al, 2011). It has been suggested that RBV-based research needs to exhibit an assessment of performance, integrate a competitive assessment, and define the notion of performance over time. Therefore, a strong indirect relation has been found between IT and firm performance (Wade & Hulland, 2004). Statistically measured IS capabilities are the critical factor for firm performance, but they may not affect performance directly (Ravinchandran & Lertwongsatien, 2005a). The impact on firm performance has been measured using specific IS capabilities, such as the supply chain, in preceding studies. The results suggested that supply chain integration mediates the effect of IT infrastructure on firm performance (Rai et al., 2006). Other mediators are organizational learning and knowledge management processes. They build the relation between IS/IT and firm performance (Pérez-López & Alegre, 2012; Tippins & Sohi, 2003b). Full mediation between firm performance and IS capabilities is in line with the preceding studies mentioned above. However, the difference is that past studies have not included additional intermediaries, and they have claimed to address firm performance with only one mediator variable. However, the model claims that one mediation would not be enough to see the impact of IS capabilities on firm performance. This study addresses firm performance from a serial mediation perspective. The important part is that none of the constructs for decision-making performance or business process performance are able to influence firm performance alone, according to the CFA results in the model. In addition, most of the previous research has been focused on organizational capabilities, and it has failed to address the decision-making perspective. Although decision-making systems have been evaluated, they have been considered under business process performance (Elbashir et al, 2008). As a result, this study provided evidence that information and knowledge need to go through decision making and business processes for the creation of their performance indicators. The integration of IS capability and the performance chain has an impact on the return on sales, distribution costs, market shares, return on investment, administrative expenses, inventory level, staff costs, and customer loyalty, which are the factors of firm performance.

4.3.8 Discussion of Control Variables

The results for the controls are mostly aligned with the expectations and outcomes that have been published in the literature. The control variables have not been substantially changed in the model. Usually, the controls are tested with only one variable; however, this study tested with two variables in the model, which is a different implementation than that of most of the past studies. The size of a firm becomes an effective measure for ISCAP, but not for FP. This indicates that larger size firms may have better ISCAP; however, this does not mean that they have better financial and organizational performance. The positive impact on ISCAP and FP are consistent with the previous research findings (Mani, Barua & Whinston, 2010; Ravinchandran & Lertwongsatien, 2005). The sectors were separated into two categories, service and manufacturing, when they were tested in the model. The service sector deals with more computerized information, and therefore, this sector has a positive impact on ISCAP. The manufacturing sector mostly deals with outcomes, human resources, and capabilities, and thus, is task driven. Therefore, the impact of the manufacturing sector appears only in FP. Because the country context is different, this result might be inconsistent with the findings in the literature. Hence, there is only one similar result in which the research was conducted in Turkey (Wright, Bisson & Duffy, 2013). The type of ownership was analyzed, and it was found that the investments of local and foreign partnerships in ISCAP are better than those of local firms. Wright et al (2013) indicated a similar approach in the Turkish context. Firm age is found to have no significant effect on either ISCAP or FP. This finding is aligned with those of previous studies, which have reached the same conclusion about the firm age control variable (Li et al, 2008).

5. CONCLUSION AND IMPLICATIONS

The primary function of this chapter is to recap the overall research and findings, and the theoretical and practical consequences. The chapter starts with a summary of the research and theoretical implications, and later continues with the managerial and policy implications. It concludes with the limitations and future research recommendations.

5.1 SUMMARY OF THE RESEARCH

This study makes a significant contribution to the understanding of the impact of information system capabilities (ISCAP) on firm performance (FP) through the indirect serial mediation of decision-making performance (DMP) and business process performance (BPER), drawing data from companies that operate in Turkey. A cross-sectional survey methodology is used with a five-point Likert scale questionnaire regarding the constructs to collect the required data. In particular, the research model was designed to cover all of the necessary constructs that are relevant, but have not been previously implemented. The theoretical perspective of the study is to synthesize using the mid-range theory, which comes from reference theories, and the resource-based theory (RBV). The mid-range theory allows us to import the RBV into the IS context. The RBV provides a framework to understand IS and its capabilities. Empirically, the RBV reveals IS resources and competencies and considers IS capabilities by decomposing three distinct characteristics. The implementation of structural equation modeling (SEM) for the survey of 204 Turkish companies indicates that these three distinct characteristics are IS infrastructure, human resources, and administrative capabilities. Infrastructure capabilities describe the software and hardware resources and competencies. Human resource capabilities are the necessary workforce and its ability to initiate static resources where they are needed in companies. Administrative capability is the adaption of tangible resources and competencies into the intangible characteristics of IS, such as strategic planning, relationship building, and creating guidelines for addressees. The data collected from two different sectors, i.e. service and manufacturing,

are assigned to the model and tested using SEM-AMOS. The empirical findings support the model, i.e., that ISCAP significantly consists of these components. The important contribution is the construction of a scale in order to define ISCAP in companies.

The transformation of ISCAP into business value requires the leveraging of the decision-making processes. In the pursuit of a company's goals, the improvement of decision-making performance is a critical management activity. The empirical results support the position that ISCAP is an important element for boosting DMP. In the survey questions, the performance is described as the efficiency and effectiveness of decision making. This proposal's outcome supports the proposition that providing effective organizational communication between decision makers facilitates effective performance. The evaluation of a company's situation with the necessary data and time increases the ability to investigate and make judgments. Rapidly available and accurate information and knowledge creates opportunities for efficient decisions to delegate the necessary actions. The essential part of the relation between ISCAP and DMP supports the proposition that providing information and knowledge builds efficient and effective decision-making performance.

One of the interesting results of the study is that there is no relation between ISCAP and FP and the moderation of DMP. It is known from the literature that DMP does not have a direct link with FP, because FP considers additional factors as performance indicators. However, DMP, supported with ISCAP, is expected to improve goal-seeking activity. This study provides the significant perspective that knowledge, information, data, and cognitive ability do not produce an outcome. Unimplemented decisions do not fulfill their intentions.

The prospects of business process performance are measured by different dimensions. A variety of approaches were implemented in the survey to cover all of these dimensions in the questions regarding business process performance. The study concludes that the operational and organizational capability for processing is sustained by DMP. The direct relation between them produces the outcome of their exploitation inside firms. Cognitive ability leads to action by creating optimal results throughout the processes. On the other hand, the statistical analysis shows the indirect effects of ISCAP on BPER through DMP. Thus, enriched DMP with ISCAP generates more robust business process performance.

Internal and external relations can be directed by decisions that are improved as a result of information. Time management is coordinated with the necessary cognitive alignment and measurements. The empirical results show that optimum production performance is improved by integrating the intellectual and technological perspectives. It is concluded that providing the necessary BPER through DMP with the impact of ISCAP builds a sustainable competitive advantage by using a firm's resources and competencies.

The proposed model for the impact of ISCAP on FP contributes to the IS literature by clearing up the contradictions surrounding the relationship between IS and FP. The study proves that ISCAP cannot directly impact FP. Even though some of the literature suggests that there is an intermediary between ISCAP and FP, this study determines that there is not just one intermediary that impacts FP, but that there should be additional intermediaries implemented to reach the necessary firm performance. Those intermediaries are identified in this research as DMP and BPER. The statistical results indicate that there is a serial indirect mediation between ISCAP and FP through DMP and BPER. If any one of the constructs is removed from the chain of effects, then the relation disappears. This means that decision making is a goal-seeking activity. In order to have efficient and effective decision making, firms need to have an improved information system that creates business value. However, in order to reach a firm's goal, the cognitive process needs to be activated through organizational processes. Better decision-making performance that is activated through improved business process capabilities will definitely bring success to a company, which means that it will have better financial, marketing, and administrative performance.

The characteristics of the sample in the Turkish context include different perspectives. Fifty-two percent of the respondents to our survey are senior/executive managers in the companies that participated in the research. The rest are middle and first line managers. The sample results show that a greater number of high level managers are interested in their companies' technological perspectives. Of the respondent companies, 46 percent had 200 or fewer employees. However, the remaining 54 percent of the companies had more than 200 employees. A significant number of respondents, 21 percent, were from companies that have between 1000 and 5000 employees. The distribution of the number of employees indicates that most of the respondent companies are larger than those categorized as small and medium enterprises (SME). The Turkish State Institute of

Statistics, the Turkish Small Business Administration and the EU identify SMEs as companies that have fewer than 250 employees (Bayraktar et al, 2009). Although the study has a slightly different limit, it is obvious that the respondent companies are mostly larger than SMEs. Fifty-three percent of the responding companies have between 11 and 30 years of operation. Further, 83 percent of the responding companies have an annual revenue of more than 25 million. The number of employees, the years of operation, and the annual revenue results indicate that the respondents' companies are medium and large companies. This shows that most of them are able to invest in IS to improve their business value and competitive advantage. Foreign-owned companies or foreign partnerships amounted to 22 percent of all of the respondents' companies. The industry sectors were grouped into the manufacturing and service sectors. Approximately 57 percent of the respondents were from the service sector, which is more than those from the manufacturing sector. The analyzed control variables were tested for both ISCAP and FP. The effect of SIZE on ISCAP is identified because large companies need to able to control information and disseminate it efficiently and effectively. The task-driven approach of the manufacturing sector is only able to impact FP; nevertheless, the service sector is more interested in technology because of its knowledge-driven attitude. Multinational companies seem to invest more in ISCAP because of their need for information and communication technologies. In addition, they have fewer budget constraints on investing in high technology so that they can survive in a competitive environment.

The findings of this study in the Turkish context provide clues to the extent of the impact that IS can have in the business environment. A recent research study (Wright et al, 2013) noted that Turkish companies still rely on their staffs' memories, and only 2 percent of them have purchased a standardized IS system. There is still ignorance and lack of knowledge and expertise in applying, implementing, and using IS systems (Wright et al, 2013). However, the aforementioned study focused on only SMEs in Turkey. This research concentrated mostly on large companies, which advocate IS systems, use these systems to make decisions and increase their decision-making performance, and implement decisions based on information and knowledge to provide better performance.

5.2 THEORETICAL IMPLICATIONS

The key theoretical contribution of this research is the integration of mid-range theory in the IS discipline by domesticating the RBV into the proposed framework. The important advantage from the implementation of the mid-range theory is the connection of the abstract and testable theories. The theory is able to generalize IS paradigms with its idiosyncratic characteristics (Grover & Lyytinen, 2015). The domestication of the RVB with this method enables the transfer of RBV into the IS field. Thus, the proposed framework results indicate that this theoretical approach is sufficiently useful to explain the complicated frameworks in the IS discipline. Likewise, the mid-range theory provides the opportunity for the orientation of other theoretical approaches within the IS field, including those that have been implemented in reference disciplines, such as economics, management, engineering, etc.

On the other hand, the application of the serial mediation model in this research proves that multiple constructs can be linked serially to obtain the output of the model. The results demonstrate pure serial mediation in the proposed framework. Hence, the different dimensions of indirect relationships always need to be considered while the theoretical background is being built.

5.3 MANAGERIAL AND POLICY IMPLICATIONS

Companies that continuously invest in technology remain alive in a highly fluctuating and competitive environment. Advanced IS capabilities are adopted in the search for ways to manage information and knowledge more efficiently. Work is evolving from being physical oriented into a more information and knowledge orientation. People have access to highly capable technologies, the connectivity of these resources has huge capacity, and highly proficient enterprise applications exist throughout organizations. Porter (1985) noted that the imprudent integration of IT systems may not provide the desired result of increased competitiveness (Tippins & Sohi, 2003a). The reason is that the direct effect is not supported, because the IT itself is not sufficient to generate business value.

Nonetheless, the integrated resources and competencies that comprise IS capabilities need to be considered by organizations. This study proves that simply having IT resources is not a 'silver bullet'. Practically speaking, the study suggests that the hardware/software infrastructure and its capacity, the human resource capability to apply and maintain the technology, planning, organizing, projecting, integration with business objectives, and the dissemination of information all need to be generated, which, in turn, generates the IS capabilities needed for firms to produce business value and maintain their competitiveness in the market.

Acquiring the advantages provided by all technologies requires the ability to realize how systems and the use of information can or do improve firm performance. Sustained investment in evolving capabilities allows organizations to utilize the technology, the information, and the systems. These additional investments provide explicit, measurable value through the release of organizational capabilities and their performance (Peppard & Ward, 2004). This study confirms the need for organizational capabilities, which are defined as decision-making performance and business process performance. Investments in IS capabilities should support decision-making activities and improve their performance. Improved cognitive performance is not enough to gain the performance, financially or organizationally, that is necessary in the competitive market. These decisions should be implemented in every segment of the firm to leverage the investments in IS capabilities in order to have an impact on firm performance. The results suggest that leaving out any one of them may result in the failure to reach the projected high firm performance. Likewise, the integrated model that is suggested in this research may provide good coordination, create a better flow of knowledge, and organize a strong strategic perspective for the firms to distinguish themselves from the competition.

Following the investment and competition perspective, the study shows that local companies make less investments in IS capabilities, and that they still perceive IS as a resource, not a capability that creates value for companies in Turkey. At the same time, manufacturing companies, although they seem to implement technology, still operate from a task-driven perspective and focus on outcomes; this means that technology is not being transformed into a value creator in Turkey. Manufacturing firms need to change their approach to IS in order to capture the significance of technology for Turkey.

5.4 LIMITATIONS AND FUTURE RESEARCH

This study proposes some useful insights and important empirical findings through the serial mediation approach in the IS field; nonetheless, a degree of caution should be applied when considering the results. The selection of Turkey as the study context created a limitation, although it also made a contribution. The context limits the generalizability of the study findings. Although Turkey is an emerging market, its cultural, historical, and institutional realities create an obstacle to the generalizability of the findings from a more global perspective. Hence, future research could compare the behavior of developed and emerging countries to see whether or not the results are the same. In considering IS capabilities and their impact, the business culture should be analyzed using a case study approach. Also, the number of companies in the sample should be increased to obtain a more representative sample of the population to attain higher statistical significance. One of the limitations is that only one respondent was chosen from each company. The study could be implemented with more than one respondent to understand the behavior of different people and departments with respect to IS capabilities. The answers could be cross-checked and user behavior could be measured through the use of multiple respondents. An additional limitation of the research is that we did not consider the kinds of applications that were used in asking about IS capabilities, and user involvement and satisfaction with the systems. Every IS system may have a different effect on DM, BPER and FP. In future studies, the collection of the types of IS applications and the measurement of their individual impact would provide meaningful knowledge in the field. After the implementation of IS, it sometimes takes time to obtain and understand its benefits. The measurement represented by the survey was applied during a certain time period in this study. This is a missing part of the study, and in future research, a longitudinal approach should be adopted to ascertain the differences before and after IS. In this way, panel data could be used to compare the financial consequences for the firms. The theoretical background of the study is based on the resource-based view. Therefore, environmental uncertainty and competitiveness can be applied in future research. Although the research makes a contribution by using the mid-range theory with the RBV, a contingency theory needs to be implemented to see the effect of the contingency factors

of ISCAP on FP. Furthermore, the relations of each of the ISCAP sub-constructs (IC, HRC, and AC) need to be checked by other intermediary instruments to ascertain whether or not each capability has its own effect on each of the constructs and latent variables. The serial indirect mediation model needs to be improved in future research initiatives. Instead of using two serial mediations, the number of serial mediations could be increased to ascertain the behavior in more complex relations. The decision-making performance indicators require more research to reveal a clearer distinction between the decision-making processes. Innovative performance, which may affect firm performance and competitive advantage, could be the subject of future research. Likewise, the dissertation offers substantial opportunities to conduct research about the IS discipline in order to improve both its theoretical and practical background.

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APPENDICIES

Appendix A Confirmatory Factor Analysis Results

Constructs	Items	FO-SRW[a]	Model SRW[b]	AVE[c]	CR[d]	Cronbach`s Alpha
Information System Capability	**ISCAP**					
Infrastructure Capability	**IC**		**0.94***	**0.50**	**0.85**	**0.77**
Our IS infrastructure is suitable for developing customized software applications when the need arises.	IC4	0.49*	0.57*			
Our IS infrastructure is able to respond quickly to the requests from internal and external customers.	IC8	0.74*	0.78*			
The capacity of our network infrastructure is fully competent to meet our company needs.	IC10	0.77*	0.79*			
Our company`s data can be shared with internal as well as external units of the company.	IC11	0.41*	0.50*			
Our IS infrastructure is highly secure to protect our company from intruders and hackers.	IC12	0.73*	0.78*			
Our IS infrastructure provides fast and flexible operations for the internet based systems.	IC13	0.64*	0.74*			
Human Resource Capability	**HRC**		**0.92***	**0.50**	**0.83**	**0.83**
Our IS staff has adequate knowledge of computer based systems.	HRC1	0.67*	0.68*			
Our company seeks high degree of computer based technical expertise for IS department/unit`s employees.	HRC2	0.50*	0.52*			
Our IS staff has ability to learn quickly and apply new technologies as they become available.	HRC4	0.84*	0.83*			
Our IS staff has the skills and knowledge to manage projects in our current business environment.	HRC5	0.81*	0.80*			
Our IS staff is capable of quickly maintaining the system whenever a failure occurred.	HRC10	0.67*	0.67*			
Administrative Capability	**AC**		**0.95***	**0.51**	**0.83**	**0.82**
Our company`s IS strategy is in line with our corporate strategy.	AC1	0.70*	0.71*			
Our company`s IS managers have an executive level authority.	AC2	0.64*	0.65*			
Our company is able to make IS plans for internal as well as external units of the company.	AC3	0.72*	0.73*			
Our IS software development process can be easily adapted to different business development projects in our company.	AC4	0.74*	0.75*			
IS service quality is assessed by using appropriate performance standards.	AC7	0.69*	0.70*			

Appendix A Confirmatory Factor Analysis Results (Cont`d)

Constructs	Items	FO-SRW[a]	Model SRW[b]	AVE[c]	CR[d]	Cronbach`s Alpha
Strategic Decision Making Efficiency	**DMP**			**0.51**	**0.86**	**0.85**
Our company communicates the results of organizational level analysis to work group and/or functional level operations to enable effective support for decision making.	DMP1		0.71*			
Our company has a culture to facilitate long term strategic planning.	DMP3		0.72*			
Our company makes strategic decisions effectively.	DMP4		0.76*			
Our company reduces the time required to make decision.	DMP6		0.58*			
Our company`s organizational intelligence is designed to reach accurate and comprehensive information in a timely manner.	DMP7		0.76*			
Decisions are more consistent between varies departments in our company.	DMP10		0.77*			
Business Process Performance	**BPER**			**0.50**	**0.89**	**0.83**
Our company establishes close relationships with the customers.	BPER1		0.71*			
Our company maintains close relationships with the suppliers.	BPER2		0.53*			
Our company has rapid and effective internal and external coordination for its regional, national, and global activities.	BPER3		0.73*			
The percentage of utilization of tools and equipments has been improved.	BPER10		0.69*			
The productivity of labor has been improved.	BPER11		0.78*			
Our customers' requests have been adequately responded.	BPER14		0.79*			
Our company is capable of accessing easily to different distribution channels in order to enter existing or/and new market segments.	BPER15		0.64*			
Market trends have been identified more quickly.	BPER16		0.75*			
Our products and/or services are differentiated from those of our competitors.	BPER18		0.66*			

Appendix A Confirmatory Factor Analysis Results (Cont`d)

Constructs	Items	FO-SRW[a]	Model SRW[b]	AVE[c]	CR[d]	Cronbach`s Alpha
Firm Performance	**FP**			**0.50**	**0.87**	**0.77**
Our company has achieved a high level of return on sales.	FP2		0.76*			
Our company has increased its market share.	FP4		0.77*			
Our company has achieved a high level of return on investment.	FP5		0.78*			
Our company's inventory has been reduced.	FP7		0.67*			
Our staff cost has been reduced.	FP8		0.53*			
Our company has achieved a higher level of customer loyalty.	FP9		0.69*			

NOTES: *p<0.001, [a] First Order Standardized Regression Weight, [b] Path Model Standardized Regression Weight, [c] Average Variance Extracted, [d] Composite Reliability

Appendix B Literature Review Article List

Author(s)	Source	Study Constructs	Methodology	Main Findings
Huber (1990)	Academy of Management Journal	Effectiveness of Environmental Scanning- Quality and Timeliness of Organizational Intelligence- Quality of decisions- Speed of Decision Making	Conceptual	Advance IT is different than traditional one. Availability of advance IT extend the communication and decision making options. Use of advance IT leads to more available and quickly retrieved information. Increased information accessibility leads to the changes in organizational design. So that, speed and effectiveness with which information can be converted to intelligence and decisions increases.
Mahmood & Soon (1991)	Decision Science	IT & Organizational Strategic Variables- Individual Strategic Variables	Structured Interview	It is identified that industrial variables are potentially affected by IT.
Dean & Sharfman (1996)	Academy of Management Journal	Strategic decision making process (procedural rationality, political behavior, environmental favorability, quality of implementation)- decision effectiveness- Environmental instability	Interview- Factor Analysis	Decision making process is related to decision success
Fenny & Willcocks (1998)	Sloan Management Review	Core IS Capabilities- Business and IT Vision- Design of IT Architecture- Delivery of IS Services	Conceptual	Organizations benefit from relating core IS capabilities model to their own particular circumstances, priorities, and plans. Implementing core IS capabilities help firms to achieve business advantage through IT.

Appendix B Literature Review Article List (Cont`d)

Bharadwaj (2000)	MIS Quarterly	IT Infrastructure (tangible)- Human IT Resources- IT Enabled Intangibles- Firm Performance	RBV, Matched Sample Comparison Group, T-test, Wilcoxon Rank Sum Test	IT infrastructure, Human IT Resources and IT enabled intangibles develops the notion of IT resources. IT capability and firm performance positively and significantly related to each other.
Tippins & Sohi (2003)	Strategic Management Journal	IT Knowledge- IT Operations -IT Objects- IT Competency- Firm Performance	RBV & SEM	The mediating effect of organizational learning between IT competency and Firm Performance is supported. IT knowledge, IT operations, and IT objects need to be exist in order to have IT competency.
Santhanam & Hartono (2003)	MIS Quarterly	IT Capability- Financial Performance- Firm Performance (Profit and Cost Ratio)	RBV -Longitudinal - Benchmark Comparison- Willcoxon and t-Test	Superior IT capability shows superior current and sustained firm performance.
Baum & Wally (2003)	Strategic Management Journal	Strategic Decision Speed- Dynamism, Munificence, Centralization, Decentralization, Formalization, Informalization- Firm Performance	Decision making theory- Organization theory -SEM	Fast strategic decision making predicts firm growth and profit and mediates the relation of dynamism, munificence, centralization, decentralization, and formalization with firm performance
Peppard & Ward (2004)	Journal of Strategic Information System	IS Capability- IS Competencies- Organizational Performance	Conceptual	Organization`s performance will be significantly depend on its IS capability, recognizes IS/IT plays an integral role.

Appendix B Literature Review Article List (Cont`d)

Wade & Hulland (2004)	MIS Quarterly	Information systems resources, competitive advantage, IS strategic planning, information resource management	RBV & Conceptual	Resource based view is a useful tool to understand how firm affects. Understanding the role of IS in the firm. RBV makes great distinction between IT and IS.
Ravichandiran & Lertwongsatien (2005)	Journal of Management Information Systems	IS Human Capital- IT Infrastructure Flexibility- IS Partnership Quality- IS Capability- IS Support for Core Competencies- Firm Performance	RBV & PLS	Firm performance is explained by IT supports and enhance a firm`s core competencies. Organization`s ability to use IT to support core competencies is depend on IS functional capabilities which are human, technology, and relationship resources.
Gregor (2006)	MIS Quarterly	Examine the structural nature of theory in IS	Conceptual	Introducing theory types in IS and legitimacy and value of each theory type. Building integrated theory encompasses all theory types.
Gable, Sedera, Chan (2008)	Journal of the Association for Information Systems	Individual Impact- Organizational Impact- Information Quality- System Quality	Exploratory & Confirmatory	Impacts are explicitly and intentionally measured at the same time as Quality
Elbashir, Collier, Davern (2008)	International Journal of Accounting Information Systems	Business Process Performance- Customer Intelligence- Supplier Relations- Internal Efficiency- Organizational Performance	SEM & PLS	Positive significant relation between business process performance and its three reflective factors. Positive significant relation between business process performance, and organization performance.

Appendix B Literature Review Article List (Cont`d)

Stoel & Muhanna (2009)	Information & Management	Internally focused IT Capability- Externally focused IT Capability- Environmental Conditions- Firm Performance	RBV - Contingency, Shapiro- Wilks Test- Tobin's-Q- Regression Model	Externally focused IT capability positively affect firm performance. Aggregate IT capability gives conflicting findings depends on environment. Aggregate IT capabilities and firm performance depends on the net effect of individual components of IT capabilities.
Ordanini & Rubera (2009)	Information & Management	Slack Resources- Innovative Orientation- External Ties- Firm IT Capabilities- Partners IT Readiness- Service Providers IT Capabilities- Firm Performance after implementing e-commerce	RBV- CFA, t-Test	Performance is positively associated with after implementing e-commerce application. First 3 years performance with e-commerce suffered. After 4 years performance is significant and positive. Interorganizational ties do not support IT innovativeness.
Mithas, Ramasubbu, Sambamurthy (2011)	MIS Quarterly	Information Management Capability- Performance Management Capability- Customer Management Capability- Process Management Capability	SEM	Information management capability has a positive association between customer management, process management, performance management
McLaren, Head, Yuan, Chan (2011)	MIS Quarterly	IS Capabilities- Operational Efficiency- Operational Flexibility- Planning- Internal Analysis- External Analysis- Competitive Strategy (Defender, Prospector, Analyzer, Reactor)	The Multilevel Strategic Fit Measurement Model, Qualitative Case Study	There is a perfect fit between the capabilities of IS and the firm`s competitive strategies.

Appendix B Literature Review Article List (Cont`d)

Lopez & Alegre (2012)	Industrial Management and Data Systems	IT Knowledge- IT Operations -IT Infrastructure- IT Competency-Knowledge Management Process- Performance Outcomes	SEM	IT Competency facilitate knowledge management by supporting the process of knowledge acquisition, transfer, and use. Knowledge management influence market performance positively. There is a relation between IT competency and firm performance
Cepeda-Carrion, Cegarra-Navarro, Jimenez-Jimenez (2012)	British Journal of Management	Unlearning context-Realized Absorptive Capacity- Potential Absorptive Capacity- IS Capability- Firm Innovativeness	Absorptive Capacity Theory & SEM + PLS	Absorptive capacity is a determinant for developing a company`s innovativeness. Unlearning context is a determinant for both realized and potential absorptive capacity. Absorptive capacity is increased through information system capabilities.
Yeh, Lee, Pai (2012)	Business Process Management Journal	Quality of IT Strategy Implementation Process- IS/IT Leadership Capability- IT Resource Allocation Capability- Knowledge Sharing Capability	SEM	Capability of information system could have a direct effect and significant effect on the quality of IT strategy implementation.
Grover & Lyytinen (2015)	MIS Quarterly	Information systems seek to domesticate high level reference theory in the form of mid- level abstraction	Conceptual	Critically examine and debate negative impacts of the field`s dominant epistemic scripts and relax them by permitting IS scholarship to implement alternative form of knowledge

Appendix C Cover Letter (English)
A GLOBAL SURVEY ON THE EFFECT OF INFORMATION SYSTEM CAPABILITIES ON FIRM PERFORMANCE

Dear Mr. /Ms...

We are writing to invite you to participate in a confidential survey jointly undertaken by the Business School of Bahcesehir University, Istanbul, Turkey. The purpose of the survey is to gain a deeper understanding of the factors that relate to the present state of information system capabilities and its effect on strategic decision making and firm performance in Turkish companies.

Your cooperation will greatly assist this project. Please find enclosed the *questionnaire* awaiting your completion. If you are personally unable to respond please pass the questionnaire to a colleague with the relevant knowledge and return it in the envelope provided.

In appreciation of your participation, we will send you *a summary report* of the research findings when the study is completed. Completing the questionnaire will only take a *short time* and you will make a valuable contribution to our research study.

We assure you that your individual responses will be analyzed anonymously and they will be held in strict *confidentiality*. Neither you nor your organization will be identified during the analysis and report stages of the project. We look forward to receiving your completed questionnaire. Thank you very much for your participation.

Yours sincerely,

Professor Ekrem Tatoğlu   Professor Erkan Bayraktar   Professor Selim Zaim

Arafat Salih Aydıner, MSc.

Appendix D Survey Questionnaire (English)

	SECTION 1- INFORMATION SYSTEM (IS) CAPABILITIES					
	Please indicate the level of your agreement to the following questions about your company`s information system (IS) capabilities.					
	A- Infrastructure Capabilities					
	(1) Strongly Disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly Agree					
1	Our IS infrastructure is suitable for developing customized software applications when the need arises.	1	2	3	4	5
2	Our IS department provides reliable hardware solutions and products for the company units.	1	2	3	4	5
3	Our IS is always readily available in a working condition (up-and-running).	1	2	3	4	5
4	Our IS infrastructure is able to respond quickly to the requests from internal and external customers.	1	2	3	4	5
5	The capacity of our network infrastructure is fully competent to meet our company needs.	1	2	3	4	5
6	Our company`s data can be shared with internal as well as external units of the company.	1	2	3	4	5
7	Our IS infrastructure is highly secure to protect our company from intruders and hackers.	1	2	3	4	5
8	Our IS infrastructure provides fast and flexible operations for the internet based systems.	1	2	3	4	5
	B- Human Resource Capabilities					
1	Our IS staff has adequate knowledge of computer based systems.	1	2	3	4	5
2	Our company seeks high degree of computer based technical expertise for IS department/unit`s employees.	1	2	3	4	5
3	Our IS staff has ability to learn quickly and apply new technologies as they become available.	1	2	3	4	5
4	Our IS staff has the skills and knowledge to manage projects in our current business environment.	1	2	3	4	5
5	Our IS staff is capable of implementing the right application at the right time.	1	2	3	4	5
6	Our IS staff is capable of discovering potential problems rapidly in the system.	1	2	3	4	5
7	Our IS staff is capable of quickly maintaining the system whenever a failure occurred.	1	2	3	4	5
	C- Administrative Capabilities					
1	Our company`s IS strategy is in line with our corporate strategy.	1	2	3	4	5
2	Our company`s IS managers have an executive level authority.	1	2	3	4	5
3	Our company is able to make IS plans for internal as well as external units of the company.	1	2	3	4	5
4	Our IS software development process can be easily adapted to different business development projects in our company.	1	2	3	4	5
5	Our IS department has a clear guideline on how to prioritize service requests from users.	1	2	3	4	5
6	IS service quality is assessed by using appropriate performance standards.	1	2	3	4	5

Appendix D Survey Questionnaire (English) (Cont`d)

SECTION 2- COMPANY PERFORMANCE

Please indicate the level of your agreement to the following questions that are related to the effects of your Information Systems (IS) on your company`s performance.

A- Decision Making Performance

	(1) Strongly Disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly Agree					
1	Our company communicates the results of organizational level analysis to work group and/or functional level operations to enable effective support for decision making.	1	2	3	4	5
2	Our company has a culture to facilitate long term strategic planning.	1	2	3	4	5
3	Our company makes strategic decisions effectively.	1	2	3	4	5
4	Our company can analyze customer and market information quickly and effectively.	1	2	3	4	5
5	Our company reduces the time required to make decision.	1	2	3	4	5
6	Our company`s organizational intelligence is designed to reach accurate and comprehensive information in a timely manner.	1	2	3	4	5
7	Our company leads to more rapid and accurate identification of problems and opportunities for strategic decision making.	1	2	3	4	5
8	Decisions are more consistent between varies departments in our company.	1	2	3	4	5

B- Business Process Performance

1	Our company establishes close relationships with the customers.	1	2	3	4	5
2	Our company maintains close relationships with the suppliers.	1	2	3	4	5
3	Our company has rapid and effective internal and external coordination for its regional, national, and global activities.	1	2	3	4	5
4	Our meetings and discussions have been held efficiently and effectively.	1	2	3	4	5
5	Our company is successful in gaining economies of scale.	1	2	3	4	5
6	The percentage of utilization of tools and equipments has been improved.	1	2	3	4	5
7	The productivity of labor has been improved.	1	2	3	4	5
8	Our customers' requests have been adequately responded.	1	2	3	4	5
9	Our company is capable of accessing easily to different distribution channels in order to enter existing or/and new market segments.	1	2	3	4	5
10	Market trends have been identified more quickly.	1	2	3	4	5
11	Our products and/or services are differentiated from those of our competitors.	1	2	3	4	5

C- Firm Performance

1	Our company has achieved a high level of return on sales.	1	2	3	4	5
2	Our company's distribution cost has been reduced.	1	2	3	4	5
3	Our company has increased its market share.	1	2	3	4	5
4	Our company has achieved a high level of return on investment.	1	2	3	4	5
5	Our company`s administrative expenses have been reduced.	1	2	3	4	5
6	Our company's inventory has been reduced.	1	2	3	4	5
7	Our staff cost has been reduced.	1	2	3	4	5
8	Our company has achieved a higher level of customer loyalty.	1	2	3	4	5

Appendix D Survey Questionnaire (English) (Cont`d)

SECTION 3- ENVIRONMENTAL UNCERTAINTY

Please indicate the level of your agreement to the following questions which are related to your company`s business approach for your industry.

	(1) Strongly Disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly Agree					
1	We often change our marketing strategy due to immense sectorial competition to keep up with the competitors and preserve our market share.	1	2	3	4	5
2	Our products and/or services have a high risk of being obsolete due to rapid change of products and services in the sector.	1	2	3	4	5
3	We hardly forecast our competitors` strategy and type of move because of changing market structure rapidly.	1	2	3	4	5
4	We hardly forecast our customers` requirements and preferences because of rapidly changing environment.	1	2	3	4	5
5	We are forced radically to change our style in products and services so often because of the market, competitor or customer requests pressure.	1	2	3	4	5

SECTION 4- IMPLEMENTATION OF IS SYSTEMS

Please identify the relative use of the following Information Systems (IS) in your company.

A- Executive Support Systems

	(1) Never (2) Rarely (3) Sometimes (4) Often (5) Always					
1	Market Intelligence System	1	2	3	4	5
2	Investment Intelligence System	1	2	3	4	5
3	Technology Intelligence System	1	2	3	4	5
4	Forecasting System	1	2	3	4	5
5	Profit Planning System	1	2	3	4	5
6	Personnel Planning Systems	1	2	3	4	5

B- Management Information Systems

1	Data Capturing Systems	1	2	3	4	5
2	Transaction Processing Systems	1	2	3	4	5
3	Information Storage	1	2	3	4	5
4	Information Retrieval Systems	1	2	3	4	5
5	Information Propagation Systems	1	2	3	4	5
6	Financial Systems	1	2	3	4	5
7	Logistic Systems	1	2	3	4	5
8	Workflow Systems	1	2	3	4	5
9	Warehouse Management Systems	1	2	3	4	5
10	Human Resource Management System	1	2	3	4	5
11	Supply Chain Management System	1	2	3	4	5
12	Customer Relationship Management System	1	2	3	4	5
13	Data Analysis System	1	2	3	4	5
14	Decision Support System	1	2	3	4	5
15	Accounting System	1	2	3	4	5
16	Content Management System	1	2	3	4	5
17	Customer Service Management System	1	2	3	4	5
18	Sales and Demand Management System	1	2	3	4	5
19	Customer Order Fulfilment System	1	2	3	4	5
20	Manufacturing Management System	1	2	3	4	5
21	Procurement Management System	1	2	3	4	5
22	Product Development System	1	2	3	4	5
23	Return Management System	1	2	3	4	5

Appendix D Survey Questionnaire (English) (Cont`d)

C- Knowledge Management and Business Intelligence Systems						
1	Information Creation, Sharing and Management System	1	2	3	4	5
2	Document Management System	1	2	3	4	5
3	Archive Management System	1	2	3	4	5
4	Data Warehousing	1	2	3	4	5
5	Data Mining	1	2	3	4	5
6	Dashboard	1	2	3	4	5
7	Scorecard	1	2	3	4	5
8	Visualization	1	2	3	4	5
9	OLAP Analysis	1	2	3	4	5
D- Office Systems						
(1) Never (2) Rarely (3) Sometimes (4) Often (5) Always						
1	Word Processing	1	2	3	4	5
2	Document Imaging	1	2	3	4	5
3	Electronic Calendar	1	2	3	4	5
4	Electronic Notes	1	2	3	4	5
5	Engineering Applications	1	2	3	4	5
E- Web/Social Media/Communication Systems						
1	E-mail System	1	2	3	4	5
2	Electronic Commerce	1	2	3	4	5
3	Electronic Meeting Systems	1	2	3	4	5
4	Social Media Systems	1	2	3	4	5
5	Video Conferencing	1	2	3	4	5
6	Blogs and Instant Messaging	1	2	3	4	5
F- Geographic Information Systems						
1	Global Positioning Systems (GPS)	1	2	3	4	5
2	Image Processing Systems	1	2	3	4	5
3	Navigation Systems	1	2	3	4	5

Appendix D Survey Questionnaire (English) (Cont`d)

SECTION 5- GENERAL QUESTIONS

a- What is your position in the company? ....

b- Please choose the best option that describes your level of authority and responsibility for assessing the information systems and technology policies in your company.

Not at all Responsible						Completely Responsible
1	*2*	*3*	*4*	*5*	*6*	*7*

c- Which of the following best describes your company?

☐ %100 Locally owned   ☐ Local-Foreign investment (specify %........................ foreign

d- Please choose the most appropriate business sector that defines your company`s activity ?

☐ Hunting, Fishery, Agriculture and Forestry   ☐ Hardwood, and Paper
☐ Food industry   ☐ Communication
☐ Mining and Quarry   ☐ Media, Broadcasting, Publication
☐ Petroleum, Chemical, Tire, Plastic, and Pharmaceutical   ☐ Cement, Soil, Glass, Energy, Construction
☐ Textile, Leather, Weaving, Clothing   ☐ Trade, Office, Education, and, Fine Arts
☐ Restaurants   ☐ Information Systems and Technology
☐ Ship Building, Maritime Transportation, Ant repo, and Warehousing   ☐ Healthcare and Social Services
☐ Defense and Security   ☐ Wholesale or Retail

e- How many years has your company been operating in this sector ? ....

f- What is the approximate number of employees working in your company ? ....

g- What is the approximate number of employees working in your company`s IS department/ unit ? ....

h- What is your company`s annual revenue ?

☐ 25.000.000 TL'den az	☐ 100.000.000–249.999.000 TL	☐ 500.000.000–1.000.000.000 TL
☐ 25.000.000–99.999.000 TL	☐ 250.000.000–499.999.000 TL	☐ 1.000.000.000 TL'den fazla

i- What is your company`s annual budget for IS department/ unit ?

☐ 25.000.000 TL'den az	☐ 100.000.000–249.999.000 TL	☐ 500.000.000–1.000.000.000 TL
☐ 25.000.000–99.999.000 TL	☐ 250.000.000–499.999.000 TL	☐ 1.000.000.000 TL'den fazla

j- How long has your IS department/unit been active? ....

Thank you for your help with this research
Would you like to receive a copy of the results of this research?
If **YES,** Please attach your business card to the questionnaire

BİLİŞİM SİSTEMLERİ KABİLİYETLERİ VE İŞLETME PERFORMANSINA ETKİSİ ÜZERİNE BİR SAHA ARAŞTIRMASI

Sayın Bay/Bayan ....,

Elinize ulaşmış bulunan anket formu, Bahçeşehir Üniversitesi Sosyal Bilimler Enstitüsü ile Uluslararası Ticaret ve İşletme Bölümü tarafından yürütülen *Türkiye'deki İşletmelerin Sahip Olduğu Bilişim Sistemleri Kabiliyetlerinin İşletme Performansına olan Etkisini* ortaya koymak üzere hazırlanmış bir araştırma projesi ile ilgilidir.

Bu proje ile Türkiye'de imalat ve hizmet sektöründe faaliyet gösteren işletmelerin bilişim sistemleri kabiliyetlerine ilişkin düzeyin belirlenmesi ve sonrasında işletmenin genel performansı üzerindeki etkisinin ortaya konulması amaçlanmaktadır. Ayrıca, proje kapsamında Türkiye'deki işletmelerin stratejik karar verme ve operasyonel performansının etkinliği de araştırılacaktır.

Bu anket bir başarı testi olmadığından, soruların *doğru ya da yanlış cevapları yoktur*. Projenin başarısında sizlerin katkısı çok önemli olduğu için anketin üzerinde düşüncelerinizi yazabilir ve düzeltmelerde bulunabilirsiniz. Verilerin analizinde yanıtlanmamış bir soru ciddi problemlere yol açacağı için, tüm soruları cevaplandırmaya çalışınız.

Anketimiz, işletmede stratejik karar verme pozisyonunda olan ve bilişim sistemleri konusunda bilgi sahibi üst düzey bir yönetici tarafından doldurulabilecek şekilde tasarlanmıştır. Diğer taraftan, anketimizin üst düzey yöneticilere kendi işletmelerinde kullanılan bilişim sistemlerinin önemi ve gerekliliği konusunda iyi bir değerlendirme fırsatı sunacağı kanaatini taşımaktayız.

Araştırma projesinin gerçekleşmesine çok büyük katkı sağlayacağı için araştırmaya katılımınızı şükranla anacağız. Bu projeye katılımınızın Türkiye'deki üniversite ve sanayi işbirliğinin gelişmesine önemli bir katkı sağlayacağını düşünüyoruz. Araştırma ile ilgili doldurmanızı arzu ettiğimiz anket formu ekte yer almaktadır. Anket formunu doldurmanın çok fazla bir zamanınızı almayacağını umuyoruz. Eğer anketi şahsen doldurmanız mümkün değilse, konu ile ilgili bilgiye sahip bir meslektaşınızın doldurması da bizim için uygun olacaktır. Doldurulmuş anket formunu lütfen üzerinde geri dönüş adresi yazılı olan zarf içerisinde bize iletiniz. Araştırma tamamlandığında, eğer arzu ederseniz, araştırma bulgularını içeren *özet bir raporu* size takdim edeceğiz.

Anketten elde edilen bilgiler özenle muhafaza edilecek ve sonuçlar *toplu* olarak istatiksel analizlere tabi tutulacaktır. Dolayısıyla ne siz ne de işletmeniz ile ilgili kimlik bilgilerine *yer verilmeyecektir*.

Saygı ve teşekkürlerimizle...

Prof. Dr. Ekrem Tatoğlu   Prof. Dr. Erkan Bayraktar   Prof. Dr. Selim Zaim

Araş. Gör. Arafat Salih Aydıner

Appendix F Survey Questionannire (Turkish)

BÖLÜM 1- İŞLETMENİN BİLİŞİM SİSTEMLERİ KABİLİYETLERİ
İşletmenizin bilişim sistemleri kabiliyetlerine ilişkin aşağıdaki her bir ifadeye katılım düzeyininizi belirtiniz.

A- Teknolojik Altyapı ile İlgili Kabiliyetler

(1) Kesinlikle Katılmıyorum (2) Katılmıyorum (3) Fikrim Yok (4) Katılıyorum (5) Kesinlikle Katılıyorum

1	Bilişim sistemleri alt yapısı ihtiyaç olduğunda isteğe göre uyarlanmış yazılım uygulamaları yapmaya uygundur.	1	2	3	4	5
2	İşletmemizde bilişim sistemleri birimi diğer birimlere güvenilir donanım çözümleri ve ürünleri sağlamaktadır.	1	2	3	4	5
3	Bilişim sistemlerimiz daima çalışır durumdadır.	1	2	3	4	5
4	Bilişim sistemlerimizin alt yapısı iç ve dış müşterilerden gelen isteklere hızlı bir şekilde cevap verebilmektedir.	1	2	3	4	5
5	İşletmemizin ihtiyaçlarını yeteri kadar karşılayacak kapasitede ağ (network) altyapısına sahibiz.	1	2	3	4	5
6	İşletmemizin verileri tüm kurum çapında (yurt içi/dışı) paylaşılabilmektedir.	1	2	3	4	5
7	Bilişim sistemleri alt yapımız firmaya gelebilecek saldırı ve sızmalara karşı yeterince güvenlidir.	1	2	3	4	5
8	Bilişim sistemleri altyapımız, internet bağlantılı sistemlerin hızlı ve esnek çalışmasını sağlamaktadır.	1	2	3	4	5

B- İnsan Kaynakları ile İlgili Kabiliyetler

1	Bilişim sistemleri personelimiz bilgisayar temelli sistemlerde yeteri kadar bilgi sahibidirler.	1	2	3	4	5
2	İşletmemizde bilişim sistemleri birimi için çalışacak olan personelde bilgisayar sistemleri konusunda teknik deneyim aranmaktadır.	1	2	3	4	5
3	Bilişim sistemleri personelimiz yeni teknolojileri hızlıca öğrenerek işletmede uygulamaktadır.	1	2	3	4	5
4	Bilişim sistemleri personelimiz mevcut iş koşullarında proje yönetecek bilgi ve kapasiteye sahiptir.	1	2	3	4	5
5	Bilişim sistemleri personelimiz doğru zamanda doğru uygulamayı gerçekleştirme yeteneğine sahiptir.	1	2	3	4	5
6	Bilişim sistemleri personeli, işletmemiz etkilenmeden, sistemdeki potansiyel problemleri ortaya çıkarabilecek kapasitededir.	1	2	3	4	5
7	Bir sistem arızası oluştuğunda, bilişim sistemleri personelimiz yeterince hızlı bir şekilde müdahale etmektedir.	1	2	3	4	5

C- Yönetim ile İlgili Kabiliyetler

1	Bilişim sistemleri stratejisi, işletmemizin stratejisini desteklemektedir.	1	2	3	4	5
2	İşletmemizde, bilişim sistemleri birimi yöneticisi, icra yetkisine sahip yöneticilerden seçilmektedir.	1	2	3	4	5
3	İşletmemizin tamamına (yurt içi/dışı) yönelik bilişim sistemleri planlaması yapabilmektedir.	1	2	3	4	5
4	Bilişim sistemlerinin yazılım geliştirme süreçleri işletmemizdeki diğer birimlerin değişik iş geliştirme yöntemleri ile kolaylıkla adapte edilebilmektedir.	1	2	3	4	5
5	Bilişim sistemleri birimimizin kullanıcılar tarafından yapılan servis isteklerinin nasıl önem sırasına konulduğu ile alakalı açık yönergesi bulunmaktadır.	1	2	3	4	5
6	Bilişim sistemleri servis kalitesi, uygun performans standartları kullanılarak izlenmektedir.	1	2	3	4	5

Appendix F Survey Questionannire (Turkish) (Cont`d)

	BÖLÜM 2- İŞLETME PERFORMANSI					
	İşletmenizdeki bilişim sistemleri kabiliyetlerinin, işletmenizin performansını nasıl etkilediğine ilişkin aşağıdaki her bir ifadeye yönelik katılım düzeyinizi belirtiniz.					
	A- İşletmenin Karar Verme Performansı					
	(1) Kesinlikle Katılmıyorum (2) Katılmıyorum (3) Fikrim Yok (4) Katılıyorum (5) Kesinlikle Katılıyorum					
1	İşletmenin genel durum analizi ile birimlerin durum analizleri biribiri ile uyumludur.	1	2	3	4	5
2	İşletmemizde uzun soluklu stratejik planlama geleneği vardır.	1	2	3	4	5
3	İşletmemizde stratejik kararlar etkin olarak verilir.	1	2	3	4	5
4	İşletmemiz müşteri ve pazar bilgilerini hızlı ve etkin bir şekilde analiz edebilir.	1	2	3	4	5
5	İşletmemizde karar verme süreçleri kısadır.	1	2	3	4	5
6	İşletmemizin kurumsal zekası, doğru ve anlaşılabilir bilgiye zamanında ulaşmayı sağlayacak yapıdadır.	1	2	3	4	5
7	İşletmemizde, stratejik kararlarda problemler ve fırsatlar hızlı şekilde tespit edilir.	1	2	3	4	5
8	İşletmemizdeki farklı birimlerin aldığı kararlar arasında uyum vardır.	1	2	3	4	5
	B- İşletmenin Süreç Performansı					
1	İşletmemiz müşterileri ile yakın ilişki kurar.	1	2	3	4	5
2	İşletmemiz tedarikçileri ile yakın ilişki kurar.	1	2	3	4	5
3	İşletmemiz; ulusal, bölgesel ve küresel ölçekli faaliyetlerinde içeride ve dışarıda hızlı ve etkin bir koordinasyona sahiptir.	1	2	3	4	5
4	Toplantılarımız ve müzakerelerimiz verimli ve etkin yapılmaktadır.	1	2	3	4	5
5	İşletmemiz pazarda büyük ölçekli üretim/hizmet konusunda başarılıdır.	1	2	3	4	5
6	İşletmemizdeki ekipman ve teçhizatların kullanım oranı artırılmıştır.	1	2	3	4	5
7	Çalışanlarımızın verimliliği artırılmıştır.	1	2	3	4	5
8	Müşterilerimizin ürünler ve/veya hizmetler hakkındaki ihtiyaç duyduğu bilgilere cevap verilmektedir.	1	2	3	4	5
9	İşletmemiz mevcut ve yeni pazarlara kolaylıkla katılmak için alternatif dağıtım kanallarına girebilmektedir.	1	2	3	4	5
10	Rakiplerden önce pazar eğilimlerini belirleyebilmekteyiz.	1	2	3	4	5
11	Ürün ve hizmetlerde rakiplerimize göre farklılık oluşturmaktayız.	1	2	3	4	5
	C- İşletmenin Genel Performansı					
1	İşletmemizin satış hasılatı artmaktadır.	1	2	3	4	5
2	İşletmemizin dağıtım giderleri düşmektedir.	1	2	3	4	5
3	İşletmemizin pazar payı yükselmektedir.	1	2	3	4	5
4	İşletmemizin yaptığı yatırımlar yüksek getiri sağlamaktadır.	1	2	3	4	5
5	İşletmemizin genel idari maliyetleri düşmektedir.	1	2	3	4	5
6	Stok maliyetimiz düşmektedir.	1	2	3	4	5
7	Çalışan maliyeti düşmektedir.	1	2	3	4	5
8	İşletmemizin müşteri sadakati yüksektir.	1	2	3	4	5

Appendix F Survey Questionannire (Turkish) (Cont`d)

BÖLÜM 3- SEKTÖREL BELİRSİZLİKLERLE BAŞEDEBİLME					
İşletmenizin sektöründen ya da rekabet çevresinden kaynaklanan belirsizliklere yönelik tutumuna ilişkin aşağıdaki her ifadeye katılım düzeyinizi belirtiniz.					
(1) Kesinlikle Katılmıyorum (2) Katılmıyorum (3) Fikrim Yok (4) Katılıyorum (5) Kesinlikle Katılıyorum					
1	Sektördeki sıkı rekabetten dolayı pazar payımızı muhafaza edebilmek ve rakiplerle rekabet edebilmek için pazarlama yöntemlerimizi oldukça sık değiştirmekteyiz.	1	2	3	4 5
2	Sektördeki hızlı değişen ürün ya da hizmetlerden dolayı, işletmemizin ürün ya da hizmetlerinin demode olma riski yüksektir.	1	2	3	4 5
3	Hızlı değişen pazar yapısından dolayı rakiplerimizin hareket tarzı ve stratejilerini zor tahmin etmekteyiz.	1	2	3	4 5
4	Hızlı değişen şartlar müşterilerimizin talep ve beğenisini tahmin etmemizi güçleştirir.	1	2	3	4 5
5	Pazar, rakip, veya müşteri talep baskısı ile üretim ve hizmet tarzımızı büyük miktarda ve sıklıkla değiştiririz.	1	2	3	4 5
BÖLÜM 4- İŞLETMENİZDE KULLANILAN BİLİŞİM SİSTEMLERİ					
Aşağıdaki bilişim sistemlerinin, işletmenizdeki kullanım düzeyini belirtiniz.					
A- Üst Yönetici Destek Sistemi (Executive Support Systems)					
(1) Asla (2) Nadiren (3) Bazen (4) Sık sık (5) Her Zaman					
1	Akıllı Pazar Sistemleri (Market Intelligence System)	1	2	3	4 5
2	Akıllı Yatırım Sistemleri (Investment Intelligence System)	1	2	3	4 5
3	Akıllı Teknoloji Sistemleri (Technology Intelligence Systems)	1	2	3	4 5
4	Tahmin Etme Sistemleri (Forecasting)	1	2	3	4 5
5	Kâr Planlaması Sistemleri (Profit Planning Systems)	1	2	3	4 5
6	Çalışan Planlama Sistemleri (Personnel Planning)	1	2	3	4 5
B- Yönetim Bilişim Sistemleri (Management Information Systems)					
1	Veri Yakalama Sistemleri (Data Capturing Systems)	1	2	3	4 5
2	Veri İşleme Sistemler (Transaction Processing Systems)	1	2	3	4 5
3	Bilgi Depolama Sistemleri (Information Storage)	1	2	3	4 5
4	Bilgi Erişim Sistemleri (Information Retrieval)	1	2	3	4 5
5	Bilgi Dağıtım Sistemleri (Information Propagation)	1	2	3	4 5
6	Finans Sistemi (Financial Systems)	1	2	3	4 5
7	Lojistik Sistemi (Logistics)	1	2	3	4 5
8	İş Akış Sistemleri (Workflow Systems)	1	2	3	4 5
9	Depo Yönetim Sistemleri (Warehouse Management)	1	2	3	4 5
10	İnsan Kaynakları Yönetim Sistemi (Human Resource Management System)	1	2	3	4 5
11	Tedarik Zinciri Yönetim Sistemi (Supply Chain Management System)	1	2	3	4 5
12	Müşteri İlişkileri Yönetim Sistemi (Customer Relationship Management System)	1	2	3	4 5
13	Veri Analiz Sistemi (Data Analysis System)	1	2	3	4 5
14	Karar Destek Sistemi (Decision Support System)	1	2	3	4 5
15	Muhasebe Sistemi (Accounting System)	1	2	3	4 5
16	İçerik Yönetim Sistemi (Content Management System)	1	2	3	4 5
17	Müşteri Yönetim Sistemi (Customer Service Management System)	1	2	3	4 5
18	Satış ve Talep Yönetim Sistemi (Sales and Demand Management System)	1	2	3	4 5
19	Müşteri Sipariş Memnuniyet Sistemi (Customer Order Fulfilment System)	1	2	3	4 5
20	İmalat Yönetim Sistemi (Manufacturing Management System)	1	2	3	4 5

Appendix F Survey Questionannire (Turkish) (Cont`d)

21	Satın Alma Yönetim Sistemi (Procurement Management System)	1	2	3	4	5
22	Üretim Geliştirme Sistemi (Product Development System)	1	2	3	4	5
23	İade Yönetim Sistemi (Return Management System)	1	2	3	4	5

BÖLÜM 4- İŞLETMENİZDE KULLANILAN BİLİŞİM SİSTEMLERİ (DEVAMI)

C- Bilgi Yönetim Sistemi (Knowledge Management System)/ İş Zekası Sistemleri (Business Intelligence Systems)

1	Bilgi Oluşturma, Paylaşım ve Yönetim Sistemleri (Information Creation, Sharing and Management System)	1	2	3	4	5
2	Dokümantasyon Yönetim Sistemi (Document Management System)	1	2	3	4	5
3	Arşiv Yönetim Sistemi (Archieve Management System)	1	2	3	4	5
4	Veri Depolama Sistemleri (Data Warehousing)	1	2	3	4	5
5	Veri Madenciliği (Data Mining)	1	2	3	4	5
6	Tablolama (Dashboard)	1	2	3	4	5
7	Puanlama Sistemi (Scorecard)	1	2	3	4	5
8	Canlandırma Sistemleri (Visualization)	1	2	3	4	5
9	OLAP Analizleri (OLAP Analysis)	1	2	3	4	5

D- Ofis Sistemleri

(1) Asla (2) Nadiren (3) Bazen   (4) Sık sık (5) Her Zaman

1	Yazı İşleme (Word Processing)	1	2	3	4	5
2	Döküman Resimleme (Document Imaging)	1	2	3	4	5
	Elektronik Randevu (Electronic Calendar)	1	2	3	4	5
4	Elektronik Not Uygulamaları (Electronic Notes)	1	2	3	4	5
5	Mühendislik Uygulamaları (Engineering Applications)	1	2	3	4	5

E- Web/Sosyal Medya/İletişim Sistemleri

1	Elektronik Posta Sistemi (e-mail System)	1	2	3	4	5
2	Elektronik Ticaret Sistemi (Electronic Commerce)	1	2	3	4	5
3	Elektronik Toplantı Sistemi (Electronic Meeting)	1	2	3	4	5
4	Sosyal Medya Sistemleri (Social Media Systems)	1	2	3	4	5
5	Video Konferans Sistemleri (Video Conferancing)	1	2	3	4	5
6	Blog ve Anlık Haberleşme Sistemleri (Blogs and Instant Messaging)	1	2	3	4	5

F- Coğrafi Bilgi Sistemi

1	Global Konum Sistemleri (GPS)	1	2	3	4	5
2	Resim İşleme Sistemleri (Image Processing Systems)	1	2	3	4	5
3	Yön Bulma Sistemleri (Navigation Systems)	1	2	3	4	5

Appendix F Survey Questionannire (Turkish) (Cont`d)

BÖLÜM 5- GENEL SORULAR

a- İşletmedeki iş/görev ünvanınız nedir? ....

b- Lütfen işletmenizdeki bilişim sistemleri ve teknoloji politikalarını belirlemedeki yetki ve sorumluluk düzeyinizi aşağıdaki ölçek üzerinden

Hiç Yetkim Yok   Tamamen Yetkiliyim

  1   *2*   *3*   *4*   *5*   *6*   *7*

c- Aşağıdakilerden hangisi işletmenizi en iyi tanımlar ?

☐ %100 Yerli Sermaye   ☐ Yerli-yabancı ortak girişim (lütfen yabancı ortaklığın payını belirtiniz

d- İşletmenizi tanımlayan iş kolu veya kolları aşağıdakilerden hangisidir (birden fazla seçenek işaretleyebilirsiniz) ?

☐ Avcılık, balıkçılık, tarım ve ormancılık	☐ Ağaç ve kâğıt
☐ Gıda sanayisi	☐ İletişim
☐ Madencilik ve taş ocakları	☐ Basın, yayın ve gazetecilik
☐ Petrol, Kimya, Lastik, Plastik ve İlaç	☐ Beton, Toprak, Cam, Enerji, İnsaat
☐ Dokuma, hazır giyim ve deri	☐ Ticaret, büro, eğitim ve güzel sanatlar
☐ Lokantalar	☐ Bilişim ve teknoloji
☐ Gemi yapımı ve deniz taşımacılığı, ardiye ve antrepoculuk	☐ Sağlık ve sosyal hizmetler
☐ Savunma ve güvenlik	☐ Toptan ve perakende ticaret

e- İşletmeniz bulunduğu sektörde kaç yıldır faliyet göstermektedir ? ....

f- İşletmenizde yaklaşık olarak kaç kişi çalışmaktadır ? ....

g- İşletmenizin Bilgi İşlem bölümünde, yaklaşık olarak kaç kişi çalışmaktadır ? ....

h- İşletmenizin yıllık cirosu aşağıdaki seçeneklerden hangisidir ?

☐ 25.000.000 TL'den az	☐ 100.000.000–249.999.000 TL	☐ 500.000.000–1.000.000.000 TL
☐ 25.000.000–99.999.000 TL	☐ 250.000.000–499.999.000 TL	☐ 1.000.000.000 TL'den fazla

i- İşletmenizin yıllık Bilgi İşlem bütçesi aşağıdaki seçeneklerden hangisidir ?

☐ 25.000.000 TL'den az	☐ 100.000.000–249.999.000 TL	☐ 500.000.000–1.000.000.000 TL
☐ 25.000.000–99.999.000 TL	☐ 250.000.000–499.999.000 TL	☐ 1.000.000.000 TL'den fazla

j- İşletmenizde kaç yıldır Bilgi İşlem birimi bulunmaktadır ? ....

BU ÇALIŞMAYA YARDIM VE KATKILARINIZDAN DOLAYI TEŞEKKÜR EDERİZ
Bu çalışmanın sonuçları hakkında bilgi edinmek ister misiniz?
EVET ise lütfen ankete kart vizitinizi ekleyiniz.