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Three Essays on Digital Marketing

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THREE ESSAYS ON DIGITAL MARKETING

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

Business Administration
(Marketing)

by

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Four years ago, I embarked on the intellectual journey of doctoral studies in the marketing department at Louisiana State University. It has been an arduous yet fulfilling and transformative process. As I reflect upon the significance of my personal “metamorphosis”, I gratefully and humbly acknowledge the contributions of the people who have helped me.

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ABSTRACT

This dissertation is primarily interested in finding out how marketing can play a more strategic role in helping firms to improve performance in the Digital Age. It contains three essays on digital marketing. The unifying theme is figuring out how the marketing department can benefit from the informational value of (big) data and advanced analytics and thus improve customer and business performance. The first essay develops a scale for measuring marketing information capability. The scale has passed rigorous tests standards. The second essay empirically examines the antecedents, moderators and consequences of marketing information capability. The antecedents include cross-functional cooperation between marketing and IT departments, IT capabilities, top management emphasis, and the influence of marketing department within the firm. Dependent variables are customer relationship management, new product development and supply chain management. The moderating effects of competitive intensity and environmental dynamisms are also investigated. The third essay performs an empirical study on the adoption of data analytics that moderate the relationships between marketing information capability and its consequent variables, such as customer relationship management, new product development and supply chain management.

ESSAY 1: RIDING THE TIDAL WAVE OF MARKETING INFORMATION REVOLUTION IN THE DIGITAL AGE: THE DEVELOPMENT OF A SCALE TO MEASURE MARKETING INFORMATION CAPABILITY

INTRODUCTION

Big data is perhaps one of the hottest buzzwords across many industries and many academic disciplines (Barber, 2012; Catts, 2012; Deighton, Rizley, & Keane, 2012; Knapp, 2012). Today, many companies are gathering astronomical amounts of data. The term “big data” is used to refer to data sets that have become too large for conventional marketing and IT methodologies to handle. Both industry practitioners (Barton & Court, 2012) and academic researchers (McAfee & Brynjolfsson, 2012) believe that big data possesses the potential to bring competitive advantage to data-driven companies. An industry survey conducted by IBM and the Said Business School of University of Oxford revealed that about 49% of participating business and IT professionals hope to achieve customer-centric objectives from big data projects (Schroeck, Shockley, Smart, Romero-Morales, & Tufano, 2012). The management of big data usually requires expertise from IT, marketing or a newly created data science department (Barton & Court, 2012; Provost & Fawcett, 2013). So both marketing and IT departments play important roles in the management of big data in most companies (Franks, 2012; Mayer-Schönberger & Cukier, 2013).

However, the marketing function does not seem to be fully capable of handling the issues of big data. The fundamental question for organizations is how to better manage and use market information for the benefit of creating more satisfied and profitable customers and generating better financial results. Marketing professionals in the 21st century find it increasingly difficult to keep up with the rapid changes in their industries. As Day (2011) points out, a “widening gap” exists between firms’ marketing capabilities and the complex

realities of their external environments. Some scholars point out that the roles of the CMOs are declining in the C-Suites and the marketing function is not considered crucial in overall business strategy-making processes in many companies (N. Kumar, 2004; Nath & Mahajan, 2011). The emergence of the big data phenomenon has further highlighted the urgent need to improve marketing's deficient capabilities. Consequently, the Marketing Science Institute (MSI) identifies the inadequacy of traditional marketing methods and calls for a better understanding of "marketing organizations and capabilities" in the era of big data (Deighton et al., 2012; Desai, 2012).

Despite major progress towards the understanding of marketing capabilities in the past ten years, much still remains to be studied. Most important of all, marketing information capability, as one important type of these marketing capabilities, has been hardly investigated. The author proposes that a more complete understanding of marketing information capability will help marketers and researchers to better cope with the onslaught of data and information (George S. Day, 1994a; Vorhies & Morgan, 2005). This essay makes two important contributions. First, it contributes to the marketing and IT literature by empirically developing and testing a scale for measuring marketing information capability, which is a multi-dimensional construct. Second, it contributes to the strategy literature by shedding new light on the nature of marketing information capability as important firm resources.

The rest of the essay proceeds as follows. To fully understand the nature of the marketing information capability construct, an extensive literature review of marketing, IT and strategic management has been conducted. Fifteen marketing executives have been interviewed. The essay notes possible antecedents, outcomes and moderators that are evident in the emerging data-driven marketing era in which marketing information

capability has an important role. Based on the literature review and field interviews, marketing information capability has been defined as a multi-dimensional construct. Then three tests have been conducted to purify and validate the construct items. According to the test results, the scale has met rigorous development standards. In the end, theoretical and managerial implications are discussed.

LITERATURE REVIEW

MSI has highly recommended the value of cross-disciplinary research (Desai, 2012). In addition, marketing and IT scholars (Buehrer, Senecal, & Pullins, 2005; Hunter & Perreault Jr, 2006) have recognized that the study of the impact of information technologies on marketing must draw from theories and acquire models from multiple disciplines. Therefore, this literature review will take an interdisciplinary approach. A truly comprehensive understanding of the research topics in this dissertation entails detailed literature review on several academic subjects, such as marketing, information systems, and strategic management.

The Resource-Based Theory of the Firm

The resource-based view (RBV) of the firm examines configurations of internal resources. It explains how firms create sustainable competitive advantage. Marketing scholars turn to the resource-based view to describe and understand marketing capabilities. Marketing capabilities enable firms to establish effective strategies to respond promptly to the emerging challenges in competitive environment (George S. Day, 1994a; Morgan, Vorhies, & Mason, 2009). IT scholars also apply resource-based view to study IT capabilities.

A Brief Introduction

Penrose (2009) was probably the first economist to treat firms as bundles of resources and to systematically analyze the growth of firms with a resource-based perspective (Wernerfelt, 1984). However, the resource-based view only started to gain traction as an influential theory in the field of strategic management in the late 1980s. The resource-based view attempts to answer the quintessential question in management: how can firms achieve sustainable competitive advantage (Rajendra K. Srivastava, Fahey, & Christensen, 2001)? In contrast to the dominant positioning school of strategy (Michael E Porter, 2008a), which focuses on the attractiveness of industry structure and competition analysis, the resource-based view analyzes the internal resources and capabilities of the firm to explain how firms can achieve sustained competitive advantage. As a popular and important perspective on strategic organizing, the resource-based view helps practitioners and academic scholars to better understand why some companies can achieve superior performance while others fail to do so (J. Barney, Wright, & Ketchen Jr, 2001; Peteraf, 1993; Priem & Butler, 2001).

Basic Principles of the Resource-based View

A thorough understanding of the resource-based view first entails a detailed discussion on what constitutes firm resources and capabilities. Many definitions exist in the extant literature (See Table 1.1, which is organized chronologically). Wernerfelt (1984) defined resources as “those (tangible and intangible) assets which are tied semi-permanently to the firm”. Barney’s 1991 definition is more inclusive and incorporates “all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc.” that firms utilize to realize superior performance (J. Barney, 1991). For the purpose of this dissertation, resources are regarded as “the tangible and intangible assets firms use to

develop and implement their strategies” (Ray, Barney, & Muhanna, 2004). Following the common practice of resource-based view scholars, the dissertation will use resources and capabilities interchangeably.

Table 1.1: Definitions for Resources and Capabilities

| Author(s) | Definition |
|---------------------------|---|
| (Wernerfelt, 1984) | “A firm’s resources at a given time could be defined as those (tangible and intangible) assets which are tied semi-permanently to the firm.” Examples include “brand names, in-house knowledge of technology, employment of skilled personnel, trade contracts, machinery, efficient procedures, capital, etc.” |
| (J. Barney, 1991) | “Firm resources include all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness.” Firm’s resources can be roughly put into three groups: physical capital resources (location, access, technology, etc.), human capital resources (employee knowledge, experience, and their working relationship) and organizational capital resources (coordination, structure, control, planning, etc.) |
| (Grant, 1991) | “Resources are inputs into the production process.” Resources can be classified into six groups: “financial resources, physical resources, human resources, technological resources, reputation, and organizational resources.” “A capability is the capacity for a team of resources to perform some task or activity...a routine, or a number of interacting routines.” |
| (Kogut & Zander, 1992) | Combinative capabilities are “the intersection of the capability of the firm to exploit its knowledge and the unexplored potential of the technology.” |
| (Amit & Schoemaker, 1993) | Resources are “stocks of available factors that are owned or controlled by the firm.” Capabilities are “a firm’s capacity to deploy resources, usually in combination, using organizational processes, to effect a desired end. They are information-based, tangible or intangible processes that are firm specific and are developed over time through complex interactions among the firm’s resources.” |
| (George S. Day, 1994a) | “Capabilities are complex bundles of skills and collective learning, exercised through organizational processes, that ensure superior coordination of functional activities.” |

(Table 1.1 continued)

| Author(s) | Definition |
|--------------------------------|---|
| (Teece, Pisano, & Shuen, 1997) | “Resources are firm specific assets that are difficult to if not impossible to imitate.” Competences are resources that are “assembled in integrated clusters spanning individuals and groups so that they enable distinctive activities to be performed.” Dynamic capabilities are “the firm’s ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments.” |
| (Eisenhardt & Martin, 2000) | Dynamic capabilities are “the firm’s processes that use resources—specifically the processes to integrate, reconfigure, gain and release resources—to math and even create market change. Dynamic capabilities thus are the organizational and strategic routines by which firms achieve new resource configurations as markets change, collide, split, evolve, and die.” |

The resource-based view is based on two fundamental assumptions about firm resources and capabilities: heterogeneity and immobility. The RBV postulates that valuable and rare organizational resources that are hard to imitate and substitute provide firms with potential sources of competitive advantage (J. Barney, 1991). According to Barney (1991), firm resources with the potential to create sustainable competitive advantage have four attributes: value, rareness, inimitability, and substitutability. This essay will use these four attributes to evaluate whether resources or capabilities are likely to help firms create customer value and superb performance.

Scholars from both marketing (Rajendra K. Srivastava et al., 2001) and IT (Wade & Hulland, 2004) have recognized the usefulness of the RBV model in their respective domains. Attempting to bridge the gaps between marketing and the RBV, Srivastava et al. (2001) identified marketing specific resources with the potential to meet the RBV’s four criteria, such as valuableness and imperfect imitability. They classified market-based assets into two groups: relational and intellectual assets. Relational assets include customers,

channels, and so on, while intellectual assets are the knowledge and information about firms' competitors. In addition, they proposed a model that describes how resources could be converted into customer value and competitive advantage via market-based processes, such as customer relationship management. This essay will use this framework to scrutinize marketing capabilities as strategic firm resources.

Dynamic Capabilities Theory

The resource-based view is a widely used strategic theoretical framework, but its original conceptualization has limitations. Several researchers have proposed some notable extensions to the RBV, such as dynamic capabilities theory (Teece et al., 1997).

Teece et al. (1997) extended the resource-based view and proposed dynamic capability theory. The resource-based view is a widely used strategic theoretical framework, but it has some limitations. They defined dynamic capabilities as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments." Therefore, dynamic capability refers to the organization's ability to efficiently change and reorganize its resources to adapt to the unpredictable environment. During this process, new resources can be created and the existing resources can be reconfigured if needed (Vorhies et al., 2011). Dynamic capabilities can be considered as the strategic routines by which firms rearrange and reorganize resources as market conditions change (Eisenhardt & Martin, 2000). Dynamic capabilities can also be treated as an identifiable and specific process (Eisenhardt & Martin, 2000). Further, Teece et al (1997) pointed out that capabilities are dynamic when firms combine and deploy the available resources in different ways to reflect different market situations.

Marketing capabilities are important firm capabilities, but resource-based theory fails to explain the impact on marketing capabilities brought by the dynamic environment

(Legnick-Hall and Wolff, 1999). In addition, Priem and Butler (2001) pointed out that the resource-based view cannot explain how organizational resources are deployed to achieve the goal of profit making. Dynamic capability theory describes how the different resources can be transformed and organized in new patterns to reflect the changing market (Teece et al, 1997). The current business environment is constantly changing and dynamic, so firms have to utilize their available resources to meet the shifting demands of the market in order to keep their competitive advantage. Information management capability also needs to be “dynamic” so that firms are able to process reliable and timely information, which is crucial for the firms’ success.

Marketing Capabilities

Before a full introduction to marketing capabilities is given, a brief literature review on the market orientation concept is presented, because it is closely related to a firm’s marketing capabilities (Dutta, Narasimhan, & Rajiv, 1999). For instance, Morgan et al. (2009) hypothesized that market orientation and marketing capabilities interact with each other to impact firm performance. Besides, market orientation also emphasizes the importance of information and intelligence about customers. Therefore, the market orientation concept is also closely related to the previous discussion on information and big data.

Definition of Marketing Capabilities

It is believed that companies with high marketing capabilities can outperform their competitors when they acquire a better understanding of their consumers’ motivations and behaviors and are capable of providing better products and services (Dutta et al., 1999). Although marketing researchers recognize the strategic role of marketing capabilities, they

have not agreed on a uniform definition. Different definitions and scale measures exist and they have evolved over time (See Table 1.2 and Appendix B). Day (1994) systematically analyzed organizational capabilities and defined capabilities as “complex bundles of skills and accumulated knowledge” that help firms to achieve competitive advantage. Day also emphasized the importance of distinctive capabilities for market-driven organizations and suggested that firms’ capabilities can be classified into three main categories: outside-in capabilities, inside-out capabilities and spanning capabilities. Two of Day’s three categories relate to marketing functions. Market sensing and customer linking belong to the outside-in group and the conventional four Ps are embedded in the spanning processes. Day’s theoretical framework and his most recent call for marketing professionals and researchers to “close the marketing capabilities gap” (George S. Day, 2011) are especially relevant to the study on the challenges and opportunities that big data has brought to the field of marketing and IT.

Similar to Day’s outside-in and spanning capabilities (1994), Morgan et al.’s definition (2009) is closely related to the marketing four Ps and marketing strategy, and consists of two major types. The first type of marketing capabilities concerns the firms’ abilities to manage the traditional marketing mix, “such as product development and management, pricing, selling, marketing communications and channel management” (Vorhies & Morgan, 2005). The second type of marketing capabilities serves firms at a strategic level through their effects on marketing strategy (Morgan, Zou, Vorhies, & Katsikeas, 2003). Firms with strong marketing capabilities exhibit strong management skills of traditional four Ps and are able to better implement and execute marketing plans. In addition, Vorhies et al (2011) proposed the concept of customer-focused marketing

capabilities, which are comprised of two dimensions: customer management capability and brand management capability.

Table 1.2: Marketing Capabilities: Definitions and Dimensions

| Author(s) | Dimensions | Antecedents | Consequences |
|--|--|--|--|
| (Vorhies & Morgan, 2005) | Eight marketing capabilities that have the potential to create competitive advantages: pricing, product development, channel management marketing communication, selling, market information management, market planning, and marketing implementation | Market-based organizational learning | Overall firm performance: customer satisfaction, market effectiveness, and profitability |
| (Jayachandran, Sharma, Kaufman, & Raman, 2005) | <ol style="list-style-type: none"> 1) Information reciprocity 2) Information capture 3) Information integration 4) Information access 5) Information Use | <ol style="list-style-type: none"> 1) Customer relationship orientation 2) Customer-centric management systems | Customer relationship performance |

The Importance of Marketing Capabilities

Marketing capabilities are key organizational capabilities, and strong marketing capabilities can bring sustainable competitive advantage to the firms. In addition, marketing capabilities can also impact other aspects of organizational variables. Previous researchers have examined the relationships between marketing capabilities, customer satisfaction and firm performance (George S. Day, 1994a, 2011; Morgan, Vorhies, et al., 2009; Vorhies et al., 2011). The general consensus is that a positive relationship exists between marketing capabilities and firm performance. Furthermore, Krasnikov et al (2008) conducted a meta-analysis study of firm capabilities. They drew the conclusion that

marketing capabilities have a stronger impact on firm performance than the other firm-level capabilities, such as R & D and operations capabilities.

Song et al (2005) found that technology-related capabilities and marketing capabilities can interact with each other to deliver superior firm performance. They also found that the impact of marketing capabilities is relatively low in a technology turbulent environment. The research by Dutta et al. (1999) showed that marketing capabilities, R&D and operation capabilities and their interactions are important determinants of firm's financial performance.

Market Orientation

Market orientation is an important construct in marketing (Kohli & Jaworski, 1990). It has been extensively researched during the past two decades (Kirca, Jayachandran, & Bearden, 2005; Morgan, Vorhies, et al., 2009). It has close connections with marketing capabilities. In particular, it has important similarities with marketing information capability. However, major differences also exist. Therefore, a brief review on market orientation is warranted for the better understanding and delineation of marketing information capability.

Researchers have thoroughly studied the antecedents and consequences of market orientation (Hult, Ketchen, & Slater, 2005). Extensive empirical studies have provided evidence that market orientation significantly influences business performance (J. K. Han, Kim, & Srivastava, 1998). Market orientation consists of three distinct informational processes that acquire, disseminate and respond to market intelligence, which is the information regarding customers' current and future needs as well as the external market factors that influence those needs. According to resource-based view, resources and capabilities are deployed within organizational processes. These capabilities to manage

information impact market orientation. The higher the capabilities of firms to acquire and utilize information, the higher the quality of the information provided to the firms.

Marketing and Information Technologies

IT has fundamentally transformed the modern practices of marketing. Since the 1970s, organizations have implemented IT systems to improve organizational efficiency and effectiveness. Many marketing activities, such as Internet advertising and web marketing analytics, have become more and more integrated with IT. Marketing and IT scholars have extensively studied the business impacts of two special types of information technologies that are relevant to marketing profession: sales force automation (SFA) systems (Buttle, Ang, & Iriana, 2006) and customer relationship management (CRM) systems (Mithas, Krishnan, & Fornell, 2005; Payne & Frow, 2005).

It is conducive to acquire a better understanding of the relationship between marketing and IT, so this dissertation will first briefly review the current literature on CRM and SFA. It is also important to review the literature on the relationship between the Internet and marketing because the Internet has brought unprecedented changes to the marketing industry (Varadarajan & Yadav, 2009; Wymbbs, 2011).

Customer Relationship Management (CRM)

Payne and Frow (2005) presented a useful conceptual framework for CRM. They viewed CRM strategy as four interactive processes: strategy development, value chain process, multichannel integration and performance assessment. CRM technologies are believed to help improve customer relationship. For example, Jayachandran, Sharma, Kaufman, and Raman (2005) found that CRM technologies moderate the relationship between relational information processing and customer relationship. According to Rapp,

Agnihotri, and Forbes (2008), sales technology can help strengthen salesperson-customer relationship. In addition, Mithas et al. (2005) demonstrated that positive correlations exist between the adoption of CRM applications and customer knowledge as well as customer satisfaction.

Sales Force Automation (SFA)

Buttle, Ang, and Iriana (2006) defined SFA as “the application of information technology to support the sales function”. In sync with Hunter and Perreault (2006)’s view, this dissertation defines sales technologies as all IT technologies that are conducive to the sales performance. Much research has been conducted on the antecedents and consequences of sales technologies in the business-to-business (B2B) contexts and only recently have scholars called for the investigation into the roles of IT/IS in business-to-consumer (B2C) environment (Ahearne & Rapp, 2010). With a triadic framework on the impact of B2C technology linkages, Crittenden, Peterson, and Albaum (2010) concluded that technology plays an important connecting role in the following three pairs of relationships: from the company to the sales force, from the sales force to the consumers and from the consumers to the company. In particular, Crittenden et al (2010) pointed out the need for researchers and practitioners to better understand the impact of connecting technologies on the interface between salespeople and consumers. Many scholars have found evidence that SFA adoption has positive effect on customer satisfaction and sales performance (Homburg, Droll, & Totzek, 2008; V. Kumar, Sunder, & Ramaseshan, 2011; Rapp et al., 2008).

The Internet and Marketing

Besides research on SFA and CRM, extensive scholarly work has been conducted on the impact of the Internet on marketing. In less than two decades, the World Wide Web (or simply the Web) has fundamentally transformed sales, marketing and advertising. With its interactive capabilities, the Web stands out as a connecting platform for Internet users and provides more interactive functionalities than the other traditional media, such as TV, radio or magazines (Li, 2011).

To take advantage of the Web as new interactive publishing venues (Christopher, 2007; De Hertogh, Viaene, & Dedene, 2011), companies were quick to adopt the Web's marketing-customer interfacing features, such as e-commerce sites, web logs, social media networking sites, and virtual social worlds (Kaplan & Haenlein, 2010). From a marketer's perspective, the Web provides both new sales channels and advertising medium (Campbell, Pitt, Parent, & Berthon, 2011; Dou & Krishnamurthy, 2007).

Even though the business impacts of IT on marketing have been studied, few researchers have examined the specific relationship between marketing capabilities and information management capability. Kholi and Grover (2008) contended that IT-enabled information management capability impacts other organizational capabilities, and thus influences overall firm performance. To the best of the author's knowledge, this dissertation is the first cross-disciplinary study to examine the strategic relationship between marketing capabilities and information management capability by using the resource-based view of the firm.

Big Data and Information

Big Data

Despite widespread interest and high hopes in its business value, big data is not yet a well-defined concept (Franks, 2012; Schroeck et al., 2012). Instead of giving a definition for big data, McAfee and Brynjolfsson (2012) sought to delineate the differences between big data and traditional business analytics in three respects: first, the volume of big data is significantly larger; the velocity of data generation is much faster in many situations; and there are many more varieties of formats and sources of data. In addition to volume, velocity, and variety, IBM claimed that big data has a fourth dimension: veracity, which pertains to the inherent uncertainties associated with certain data types (IBM, 2013).

The four-V (volume, velocity, variety, and veracity) description of big data is useful for practitioners, but it is not a rigorous developed construct. Many questions still remain unanswered regarding the fundamental nature of big data. First, how “big” does the quantity of data have to grow to qualify as big data? Petabytes? Zettabytes (Franks, 2012)? Second, it needs to further clarify the difference between big data and the “conventional” data. Even before the so-called “big data era”, many companies have already been processing gigantic data with critical requirements of speed and value, such as the NASDAQ stock exchange and the eBay’s bidding platform. In some sense, big data might not be a totally new thing. Third, how does the big data phenomenon fit into the current IT or marketing processes? Should the big data issue be managed at the organizational level? Are newly designed processes necessary for the successful implementation of big data projects (Desai, 2012)? What is the impact of cooperation and competition between IT and marketing on the success of big data projects?

Information

The concept of information is very important in theory building and applications in both marketing and information systems (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013; Drnevich & Croson, 2013; Maltz & Kohli, 1996; Raju & Roy, 2000). However, information is very difficult to define precisely. In marketing, information is sometimes used synonymously with knowledge (Glazer, 1991) or intelligence (Sinkula, 1994). This type of usage is in line with The Merriam Webster dictionary definition for information: “the communication or reception of knowledge or intelligence.” An important distinction is noteworthy at the beginning and needs to be emphasized: data is not equivalent to information. Big data generally needs to be processed by new methods of marketing and statistical analysis before it can become valuable information.

Information is a double-edge sword to companies. On the one hand, a firm’s ability to process market-related information is especially pertinent in an information-rich environment because information processing is considered an essential activity in the firm’s value chain system (Porter & Millar, 1985). For many companies, it appears that the more information they collect, the better position they are in. Information flows through every activity in the value chain and plays an important part in the formation of competitive advantage. Porter and Millar (1985) also claimed that information technologies affect industry structure, provide companies with competitive advantage and even generate new businesses. More recently, Drnevich and Croson (2013) argued that IT strategy is essential to the firm’s business strategy because information has become embedded in a firm’s products and services. They claimed that IT strategy could contribute to firm performance at the firm level. Besides, they have also provided theoretical underpinnings for how to connect IT values with firm-level strategies.

On the other hand, more data is not necessarily better for at least two reasons. First, human beings are limited by bounded rationality, and the human ability to process and interpret information is constrained (Cyert & March, 1963; Simon, 1991). There appears to be a real danger of information overload in the time of big data. Information overload is not a unique phenomenon in today's world (Eppler & Mengis, 2004). Marketers have been attempting to handle ever-increasing amount of information since the 1960s and marketing information systems have been built to quicken the process of producing marketing intelligence to develop firms' competitive advantages (Cox & Good, 1967; Glazer, 1991; Hulbert, Farley, & Howard, 1972). Moreover, the law of diminishing returns (P. Johnson, 2005) clearly states that adding more inputs to the production process will start to generate lower per-unit returns at certain stage. In Statistics, for example, larger sample size is desirable because the increase can usually lower the sampling error. Nevertheless, adding more observations will not have any significant effect on the sampling error once the sample has reached a certain size. If it is reasonable to believe that information also exhibits the property of diminishing returns, then big data should follow similar inefficiencies.

It might be reasonable to expect that insights provided by IT and marketing scholars regarding the strategic value of information will shed new light on the big data issue. This dissertation will delve deeper into the current research on information and its central position in marketing and IT and provide a strategic framework for research on big data.

Information Processes

Davenport and Prusak (1997) reminds us that the primary function of information is to "inform people." The fate and value of information lie in the hands of the people who acquire, share and utilize it. The information technologies that facilitate the management of information are only part of the "information ecology" (T. Davenport & L. Prusak,

1997), i.e., the company’s overall information environment, which consists of information processes, information technologies, information management, people (Marchand, Kettinger, & Rollins, 2000). Table 1.3 provides a summary of the extant literature on information processes.

Table 1.3: Information Processes: Antecedents and Consequences

| Constructs and Sources | Dimensions | Antecedents | Consequences |
|---|---|---|--|
| Market information processes (Moorman, 1995) | <ol style="list-style-type: none"> 1. Information acquisition 2. Information transmission 3. Conceptual utilization (information commitment and processing) 4. Instrumental utilization | Culture (four types) <ol style="list-style-type: none"> 1) Clan 2) Hierarchy culture, 3) Adhocracy culture 4) Market culture | New product outcomes: <ol style="list-style-type: none"> 1) Performance, 2) Timeliness 3) Creativity |
| (Marchand et al., 2000) | <ol style="list-style-type: none"> 1) Information Technology Practices 2) Information management practices 3) Information behaviors and values | <ol style="list-style-type: none"> 1. Attitude 2. Inspiring Leadership | |
| Relational information processes (Jayachandran et al., 2005) | <ol style="list-style-type: none"> 1) Information reciprocity 2) Information capture 3) Information integration 4) Information access 5) Information Use | <ol style="list-style-type: none"> 1) Customer relationship orientation 2) Customer-centric management systems | Customer relationship performance |

In his doctoral dissertation on information management in the process of new product development, Frishammar (2005b) argued that information processing consists of three main steps: the acquisition, sharing and utilization of information. A major false belief of information processes is that they are necessarily linear and sequential. A product manager recognizes the need to gather information about consumers’ possible reactions to

potential value-adding features in a new line of products. The political infighting between the product development team and marketing might prevent the product manager from seeking information from the marketing group. In this instance, information activities stop after the need identification. Another assumption seems to be that the quality of information is always guaranteed. In fact, if wrong and misleading information is shared smoothly and promptly, the consequence can be more detrimental than lack of information sharing.

The Learning Mechanism for Marketing Departments

In order to respond to various challenges, marketing departments find it necessary to keep increasing their capabilities by engaging in constant learning processes (Sinkula, Baker, & Noordewier, 1997; Slater & Narver, 1995). Recognizing the importance of organizational learning to marketing functions, marketing researchers have started to build up a significant literature on organizational learning and marketing (Slater & Narver, 1995). Learning theory acts as an important tool for marketers to better understand several crucial concepts, such as marketing orientation (Kohli & Jaworski, 1990), marketing capabilities (Morgan, Vorhies, et al., 2009) , marketing exploration and exploitation (Vorhies et al., 2011). The organizational learning literature is relevant to the study of marketing capabilities, because cross-functional learning directly impacts marketing capabilities.

Huber (1991) presented an excellent review on the four closely-related processes in organizational learning: the acquisition of knowledge, the distribution and interpretation of information, and organizational memory. The process-oriented approach to organizational learning provides valuable insights into the issue of marketing capabilities. Learning-oriented firms can adapt to the changes in external environment more quickly

and discern the changes in customer tastes and attitudes in a timely manner. Then it is not surprising that both marketing literature and industry wisdom have confirmed that a learning-oriented organization is better at customer service and that the level of customer satisfaction is higher (Morgan, Vorhies, et al., 2009). When organizations are faced with the challenges of big data and competitive environment (George S. Day, 2011), learning can help close the “widening” marketing capabilities gap.

Vorhies et al. (2011) explored how to enhance marketing capabilities through exploitation and exploration. Day (2011) posited that marketing capabilities have evolved from the dynamic stage to the adaptive stage through continuous exploration and exploitation. He proposed that marketing capabilities could be defined differently based on the “outside-in” and “inside-out” approaches. The “inside-out” approach begins with the firm’s inside capabilities and treats the firm as the vantage point. Thus marketing capabilities are dynamic through continuous exploration. In contrast, the “outside-in” approach starts with the market. Market-driven organizations must adapt well to the external environment and develop both adaptive and dynamic marketing capabilities (Day, 2011).

Value Chain

Since the publications of the seminal writings of Alfred Chandler (Chandler, 2007), the so-called classical school of strategy has provided prominent paradigms on strategic thinking and practice (Mintzberg, 1990). The classical positioning school’s representative scholar is Michael Porter, who argues that the fundamental inquiry in strategy is to find out what factors determine the success or failure of firms (Michael E Porter, 1991). If a firm needs to maintain sustainable competitive advantage in order to achieve long-term success, then what is the means by which competitive advantage can be discovered and enhanced?

Porter's answer is the value chain. Porter (1998) posited that the value chain "divides a firm into the discrete activities it performs in designing, producing, marketing, and distributing its product". Since marketing capability is a resource inside the firm, this dissertation adopts the value-chain model for its value to analyze and examine the internal firm resources.

Porter's five-forces model (Michael E Porter, 2008b) and value-chain analysis (Michael E Porter, 2008a) have been useful strategic frameworks for practitioners. The value-chain framework, which Porter calls the activity-based theory of the firm, uses the concept "linkages" to describe the interdependencies, or the coordination and competition of various activities, including marketing and IT-related activities. According to Porter (2008a), the generic value chain consists of primary and support activities. For example, the activity conducted by the marketing and sales groups belongs to one of the primary activities. The information system is a major component of technology development, which is a support activity. Each of the nine value-adding activities is both a consumer and a producer of information, so it is easy to see why information technologies permeate the whole value chain (M. Porter & V. Millar, 1985). The author argues that observing the cooperation between IT and marketing through the lens of value chain brings new understanding of marketing capability.

As shown by the value chain framework, IT is the supporting activity to the primary organizational activities such as operations, marketing and services and so on. The IT-enabled information management capability enhances the information flow and exchange within the organization. Based on the resource-based view, information management capability and marketing capabilities are important resources of organizations. However, these resources are not static and can be influenced by various internal and external factors

such as technology turbulent environment, competitor uncertainty, and so on (Trainor et al., 2011).

Field Interviews on Marketing Information Capability

The literature review in marketing, IT and strategy provides a solid theoretical foundation for the construct of marketing information capability as an important firm capability. However, the research on the role of marketing information capability in the digital age is new and no definition exists. Besides, no research has addressed its antecedents and consequences. To augment the insights from literature review, the author conducted interviews with 12 industry executives and practitioners. In addition, the essay will develop a scale for measuring marketing information capability. Conducting field interviews is an important step in scale development (Netemeyer, Bearden, & Sharma, 2003). Among the interviewees, nine were from the marketing function and three were from the IT function. The majority of the interviews were recorded.

Interview Procedures

First, the interviewer introduced the purpose of the study. Interviewees were informed that the study examines marketing information capability at the organizational level and aims to identify the distinct capacities that organizations possess in market information management. Interviewees were welcome to share their cross-functional perspectives on marketing information capability.

Second, the interviewees were informed that the research project sought to collect information at the aggregate level. If the information from the interview was used in the research publication, the interviewees and their organizations would not be explicitly identified.

Third, background information was collected regarding the interviewees' positions in their companies and their companies' information.

Fourth, each interviewee was provided with six questions. Their feedback was audio recorded in most cases. For the rest, detailed notes were taken by a second interviewer, whose sole function was to write down the interviewee's responses when recording was not possible.

Fifth, the interviewer wrapped up the interview and thanked the executives and practitioners for their feedback.

Interview Questions

Six groups of questions were asked. The questions were:

First, what does "marketing information capability" mean to you? Can you please give specific examples for marketing information capability in your professional domain?

Second, what factors improve marketing information capability? What factors impede marketing information capability?

Third, are there any beneficial impacts of marketing information capability? Any detrimental consequences?

Fourth, can you think of any situations where marketing information capability is important? What about situations where marketing information capability is not important?

Fifth, what does "big data" mean to you? Has your organization implemented any big data project? If yet, what are the results? If no, what are the reasons? Is there any distinct marketing information capability that is very important in big data projects?

Sixth, how does your organization handle the information in social media? How frequently does your organization use social media for informational purpose?

Interview Results

A close analysis of the interview responses revealed that marketing and IT executives regard marketing information capability as an important firm-level capacity. They confirmed that marketing information capability is significantly impacted by cross-functional cooperation, IT capabilities, and the influence of the marketing department within the firm. As far as the consequences of marketing information capability are concerned, firm financial performances and customer satisfaction are the two major factors.

One significant antecedent variable provided by the interviewed executives is top management emphasis. The proposition regarding it will be provided in the following research propositions section under top management emphasis on market.

MARKETING INFORMATION CAPABILITY

Definition

Based on an extensive review of current literature in marketing, IT and strategy and insights from field interviews, *marketing information capability is defined as a marketing department's capability to effectively and efficiently collect, disseminate, process and utilize information about the firm's customers and competitors.* A firm's marketing information capability is manifested in organizational information processes. To the best of the author's knowledge, this essay is the first one that formally defines marketing information capability.

It is important to identify the end users of information (Peter F Drucker, 1990). As Drucker (1990) puts it, "We'll have to learn, before understanding any task, to first ask the question, 'what information do I need, and in what form, and when?'" What business functions does it serve? How many business groups will the effort involve? What business objectives does it satisfy? When is the information needed? The next important step in

information acquisition is to determine the source of the required data and information (T. H. Davenport & L. Prusak, 1997). Marketing managers should be able to decide whether the information should be acquired from internal customer database, or generated from external market intelligence, or obtained from marketing consultants (Kotler & Keller, 2012). Sometimes they need multiple sources of information.

The distribution of information can happen at many levels. It happens at the intra-functional level when the marketing department personnel share information within the marketing group. This type of information dissemination is probably the easiest to manage. Then marketing information usually needs to travel across departments and boundaries. Cross-functional information sharing has been found to be important success factor in financial performance. Today, many companies need to share marketing information with their suppliers and customers.

Information processing takes many forms: such as categorizing and packaging (Davenport & Prusak, 1997), integrating (Jayachandran et al., 2005) and interpreting (Day, 1994a) of information. Moorman (1995) regards information processing as the conceptual use of information.

The utilization of marketing information and knowledge have been studied in depth by several scholars (Blattberg, Glazer, & Little, 1994; Menon & Varadarajan, 1992). The value of information and knowledge cannot be realized without being utilized. Thus, the utilization of the information is included as one of the dimensions of marketing information capability.

A Preliminary Conceptual Model

Based on literature reviews and field interviews, a summary of the antecedents and outcomes of marketing information capability is provided in Figure 1.1. It acts as a

preliminary conceptual model for marketing information capability. The tentative model shows that marketing information capability is an important variable – perhaps an important mediator – for a variety of antecedents and consequences.

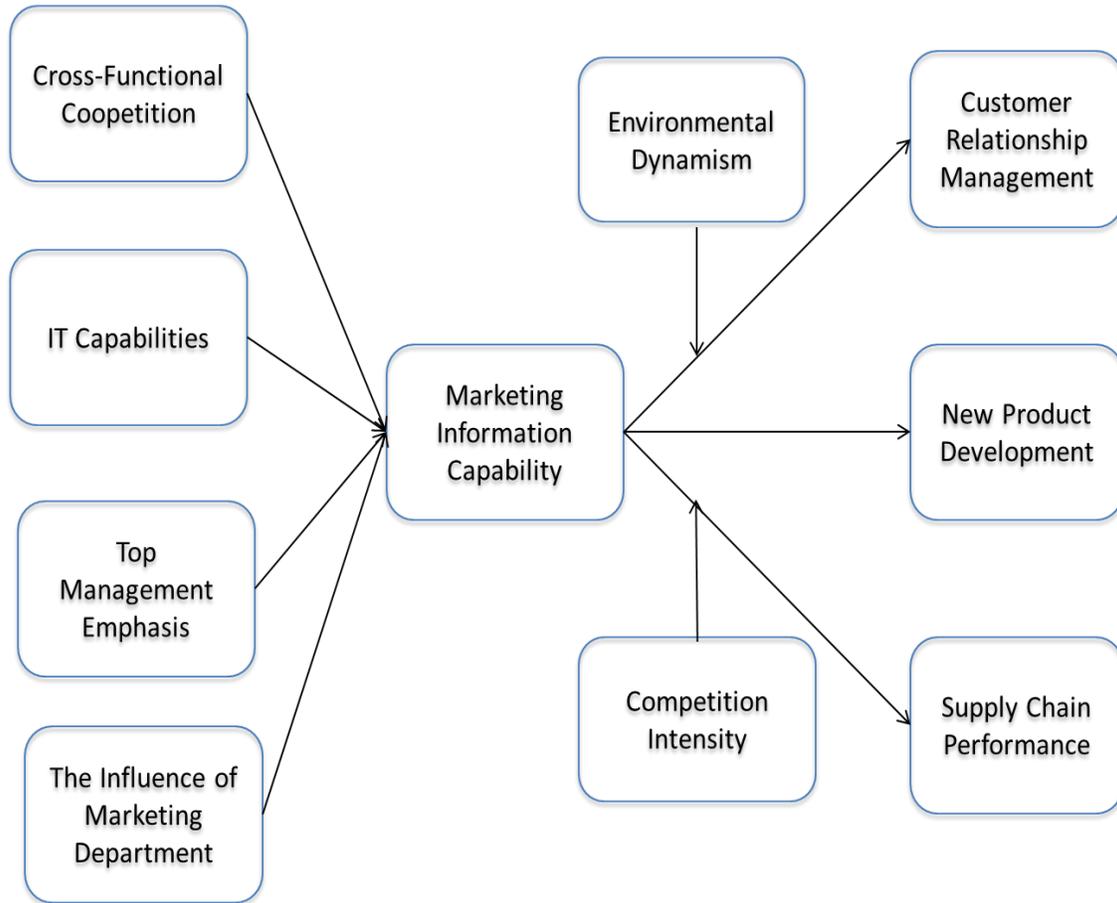


Figure 1.1: A Preliminary Model for Marketing Information Capability

Antecedent Variables

Drawing from a cross-disciplinary literature review and interviews with marketing and IT executives, this essay includes four antecedents to marketing information capability.

Cross-Functional Coopetition

Previous research has demonstrated that one of the factors that hinders organizational performance is the knowledge or information transfer across different functional groups within the organization (Szulanski, 1996). Different departments have to cooperate with each other, and they also have to compete for the limited resources and available information within the organization (Luo, Slotegraaf, & Pan, 2006). Coopetition is simultaneous cooperation and competition, and it can happen at three different levels: individual, functional department, or firm level (Brandenburger & Nalebuff, 2011; Luo et al., 2006; Tsai, 2002). While most previous research investigated the coopetition phenomena on the inter-firm level (Rindfleisch & Moorman, 2003; Zeng & Chen, 2003), very little has focused on the intra-organizational level (Luo et al., 2006). This dissertation restricts the discussion to the coopetition that occurs among different groups within a firm, i.e., cross-functional coopetition or intra-organizational coopetition. Luo et al. (2006) defined the construct of cross-functional coopetition as “the joint occurrence of cross-functional cooperative ability and competition” and “the joint occurrence of cross-functional cooperative intensity and competition.” Cross-functional cooperative ability is defined as the skills to learn, transform and disseminate knowledge through cross-functional interactions, and cross-functional cooperative intensity refers to how frequently and closely the different departments interact with each other (Luo et al, 2006).

Some previous researchers posited that cross-functional conflicts can produce benefits for the organization (Anderson & Narus, 1990; Lado, Boyd, & Hanlon, 1997). Luo et al (2006) found empirical evidence that cross-functional performance can positively impact customer relationship management and firm performance. In addition, several scholars argue that appropriate level of coordination and competition increases customer

retention (Brodie, Winklhofer, Coviello, & Johnston, 2007; Trainor, Rapp, Beitelspacher, & Schillewaert, 2011). Consequently, both marketing and information systems scholars have recognized the importance of organizational learning and cooperation from each other. For instance, Sinkula (Sinkula, 1994) used organizational learning models to explain how organizations acquire and process information. However, it is inevitable that competition exists between different functional groups. It is meaningful to explore the phenomenon of cooptation more in depth.

Departments within firms must coordinate at least to some degree with each other because they all share explicit common goals specified by the overall firm. At the same time, however, cross-functional relationships exhibit competitive characteristics because of the existence of separate needs and sub-goals of different departments (Tsai, 2002). The strategic integration between IT and marketing departments showcases this cooptation relationship very well. An illuminating concept that sheds light on the nature of cooptation is “linkages.” In Porter (1998)’s value chain system, linkages play a connecting role among different codependent value activities. The IT department provides support for the marketing and sales department.

Customer relationship management (CRM) is an area where IT and marketing cooperation can be especially beneficial. The usages of many of the new CRM technologies span boundaries between IT and marketing departments. Empowered by the more efficient flow of information, customers become increasingly more connected and knowledgeable about products and services and are in a position to demand more from firms. Meanwhile, new digital technologies keep emerging that have direct impacts on the firm’s ability to interface with customers. Research findings show that when marketing departments learn from and cooperate with the IT group, the processes of customer acquisition and retention

can be improved (Brodie et al., 2007; Trainor et al., 2011). IT personnel can also benefit from coordination with the marketing personnel by better understanding business requirements and customer needs.

On the other hand, since IT and marketing are two distinct departments, they sometimes have to compete for limited firm resources and tension and conflicts always exist. Take the case of big data and business analytics for example. Business analysis is a traditional marketing domain. However, the complexities of big data projects require comprehensive knowledge of both analytical/statistical models and IT processing skills. As CMOs plan to increase their own departments' capability to manage data and information, competition between marketing and IT departments will start to appear (Desai, 2012).

IT Capabilities

Information management capability is an important construct in this dissertation. Its complete understanding has made it necessary to perform a detailed examination of the concept of information and the important role of information in a firm's strategy development. As the literature review on information in the previous section has indicated, information has the potential to provide companies the opportunities to gain sustained competitive advantage. This section will investigate how companies manage information through their information management capability.

The review will first present the modern definitions of information management capability. Then its connections with and differences from other IT capabilities will be discussed. Also covered is the potential strategic value of information management capability as an organizational level resource.

Many researchers proposed to focus on information rather than on the underlying technologies. Marketing researcher Glazer (1991) pointed out that it is necessary to go “beyond the technology to view management of ‘information’ itself as an asset to gain competitive advantage.” IT scholars have also long recognized the importance of effective management of information. For instance, Marchand, Kettinger and Rollins (2000) observed more than 1000 high-level executives and concluded that “information technology improves business performance only if combined with competent information management and the right behaviors and values”. They brought up the concept of information orientation as a valuable tool to evaluate whether a firm manages its information effectively. In addition, they identified three basic capabilities related to information orientation: the capabilities to (1) manage the supporting IT infrastructure, (2) manage the information and (3) establish a culture that fosters effective consumption of information.

Borrowing from the information orientation concept, Mithas et al. (2011) defined information management capability as the “ability to provide data and information to users with the appropriate levels of accuracy, timeliness, reliability, security, confidentiality, connectivity, and access and the ability to tailor these in response to changing business needs and directions.” Mithas et al.’s working definition of information management capability is similar to information orientation in two respects: the supporting technologies and the quality of the information. However, it is missing a critical element, i.e., the company’s capacity to encourage and guide its people to take good advantage of information. As Marchand et al (2000) pointed out, the quality of IT management practices and the ability to instill the culture of information are important factors to a firm’s success. Therefore, while recognizing the value of Mithas et al (2011)’s efforts in conceptualizing

information management capability, the author believes their definition needs to be improved and the culture element must be incorporated.

Mithas et al (2011) made another contribution to the IT literature by conducting the first empirical research with a primary focus on information management capability and its relationship with firm performance. Those authors found empirical evidence that information management capability positively impacts firm-level capabilities, such as process and performance capabilities, which mediate the relationship between information management capability and firm performance. Most recently, Setia, Venkatesh and Joglekar (2013) studied customer service units of a large Indian bank and discovered that the quality of information positively impact customer orientation capability and customer service capability, which both have mediating effects on the relationship between the quality of information and the performance of customer service. This finding further highlights the importance of competent information management and the firms' need to acquire high information management capability.

Marketing Department's Influence

Several marketing scholars have voiced their concern about the declining influence of the marketing function within firms (Verhoef & Leeflang, 2009). Whenever there is economic upheaval, the budgets and personnel of the marketing departments are usually the first to be negatively impacted, since marketing is considered to be non-critical for the firm. This is paradoxical according to Porter's value chain system, in which marketing is regarded as a primary activity. As puzzlingly, the importance of the role of chief marketing officer is also believed to be decreasing (Nath & Mahajan, 2008).

It seems that contingency theory can be applied to explain why the marketing departments have diminishing power in the companies. According to a strategic

contingencies' theory of intra-organizational power, the power of a department is dependent on "its coping with uncertainty, substitutability, and centrality" (Hickson, Hinings, Lee, Schneck, & Pennings, 1971). Like the marketing departments, the IT groups encounter similar situations at difficult financial times. Logically, the marketing information capability will be harmfully influenced whenever the power of the marketing is decreased.

Top Management Emphasis

This is an important insight drawn from the interview results. The rationale is that marketing information capability will develop more fully and become more helpful if top management put a great emphasis on the importance of the information concerning the customers and competitors. This is actually easy to understand: if the management team cares very much about market information, the marketing group will be able to more easily garner the necessary symbolic support and critical financial resources. Consequently, the firm's marketing information capability will grow stronger.

Consequence Variables

This essay examines three consequences of marketing information capability. Drawing insights from resource-based view and market-based assets, the essay includes customer relationship management, new product development performance and supply chain management performance.

According to Srivastavaa, Faheyb and Christensen (2001), marketing-specific resources impacts firm performance indirectly by working through three market processes, including customer relationship management, product development and supply-chain management.

SCALE DEVELOPMENT PROCESS

As was noted earlier, there is no known scale measuring marketing information capability. Consequently, the remainder of this essay describes the process used to develop a reliable and valid scale for this construct. This author has followed the four-step scale development procedure prescribed by Netemeyer, Beardon, and Sharma (2003). First, construct definition for marketing information capability was provided. Second, the initial scale items were created from literature review and field interviews and were then evaluated by domain experts. Third, the scale items were purified in study one. Fourth, the scale was tested and finalized in study two. The final scale has passed the important test criteria for exploratory factor analysis and confirmatory factor analysis (Hair, Black, Babin, & Anderson, 2010; Netemeyer et al., 2003).

Construct Conceptualization

Marketing information capability is a type of marketing capabilities. *It is defined as a marketing department's capability to effectively and efficiently collect, disseminate, process and utilize information about the firm's customers and competitors.* It is a firm-level resource that enables marketing departments to collect, disseminate, process and utilize information effectively and efficiently so that firms can take prompt actions to address critical business issues in dynamic environments. Marketing information capability is a second order construct that has four dimensions: information acquisition, information dissemination, information processing and information utilization.

Initial Item Generation and Revision

The initial items of the scale came from two main sources: research findings and field interviews. Literature review from marketing, management and information systems reveal four factors for marketing information capability. Those factors describe

marketing's capabilities to acquire, distribute, process and utilize information for marketing and organizational purposes.

Phone interviews were conducted with 12 company executives from companies of all sizes. The purpose of the interview was to find out how marketing and IT professionals view marketing information capability and its important role. Each interview took about 30 minutes.

The initial scale items were generated from literature review and qualitative interviews. The items were sent to four domain experts who were marketing PhD students to evaluate construct validity and face validity. A total of 30 items were listed. All the items were mixed up. The domain experts were asked to put those items into four distinct groups: acquiring information, distributing information, processing information and utilizing information. In addition, they were asked to point out any confusing items. The purpose of domain expert evaluation is to conduct initial judgment of the scale items. Revisions were made based on the domain experts' feedback. One item was deleted because the majority of the experts did not agree on which dimension the item should belong to.

Study One: Item Purification

After initial item generation and revision, it was conceptualized that marketing information capability is a multi-dimensional, second-order construct which consists of four factors: the acquisition of information, the dissemination of information, the processing of information, and the utilization of information. Study one was conducted to further purify the generated items.

The survey participants were business executives who work in marketing, sales and customer services functions from diverse industries such as retailing, telecommunication and high technology. The author recruited business school students who were asked to

provide the contact information for one company executive. A student would receive one extra class credit if his or her recommended business executive had participated in the survey.

The online survey was implemented through the Qualtrics website. A total of twenty-nine items were included in the online survey. The survey used a seven-point Likert scale (Nunnally, 2010) for the performance of each of the various items of marketing information capability. The levels ranged from strongly disagree; disagree; somewhat disagree; neither disagree nor agree; somewhat agree; agree; strongly agree. Emails containing the link for the online survey were sent to 59 company executives. Forty-one responses were received and the response rate was 69%.

Cronbach's Alpha reliability measures indicated that all of the factors met the 0.70 benchmark and the reliabilities for the four dimensions were high, with .82 for marketing information acquisition, .85 for marketing information dissemination, .87 for marketing information processing and .78 for marketing information utilization. Five items were deleted because of cross-loading issues.

Study Two

After the scale items had been further purified by study one, study two was conducted to validate latent structure of the retained items. The complete list of items used in Study Two is provided in Appendix A.

Sample

The procedure to collect data for study two was similar to that of study one. Undergraduate students from a large business school located in the South of the United

States were invited to provide contact information for senior business executives. Those students whose contacts participated in the survey received one extra class credit.

The survey participants consisted of marketing, sales, customer services and IT executives from diverse industries, such as retailing, healthcare and financial services. About one hundred forty surveys were sent to the listed company executives via emails. Ninety-five business executives responded to the survey. The response rate was 68%. A total of thirty-three items were included in the Qualtrics survey.

Exploratory Factor Analysis

An exploratory factor analysis of the data was carried out. Varimax rotation was used. The author deleted the items whose loadings were below .5 (Hair et al., 2010; Netemeyer et al., 2003). Only the items whose loadings were higher than .5 were retained. Three of those items had cross-loading issues and were deleted (see Table 1.4). Finally, information acquisition had five items; information dissemination had six items; information processing had six items; and information utilization had three items.

Table 1.4. Scale Items and Exploratory Factor Analysis Output

| Full Set of 33 Variables | Factor | | | |
|---|-------------|---|---|------------------|
| | 1 | 2 | 3 | 4 |
| Our marketing department is able to.... | | | | |
| continuously collect information from customers. | .555 | | | .523 * |
| continuously collect information about competitors. | | | | .578 |
| continuously collect information about relevant public other than customers and competitors. | | | | .718 |
| continuously collect information from external experts, such as marketing consultants. | | | | .793 |
| continuously collect information from other functional departments, such as billing or IT. | | | | .688 |
| continuously collect information through marketing intelligence, such as social media or online search. | | | | .563 |

(Table 1.4 continued)

| Full Set of 33 Variables | Factor | | | |
|---|-------------|--------------|--------------|---|
| | 1 | 2 | 3 | 4 |
| Our marketing department is able to disseminate information by ... | | | | |
| holding interdepartmental meetings to discuss market trends and developments. | | | .605 | |
| spending time discussing customers future needs with other functional departments. | | | .649 | |
| circulating important documents (e.g. reports, newsletters) on customers. | | | .692 | |
| communicating closely with other functional departments concerning market trends and developments. | | | .707 | |
| communicating closely with other functional departments concerning customers. | | | .699 | |
| alerting other departments when it finds out something important about customers. | | | .651 | |
| alerting other departments when it finds out something important about competitors. | | .681 | .511* | |
| Our marketing department is able to correctly and promptly... | | | | |
| process market information to reduce its complexity so that the information is easier to understand. | .558 | | | |
| process customer information from various functions that interact with customers. | .665 | | | |
| process information about market trends and developments. | .717 | | | |
| integrate customer information from different communication channels (such as telephone, e-mail, the Internet, or personal contact). | .777 | | | |
| integrate competitor information from different communication channels (such as telephone, e-mail, the Internet, or personal contact). | .545 | .587* | | |
| integrate market trends information from different communication channels (such as telephone, e-mail, the Internet, or personal contact). | .751 | | | |
| organize information about customers in meaningful ways. | .670 | | | |

(Table 1.4 continued)

| | | | |
|--|--|-------------|--|
| Our marketing department is able to..... | | | |
| use information to develop competitor profiles. | | .807 | |
| use information to evaluate competitors. | | .783 | |
| use information to respond to competitors moves. | | .703 | |

* denotes the cross-loaded items that are deleted.

Confirmatory Factor Analysis

Confirmatory factor analysis was subsequently performed on the remaining 20 items. The initial CFA test result indicated that seven more items needed to be deleted because they were cross-loaded with the other factors. The final scale had 13 items and four dimensions (see Figure 1.2 for details), which were information acquisition (three items), information dissemination (four items), information processing (three items) and information utilization (three items). In addition, using AMOS 20, the author conducted confirmatory factor analysis on the same dataset to confirm the latent structure of the second order construct (Hurley et al., 1997).

The results demonstrated that the proposed model met the typical requirements of fitness indices (Kline, 2011). The chi-square value is 71.8. GFI (Goodness-of-Fit Index) is .90, CFI (Comparative Fit Index) is .985 and RMSEA (Root mean square error of approximation) is .048. Refer to Table 1.5 for the detailed model fit descriptions and the complete result. The first level of the subdimensions demonstrated good model fit. The scale reliability, convergent validity and discriminant validity of these four constructs were also examined. Since these four constructs are first level factors, the convergent validity and discriminant validity were focused on the first level in study two. Future study three will demonstrate the convergent validity and discriminant validity at both first level and second level constructs.

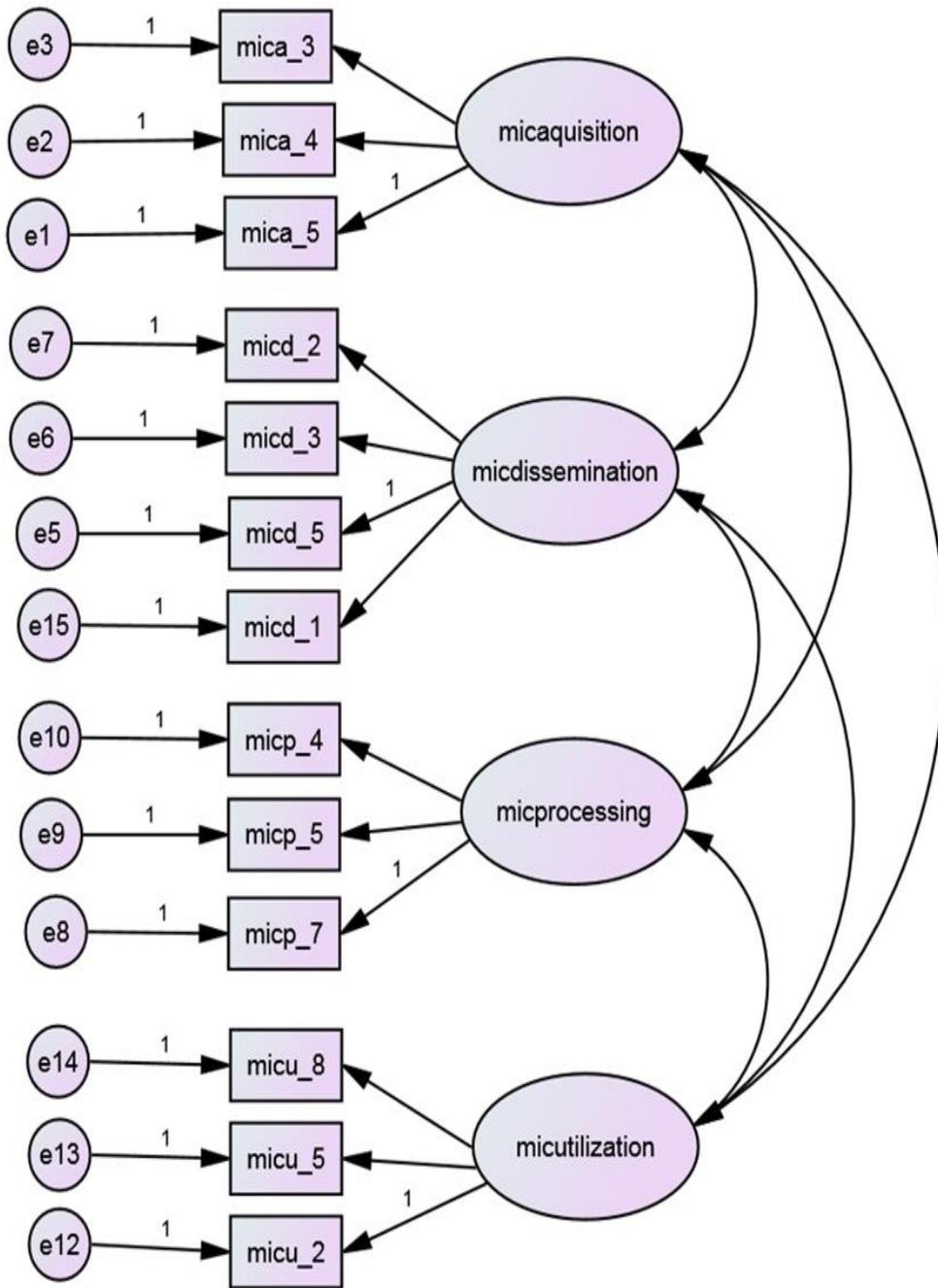


Figure 1.2: CFA Model
 (Refer to Appendix A for the items and their names in the model)

Table 1.5: CFA Model Fit Summary

| CMIN | | | | | |
|------------------------------------|---------------|-------------|---------------|-------------|---------|
| Model | NPAR | CMIN | DF | P | CMIN/DF |
| Default model | 32 | 71.801 | 59 | .122 | 1.217 |
| Saturated model | 91 | .000 | 0 | N/A | N/A |
| Independence model | 13 | 959.555 | 78 | .000 | 12.302 |
| RMR, GFI | | | | | |
| Model | RMR | GFI | AGFI | PGFI | N/A |
| Default model | .089 | .904 | .852 | .586 | N/A |
| Saturated model | .000 | 1.000 | N/A | N/A | N/A |
| Independence model | 1.065 | .229 | .100 | .196 | N/A |
| Baseline Comparisons | | | | | |
| Model | NFI Delta1 | RFI rho1 | IFI Delta2 | TLI rho2 | CFI |
| Default model | .925 | .901 | .986 | .981 | .985 |
| Saturated model | 1.000 | N/A | 1.000 | N/A | 1.000 |
| Independence model | .000 | .000 | .000 | .000 | .000 |
| Parsimony-Adjusted Measures | | | | | |
| Model | PRATIO | PNFI | PCFI | N/A | N/A |
| Default model | .756 | .700 | .745 | N/A | N/A |
| Saturated model | .000 | .000 | .000 | N/A | N/A |
| Independence model | 1.000 | .000 | .000 | N/A | N/A |
| RMSEA | | | | | |
| Model | RMSEA | LO 90 | HI 90 | PCLOSE | N/A |
| Default model | .048 | .000 | .083 | .509 | N/A |
| Independence model | .347 | .327 | .367 | .000 | N/A |

Scale Reliability

Cronbach's alpha was used to measure scale reliability. The benchmark score for Cronbach's alpha was 0.70 (Cronbach, 1951). All of the four dimensions met the reliability criteria: information acquisition (0.85), information dissemination (0.87), marketing information processing (0.90) and information utilization (.91). Average variance extracted (AVE) was also used to test reliability (Fornell & Larcker, 1981). AVE values for all of the examined factors in a model must exceed .50 (Fornell & Larcker, 1981). The CFA test demonstrated that the AVEs for the four dimensions were all above .50 and thus met the reliability requirements.

Discriminant Validity

In order to demonstrate that the four dimensions in the model are four distinct constructs, it is necessary to prove that the constructs have discriminant validity. One of the approaches to test discriminant validity is to compare the squared correlations between constructs with the AVE from each construct (Fornell & Larcker, 1981). To establish discriminant validity, the AVEs of the constructs are required to be higher than the squared correlations between constructs. As shown in Table 1.6, all AVE values of the constructs are higher than the squared correlations between the constructs. Therefore, it can be reasonably concluded that discriminant validity between the constructs exists and the four dimensions are distinct.

Table 1.6: Average Variance Extracted and Standardized Correlation between Factors

| Average Variance Extracted | |
|-----------------------------------|-----|
| Market Information Acquisition | .56 |
| Market Information Dissemination | .77 |
| Market Information Processing | .70 |
| Market Information Utilization | .72 |

(Table 1.6 continued)

| Correlations Between Factors | |
|---|-------------|
| Market Information Acquisition and Market Information Dissemination | .706 (.50*) |
| Market Information Acquisition and Market Information Processing | .56 (.31) |
| Market Information Acquisition and Market Information Utilization | .709 (.50) |
| Market Information Dissemination and Market Information Processing | .817 (.67) |
| Market Information Dissemination and Market Information Utilization | .605 (.37) |
| Market Information Processing and Market Information Utilization | .627 (.39) |

*denotes the squared correlations between constructs

Convergent Validity

All the loadings from the constructs to their individual indicators are significant and most of the standardized regression weights are above 0.7. Moreover, the calculations of average variance extracted (AVE) show that the AVE value of each construct exceeds the minimum threshold of .5 (Fornell & Larcker, 1981) and the reliability requirement is met, too. In addition, the proposed model fits very well as shown in Table 1.5. Therefore, the final items in the model demonstrate enough evidence for convergent validity.

Nomological Validity

Assessments of the nomological validity were based on the correlations between factors constructs (Netemeyer et al., 2003). The constructs were supposed to be positively correlated to each other. The data results supported the prediction that the four dimensions all have significant positive correlations with the second-order construct—marketing information capability. Therefore, all the constructs fulfilled the requirements of nomological validity.

Study Three

Study two produced nineteen scale items. The purpose of study three is to further validate and then finalize those nineteen items.

Sample

Study three used the same procedure for data collection as in the two previous studies. Contact information for senior marketing and sales executives were acquired from undergraduate students who were business majors from a large university in the south of the United States. Those students received one course credit in return. These students are different students from Study Two and thus the respondents for this study are different from those in Study Two as well.

Based on the scale development results from study two, a total of nineteen items for the final scale were included in the survey, which was implemented on the Qualtrics website. About 290 surveys were sent via emails to senior marketing or sales executives. One hundred and eighty responded to the surveys. Those survey participants came from different industries, including healthcare, retailing, and financial services. The response rate was 62%.

Exploratory Factor Analysis

Because of the different sample size from Study Two, first, an exploratory factor analysis of data was conducted. The items whose loadings were below .5 need to be deleted (Hair et al., 2010; Netemeyer et al., 2003). One item was cross-loaded and thus were deleted (see Table 1.7). Thirteen items were kept. And all their loadings were higher than .5. The exploratory factor analysis test confirmed that the construct of marketing information capability has four factors: information acquisition (three items), information

dissemination (four items), information processing (three items) and information utilization (three items).

Table 1.7. Scale Items and Exploratory Factor Analysis Output

| Full Set of Variables | Factors | | | |
|---|---------|------|-------|------|
| | 1 | 2 | 3 | 4 |
| Our marketing department continuously collects information | | | | |
| about customers. | | | | .790 |
| from external experts, such as marketing consultants. | | | | .770 |
| from other functional departments, such as billing or IT. | | | | .736 |
| Our marketing department accurately and timely disseminates information by ... | | | | |
| holding interdepartmental meetings to discuss market trends and developments. | | | .656 | |
| spending time discussing customers future needs with other functional departments. | | | .669 | |
| circulating important documents (e.g. reports, newsletters) on customers. | | | .778 | |
| circulating important documents (e.g. reports, newsletters) on competitors. | | .616 | .578* | |
| communicating closely with other functional departments concerning market trends and developments. | | | .630 | |
| Our marketing department is able to accurately and timely... | | | | |
| process information about market trends and developments. | .728 | | | |
| integrate customer information from different communication channels (such as telephone, e-mail, the Internet, or personal contact). | .769 | | | |
| integrate market trends information from different communication channels (such as telephone, e-mail, the Internet, or personal contact). | .545 | | | |
| Our marketing department effectively uses information to..... | | | | |

(Table 1.7 continued)

| Full Set of 33 Variables | Factors | | | |
|-------------------------------|---------|------|---|---|
| | 1 | 2 | 3 | 4 |
| develop competitor profiles. | | .801 | | |
| evaluate competitors. | | .820 | | |
| respond to competitors moves. | | .787 | | |

*denotes the cross-loaded item that is deleted.

Confirmatory Factor Analysis

Since marketing information capability is a second-order construct, the author used AMOS 20 to conduct a two-step confirmatory factor analysis. The first step tested marketing information capability's four dimensions as first-order constructs. The second step tested marketing information capability itself as a second-order construct.

First-Order Construct Testing

The initial test result from confirmatory factor analysis showed that one item must be deleted due to a cross loading issue. Confirmatory factor analysis demonstrated that these items were loaded on four different dimensions and the sample data was consistent with the hypothesized measurement model (see Figure 1.3). The chi-square value was 67.614. CFI was .981 and RMSEA (see Table 1.8) was .048. The CFA results demonstrated that the hypothesized model met the standard criteria of fitness indices (Kline, 2011).

Table 1.8: CMIN Model Fitness for the Four Dimensions of Marketing Information Capability

| Model | NPAR | CMIN | DF | P | CMIN/DF |
|--------------------|------|----------|----|------|---------|
| Default model | 42 | 67.614 | 48 | .032 | 1.409 |
| Saturated model | 90 | .000 | 0 | | |
| Independence model | 24 | 1073.223 | 66 | .000 | 16.261 |

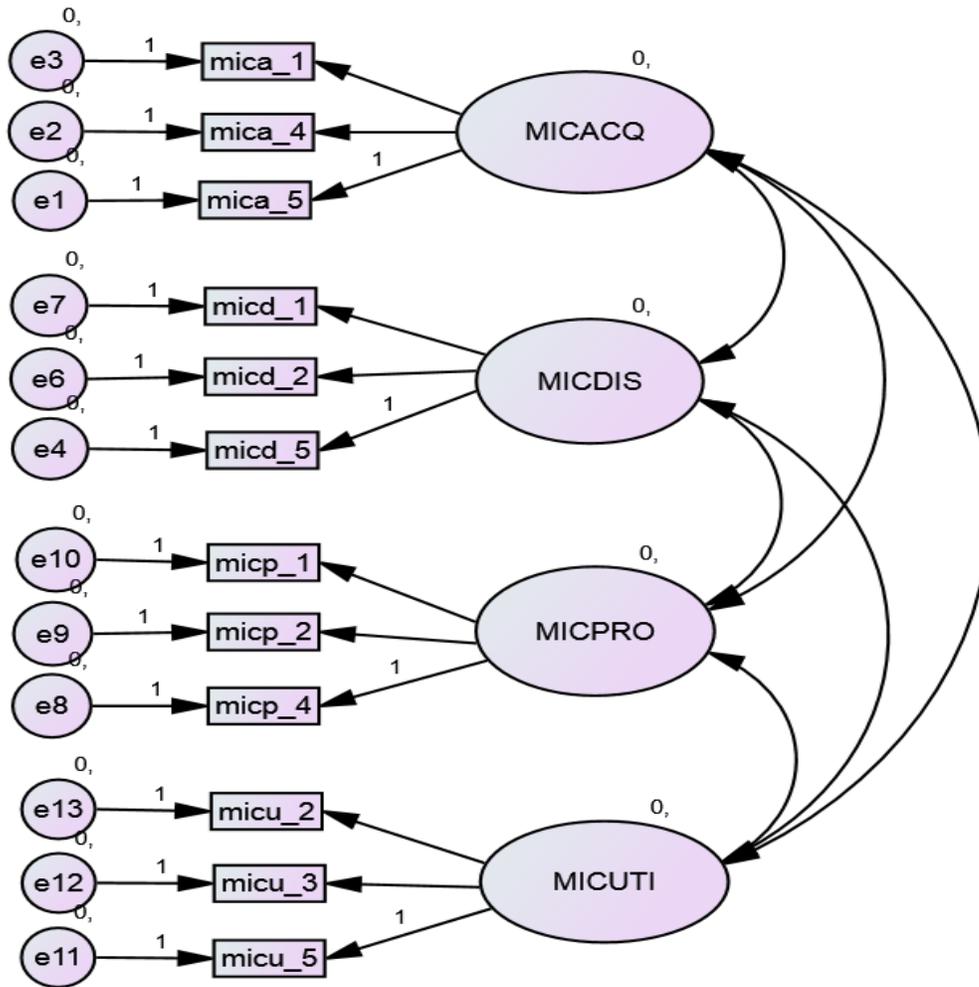


Figure 1.3: Measurement Model
 (Refer to Appendix C for the items and their names in the model)

Second-Order Construct Testing

Then the testing of the second-order CFA model further confirmed the latent structure of the marketing information capability (Hurley et al., 1997) (See Figure 1.4). The chi-square value was 71.351. CFI (Comparative Fit Index) was .979 and RMSEA (Root mean square error of approximation) was .049 (Refer to Table 1.9 for complete result). All of the above model fitness indices met the standard requirements (Kline, 2011).

The finalized scale for marketing information capability (see Appendix C) included twelve items belonging to four dimensions, which were information acquisition (three items), information dissemination (three items), information processing (three items) and information utilization (three items).

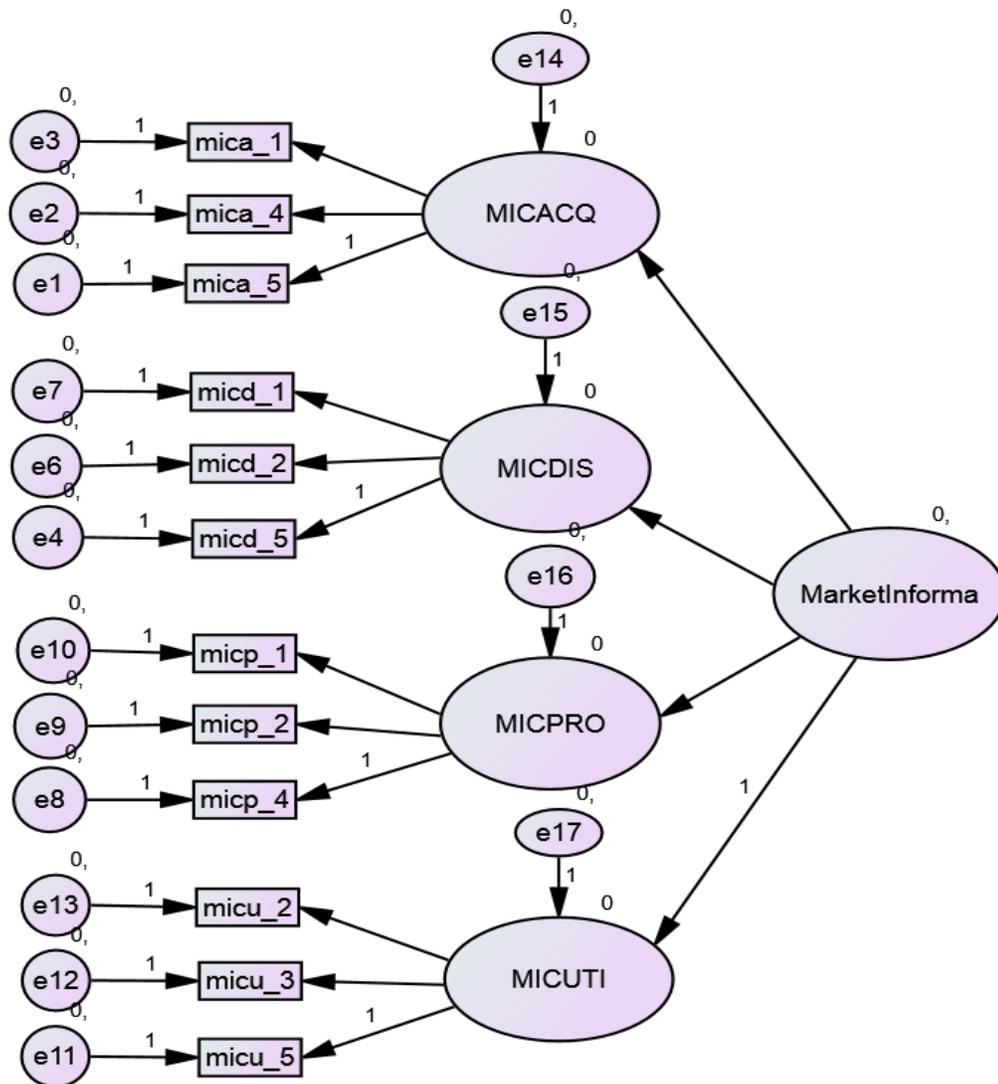


Figure 1.4: Marketing Information Capability as a Second Order Construct (Refer to Appendix C for the items and their names in the model)

Table 1.9: CMIN Marketing Information Capability as a Second-Order Construct

| Model | NPAR | CMIN | DF | P | CMIN/DF |
|--------------------|-------------|--------------|-----------|----------|----------------|
| Default model | 40 | 71.351 | 50 | .025 | 1.427 |
| Saturated model | 90 | .000 | 0 | | |
| Independence model | 24 | 1073.22 3 | 66 | .000 | 16.261 |

Scale Reliability

Two approaches were used to test the reliability of the scale. First, Cronbach’s alpha was calculated for marketing information capability and its four dimensions. The benchmark score for Cronbach’s alpha was 0.70 (Cronbach, 1951). The Cronbach’s alpha for marketing information capability is 0.876. Besides, all of the four dimensions met the scale reliability standard: information acquisition (0.807), information dissemination (0.835), marketing information processing (0.803) and information utilization (.857).

The second criterion used for scale reliability is average variance extracted (AVE). The AVE values of the constructs in a model must be higher than .50 (Fornell & Larcker, 1981). The calculated AVEs for the four dimensions were all above .50 and thus met the reliability requirements (See Table 1.10 for details).

Discriminant Validity

Marketing information capability is a second-order construct that has four dimensions. It is important to determine whether the four dimensions in the model are have discriminant validity. According to Fornell and Larcker (1981), the AVEs were calculated at first. Then the squared correlations between constructs were calculated. The squared correlations between constructs were lower than AVEs from each construct (see Table 1.10

for details). It seems reasonable to draw the conclusion that there is discriminant validity between the constructs. Therefore, the four dimensions are distinct constructs.

It is also necessary to show that marketing information capability is distinct from other information-related constructs, such as IT-enabled information management capability. Information management capability is the firm's "ability to provide data and information to users with the appropriate levels of accuracy, timeliness, reliability, security, confidentiality, connectivity, and access and the ability to tailor these in response to changing business needs and directions" (Mithas et al., 2011). According to the CFA test results and AVE formulas, the AVEs for marketing information capability and information management capability are 0.59 and 0.65 respectively (see Table 1.11). The squared correlation between those two constructs is 0.25. Reasonably, it can be concluded that marketing information capability is a different construct from information management capability. To sum up, the scale for marketing information capability meets discriminant validity requirements.

Convergent Validity

First, the individual indicator variables are highly correlated with their respective factors (see Table 1.12 for details). For example, the factor loadings for the three indicator variables of information acquisition construct are all above 0.7. Second, information acquisition, information dissemination, marketing information processing and information utilization are highly correlated with marketing information capability (see Table 1.12 for details). For example, the correlation between information acquisition and marketing information capability is 0.738. It seems to be reasonable to conclude that the model meets requirements for the test of convergent validity.

Table 1.10: Average Variance Extracted and Standardized Correlation between Factors

| Average Variance Extracted | |
|---|-------------|
| Market Information Acquisition | .58 |
| Market Information Dissemination | .65 |
| Market Information Processing | .58 |
| Market Information Utilization | .67 |
| Correlations Between Factors | |
| Market Information Acquisition and Market Information Dissemination | .613 (.38*) |
| Market Information Acquisition and Market Information Processing | .584 (.34) |
| Market Information Acquisition and Market Information Utilization | .553 (.31) |
| Market Information Dissemination and Market Information Processing | .726 (.53) |
| Market Information Dissemination and Market Information Utilization | .502 (.25) |
| Market Information Processing and Market Information Utilization | .526 (.28) |

*denotes the squared correlations between constructs.

DISCUSSION

Marketing professionals are flooded with data at present: internally, customer relationship management systems (CRM) and sales force automation (SFA) software are acquiring, storing and processing more and more business data (Berry & Linoff, 2004); externally, data comes from social media websites, such as Facebook and Twitter, or from other Internet media, such as web blogs, opinion forums and brand websites (Gayo-Avello, 2011). Then how should marketing departments use information to help their companies

Table 1.11: AVE for Marketing Information Capability and IT-Enabled Information Management Capability

| Standardized Regression Weight | | | Estimates | AVEs |
|--------------------------------|------|--|-----------|---|
| MIC Acquisition | <--- | Marketing Information Capability (MIC) | .736 | Marketing Information Capability (MIC): 0.59 |
| MIC Dissemination | <--- | Marketing Information Capability (MIC) | .840 | |
| MIC Processing | <--- | Marketing Information Capability (MIC) | .857 | |
| MIC Utilization | <--- | Marketing Information Capability (MIC) | .618 | |
| itimc_7 | <--- | IT Information Management Capability (itimc) | .787 | IT Information Management Capability (itimc): 0.65 |
| itimc_6 | <--- | IT Information Management Capability (itimc) | .804 | |
| itimc_5 | <--- | IT Information Management Capability (itimc) | .728 | |
| itimc_4 | <--- | IT Information Management Capability (itimc) | .682 | |
| itimc_3 | <--- | IT Information Management Capability (itimc) | .891 | |
| itimc_2 | <--- | IT Information Management Capability (itimc) | .842 | |
| itimc_1 | <--- | IT Information Management Capability (itimc) | .880 | |

to gain customer insights and improve financial performances? Based on extensive literature review and field interviews with marketing and IT professionals, the essay found out that firms need to improve their market information capability, which is marketing's abilities to acquire, distribute, process and utilize information for the benefits of customer and business performance.

Table 1.12: Convergent Validity for Marketing Information Capability *

| Standardized Regression Weight | | | Estimate |
|--------------------------------|------|--|----------|
| mica_5 | <--- | MIC Acquisition (mica) | .780 |
| mica_4 | <--- | MIC Acquisition (mica) | .767 |
| mica_1 | <--- | MIC Acquisition (mica) | .746 |
| micd_5 | <--- | MIC Dissemination (micd) | .730 |
| micd_2 | <--- | MIC Dissemination (micd) | .883 |
| micd_1 | <--- | MIC Dissemination (micd) | .791 |
| micp_4 | <--- | MIC Processing (micp) | .768 |
| micp_2 | <--- | MIC Processing (micp) | .706 |
| micp_1 | <--- | MIC Processing (micp) | .802 |
| micu_5 | <--- | MIC Utilization (micu) | .788 |
| micu_3 | <--- | MIC Utilization (micu) | .829 |
| micu_2 | <--- | MIC Utilization (micu) | .841 |
| MIC Acquisition | <--- | Marketing Information Capability (MIC) | .738 |
| MIC Dissemination | <--- | Marketing Information Capability (MIC) | .838 |
| MIC Processing | <--- | Marketing Information Capability (MIC) | .837 |
| MIC Utilization | <--- | Marketing Information Capability (MIC) | .642 |

* (See Appendix C for the above items).

This essay thoroughly investigates the marketing information capability construct and develops a scale for it. It first conducts a multi-disciplinary literature review. Since marketing information capability is a firm-level marketing capability, the essay uses resource-based view and dynamic capabilities as its theoretical foundations. In addition, the relationship between marketing and information technologies has also been reviewed. The value-chain framework sheds light on the cross-functional competition between marketing and IT departments. The section on information and big data focuses on the informational aspect of marketing information capability.

This essay then developed and empirically validated a scale for measuring marketing's capabilities to manage information, i.e., marketing information capability. The essay proposed that marketing information capability is a multi-dimensional latent construct that consists of four factors: acquiring information, distributing information, processing information, and utilizing information. Qualitative field interviews were conducted. Three studies were then conducted. The test results confirmed that the essay's proposal about marketing information capability was correct. The final scale demonstrated high reliability and reached the required levels of convergent and discriminant validity.

Theoretical and Managerial Implications

This essay makes valuable theoretical contributions to both marketing and strategic management. In marketing, it builds upon the research on marketing capabilities and market orientation and provides new understanding of the role of marketing capabilities in important business processes and firm performance. In strategy, it is firmly established on resource-based theory and empirically corroborates the theory in return.

The essay is the first to thoroughly investigate the marketing information capability construct from the perspective of firm resources and capabilities and it derives strong theoretical support from resource-based view of the firm, which is one of the important theories that attempt to explain the causes of firms' successes and failures. According to the resource-based theory, marketing information capability becomes a valuable and rare resource that is difficult for the firm to substitute and also hard for the competitors to imitate, when it is developed fully and properly. It helps the firms to have a better sense of their markets and connects the firms more closely with their customers. Marketing information capability is dynamic in nature as well. As market situations change, firms can reconfigure and redeploy marketing information resources to keep their competitive

advantages. This dynamic characteristic is important because timely and reliable information is a prerequisite for firms' success.

The resource-based view has become increasingly important in marketing. When the author was conducting the third study, a series of articles on the role of resource-based theory in marketing was published by the Journal of Academy of Marketing Science in January 2014 (George S Day, 2014; Kozlenkova, Samaha, & Palmatier, 2014). For example, Barney (2014) listed three areas where marketing scholars could make valuable contributions to the theoretical development of resource-based theory. One way is to help pinpoint the origins of capabilities. By studying marketing information capability under the framework of resource-based theory, the research and findings of this essay are especially relevant and current. Based on interviews with senior marketing executives and three empirical studies, the essay sheds new light on marketing information capability as an important firm resource.

In the context of marketing literature, marketing information capability is an important type of marketing capabilities, which have been proved to be critical firm resources. The studies in this essay contribute to the research understandings of marketing capabilities by elaborating on critical variables that are antecedents and outcomes of an important marketing resource, i.e., marketing information capability. This essay has found some important ways that marketing capabilities can improve firm performance indirectly through critical business processes, such as customer relationship management, new product development and supply chain management. This contribution is valuable because most articles on the consequences of marketing capabilities generally focus directly on firm performance and customer performance.

The research on marketing information capability is especially relevant and useful for the marketing practitioners who must handle the challenges of information and big data in the digital age. To begin with, the essay provides the first scale for measuring marketing information capability. Field interviews reveal that the first step to deal with issues in big data and data analytics is to properly measure the firms' abilities to acquire, distribute, process and apply information. Therefore, the scale for marketing information capability is a valuable tool for marketing professionals.

Limitations and Future Research

The sample participants for the three studies were mostly marketing executives from companies located in the southeast of the United States. This brings up the potential generalizability issue of the research findings in the essay. In the future, surveys can be sent to marketing executives and senior management from companies which are more geographically diverse.

The scale developed in this essay provides a valuable tool for measuring marketing information capability. The development of the scale makes it possible to conduct further studies on the antecedents and consequences of marketing information capability in essays two and three.

ESSAY 2: EXAMINING THE ANTECEDENTS AND CONSEQUENCES OF MARKETING INFORMATION CAPABILITY

INTRODUCTION

Several major trends are occurring in the field of marketing. First, big data and marketing analytics have become increasingly important to modern organizations (H. Chen, Chiang, & Storey, 2012; T. H. Davenport, 2006; Deighton et al., 2012; Lapointe, 2012; Vriens & Brazell, 2013). Companies, such as GE (Catts, 2012), Intel (Barber, 2012) and IBM, as well as researchers and scientists (Hey, Tansley, & Tolle, 2009) regard big data as an important phenomenon that calls for the attention of CEOs and political leaders. In an Information Age (Castells, 2011) characterized by explosion of data and information, companies collect and store massive amount of data in hopes of acquiring information and knowledge to increase customer satisfaction and improve business performance. The term “big data” has been created to denote huge data sets that require sophisticated methods and technologies (Franks, 2012; Mayer-Schönberger & Cukier, 2013; Provost & Fawcett, 2013).

However, big data does not automatically turn into information that can generate value for the companies. According to Glazer (1991) and Moorman (1995), data can only become valuable information when it is given meaning in proper environment. To make sense out of big data, companies must put proper business analytics in place. Data-driven companies, like Google and Amazon.com, take advantage of their analytical prowess and exclusive access to consumer data to establish dominant positions in their industries (Clifton, 2012; T. H. Davenport, 2006; T. H. Davenport & Harris, 2007; Franks, 2012). For example, Google advertising revenue reached \$ 43 billion in 2012 and most of it was

directly connected to the IT-enabled, analytics-based AdSense and AdWords platforms (Peterson, 2013).

The second trend is that consumers have access to more information and have become significantly more connected and empowered than before. Consumers now use social media (Rapp, Beitelspacher, Grewal, & Hughes, 2013), such as Facebook and Twitter (Agrifoglio, Black, Metallo, & Ferrara, 2012; Barnes & Böhlinger, 2011), to connect with the other consumers and share their opinions about their product purchases and service experiences (Chevalier & Mayzlin, 2006; Vázquez-Casielles, Suárez-Álvarez, & del Río-Lanza, 2013). To make better purchase decisions, consumers routinely use online word of mouth (Godes & Mayzlin, 2002; Kozinets, de Valck, Wojnicki, & Wilner, 2010) and product ratings (Moe & Trusov, 2011). As Thaler and Tucker (2013) put it, “smarter information” makes “smarter consumers”.

The information that has empowered the customers has also provided companies with unprecedented opportunities to establish mutually beneficial relationships with their customer base. Marketing scholars are aware of the value of customers’ information (Jayachandran et al., 2005; Sinkula, 1994) and urge companies to be more market and customer-oriented (Deshpandé, Farley, & Webster Jr, 1993; Kohli & Jaworski, 1990; Slater & Narver, 1994).

A clear underlying theme emerges from these trends: data and information have become invaluable resources for firms as well as for customers. In the highly insightful, still relevant 1994 book *The Marketing Information Revolution* edited by Blattbert, Glazer and Little (1994), marketing information is predicted to transform marketing. This prediction proves to be largely true. The new big data phenomenon is arguably a continuation of the marketing information revolution from the 1990s. It further highlights

the potential value of information and dictates that researchers and companies take it seriously. Dominic Barton, the CEO of McKinsey and David Court, lead partner in advanced analytics, proposed convincingly that the success of big data projects is contingent upon marketing business analytics, IT support, and transformation of firm capabilities (Barton & Court, 2012). Therefore it is reasonable to expect that marketing has an important role in preparing firms to harness the power of information and big data.

Research Questions

Marketing professionals and scholars find it a challenge to deal with the explosion of data and information in the “information age” (Deighton et al., 2012). As a solution, Day (2011) suggests that the possession of the right marketing capabilities enables companies to better cope with the fast-changing market environment. Marketing information capability is an important kind of marketing capability that has potential to create sustained competitive advantage for firms (Vorhies & Morgan, 2005). Researchers have made significant contributions to the understanding of various marketing capabilities. However, not enough attention has been given to marketing information capability. First, no empirical studies have examined the antecedents and consequence of marketing information capability. For example, there is a dearth of literature on the impact of cross-functional cooperation on the development of marketing information capability. Although previous research (Mithas et al., 2011) has shown that IT capabilities positively impact overall firm performance, no research has been conducted to examine the relationship between these two critical types of firm resources. Do IT capabilities directly influence marketing information capability? Or do IT capabilities and marketing information capability interact with each other to impact firm performance in the areas of customer satisfaction, new product development and supply chain management? Besides, no

researchers have looked into the relationship between marketing information capability and the influence of marketing within the firm. An important question is whether marketing information capability becomes stronger as the marketing department becomes more powerful in the firm.

Filling those research gaps, this essay will make the following contributions to the current literature. First, it will explore marketing information capability from the resource-based perspective. Second, it conducts the first empirical study on marketing information capability's antecedents and consequences. Third, the relationship between marketing information capability and IT capabilities will be fully explored. Fourth, it examines the possible factors that moderate the relationship between marketing information capability and its three business outcomes: customer relationship management, new product development performance and supply chain performance.

THEORETICAL FOUNDATIONS AND HYPOTHESES DEVELOPMENT

Information and Business Research

According to Daniel Bell (1973), we are living in a post-industrial society, characterized by explosion of information and knowledge. Manuel Castells calls it the Network Society, where the global economy and numerous aspects of our modern life depend on instantaneous communication and safe handling of information (Castells, 2011). To modern organizations, information has become an essential resource in almost all of their functions and processes. However, information is very difficult to define precisely. Scholars from diverse academic fields have suggested more than a dozen different definitions (Machlup & Mansfield, 1983).

The lack of uniform conceptualization for the construct of information has not prevented scholars from making significant contributions to information-related literature. In fact, the concept of information holds a central place in theory building and applications in various areas of academic research, such as marketing (Glazer & Weiss, 1993; Raju & Roy, 2000; Van Bruggen & Wierenga, 2010), organizational studies (Daft & Lengel, 1986; Daft & Weick, 1984; Galbraith, 1974) and management information systems/technologies (McKinney Jr & Yoos Ii, 2010). Table 2.1 provides a cross-disciplinary summary of some of the important articles on information. Although some scholars make strict distinctions among data, information and knowledge (Bell, 1973; Grant, 1996), they are often used synonymously in the academic literature as well as daily life. This essay will follow the practice of Moorman (1995) and adopt Glazer’s (1991) definition: information is “data that have been organized or given structure-that is, placed in context-and thus endowed with meaning.” Similarly, Drucker regards information as “data endowed with relevance and purpose” (Peter F. Drucker, 1988).

Table 2.1: Information and Knowledge in Marketing

| <u>Information and Knowledge in Marketing</u> | |
|---|---------------------------------------|
| <u>Focus of Research</u> | <u>References</u> |
| Information Intensity | (Glazer, 1991) |
| How does trust between providers and consumers of market research information impact the utilization of such information? | (Moorman, Zaltman, & Deshpande, 1992) |
| What factors decide users’ trust in market research and its providers? Five factors were investigated. Interpersonal factors impact trust the most. The other antecedents, including the department’s power, were also found to somewhat impact trust. | (Moorman, Deshpandé, & Zaltman, 1993) |
| The marketing function will be transformed by the information revolution. The marketing personnel need to take advantage of the available information technologies and the information these technologies provide. | (Blattberg et al., 1994) |

(Table 2.1 continued)

| | |
|--|-------------------------------|
| More data is not the solution. Marketers need to engage in continuous learning to better understand their markets. Learning processes are suggested. | (George S. Day, 1994b) |
| Market information processing is strongly related to new product performance. | (Ottum & Moore, 1997) |
| What consist of a modern marketing information system? | (Kotler & Keller, 2012) |
| <u>Information and Knowledge in Organizational Studies</u> | |
| <u>Focus of Research</u> | <u>References</u> |
| Organizations were studied as systems that “interpret” information. Four modes of interpretation were introduced. The antecedents and consequences of the four modes were also studied. | (Daft & Weick, 1984) |
| Organizations process information because of uncertainty and equivocality. “Lack of clarity” is the issue, not the “lack of data.” | (Daft & Lengel, 1986) |
| How much information managers have to process depends on the uncertainty of the tasks at hand. | (Galbraith, 1974) |
| <u>Information and Knowledge in Information Systems / Technologies</u> | |
| <u>Focus of Research</u> | <u>References</u> |
| Digital technologies can help companies to become customer-centric. The capabilities of the customer service units to be customer-oriented and to be responsive to customer needs were fully investigated. | (Setia et al., 2013) |
| A normative taxonomy of information was provided. Four different views of information were discussed. | (McKinney Jr & Yoos li, 2010) |

The Resource-Based Theory of the Firm: What are Capabilities?

The resource-based theory (Grant, 1991) of the firm, also known as the resource-based view (RBV) (Wernerfelt, 1984), or approach (Teece et al., 1997), posits that internal resources can explain the differences in firm performance and that the unique configurations of resources and capabilities embedded in organizational processes determine sustainable competitive advantage¹ (J. Barney, 1991; Wernerfelt, 1984). The resource-based approach explains firm performance by focusing on internal resources. This

¹ “A firm is said to have a sustained competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors and when other firms are unable to duplicate the benefit of the strategy.” (J. Barney, 1991)

is fundamentally different from the five-force framework by Porter. Porter argues that the industry structure, determined by the interactions among competitors, buyers, suppliers, new market entry and substitutes, dictates which firms can achieve long-term over-the-average profit returns (Michael E Porter, 1980, 2008a, 2008b).

An understanding of resource-based theory starts with what constitutes firm resources and capabilities. Resources and capabilities are evolving concepts and many definitions exist in the extant literature. According to Wernerfelt (1984), resources are assets that are owned semi-permanently by firms (Caves, 1980). Resources can be tangible or intangible. Barney (1991)'s initial definition for resources is more inclusive and covers "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc." that firms utilize to realize superior performance. Later, Ray, Barney and Muhanna (2004) define resources as assets that are used for strategic development and implementation. Their definition clearly indicate that the terms "resources" and "capabilities" can be used synonymously.

The Process Orientation

Process is a "specific ordering of work activities across time and place, with a beginning, an end and clearly identified inputs and outputs: a structure for action" (T. Davenport, 1993). The process orientation has a long tradition in studies of the firm (Argote & Greve, 2007). In *A Behavioral Theory of the Firm*, Cyert and March (1963) commit themselves to developing "process-oriented models of the firm" and "linking models of the firm as closely as possible to empirical observations." Those two commitments have fundamentally influenced later organizational studies (Argote & Greve, 2007). Although organizational theories tend to focus on the impacts of structures, scholars often validate their theories by providing the underlying processes (Argote & Greve, 2007). In their

highly influential and extensively cited theoretical paper on dynamic capabilities and strategic management, Teece, Pisano and Shuen (1997) define processes as “ the way things are done in the firm, or what might be referred to as its routines, or patterns of current practice and learning”. Processes act as coordinating and integrating mechanisms within the firm, enable the firm to learn and reinvent itself in response to dramatic environmental changes (Teece et al., 1997).

Some marketing scholars suggest that marketing-specific resources exert their influences on firm financial performance through three important marketing processes: customer management, new product development and supply-chain performance (Rajenda K. Srivastava, Shervani, & Fahey, 1998; Rajendra K. Srivastava, Shervani, & Fahey, 1999). Marketing information capability is a critical marketing asset, so it is also expected to have positive impacts on customer relationship management, new product management and supply chain management. The possible impact of marketing information capability is described in Figure 2.1.

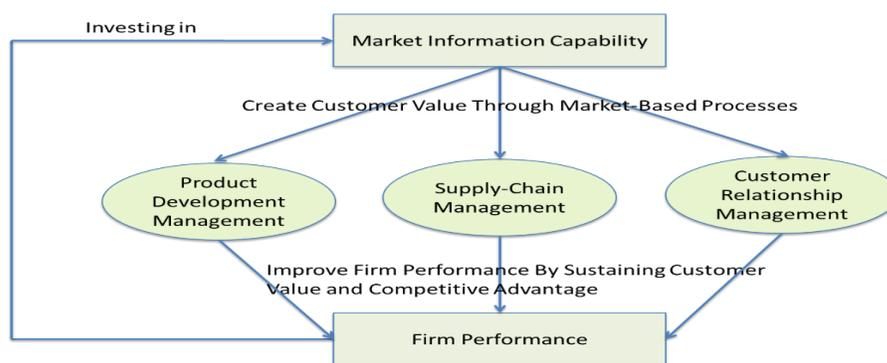


Figure 2.1: The Impact of Marketing Information Capability according to the Resource-Based View²

² This figure is revised from the original one depicting the impact of marketing-specific resources on firm performances, as postulated by Srivastava et al. (2001).

The Applications of the Resource-based View in Marketing and IT Research

Marketing scholars Hunt and Morgan (1995) have made contributions to the applications of the RBV to the field of marketing by proposing the comparative advantage theory of competition, also called the resource-advantage theory (R-A). R-A benefits substantially from the RBV and incorporates the concept of competitive advantage, the competitive rationality theory and the differential advantage theory (Hunt & Morgan, 1995). IT scholars have also demonstrated increasing interest in the RBV model (Mata, Fuerst, & Barney, 1995; Ray, Muhanna, & Barney, 2005; Wade & Hulland, 2004).

Some researchers have suggested extensions of the RBV to the IT field. For instance, using the original approach by Day (1994a) that classifies firm capabilities into inside-out, outside-in, and spanning processes, Wade and Hulland (2004) recommended a typology of IT resources and convincingly demonstrated how key IT resources fit well within this scheme of classification. They also presented a temporal depiction of the RBV: rare, valuable and appropriable IT resources first create temporary competitive advantage, which will turn into sustainable superior firm performance only when those IT resources are hard to imitate, difficult to substitute, and not prone to mobility.

Despite the need for further empirical and conceptual development, the RBV model is the right tool for analyzing the features of information management capability and marketing capabilities. Most importantly, it is a mature framework for investigating how the configurations of internal resources and capabilities can help firms build sustainable competitive advantage. According to Barney (1991)'s definition of strategic resources, marketing and IT capabilities play important roles in the establishment of sustainable competitive advantages for the following reasons. The role of marketing information

capability and IT are not replaceable in information-intensive industries (Zaefarian, Henneberg, & Naudé, 2013).

A Conceptual Model

For ease of illustration, the variables that are important to marketing information capability are first depicted in Figure 2.2. Then elaboration for each important construct is provided.



Figure 2.2: A Hypothesized Model for the Antecedents and Consequences of Marketing Information Capability

Marketing Information Capability

Since marketing information capability is a kind of marketing capability, it is important to first have a review of marketing capabilities in general and to understand their antecedents and outcomes. During the past two decades, business scholars have made significant contributions to the domain knowledge of marketing capabilities. For example, Day (1994a), Srivastava, Fahey & Christensen (2001), and Vorhies & Morgan (2005) have shed new light on the nature and definitions of marketing capabilities. Market-driven organizations with superior capabilities are able to maintain sustainable competitive advantage, increase profit growth and improve firm performance (Dutta et al., 1999; Morgan, Slotegraaf, & Vorhies, 2009; Vorhies, Morgan, & Autry, 2009). Marketing capabilities are also believed to interact with market orientation to impact firm performance (Morgan, Vorhies, et al., 2009). Although most research focuses on the role of marketing capabilities as antecedents to important firm performance criteria, Kotabe, Srinivasan & Aulakh (2002) have also found out that marketing capabilities moderate the relationship between multinationality and firm performance.

Vorhies and Morgan's (2005) definition of marketing capabilities is based on the traditional four Ps of marketing. They listed eight marketing capabilities, one of which is market information management. Market information management capability is closely related to market sensing and customer linking capabilities, the two important capabilities of market-driven companies (George S. Day, 1994a). In this essay, it is called marketing information capability to emphasize the major role the marketing department plays in developing and nurturing this capability. As the role of marketing was changing in modern organizations in the 1990s, Webster (1992) predicted that marketing might share responsibility for "information management, environmental scanning".

Marketing information capability is similar to market orientation in that both involve information about customers and competitors. However, marketing information capability is fundamentally different from market orientation in important ways, too. To fully understand and accurately define marketing information capability, it is valuable to first review the market orientation literature. Market orientation influences all aspects of marketing and is as important as the other two prominent marketing ideas: marketing as the exchange of values and marketing as the building of trust and commitment with customers (Kohli & Jaworski, 1990). Kohli and Jaworski (1990) defined market orientation as “the organization wide generation of market intelligence pertaining to current and future customer needs, dissemination of the intelligence across departments, and organization wide responsiveness to it”. According to this definition, the key focus of the market orientation concept is on customers. Market-oriented firms strive to collect accurate and prompt information about customers and competitors and use that information to create superb value for customers (Kohli & Jaworski, 1990; Slater & Narver, 1995).

One major contribution by Kohli and Jaworski (1990) is that they made several intriguing proposals regarding the consequences of market orientation. They posited that market orientation has positive impacts on employee’s job satisfaction and organizational commitment. Besides, market orientation is positively related to customer satisfaction, the number of repeat customers and firm performance. Those propositions have been later empirically confirmed by Morgan et al. (2009). Morgan et al. (2009) claimed that both market orientation and marketing capabilities have positive effects on firm performance. In addition, they proposed that the interaction between marketing capabilities and market orientation influence firm performance. Earlier research in marketing and organizational

learning suggested that there is a positive relationship between market orientation and firm performance, with marketing capabilities as the mediator (George S. Day, 1994a).

The Antecedents of Marketing Information Capability

An extensive literature review reveals that four important factors can influence marketing information capability. Those factors include cross-functional cooperation (Bengtsson & Kock, 2000; Luo et al., 2006), IT capabilities (Mani, Barua, & Whinston, 2010), top management emphasis (Kohli & Jaworski, 1990) and the influence of the marketing department within the firm. Interviews with senior marketing and IT executives have confirmed that those four variables are believed to influence marketing information capability.

Cross-Functional Cooperation

Some possible approaches to solving the problem of big data and to improving both marketing and IT capabilities include the application of appropriate information and marketing technologies and the facilitation of better cooperation between marketing and IT departments. Cooperation is “simultaneous cooperation and competition” (Bengtsson & Kock, 2000). In fact, both marketing and IT professionals need to develop new cross-disciplinary skills in order to keep pace with the current information age. For instance, one of the MSI research priorities (for the period between 2012 and 2014) states that “rethinking the capabilities required of marketing in the era of ‘big data’ will point to the need for new skills, training and organizations” (Deighton et al., 2012). Likewise, IT industry executives and leading researchers now call for more insights into the strategic importance of IT since the IT profession has been grappling with its traditionally subordinate role to business strategy for several decades (Bharadwaj et al., 2013). At the

same time, IT scholars warn of the potential danger of irrelevance of IT research because of the “theory-practice problem” (Constantinides, Chiasson, & Introna, 2012).

The knowledge and findings from these other disciplines can help marketing professionals to better understand the current issues and challenges in the dynamic and competitive business environment. The author also argues that it is worthwhile exploring effective collaboration mechanisms between marketing and IT personnel to help information flow between their departments. This essay will also investigate the impact of the cross-pollination of information and knowledge between marketing and IT departments. The essay proposes the following three hypotheses:

H_{1.1}: Collaboration between marketing and IT departments has a positive effect on marketing information capability.

H_{1.2}: Competition between marketing and IT departments has a negative effect on marketing information capability.

H_{1.3}: Cross-functional cooperation between marketing and IT departments has a positive effect on marketing information capability.

IT Capabilities

Both management scholars and business executives recognize the profound business impacts of information and information technologies in the Digital Age (Blattberg et al., 1994; Glazer, 1991; Mendenhall, 2009; M. Porter & V. Millar, 1985). IT exerts its influence by touching every value activity in a company’s value chain system, which consists of linked, codependent activities (M. E. Porter & V. E. Millar, 1985). In particular, the Internet and other digital technologies have fundamentally transformed the modern practices of marketing and created potential opportunities and unique challenges for every aspect of the traditional “marketing mix”. The Marketing Science Institute has consistently

emphasized the importance of information technology to marketing. For example, “Information technology and its descendants—scanner data, the Internet, ecommerce, new media, and big data” have appeared on MSI’s priorities’ list ten times since 1986 (Deighton et al., 2012). Consequently, an increasing number of marketing and IT scholars have begun to pay attention to the relationship between information technologies and marketing capabilities and the impact of marketing capabilities on customer and firm performance (Mithas et al., 2011; Morgan, Vorhies, et al., 2009).

Admittedly, IT does not offer panaceas and CTOs and CIOs often have a hard time justifying more IT expenditures in the C-suite, especially during hard economic times. Nevertheless broad acceptance and adoption of IT have become a necessary albeit insufficient condition for the marketing professionals to succeed in increasingly complex business landscapes (Michael E. Porter, 2001; Trainor et al., 2011). Current big data initiatives, due to their heavy reliance on IT, computer science, statistics, and marketing, make it even more important for practitioners and researchers to acquire a much better understanding of the relationship between IT and marketing. Hence the essay presents the following hypotheses concerning the relationship between IT capabilities and marketing information capability:

H₂: IT capabilities have a positive effect on marketing information capability.

Top Management Emphasis on Marketing

Hambrick and Mason (1984) proposes that the actions and exhibited values of top managers significantly influence the performances and behaviors of the employees in their organizations. For example, top management compositions are related to the innovations in banks: teams whose members are more diverse and more educated tend to manage more innovative organizations (Bantel & Jackson, 1989). Marketing researchers have also found

empirical evidence that the emphasis of top managers has a direct relationship with market orientation (Jaworski & Kohli, 1993).

Table 2.2: Top Management Emphasis on Marketing

| Sources | Major Findings |
|--------------------------|---|
| (Hambrick & Mason, 1984) | The values and cognitive characteristics of top managers impact the performance outcomes within organizations. |
| (Bantel & Jackson, 1989) | Controlling for organizational size, top management size and geographic locations, the authors found that the diversity and educational background of top managers are directly related to the innovativeness of their banks. |
| (Jaworski & Kohli, 1993) | Companies are more market-oriented if their top managers put an emphasis on the importance of market. More market-orientated firms perform better. |
| (Ocasio, 1997) | The paper extends Simon's attention-based view of the firm and concludes that the attention of top managers influences firms' behaviors and outcomes. |

Table 2.2 shows clearly that top management team plays an important role in developing and nurturing requisite marketing information capability. Hence the essay proposes:

H₃: Top management emphasis on marketing has a positive effect on marketing information capability.

Marketing Department's Influence

A major function of the marketing department is to connect the customers to product development and financial accountability within the firms (Webster, 1992; Moorman & Rust, 1999). Other scholars have argued that the influence, or the perceived importance (Moorman & Rust, 1999) or the power of marketing (Auh & Merlo, 2012) is directly related to its innovativeness and accountability (Verhoef & Leeflang, 2009), its impacts on financial outcomes (Lehmann, 2004), and its ability to “become more strategic, cross-functional, and bottom-line oriented” (N. Kumar, 2004). The power of the marketing

department has been found to be directly related to business performance (Auh & Merlo, 2012; Goetz, Hoelter, & Krafft, 2013). For a more complete list of extant literature on the role and influence of the marketing department, see Table 2.3.

Since marketing information capability is primarily a capability of the marketing department, it is then natural to argue that when a marketing department is very influential, the development of marketing information capability is positively impacted. Hence are the following propositions:

H4: The influence of the marketing department within the firm has a positive effect on marketing information capability.

The hypotheses concerning the antecedents of marketing information capability are summarized in Figure 2.3.

The Outcomes of Marketing Information Capability

Marketing information capability is a critical marketing resource. Srivastavaa, Faheyb and Christensen (2001) posit that marketing-specific resources have positive impact on customer management, new product development and supply-chain performance. Good customer management, new product development and supply-chain performance can ultimately affect the overall firm performance. Thus, customer management, new product development and supply-chain performance are very important to firms. Several researchers have found empirical support that new product development has a close connection with the quality and sources of market information available to the product teams (Moorman, 1995; Ottum & Moore, 1997). The process to develop new products is regarded as “ a sequence of information processing activities” (Frishammar, 2005a). In addition, multiple empirical tests show the importance of information in

Table 2.3: The Role and Influence of Marketing within the Firms

| Variables of Interest | Major Findings | Sources |
|---|--|----------------------------------|
| The role of marketing | A key role marketing plays in modern business world is to produce superior customer values by properly managing the relationships with customers and vendors. | (Webster, 1992) |
| The role and values of the marketing function | First, the marketing function is believed to influence customer relationship and new product performance. Second, the marketing function's value in a company is directly related to its ability to connect customers to two internal two firm elements: product and financial accountability. | (Moorman & Rust, 1999) |
| The role of marketing; marketing and strategy | The productivity and the influence of marketing have declined. Marketing must "become more strategic, cross-functional, and bottom-line oriented." | (N. Kumar, 2004) |
| The metrics of marketing | Marketing must show its impacts on financial performance if it wants to be a decision-maker in the C-Suite. | (Lehmann, 2004) |
| The influence of marketing department | The marketing department gains more influence if it becomes more innovative and accountable. | (Verhoef & Leeflang, 2009) |
| The presence of chief marketing officer | The presence of chief marketing officer is correlated to six major factors, including innovation, brand strategy, etc. CMO presence has no significant relationship with firm performance. | (Nath & Mahajan, 2011) |
| The power of marketing | The more powerful the marketing department, the better firm performance. In addition, the relationships between marketing and the other departments have been investigated. | (Auh & Merlo, 2012) |
| The role of marketing and sales | The co-occurrence of strong marketing and high market orientation improves firm performance, whereas the sales function is not conducive to the operationalization of market orientation. | (Goetz, Hoelter, & Krafft, 2013) |

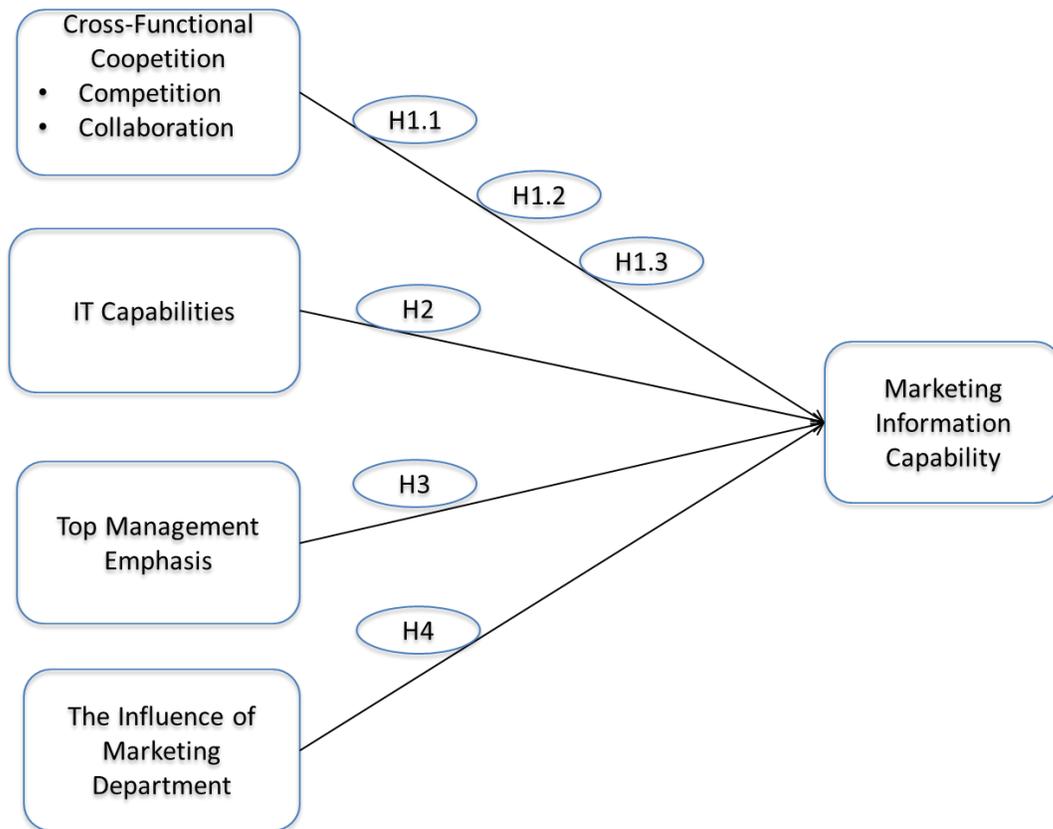


Figure 2.3: The Antecedents of Marketing Information Capability

customer relationship management (Jayachandran et al., 2005; Stein & Smith, 2009). Since marketing information capability improves the quality and timeliness of information and facilitates correct analysis and interpretation of information, it is highly likely to be positively related to customer relationship management.

The essay thus propose the following hypotheses,

H₅: Marketing information capability has a positive effect on customer relationship management.

H6: Marketing information capability has a positive effect on product development management.

H7: Marketing information capability has a positive effect on supply chain management.

The above hypotheses about the outcomes of marketing information capability is illustrated in Figure 2.4.

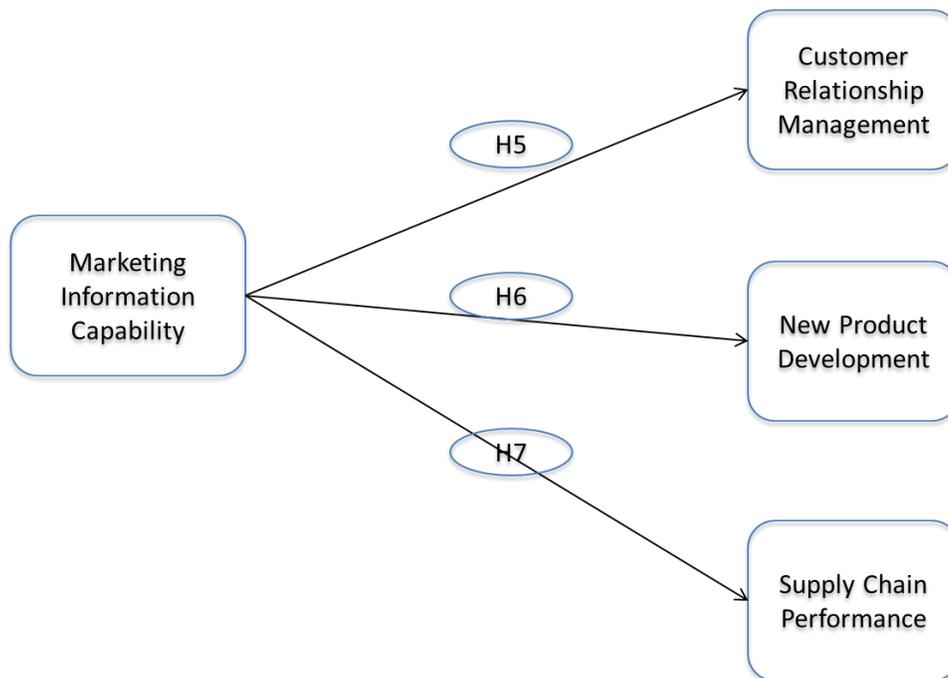


Figure 2.4: The Hypothesized Consequences of Marketing Information Capability

The Factors That Moderate Marketing Information Capability

Two moderating factors are examined in this essay: environmental dynamism and competition intensity. Environmental dynamism measures “changes in the composition of customers and their preferences” (Kohli & Jaworski, 1990). Similarly, Luo et al. (2006) calls it “market volatility”. Environmental dynamism could be potentially important

because a firm might need a stronger marketing information capability when the environment changes more dynamically. Competition intensity relates to the hostility of the competition in the industry and has been found to impact firm performances (Kohli, Jaworski, & Kumar, 1993; Luo et al., 2006). When the competition becomes fiercer in the industries, it seems that companies with higher marketing information capability can better acquire, distribute, process and utilize information to meet challenges from competitors. The author concedes that competition intensity and environmental dynamism are also likely to result in less strong relationships between marketing information capability and its dependent variables.

Essay two proposes the following hypotheses regarding the moderators of marketing information capability (see Figure 2.5).

Environmental Dynamism

H_{8.1}: Environmental dynamism has a positive moderating effect on the relationship between marketing information capability and customer relationship management.

H_{8.2}: Environmental dynamism has a positive moderating effect on the relationship between marketing information capability and new product development.

H_{8.3}: Environmental dynamism has a positive moderating effect on the relationship between marketing information capability and supply-chain performance.

Competition Intensity

H_{9.1}: Competition intensity has a positive moderating effect on the relationship between marketing information capability and customer relationship management.

H_{9.2}: Competition intensity has a positive moderating effect on the relationship between marketing information capability and new product development.

H9.3: Competition intensity has a positive moderating effect on the relationship between marketing information capability and supply-chain performance.

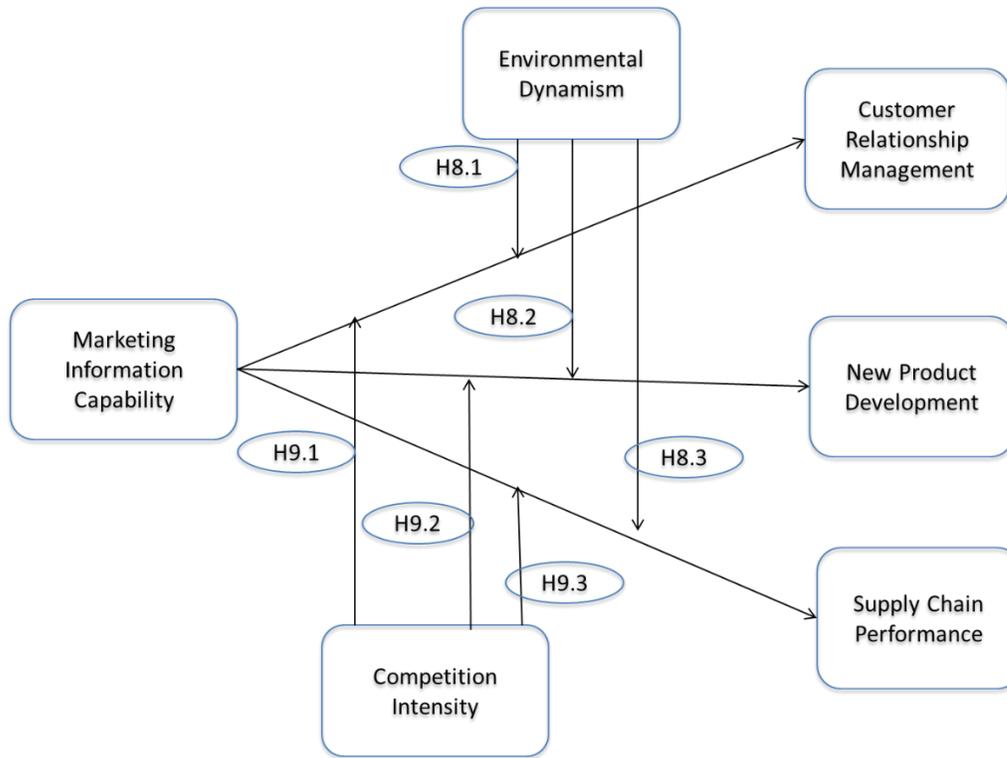


Figure 2.5: The Factors that Moderate Marketing Information Capability

PRETEST

In this section, a pretest was conducted. Not all measures in the model were included in the pretest (see Table 2.4 and 2.5 for tested constructs). The online survey included measurement items for marketing information capability and its antecedent, consequence and moderator variables. The antecedent variables were cross-functional collaboration, top management emphasis and IT capabilities. The consequence variables were customer performance and product development performance. The moderator variables were environmental dynamism and competitive intensity. The constructs for

marketing department influence and supply chain performance were not included. All the survey items (see Table 2.6) used a seven-point Likert scale, except for product development and supply chain management, with Likert scales ranging from 1 to 10 and the adoption of data analytics, with Likert scale ranging from 1 to 5 .

Sample

The pretest used the same data collection procedure that was adopted in study two of essay one. Through business school students from a large Southern university in the US, the author collected the contact information for business executives, who must be in the following functional areas: marketing, customer service, sales or IT. These students were granted one extra credit for their coursework.

The survey was implemented via Qualtrics. The link for the online survey was sent to the acquired email addresses for the business executives. The surveyed companies were from diverse industries, such as high technology, finance and telecommunication. Ninety-five out of one hundred forty executives responded to the survey. The response rate was 68%.

Reliability Test

The reliabilities of all the constructs in the model need to be higher than .70 (Cronbach, 1951). Test results indicated that all constructs met the 0.70 requirement: cross-functional collaboration (0.75), top management emphasis (0.78) and IT capabilities (0.88), customer performance (0.82), product development performance (0.76), environmental dynamism (0.82), and competitive intensity (0.91).

Regression Analyses

The essay used regression analyses with summated construct measurements to test the relationships between marketing information capability and its antecedents and consequences. Cross-functional collaboration ($b=.41$, $p=.00$), top management emphasis ($b=.44$, $p=.00$) and IT capabilities ($b=.11$, $p=.03$) all demonstrated positive and significant effects on marketing information capability. Thus, **H_{1.1}**, **H₂** and **H₃** were supported. There was some marginal interaction effect between IT capabilities ($p=.00$) and marketing information capability ($p=.105$). The model's p value is .00 and the explained R^2 is .43 (for details, see Table 2.4).

Marketing information capability exhibited significant effects on customer performance ($b=.45$, $p=.00$) and product development performance ($b=.36$, $p=.00$). The adjusted R Square is .13 for customer performance and .11 for the product development respectively. Thus, these results supported **H₅** and **H₆**. Table 2.5 provided more detailed Data analysis.

Table 2.4: Pretest Results for Antecedents of Marketing Information Capability

| Antecedents | Empirical Effects on Marketing Information Capability | |
|--------------------------------|---|---------|
| | Standardized Coefficients | P value |
| Cross Functional Collaboration | .41 | .00 |
| Top Management Emphasis | .44 | .00 |
| IT Capabilities | .11 | .03 |

Table 2.5: Consequences of Marketing Information Capability

| Consequences | Empirical Effects on Marketing Information Capability | |
|---------------------------------|---|---------|
| | Standardized Coefficients | P value |
| Customer Performance | .45 | .00 |
| Product Development Performance | .36 | .00 |

To test the moderating effects of environmental dynamism and competitive intensity, the analyses used the process model developed by Hayes (2013). Data results demonstrated that there was a significant interaction effect between environmental dynamism and marketing information capability on customer performances ($p=.01$) when the environment was changing quickly. This positive moderation effect seems to be reasonable. For instance, when the compositions and preferences of customers were changing fast, firms must gather, distribute, process and utilize quickly and more efficiently. This requires a stronger marketing information capability.

There was also an interaction effect between competition intensity and marketing information capability on product development performance ($p=.01$). Again this positive moderating effect should not be too hard to appreciate: when the competition was more hostile, there would be a greater demand on information about products and competitors. Thus, **H_{8.1}** and **H_{9.2}** were supported. As hypothesized, environmental dynamism moderates the relationship between marketing information capability and product new performance. Competition intensity moderates the relationship between marketing information capability and customer performance. However, the essay didn't find significance support for **H_{8.2}** and **H_{9.1}**.

MAIN STUDY

Sample

The main study used the same procedure to collect data as in the pretest. Contact information of senior marketing and sales executives were provided by undergraduate business school students from a large Southern University. The students were different from those in the pretest and the executives who participated in the survey for the main study were different as well. The students received one course credit in return. A Qualtrics survey was sent by email to the executives. About two hundred and ninety surveys were sent out and one hundred and eighty executives responded. Those survey participants came from different industries, including healthcare, retailing, and financial services. The response rate was 62%.

Measures

The scale for marketing information capability has been developed and tested in essay one. All the other measures were either taken directly from previous research or revised specifically for the tests in this essay. The sources for the construct measures are described in Table 2.6. Their item details are provided in the Appendix.

Table 2.6: Construct Measurements and Sources

| Construct | Sources |
|---------------------------------------|---|
| Cross-functional Cooperation | (Luo et al., 2006) |
| IT Capability | (Mani et al., 2010; Mithas et al., 2005) |
| Top Management Emphasis | (Jaworski & Kohli, 1993) |
| The Influence of Marketing Department | (Verhoef & Leeflang, 2009) |
| Marketing Information Capability | (Developed and empirically tested in essay one) |
| Customer Relationship Management | (Reinartz, Krafft, & Hoyer, 2004; Vorhies & Morgan, 2005) |

(Table 2.6 continued)

| Construct | Sources |
|------------------------------------|--|
| New Product Development | (Benedetto, 1999; Moorman, 1995; Moorman & Miner, 1997; Petersen, Handfield, & Ragatz, 2003) |
| Supply Chain Management | (I. J. Chen & Paulraj, 2004; Min & Mentzer, 2004) |
| Environmental Dynamism | (Luo et al., 2006; Vorhies & Morgan, 2005) |
| Competition Intensity | (Jaworski & Kohli, 1993; Luo et al., 2006; Vorhies & Morgan, 2005) |
| The Adoption of Big Data Analytics | (Germann, Lilien, & Rangaswamy, 2013) |

Analyses and Test Results

Among 180 responses received, four responses had missing data and were deleted. The total number of the remaining cases was 176.

Measure Validation

The author first conducted two confirmatory factor analysis (CFA) tests and validated all the constructs in the model. The first CFA measurement model included marketing information capability and its antecedent and consequence variables. Antecedent variables include cross-functional collaboration, cross-functional competition, IT capability, top management emphasis, and the influence of the marketing department. Consequence variables consist of customer performance, new product development and supply chain management. The second CFA model tested the measurement properties of three moderator variables: environmental dynamism, competition intensity and the adoption of data analytics. A summary of construct correlations is provided in Table 2.7.

First CFA Test

The first CFA test demonstrated the measurement properties of marketing information capability and its antecedent and consequence variables. Construct reliability

and discriminant validity were tested. The measurement model showed good model fit, as supported by the summary of fit indices ($\chi^2 = 1017$, d.f. = 668, $p = .000$, CFI = .924, RMSE = .055). The CFA results demonstrated that the hypothesized model met the standard criteria of fitness indices (Kline, 2011). All items were loaded significantly on their constructs and there was no evidence of any cross-loading problems. The measures also exhibited good convergent validity: all the factor loadings were higher than .50 (Table 2.8).

Table 2.7: Correlations between Constructs

| Constructs | MIC | CFC1 | CFC2 | IT | TME | IMD | CP | PD |
|--|--------|--------|--------|--------|--------|--------|---------|--------|
| Marketing Information Capability (MIC) | | | | | | | | |
| Cross-functional Collaboration (CFC1) | .463** | | | | | | | |
| Cross-functional Competition (CFC2) | .126 | .088 | | | | | | |
| IT Capability (IT) | .485** | .385** | .076 | | | | | |
| Top Management Emphasis (TME) | .477** | .406** | .142 | .268** | | | | |
| Influence of Marketing (IMD) | .379** | .200** | .364** | .182* | .478** | | | |
| Department Customer Performance (CP) | .264** | .357** | .011 | .360** | .180* | .061 | | |
| Product Development (PD) | .423** | .423** | .171* | .524** | .297** | .276** | .411*** | |
| Supply Chain Management (SCM) | .439** | .392** | .064 | .567** | .334** | .168** | .423** | .677** |

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Table 2.8: Standardized Regression Weight for Constructs in Model

| Standardized Regression Weight | | | Estimate |
|--------------------------------|------|--|----------|
| MIC Acquisition | <--- | Marketing Information Capability (MIC) | .736 |
| MIC Dissemination | <--- | Marketing Information Capability (MIC) | .839 |
| MIC Processing | <--- | Marketing Information Capability (MIC) | .860 |
| MIC Utilization | <--- | Marketing Information Capability (MIC) | .613 |
| mica_4 | <--- | MIC Acquisition | .761 |
| mica_1 | <--- | MIC Acquisition | .742 |
| mica_5 | <--- | MIC Acquisition | .789 |
| micd_5 | <--- | MIC Dissemination | .737 |
| micd_2 | <--- | MIC Dissemination | .872 |
| micd_1 | <--- | MIC Dissemination | .797 |
| micp_4 | <--- | MIC Processing | .759 |
| micp_2 | <--- | MIC Processing | .710 |
| micp_1 | <--- | MIC Processing | .807 |
| micu_5 | <--- | MIC Utilization | .787 |
| micu_3 | <--- | MIC Utilization | .833 |
| micu_2 | <--- | MIC Utilization | .839 |
| itime_6 | <--- | IT Capability | .804 |
| itime_5 | <--- | IT Capability | .724 |
| itime_3 | <--- | IT Capability | .899 |
| itime_2 | <--- | IT Capability | .835 |
| itime_1 | <--- | IT Capability | .885 |
| TME1 | <--- | Top Management Emphasis | .779 |
| TME2 | <--- | Top Management Emphasis | .569 |
| TME3 | <--- | Top Management Emphasis | .771 |
| TME4 | <--- | Top Management Emphasis | .563 |
| Colla_1 | <--- | Cross-Functional Collaboration | .739 |
| Colla_3 | <--- | Cross-Functional Collaboration | .840 |

(Table 2.8 continued)

| Standardized Regression Weight | | | Estimate |
|---------------------------------------|------|-----------------------------------|-----------------|
| Colla_4 | <--- | Cross-Functional Collaboration | .927 |
| Colla_5 | <--- | Cross-Functional Collaboration | .848 |
| InfMark_3 | <--- | Influence of Marketing Department | .860 |
| InfMark_2 | <--- | Influence of Marketing Department | .864 |
| InfMark_1 | <--- | Influence of Marketing Department | .826 |
| InfMark_4 | <--- | Influence of Marketing Department | .672 |
| cp_1 | <--- | Customer Performance | .834 |
| cp_2 | <--- | Customer Performance | .834 |
| cp_3 | <--- | Customer Performance | .846 |
| cp_4 | <--- | Customer Performance | .833 |
| pdp_1 | <--- | Product Development | .874 |
| pdp_2 | <--- | Product Development | .906 |
| SCM | <--- | Supply Chain Management | 1.000 |
| Competit_5 | <--- | Cross-Functional Competition | .657 |
| Competi_4 | <--- | Cross-Functional Competition | .799 |
| Competi_3 | <--- | Cross-Functional Competition | .798 |
| Competi_2 | <--- | Cross-Functional Competition | .846 |
| Competi_1 | <--- | Cross-Functional Competition | .763 |

Table 2.9: Composite Reliability

| Constructs | Composite Reliability |
|----------------------------------|------------------------------|
| Marketing Information Capability | .850 |
| Cross-Functional Collaboration | .906 |

(Table 2.9 continued)

| Constructs | Composite Reliability |
|---------------------------------------|------------------------------|
| Cross-Functional Competition | .887 |
| IT Capability | .918 |
| Top Management Emphasis | .769 |
| The Influence of Marketing Department | .833 |
| Customer Performance | .903 |
| New Product Development | .884 |

These constructs' Cronbach's alpha all exceeded 0.7. In addition, composite reliability, which measures the overall reliability of a set of related measuring items, was also calculated (Hair et al., 2010). Composite reliability is used to test the measure reliability in Structure Equation Modeling. The model measures met the .7 threshold for composite reliability (see Table 2.9).

To test discriminant validity, the squared correlations of the constructs can be compared with the average variance extracted (AVE). If the AVEs of each construct are higher than the squared correlations, then it can be concluded that discriminant validity exists (Hair et al., 2010). Test results showed that the constructs' AVEs were all higher than their respective squared correlations between constructs (see Table 2.10), so construct discriminant validity was proved.

Table 2.10: Average Variance Extracted and Correlations between Constructs

| Average Variance Extracted | |
|---------------------------------------|------|
| Marketing Information Capability | .590 |
| IT Capability | .692 |
| Top Management Emphasis | .510 |
| The Influence of Marketing Department | .655 |
| Cross-Functional Cooperation | .708 |

(Table 2.10 continued)

| Average Variance Extracted | |
|--|--------------|
| Cross-Functional Competition | .612 |
| Correlations Between Constructs | |
| Marketing Information Capability and IT Capability | .501 (.251*) |
| Marketing Information Capability and Top Management Emphasis | .606 (.367) |
| Marketing Information Capability and Cross-Functional Cooperation | .502 (.252) |
| Marketing Information Capability and Cross-Functional Competition | .094(.01) |
| Marketing Information Capability and the Influence of Marketing Department | .447 (.20) |
| IT Capability and the Influence of Marketing Department | .156 (.024) |
| Top Management Emphasis and Cross-Functional Collaboration | .45 (.203) |
| Top Management Emphasis and the Influence of Marketing Department | .546 (.298) |

*denotes the squared correlations between constructs.

Second CFA Test

The second CFA model tested the measurement properties of the three moderator variables: environmental dynamism, competition intensity and the adoption of data analytics. The CFA test showed that model fit met the standard requirements ($\chi^2=37.64$, d.f. =24, $p=.04$, CFI=.983 and RMSEA=.057). Environmental dynamism, competition intensity and the adoption of data analytics also had good convergent validity with their respective item loadings all above .50 (see Table 2.11). These moderator variables exceeded the threshold of 0.7 for Cronbach's alpha values. They also showed good composite reliability (see Table 2.12) and discriminant validity (see Table 2.13).

Table 2.11: Standardized Regression Weight for Moderator Constructs

| Standardized Regression Weight | | Estimate |
|---------------------------------------|---------------------------------------|-----------------|
| ED_2 | <--- Environmental Dynamism (ED) | .793 |
| ED_3 | <--- Environmental Dynamism (ED) | .832 |
| ED_4 | <--- Environmental Dynamism (ED) | .744 |
| CI_1 | <--- Competition Intensity (CI) | .901 |
| CI_2 | <--- Competition Intensity (CI) | .942 |
| CI_3 | <--- Competition Intensity (CI) | .779 |
| ADA_1 | <--- Adoption of Data Analytics (ADA) | .812 |
| ADA_2 | <--- Adoption of Data Analytics (ADA) | .840 |
| ADA_3 | <--- Adoption of Data Analytics (ADA) | .729 |

Table 2.12: Composite Reliability for Moderators

| Constructs | Composite Reliability |
|----------------------------|------------------------------|
| Environmental Dynamism | .833 |
| Competition Intensity | .908 |
| Adoption of Data Analytics | .837 |

Table 2.13: Average Variance Extracted and Correlations between Constructs

| Average Variance Extracted | |
|---|--------------|
| Environmental Dynamism | .625 |
| Competition Intensity | .769 |
| Adoption of Data Analytics | .632 |
| Correlations Between Constructs | |
| Environmental Dynamism and Competition Intensity | .334 (.112*) |
| Environmental Dynamism and Adoption of Data Analytics | .336 (.113) |
| Competition Intensity and Adoption of Data Analytics | .296 (.09) |

*denotes the squared correlations between constructs.

Results of Hypotheses Testing

After examining and validating measurement models, the author conducted hypotheses testing with Structural Equation Modelling (SEM) to examine the main effects of the antecedent variables on marketing information capability and also the main effects of marketing information capability on its dependent variables. The overall model met the model fit requirements: $\chi^2 = 1252$, d.f. = 793, $p = .000$, CFI = .90 and RMSEA = .058.

Main Effects

Cross-functional collaboration, IT capability, top management emphasis and the influence of marketing department all demonstrated significant effects on marketing information capability, with $p = .004$, $p = .000$, $p = .005$ and $p = .078$ respectively (See Table 2.14). Thus **H_{1.1}**, **H₂**, **H₃**, **H₄** were supported.

However, the author did not find significant effects of cross-functional competition and cross-functional cooperation on marketing information capability, with $p = .506$ and $p = .321$. Cross-functional cooperation is the joint occurrence of cross-functional collaboration and cross-functional competition. To test this interaction effect, first the measures of cross-functional collaboration and cross-functional competition were mean-centered and then the product of these two measures were treated as the interaction item (Ping Jr, 1995). **H_{1.2}**, **H_{1.3}** were not supported.

Test results showed that marketing information capability had positive effects on customer performance, product development management and supply chain management. The p values for **H₅**, **H₆** and **H₇** were all less than .001 (see Table 2.15), demonstrating strong evidence that **H₅**, **H₆** and **H₇** were supported.

Table 2.14: Main Antecedent Effects of Marketing Information Capability

| Main Effects | Hypotheses | Coefficient | P-Value | Overall Model Fit |
|--|------------|-------------|---------|--|
| IT Capability → Marketing Information Capability | H2 | .460 | .000 | Chi-square = 1252.592 d.f. = 793 p = .000 CFI=.90 RMSEA=.058 |
| Top Management Emphasis → Marketing Information Capability | H3 | .302 | .005 | |
| The Influence of Marketing Department → Marketing Information Capability | H4 | .153 | .078 | |
| Cross-Functional Collaboration → Marketing Information Capability | H1.1 | .240 | .004 | |
| Cross-Functional Competition → Marketing Information Capability | H1.2 | -.047 | .506 | |
| Cross-Functional Cooperation → Marketing Information Capability | H1.3 | -.064 | .321 | |

Table 2.15: Main Effects of Marketing Information Capability on Consequence Variables

| Main Effects | Hypotheses | Coefficient | P-Value | Overall Model Fit |
|---|------------|-------------|---------|--|
| Marketing Information Capability → Customer Performance | H5 | .468 | .000 | Chi-square = 1252.592 d.f. = 793 p = .000 CFI=.90 RMSEA=.058 |
| Marketing Information Capability → New Product Development | H6 | .724 | .000 | |
| Marketing Information Capability → Supply Chain Performance | H7 | .684 | .000 | |

Moderation Effects

The Process model (Hayes, 2013) was used to test the moderating impacts of environmental dynamism and competition intensity. The Process model used the value of

the moderator variables to divide the dataset into three groups: one standard deviation below the mean, mean and one standard deviation above the mean. The Process model also generated data for the purpose of plotting. The author then used Excel to plot the data. The “low” group in those plots corresponds to “one standard deviation below the mean” of the moderator value (see Figure 2.6 for an example). The “average” group corresponds to the mean of the moderator (see Figure 2.6). The “high” group corresponds to “one standard deviation above the mean” of the moderator value (see Figure 2.6). Details on how to use the Process model can be found in Hayes (2013).

Test results showed that environmental dynamism moderated the relationship between marketing information capability and new product development (see Figure 2.6) and supply chain management (see Figure 2.7), but no significant moderation effect was found for the relationship between marketing information capability and customer performance. **H_{8.2}** and **H_{8.3}** were supported, but **H_{8.1}** was not (see Table 2.16).

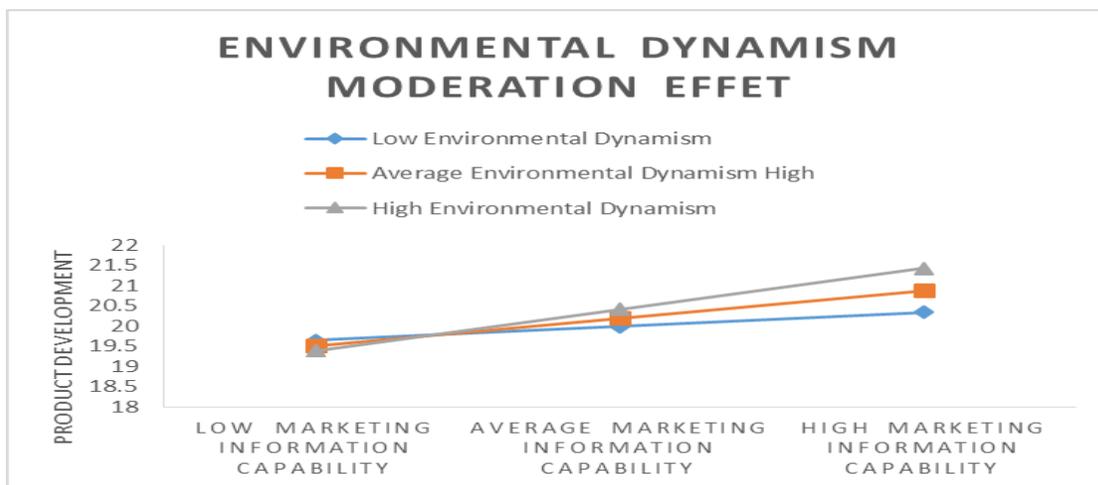


Figure 2.6: Environmental Dynamism (Marketing Information Capability → Product Development)

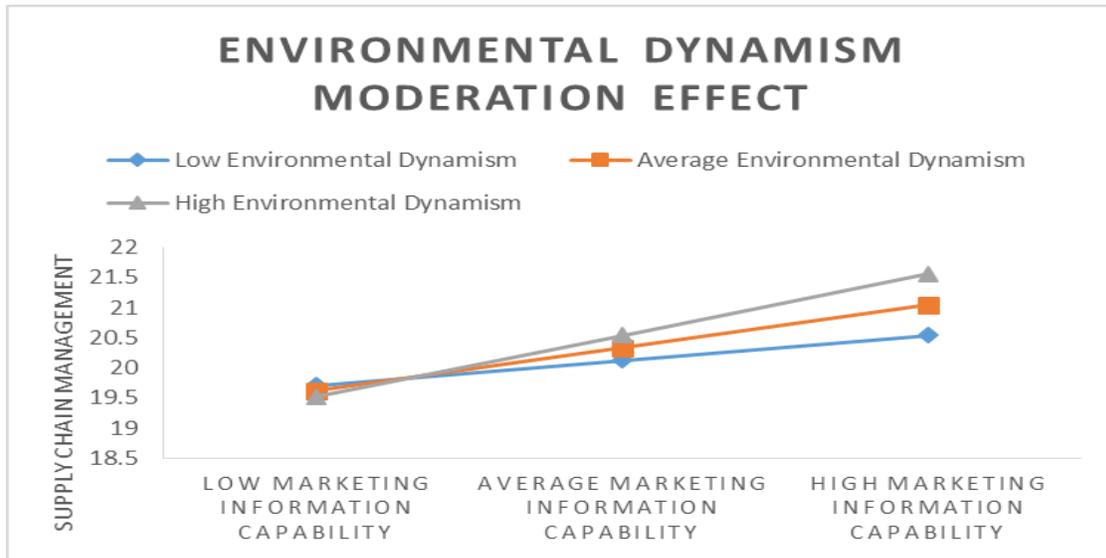


Figure 2.7: Environmental Dynamism (Marketing Information Capability → Supply Chain Management)

Table 2.16: Environmental Dynamisms' Moderation Effects

| Environmental Dynamism's Moderation Effects on | Hypotheses | Coefficient | t-Value | p-Value |
|---|------------------|-------------|---------|---------|
| Marketing Information Capability → Customer Performance | H _{8.1} | .097 | 1.801 | .073 |
| Marketing Information Capability → New Product Development | H _{8.2} | .325 | 4.068 | .000 |
| Marketing Information Capability → Supply Chain Performance | H _{8.3} | .290 | 3.464 | .000 |

According to the data analysis results, competition intensity moderated the relationship between marketing information capability and customer performance, new product development (see Figure 2.8) and supply chain management (see Figure 2.9). **H_{9.2}** and **H_{9.3}** were supported, but **H_{9.1}** was not supported (See Table 2.17).

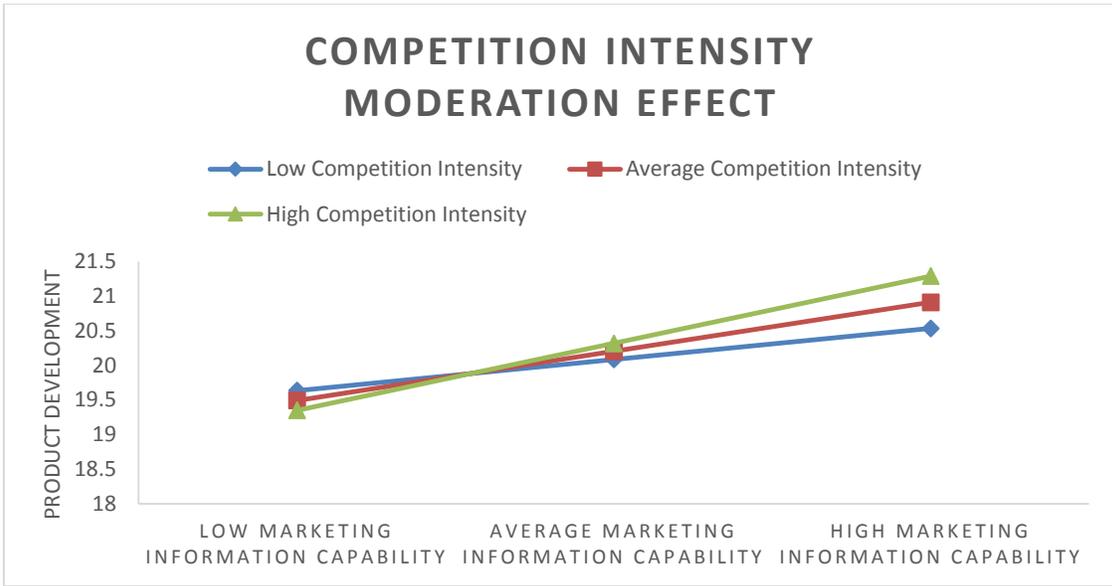


Figure 2.8: Competition Intensity (Marketing Information Capability → Product Development)

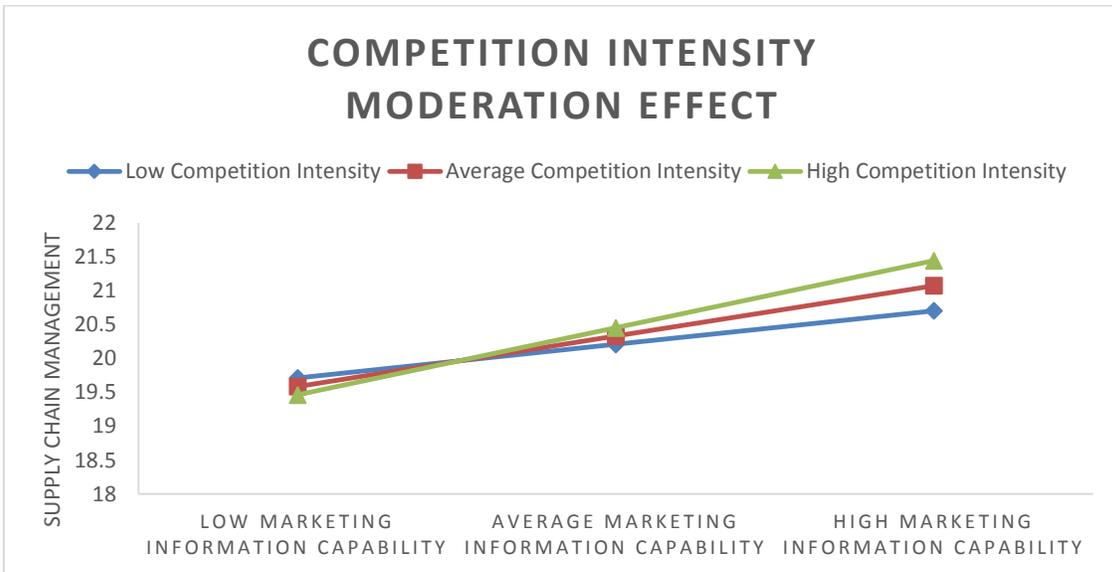


Figure 2.9: Competition Intensity's Moderation Effect (Marketing Information Capability → Supply Chain Management)

Table 2.17: Competition Intensity's Moderation Effects

| Competition Intensity's Moderation Effect on | Hypotheses | Coefficient | t-Value | p-Value |
|---|-------------------|--------------------|----------------|----------------|
| Marketing Information Capability → Customer Performance | H _{9,1} | .095 | 1.919 | .057 |
| Marketing Information Capability → New Product Development | H _{9,2} | .211 | 2.786 | .006 |
| Marketing Information Capability → Supply Chain Performance | H _{9,3} | .200 | 2.548 | .012 |

Mediation Effects

The testing of possible mediation effects of marketing information capability followed the steps specified by Kenny (2014) and Baron and Kenny (1986). First, the direct effects of antecedent variables of marketing information capability on its outcome variables were tested with SEM. IT information capability has direct effects on customer performance ($p=.000$), new product development ($p=.000$) and supply chain management ($p=.000$). Cross-functional collaboration had direct effects on customer satisfaction ($p=.004$), new product development ($p=.009$), and supply chain management ($p=.06$). Top management emphasis on marketing showed direct effect on supply chain management ($p=.017$). However, there were no other direct effects from the rest of the antecedent variables: cross-functional competition and the influence of marketing department (refer to Table 2.18). Since those three independent variables exhibited no significant effects at this stage, they would not be considered in the next steps.

Table 2.18: Regression Weights and P Values

| | Path | Estimate | S.E. | P |
|-------------------------|-----------------------------|-----------------|-------------|----------|
| Customer Performance | <--- IT Capability | .140 | .046 | .002 |
| Product Development | <--- IT Capability | .479 | .081 | .000 |
| Supply Chain Management | <--- IT Capability | .502 | .080 | .000 |
| Supply Chain Management | <--- Top Management | .332 | .139 | .017 |
| Product Development | <--- Top Management | .119 | .128 | .353 |
| Customer Performance | <--- Top Management | .078 | .081 | .338 |
| Customer Performance | <--- Influence of Marketing | -.082 | .090 | .361 |
| Product Development | <--- Influence of Marketing | .152 | .143 | .288 |
| Supply Chain Management | <--- Influence of Marketing | -.098 | .153 | .520 |
| Customer Performance | <--- Collaboration | .244 | .084 | .004 |
| Product Development | <--- Collaboration | .351 | .134 | .009 |
| Supply Chain Management | <--- Collaboration | .264 | .140 | .060 |
| Customer Performance | <--- Competition | -.024 | .048 | .621 |
| Product Development | <--- Competition | .001 | .077 | .988 |
| Supply Chain Management | <--- Competition | -.042 | .082 | .605 |

Second, the effect of IT capability on marketing information capability and the effect of cross-functional collaboration on marketing information capability must be considered. Previous tests had already confirmed that significant effects existed in those relationships (refer to Table 2.14).

Third, the effects of marketing information capability on the outcome variables need to be examined. Previous tests had already demonstrated that marketing information capability influenced customer performance, new product development and supply chain management (refer to Table 2.15).

Fourth, the effects of IT capability on product development and supply chain management and the effects of cross-functional collaboration on product development and supply chain management must be investigated while controlling for marketing information capability. For the purpose of illustration, the test analysis of the mediating effect of marketing information capability between IT capability and new product development were presented in details in this paragraph. As exhibited in Table 2.19, the indirect effect of IT capability on new product development was .112. It fell in the confidence interval between .033 and .227. Since the confidence interval did not include 0, it was shown that there was mediation effect. Besides, the direct effect of IT capability on new product development when controlling for marketing information capability was .437 with p-value .000 (see Table 2.20). Therefore it was concluded that marketing information capability partially mediates the relationship between IT capability and new product development (refer to Appendix D for Process Model output).

According to the same test analysis criteria, marketing information capability also partially mediated the following four pairs of relationships: IT capability and supply chain management, cross-functional collaboration and new product development, cross-functional collaboration and supply chain management, and top management emphasis and supply chain management (see Table 2.19). While controlling for marketing information capability, the direct effects of IT capability, cross-functional collaboration and top management emphasis on marketing were presented in Table 2.20. To conclude, marketing information capability serves as a mediator in some of the relationships depicted in the conceptual model.

Table 2.19: Confidence Intervals for Indirect Mediation Effects

| Marketing Information Capability's Mediation Effect on | Indirect Effect | Lower Level CI | Upper Level CI | Mediation |
|---|------------------------|-----------------------|-----------------------|------------------|
| IT Capability → Customer Performance | .024 | -.016 | .083 | No |
| IT Capability → New Product Development | .112 | .033 | .227 | Yes |
| IT Capability → Supply Chain Management | .109 | .034 | .221 | Yes |
| Cross-functional Collaboration → Customer Performance | .034 | -.017 | .110 | No |
| Cross-functional Collaboration → New Product Development | .188 | .067 | .341 | Yes |
| Cross-functional Collaboration → Supply Chain Management | .214 | .079 | .387 | Yes |
| Top Management Emphasis → Supply Chain Management | .261 | .138 | .446 | Yes |

Table 2.20: Direct Mediation Effects When Marketing Information Capability Was Controlled

| Model | Coefficient | t Value | p Value |
|--|--------------------|----------------|----------------|
| IT Capability → New Product Development | .437 | 5.90 | .000 |
| IT Capability → Supply Chain Management | .509 | 6.81 | .000 |
| Cross-functional Collaboration → New Product Development | .416 | 3.95 | .000 |
| Cross-functional Collaboration → Supply Chain Management | .368 | 3.34 | .001 |
| Top Management Emphasis → Supply Chain Management | .261 | 2.18 | .031 |

Rival Independent Variable

To rule out alternative explanations of the impact of marketing information capability on its consequence variables, the author included a different type of marketing capability variable—marketing planning as a rival independent variable (Aneshensel, 2002). Marketing planning was chosen because it explained more variance and exhibited a

stronger impact on firm performance when it was compared with the other types of marketing capabilities, such as marketing communication, channel management and pricing (Vorhies & Morgan, 2005). It is necessary to test marketing planning and marketing information capability together. It is important to find out whether marketing information capability still has significant impacts on the consequence variables in the presence of marketing planning.

SEM results showed that marketing information capability still had significant impacts on customer performance ($p=.000$), new product development ($p=.000$) and supply chain management ($p=.000$) when it is tested with marketing planning. However, marketing planning only showed positive impacts on new product development ($p=.000$) and supply chain management ($p=.000$), but not on customer performance (.236). Besides, the AVEs for marketing information capability and marketing planning were .55 and .83 respectively, higher than their squared correlations (.25). Demonstration of the existence of high AVEs is one of the approaches to prove discriminant validity between constructs. In conclusion, marketing information capability was a different type of marketing capability from marketing planning and exerted unique impacts on its consequence variables.

DISCUSSION

The idea of this essay originated in response to the explosion of data and information. Academic researchers and industry practitioners called for immediate action to properly handle the complexity and urgency of the big data phenomenon (Barton & Court, 2012; Desai, 2012). The essay attempted to answer the following important questions: what can marketing executives and personnel do to grasp the opportunities offered by the emergence of the data analytics and more technologies? One suggested

approach is to develop and improve the firms' marketing information capability, which consists of abilities to acquire, distribute, process and utilize information.

Building upon the research from essay one, essay two examined the antecedents and consequences of the marketing information capability construct. It conducted the first empirical studies in this arena. Besides, two important moderation effects were investigated. Using the resource-based view as its theoretical foundation, essay two tried to highlight the values of marketing information capability through its impacts on critical business processes. The research on the predictor variables are also of value. It sheds light on the factors that impact marketing information capability.

Theoretical Contributions

To the best of the author's knowledge, essay two is the first empirical article to use resource-based theory to fully study the predictor and dependent variables of marketing information capability. Marketing scholars started to use resource-based view to study the role of marketing resources and assets in firm performance in the late 1990s (Rajendra K. Srivastava et al., 2001; Rajenda K. Srivastava et al., 1998). In early 2014, several articles were published that strongly advocated the potential value of studying marketing phenomenon through the lenses of resources and capabilities (J. B. Barney, 2014; Kozlenkova et al., 2014). Hypotheses 5, 6 and 7 were also strongly supported. Marketing information capability, as a firm resource, significantly influenced three business processes: customer performance, new product development, and supply chain management. Therefore, these research findings corroborated the resource-based theory.

In essay two, original empirical studies were conducted to examine the important relationship between two firm resources: IT information management capability and marketing information capability. Since Hypothesis 2 was supported, it was important to

note one way of enhancing firm resources: through improving other critical firm resources. In addition, the studies contributed to the marketing literature on marketing capabilities. In essence, marketing information capability is an important kind of marketing capabilities that have the potential to create competitive advantages for the firms. Marketing scholars pointed out that there was a great need to understand and improve important marketing capabilities. Essay two was also a quick response to this call (Deighton et al., 2012; Desai, 2012).

Managerial Implications

The findings on marketing information capability from the main study provide relevant and useful insights to marketing professionals in three respects. First, marketing information capability is a critical firm resource that significantly impacts the outcomes of three business processes: customer performance, new product development and supply chain management. By influencing those processes, marketing information capability has the potential to bring competitive advantage to firms and improve firm performance.

Second, four important factors influence the status of marketing information capability. Those factors are cross-functional collaboration, IT capability, top management emphasis on marketing, and the influence of the marketing department within the firm. Cross-functional collaboration is an organizational level construct. It is not surprising that cross-functional collaboration aids the development of marketing information capability. When different functions and departments cooperate with each other smoothly, information flows more easily and therefore increases the firms' abilities to acquire, disseminate, process and utilize information about customers and competitors. IT capability, especially IT information management capability, provides software and

infrastructure that marketing professionals use in their daily work. Stronger IT information capability helps the firms to develop stronger marketing information capability.

Current Limitations and Future Research

Most of the senior marketing executives who responded to the surveys of this study worked in companies located in Southeastern United States. To address the potential issue of generalizability, more surveys can be conducted with marketing executives from companies in other parts of the United States. Furthermore, research can be done on current situation of marketing information capability in non-US companies.

Essay two studied two moderator variables: environmental dynamism and competition intensity. In the future, it will be useful to investigate whether firm size and industry type have impact on the relationship between marketing information capability and its dependent variables. For example, information processing or analytics are especially important to certain types of industries that rely greatly on information. Some information intensive industries include: insurance, banking, financial services or advertising industries (Drennan, 1989). It is necessary to empirically verify that marketing information capability has bigger impact on its consequent variables in these information intensive industries.

ESSAY THREE: EXAMINING THE MODERATING EFFECT OF THE ADOPTION OF DATA ANALYTICS ON THE RELATIONSHIP BETWEEN MARKETING INFORMATION CAPABILITY AND ITS DEPENDENT VARIABLES

INTRODUCTION

Information is important in marketing: it has close connections with many important marketing and organizational concepts, such as market orientation (Kohli & Jaworski, 1990; Slater & Narver, 1994), market information processing (Moorman, 1995; Sinkula, 1994), marketing capabilities (George S. Day, 2011; Vorhies & Morgan, 2005) and organizational learning (Argote & Miron-Spektor, 2011). Blattberg, Glazer and Little (1994, p. 2) stated that “marketing has always been primarily a function of information and information processing” and even foretold a “marketing information revolution” that would transform the marketing profession. With the emergence of the Internet and social media applications, their prediction turned out to be mostly true. At present, data and information are generated and collected at faster speed and in larger volumes from more diverse channels and sources (Netzer, Feldman, Goldenberg, & Fresko, 2012). The phrase “big data” has been created to describe this deluge of data and information. Recognizing the potential values of big data, the MSI lists “big data” as one of its six research priorities during 2013 and 2014 (Deighton et al., 2012).

Both business executives and scholars are keenly interested in whether big data can be transformed into useful information to improve customer and firm performance (T. H. Davenport, Barth, & Bean, 2012; McAfee & Brynjolfsson, 2012). Although no clear definition exists for big data, one important insight has been generally recognized by many experts: i.e. the impact of big data can only be realized through the proper utilization of advanced data analytics. For example, Johnson (2012) claimed that the combination of big

data and analytics will produce big opportunities for companies. However, in order to benefit from big data and advanced analytics, companies need to gather data creatively, build business models that can optimize business results and transform business processes (Barton & Court, 2012). According to Davenport and Patil (2012), data scientists who can glean valuable insights from unstructured data are in great demand. Chen et al. (2012) believe that big data will generate big impact through business intelligence and analytics.

If big data and analytics are so important, then what kind of role can marketing professionals and academics play? This dissertation proposes that the big data phenomenon can be investigated within the domain of market information capability. Essay one developed a scale for marketing information capability that has passed rigorous tests standards. Essay two conducted a comprehensive study on the antecedents and outcomes of marketing information capability. Since it has already been empirically verified in essay two that marketing information capability has positive effects on three important marketing processes, i.e. customer management, new product development and supply chain management, essay three investigates whether the adoption of big data analytics moderates the relationships between marketing information capability and its consequent variables.

HYPOTHESES REGARDING THE ADOPTION OF DATA ANALYTICS

When organizations adopt big data projects that attempt to use advanced analytical techniques to assist companies in making better business decisions, it is reasonable to expect that marketing information capability will have a stronger impact on its dependent variables. Thus, the following hypotheses were presented for empirical testing:

H_{10.1}: The adoption of data analytics has a positive moderating effect on the relationship between marketing information capability and customer relationship management.

H_{10.2}: The adoption of data analytics has a positive moderating effect on the relationship between marketing information capability and new product development.

H_{10.3}: The adoption of data analytics has a positive moderating effect on the relationship between marketing information capability and supply chain performance.

METHODOLOGY

Sample and Preliminary Data Analysis

The data sets were the same as used in the main study for Essay Two (refer to the Sample section in Essay Two for details). The information for firm size is provided in Figure 3.1.

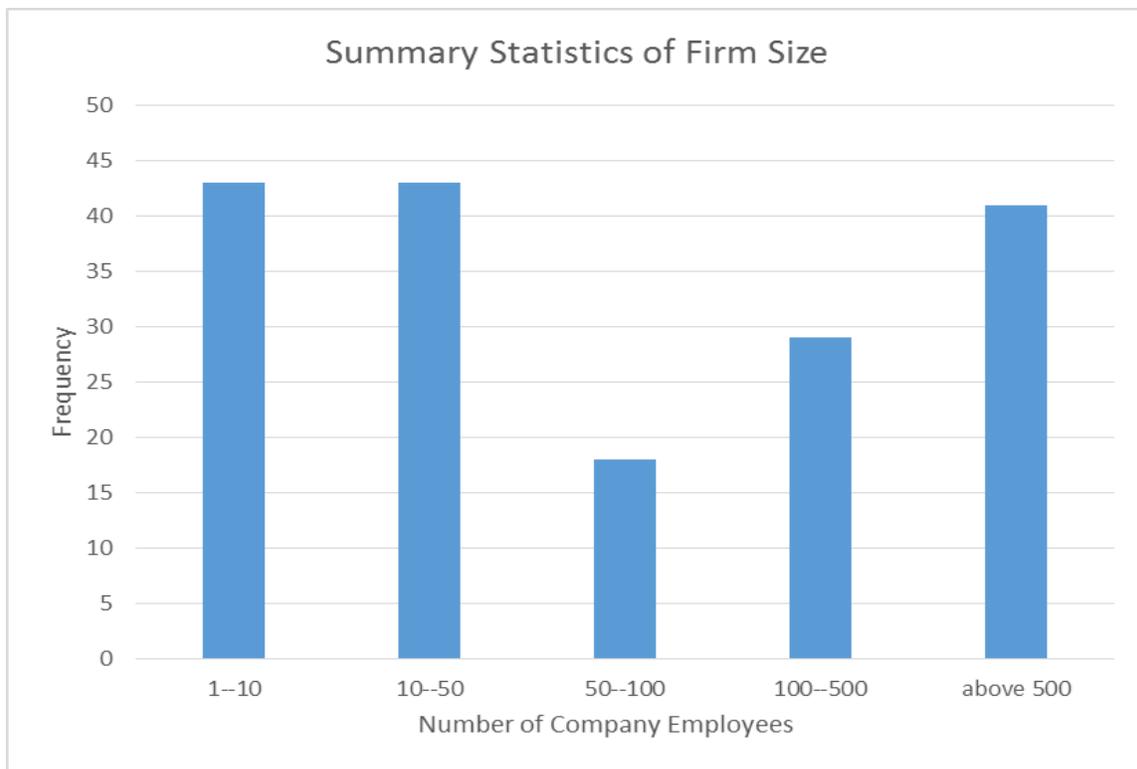


Figure 3.1: Summary Statistics of Firm Size

Measure

The measure for the adoption of data analytics was adopted from Germann, Lilien and Rangaswamy (2013) (refer to Table 2.6). It used a 5-point Likert scale, ranging from “strongly disagree” to “strongly agree”. The summary statistics for the adoption of data analytics was provided in Table 3.1. It seemed that the adoption of data analytics had differential impacts on different marketing areas. For example, it showed biggest impact on pricing management and smallest impact on channel management. A possible explanation could be that those surveyed companies used more data analytics in product pricing, but less data analytics in channel management.

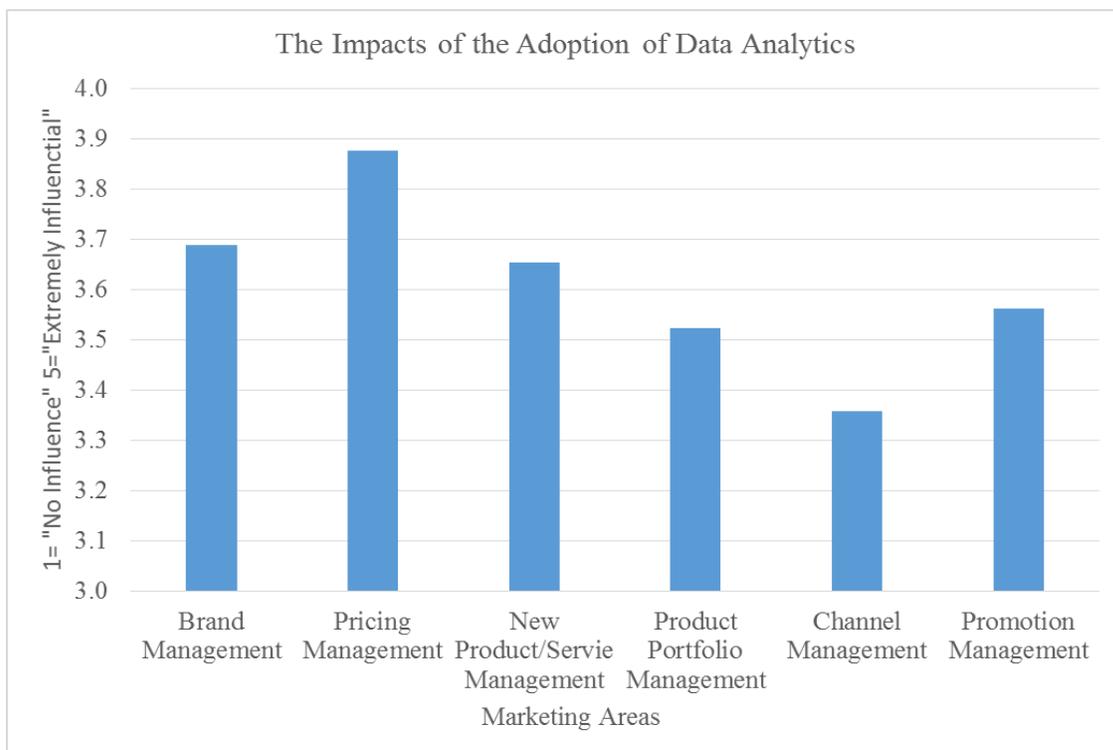


Figure 3.2: The Impacts of the Adoption of Data Analytics

Table 3.1: Summary Statistics for the Adoption of Data Analytics

| Construct | N | Minimum | Maximum | Mean | Std. Deviation | Variance |
|-----------------------|----------|----------------|----------------|-------------|-----------------------|-----------------|
| Adoption Of Analytics | 176 | 1.33 | 5.00 | 3.5953 | .77999 | .608 |

The measure demonstrated good reliability, convergent validity and discriminant validity. The Cronbach's Alpha was .834. The composite reliability was .837 (see Table 2.12). The item loadings for the adoption of data analytics were all above .5 and therefore met the criteria for convergent validity (see Table 2.11). The second CFA test in Essay Two also showed that this construct had discriminant validity from other constructs in the model (see Table 2.13).

Results of Hypotheses Testing

As was done in Essay Two, the moderation effect of the adoption of data analytics was tested with the Process model (Hayes, 2013). Detailed information on how the Process model was used in this dissertation was presented in the Moderation Effects section in Essay Two.

Testing results showed that the adoption of data analytics significantly moderated the relationships between marketing information capability and its three dependent variables: customer performance, new product development, and supply chain management. The Process Model output for the testing of moderation effect was provided in Appendix E.

The hypothesis on customer performance (**H_{10.1}**) was supported. As shown in Figure 3.3 and 3.4, the adoption of data analytics moderated the relationship between marketing information capability and customer performance in the high group ($p=.003$). In the low ($p=.852$) and average groups ($p=.062$), there were no significant effects. Therefore,

when the adoption rate of data analytics was high, marketing information capability had a more significant impact on customer performance.

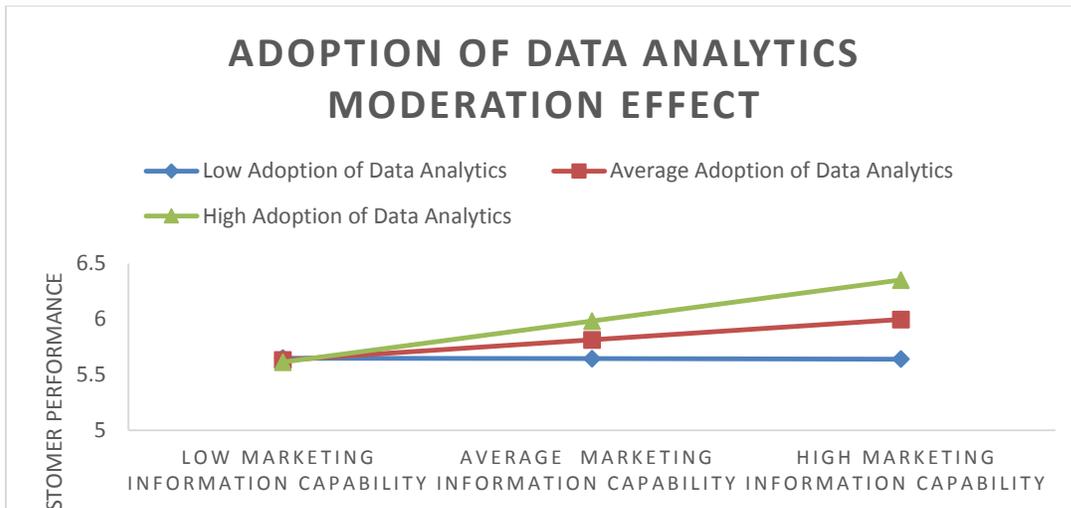


Figure 3.3: The Moderation Effect of the Adoption of Data Analytics (Marketing Information Capability → Customer Performance)

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*****
Conditional effect of X on Y at values of the moderator(s):
  Adoption    Effect      se        t         p        LLCI        ULCI
  2.815       -.018       .094      -.186     .852      -.204       .169
  3.595       .171       .091      1.882    .062      -.008       .351
  4.375       .361       .119      3.028    .003       .126       .596

Values for quantitative moderators are the mean and plus/minus one SD from
mean.
Values for dichotomous moderators are the two values of the moderator.
*****

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Figure 3.4: The Conditional Effect of Marketing Information Capability on Customer Performance at Values of the Adoption of Data Analytics

The hypothesis on new product development (**H_{10.2}**) was also supported. Figure 3.5 and 3.6 demonstrated that the adoption of data analytics moderated the relationship between marketing information capability and product development in the average group ($p=.000$) and high group ($p=.000$). In the low group ($p=.268$), there was no significant effect. This result was not surprising. When the adoption rate of data analytics was low, marketing information capability would be likely to be low. One of marketing information capability's major components was its ability to process information, which might be negatively impacted when data analytics was used on a minimal basis.

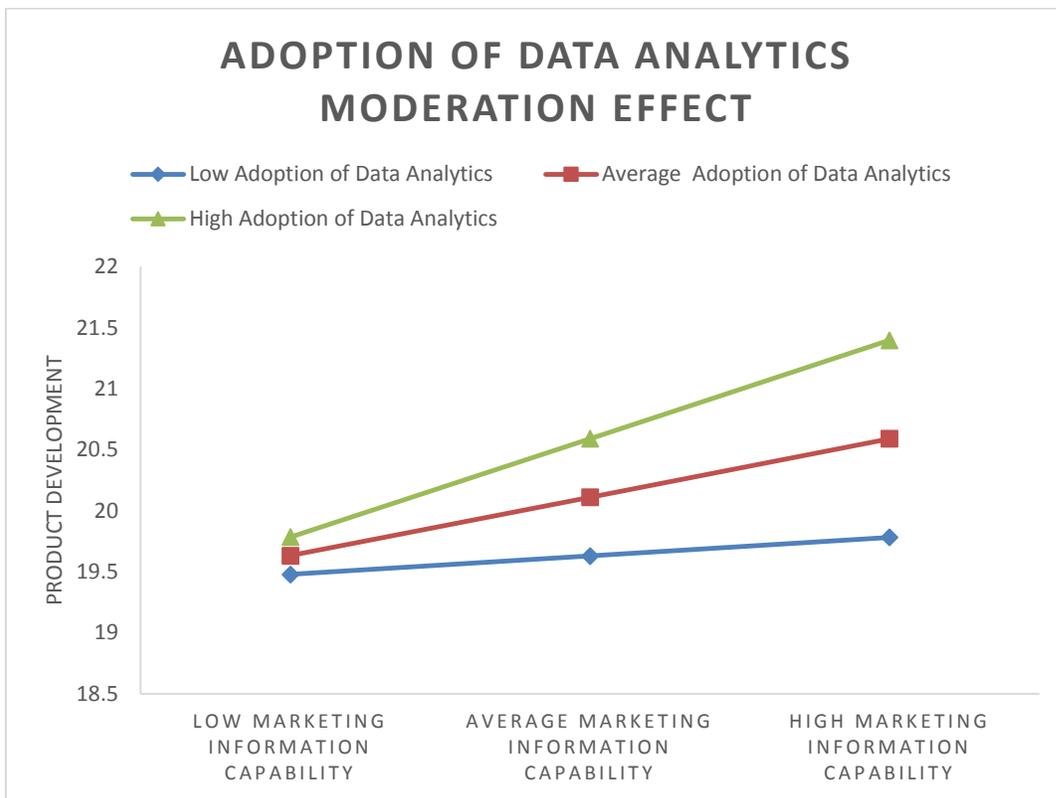


Figure 3.5: The Moderation Effect of the Adoption of Data Analytics (Marketing Information Capability → New Product Development)

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*****
Conditional effect of X on Y at values of the moderator(s):
Adoption    Effect    se    t    p    LLCI    ULCI
2.815      .156    .140    1.112    .268    -.121    .432
3.595      .487    .135    3.605    .000    .221    .754
4.375      .819    .177    4.636    .000    .470    1.168

Values for quantitative moderators are the mean and plus/minus one SD from
mean.
Values for dichotomous moderators are the two values of the moderator.
*****

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Figure 3.6: The Conditional Effect of Marketing Information Capability on New Product Development at Values of the Adoption of Data Analytics

As shown in Figure 3.7 and 3.8, the adoption of data analytics moderated the relationship between marketing information capability and supply chain management. The effects for the three groups (from lower to high) were: .356 (p=.021), .552 (p=.000) and .748 (p=.000). Hence, **H_{10.3}** was supported as well.

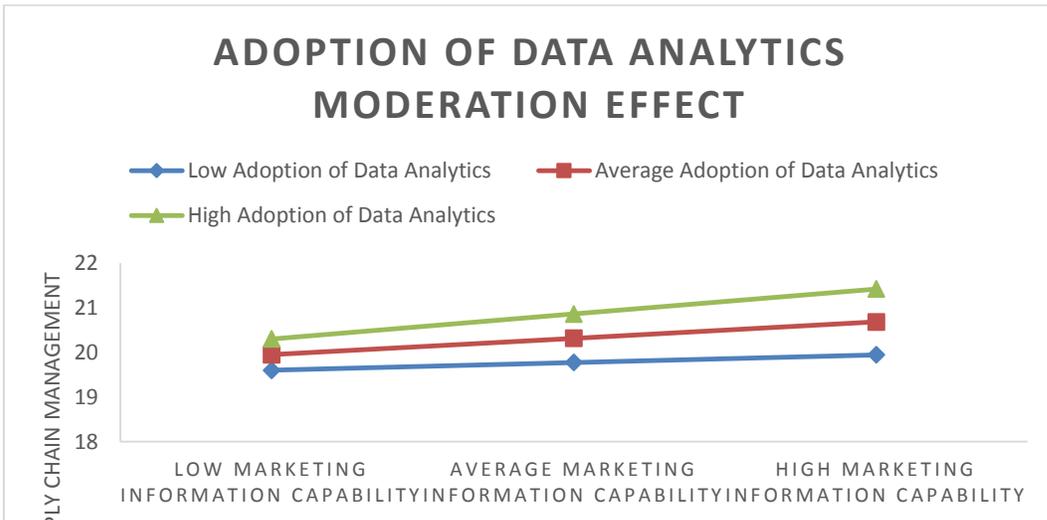


Figure 3.7: The Moderation Effect of the Adoption of Data Analytics (Marketing Information Capability → New Product Development)

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*****
Conditional effect of X on Y at values of the moderator(s):
Adoption    Effect    se      t      p      LLCI    ULCI
2.815       .356     .152    2.336  .021    .055    .656
3.595       .552     .147    3.753  .000    .262    .842
4.375       .748     .192    3.893  .000    .369    1.127

Values for quantitative moderators are the mean and plus/minus one SD from
mean.
Values for dichotomous moderators are the two values of the moderator.
*****

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Figure 3.8: The Conditional Effect of Marketing Information Capability on Supply Chain Management at Values of the Adoption of Data Analytics

BIG DATA, MARKETING INFORMATION CAPABILITY AND DATA ANALYTICS

Big data is a new phenomenon. Since there is no uniform definition for big data, it is hard to come up with a good construct for it. In this essay, the author is interested in finding out whether marketing information capability and data analytics have significant impacts on company leadership’s attitude towards big data.

The Process model (Hayes, 2013) was used to test the moderation effect of the adoption of data analytics on the relationship between marketing information capability and senior management team’s emphasis on big data. The section on moderation effects in Essay Two provided detailed information on how to use the Process model to test moderation and mediation effects in this dissertation.

Tests result demonstrated significant interaction effect between marketing information capability and the adoption of data analytics. When both data analytics adoption rate and marketing information capability were high, company senior executives

were much more likely to emphasize the importance of big data projects. The moderation effects were shown in Figure 3.9 and Figure 3.10.

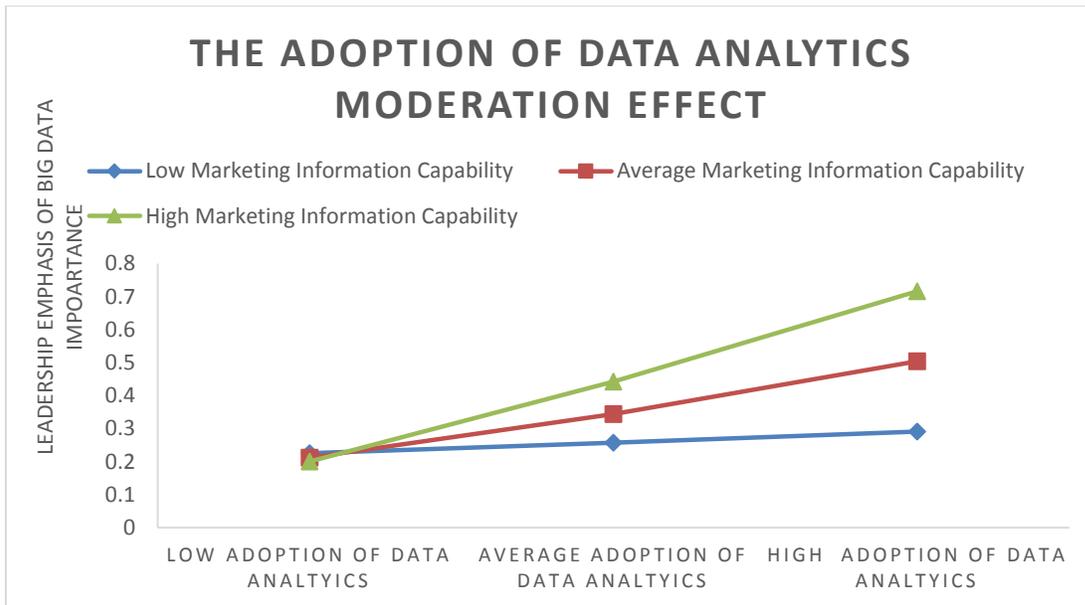


Figure 3.9: The Moderation Effect of the Adoption of Data Analytics (Marketing Information Capability → Leadership Emphasis on Big Data)

```

*****
Conditional effect of X on Y at values of the moderator(s):
Adoption    Effect    se      Z      p      LLCI    ULCI
2.818      -.077    .247    -.310  .757    -.561    .408
3.599      .420    .243    1.726  .084    -.057    .897
4.380      .917    .334    2.748  .006    .263    1.571

Values for quantitative moderators are the mean and plus/minus one SD from
mean.
Values for dichotomous moderators are the two values of the moderator.
*****

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Figure 3.10: The Conditional Effect of Marketing Information Capability on Supply Chain Management at Values of the Adoption of Data Analytics

DISCUSSION

The research on marketing information capability and data analytics are pertinent to both marketing scholars and practitioners. This essay makes contributions in the following areas.

First, it conducted one of the first empirical studies on the relationship between marketing information capability, data analytics and big data. The findings offered insights to marketing executives on how to benefit from data analytics and big data. For example, empirical testing found out that marketing information capability had big impacts on customer performance when the competition in the industries was fierce. Therefore, companies can invest in marketing resources and capabilities to better meet the challenges from their competitors.

Second, it provided a practical approach to conduct research on marketing resources and capabilities from the perspectives of the resource-based theory. Marketing information capability had significantly effects on three marketing processes: customer performance, new product development and supply chain management. The adoption of data analytics moderated these effects.

Third, the research in this dissertation was multi-disciplinary in nature and drew insights from important fields, such as marketing, IT and strategic management. The cross-pollinations of ideas from those fields will help shed new light on one of the most important questions in business management: what factors make a firm successful? By empirically testing and confirming the value of marketing information capability and its relationships with other critical business constructs, the author hopes that more business scholars from diverse fields are encouraged to collaborate with each other on a larger scale. This is in line

with the recommendations by both marketing and IT researchers (Buehrer, Senecal, & Pullins, 2005; Hunter & Perreault Jr, 2006).

Future Research

The studies on marketing information capability, data analytics and big data provide fertile ground for future research. Research in this area crosses the boundaries of marketing, IT, statistical learning (Hastie et al., 2009; James, Witten, Hastie, & Tibshirani, 2013), machine learning (Bishop & Nasrabadi, 2006; Harrington, 2012) and data mining (J. Han, Kamber, & Pei, 2006; Witten, Frank, & Hall, 2011). Marketing scholars recently brought attention to the importance of applying advanced methodologies available in data mining and machine learning to conduct marketing research (Deighton et al., 2012; Desai, 2012). One stream of future research can be conducted to investigate the potential values and limitations of those methodologies in current marketing research. Another area of potential research is to examine what insights marketing research can provide to those fields in return.

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APPENDIX A: A PRELIMINARY SCALE: MARKETING INFORMATION CAPABILITY

The working definition: marketing information capability is marketing department's capacity to acquire, distribute, process and apply information about the firm's customers and competitors effectively and efficiently to promptly respond to the changing environment and improve customer and business performance.

The response scale for each marketing information capability item is a seven-point Likert scale. The levels range from Strongly Disagree; Disagree; Somewhat Disagree; Neither Disagree Nor Agree; Somewhat Agree; Agree; Strongly Agree.

| Acquiring Information | micaquisition |
|--|--|
| Please rate your marketing department in your business unit in terms of its ability to acquire information. Our marketing department is able to ... | |
| <ul style="list-style-type: none"> • Continuously collect information from customers. • Continuously collect information about competitors' activities. • Continuously collect information about relevant public other than customers and competitors. • Continuously collect information from external experts, such as marketing consultants. • Continuously collect information from other functional departments, such as billing or IT. • Continuously collect information through marketing intelligence, such as social media or online search. | mica_1 mica_2 mica-3* mica_4 mica_5 mica_6 |
| Distributing Information | micdissemination |
| Please rate your marketing department in your business unit in terms of its ability to disseminate information. Our marketing department is able to disseminate information by ... | |
| <ul style="list-style-type: none"> • Circulating important documents (e.g. reports, newsletters) on competitors. • Communicating closely with other functional departments concerning market trends and developments. • Communicating closely with other functional departments concerning customers. | micd_1 micd_2 micd_3 |

Table continued

| Distributing Information | micdissemination |
|---|---|
| <ul style="list-style-type: none"> • Communicating closely with other functional departments concerning competitors. • Alerting other departments when it finds out something important about customers. • Alerting other departments when it finds out something important about competitors. | micd_4 micd_5 micd_6 micd_7 micd_8 micd_9 |
| Processing Information | micprocessing |
| Please rate your marketing department in your business unit in terms of its ability to process market information. Our marketing department is able to correctly and promptly ... | |
| <ul style="list-style-type: none"> • Process market information to reduce its complexity so that the information is easier to understand. • Process customer information from various functions that interact with customers. • Process information about competitors' activities. • Process information about market trends and developments. • Integrate customer information from different communication channels (such as telephone, e-mail, the Internet, or personal contact). • Integrate competitor information from different communication channels (such as telephone, e-mail, the Internet, or personal contact). • Integrate market trends information from different communication channels (such as telephone, e-mail, the Internet, or personal contact). • Organize information about customers in meaningful ways. • Organize information about competitors in meaningful ways. | micp_1 micp_2 micp_3 micp_4 micp_5 micp_6 micp_7 micp_8 micp_9 |
| Utilizing Information | micutilization |
| Please rate your marketing department in your business unit in terms of its ability to utilize information. Our marketing department is able to ... | |
| <ul style="list-style-type: none"> • Use information to develop customer profiles. • Use information to develop competitor profiles. • Use information to segment markets. | micu_1 micu_2 micu_3 |

(Table continued)

| Utilizing Information | micutilization |
|--|--|
| <ul style="list-style-type: none">• Use information to assess customer retention behavior.• Use information to evaluate competitors.• Use information to identify appropriate channels to reach customers.• Use information to customize our offers.• Use information to respond to competitors' moves.• Use information to respond to environment changes. | micu_4 micu_5 micu_6 micu_7 micu_8 micu_9 |

*The items in bold are the final items from CFA.

APPENDIX B: CURRENT SCALES FOR MARKETING CAPABILITIES

Marketing Capabilities Scale by Vorhies and Morgan (2005)

| Please rate your business unit relative to your major competitors in terms of its marketing capabilities in the following areas. Seven-point scale running –3 (“much worse than competitors”) to +3 (“much better than competitors”). | |
|--|--|
| Pricing | <ol style="list-style-type: none"> 1. Using pricing skills and systems to respond quickly to market changes 2. Knowledge of competitors’ pricing tactics 3. Doing an effective job of pricing products/services 4. Monitoring competitors’ prices and price changes |
| Product development | <ol style="list-style-type: none"> 5. Ability to develop new products/services 6. Developing new products/services to exploit R&D investment 7. Successfully launching new products/services 8. Insuring that product/service development efforts are responsive to customer needs |
| Channel management | <ol style="list-style-type: none"> 1. Strength of relationships with distributors 2. Attracting and retaining the best distributors 3. Adding value to our distributors’ businesses 4. Providing high levels of service support to distributors |
| Marketing communication | <ol style="list-style-type: none"> 1. Developing and executing advertising programs 2. Advertising management and creative skills 3. Public relations skills 4. Brand image management skills and processes 5. Managing corporate image and reputation |
| Selling | <ol style="list-style-type: none"> 1. Giving salespeople the training they need to be effective 2. Sales management planning and control systems 3. Selling skills of salespeople 4. Sales management skills 5. Providing effective sales support to the sales force |
| Market information management | <ol style="list-style-type: none"> 1. Gathering information about customers and competitors 2. Using market research skills to develop effective marketing programs 3. Tracking customer wants and needs 4. Making full use of marketing research information 5. Analyzing our market information |
| Marketing planning | <ol style="list-style-type: none"> 1. Marketing planning skills 2. Ability to effectively segment and target market 3. Marketing management skills and processes 4. Thoroughness of marketing planning processes |

(Table continued)

| Please rate your business unit relative to your major competitors in terms of its marketing capabilities in the following areas. Seven-point scale running -3 (“much worse than competitors”) to +3 (“much better than competitors”). | |
|--|---|
| Marketing implementation | <ol style="list-style-type: none">1. Allocating marketing resources effectively2. Organizing to deliver marketing programs effectively3. Translating marketing strategies into action4. Executing marketing strategies quickly |

APPENDIX C: A SCALE FOR MIC

The final scale for marketing information capability is a seven-point Likert scale from Strongly Disagree to Strongly Agree.

| | |
|--|------------------------------------|
| Acquiring Information | MICACQ |
| Please rate your marketing department in your business unit in terms of its capability to acquire information. Our marketing department continuously collects information ... | |
| <ul style="list-style-type: none"> • about customers. • from external experts, such as marketing consultants. • from other functional departments, such as billing or IT. | mica_1 mica_4 mica_5 |
| Distributing Information | MICDIS |
| Please rate your marketing department in your business unit in terms of its capability to disseminate information. Our marketing department accurately and timely disseminates information by ... | |
| <ul style="list-style-type: none"> • Holding interdepartmental meetings to discuss market trends and developments. • Spending time discussing customers' future needs with other functional departments. • Communicating closely with other functional departments concerning market trends and developments. | micd_1 micd_2 micd_5 |
| Processing Information | MICPRO |
| Please rate your marketing department in your business unit in terms of its capability to process information. Our marketing department accurately and timely... | |
| <ul style="list-style-type: none"> • Processes information about market trends and developments. • Integrates customer information from different communication channels (such as telephone, e-mail, the Internet, or personal contact). • Integrates market trends information from different communication channels (such as telephone, e-mail, the Internet, or personal contact). | micp_1 micp_2 micp_4 |
| Utilizing Information | MICUTI |
| Please rate your marketing department in your business unit in terms of its capability to utilize information. Our marketing department effectively uses information to ... | |
| <ul style="list-style-type: none"> • develop competitor profiles. • evaluate competitors. • respond to competitors' moves. | micu_2 micu_3 micu_5 |

APPENDIX D: PROCESS MODEL OUTPUT FOR MEDIATION EFFECT

Run MATRIX procedure:

***** PROCESS Procedure for SPSS Release 2.11 *****

Written by Andrew F. Hayes, Ph.D. www.afhayes.com
 Documentation available in Hayes (2013). www.guilford.com/p/hayes3

Model = 4
 Y = pdp
 X = ITIMC
 M = MarketIn

Sample size
 176

Outcome: MarketIn

Model Summary

| R | R-sq | F | df1 | df2 | p |
|------|------|--------|-------|---------|------|
| .461 | .212 | 46.861 | 1.000 | 174.000 | .000 |

Model

| | coeff | se | t | p | LLCI | ULCI |
|----------|-------|------|-------|------|-------|-------|
| constant | 2.806 | .360 | 7.792 | .000 | 2.095 | 3.516 |
| ITIMC | .303 | .044 | 6.845 | .000 | .216 | .390 |

Outcome: pdp

Model Summary

| R | R-sq | F | df1 | df2 | p |
|------|------|--------|-------|---------|------|
| .563 | .317 | 40.215 | 2.000 | 173.000 | .000 |

Model

| | coeff | se | t | p | LLCI | ULCI |
|----------|--------|------|--------|------|--------|--------|
| constant | 14.886 | .622 | 23.940 | .000 | 13.658 | 16.113 |

| | | | | | | |
|----------|------|------|-------|------|------|------|
| MarketIn | .369 | .113 | 3.278 | .001 | .147 | .592 |
| ITIMC | .437 | .074 | 5.900 | .000 | .291 | .584 |

***** TOTAL EFFECT MODEL

Outcome: pdp

Model Summary

| R | R-sq | F | df1 | df2 | p |
|------|------|--------|-------|---------|------|
| .524 | .275 | 65.992 | 1.000 | 174.000 | .000 |

Model

| | coeff | se | t | p | LLCI | ULCI |
|----------|--------|------|--------|------|--------|--------|
| constant | 15.922 | .550 | 28.942 | .000 | 14.836 | 17.008 |
| ITIMC | .549 | .068 | 8.124 | .000 | .416 | .683 |

***** TOTAL, DIRECT, AND INDIRECT EFFECTS

Total effect of X on Y

| Effect | SE | t | p | LLCI | ULCI |
|--------|------|-------|------|------|------|
| .549 | .068 | 8.124 | .000 | .416 | .683 |

Direct effect of X on Y

| Effect | SE | t | p | LLCI | ULCI |
|--------|------|-------|------|------|------|
| .437 | .074 | 5.900 | .000 | .291 | .584 |

Indirect effect of X on Y

| | Effect | Boot SE | BootLLCI | BootULCI |
|----------|--------|---------|----------|----------|
| MarketIn | .112 | .050 | .029 | .217 |

***** ANALYSIS NOTES AND WARNINGS

Number of bootstrap samples for bias corrected bootstrap confidence intervals:
5000

Level of confidence for all confidence intervals in output:
95.00

----- END MATRIX -----

APPENDIX E: PROCESS MODEL OUTPUT FOR MODERATION EFFECT TESTING

Run MATRIX procedure:

***** PROCESS Procedure for SPSS Release 2.11 *****

Written by Andrew F. Hayes, Ph.D. www.afhayes.com
Documentation available in Hayes (2013). www.guilford.com/p/hayes3

Model = 1
Y = Customer
X = MarketIn
M = Adoption

Sample size
176

Outcome: Customer

Model Summary

| R | R-sq | F | df1 | df2 | p |
|------|------|-------|-------|---------|------|
| .366 | .134 | 8.891 | 3.000 | 172.000 | .000 |

Model

| | coeff | se | t | p | LLCI | ULCI |
|----------|--------|-------|--------|------|--------|--------|
| constant | 8.631 | 1.292 | 6.680 | .000 | 6.080 | 11.181 |
| Adoption | -1.033 | .403 | -2.565 | .011 | -1.828 | -.238 |
| MarketIn | -.700 | .255 | -2.747 | .007 | -1.203 | -.197 |
| int_1 | .242 | .073 | 3.323 | .001 | .098 | .386 |

Interactions:

int_1 MarketIn X Adoption

R-square increase due to interaction(s):

| | R2-chng | F | df1 | df2 | p |
|-------|---------|--------|-------|---------|------|
| int_1 | .056 | 11.039 | 1.000 | 172.000 | .001 |

Conditional effect of X on Y at values of the moderator(s):

| Adoption | Effect | se | t | p | LLCI | ULCI |
|----------|--------|------|-------|------|-------|------|
| 2.815 | -.018 | .094 | -.186 | .852 | -.204 | .169 |
| 3.595 | .171 | .091 | 1.882 | .062 | -.008 | .351 |
| 4.375 | .361 | .119 | 3.028 | .003 | .126 | .596 |

Values for quantitative moderators are the mean and plus/minus one SD from mean.

Values for dichotomous moderators are the two values of the moderator.

Data for visualizing conditional effect of X on Y:

| MarketIn | Adoption | yhat |
|----------|----------|-------|
| 4.242 | 2.815 | 5.648 |
| 5.229 | 2.815 | 5.631 |
| 6.215 | 2.815 | 5.613 |
| 4.242 | 3.595 | 5.644 |
| 5.229 | 3.595 | 5.813 |
| 6.215 | 3.595 | 5.982 |
| 4.242 | 4.375 | 5.640 |
| 5.229 | 4.375 | 5.996 |
| 6.215 | 4.375 | 6.351 |

***** ANALYSIS NOTES AND WARNINGS

Level of confidence for all confidence intervals in output:

95.00

----- END MATRIX -----

APPENDIX F: IRB APPROVAL

Application for Exemption from Institutional Oversight

Unless qualified as meeting the specific criteria for exemption from Institutional Review Board (IRB) oversight, ALL LSU research/ projects using living humans as subjects, or samples, or data obtained from humans, directly or indirectly, with or without their consent, must be approved or exempted in advance by the LSU IRB. This Form helps the PI determine if a project may be exempted, and is used to request an exemption.



Institutional Review Board
 Dr. Robert Mathews, Chair
 130 David Boyd Hall
 Baton Rouge, LA 70803
 P: 225.578.8692
 F: 225.578.5983
irb@lsu.edu | lsu.edu/irb

– Applicant, Please fill out the application in its entirety and include the completed application as well as parts A-F, listed below, when submitting to the IRB. Once the application is completed, please the completed application to the IRB Office or to a member of the Human Subjects Screening Committee. Members of this committee can be found at <http://sites01.lsu.edu/wp/ored/human-subjects-screening-committee-members/>

- A Complete Application Includes All of the Following:
 - (A) A copy of this completed form and a copy of parts B thru F.
 - (B) A brief project description (adequate to evaluate risks to subjects and to explain your responses to Parts 1&2)
 - (C) Copies of all instruments to be used.
 - *If this proposal is part of a grant proposal, include a copy of the proposal and all recruitment material.
 - (D) The consent form that you will use in the study (see part 3 for more information.)
 - (E) Certificate of Completion of Human Subjects Protection Training for all personnel involved in the project, including students who are involved with testing or handling data, unless already on file with the IRB. Training link: (<http://php.nihtraining.com/users/login.php>)
 - (F) IRB Security of Data Agreement: (<https://sites01.lsu.edu/wp/ored/files/2013/07/Security-of-Data-Agreement.pdf>)

1) Principal Investigator: Rank:
 Dept: Ph: E-mail:

2) Co Investigator(s): please include department, rank, phone and e-mail for each
 *If student, please identify and name supervising professor in this space

| | | |
|-------------------------------------|--------------------------------|----------------|
| IRB# | <u>E8475</u> | LSU Proposal # |
| <input checked="" type="checkbox"/> | Complete Application | |
| <input checked="" type="checkbox"/> | Human Subjects Training | |
| <input checked="" type="checkbox"/> | IRB Security of Data Agreement | |

3) Project Title:

STUDY EXEMPTED BY:
 Dr. Robert C. Mathews, Chairman
 Institutional Review Board
 Louisiana State University
 130 David Boyd Hall
 225-578-8692 / www.lsu.edu/irb
 Exemption Expires: 10/23/2016

4) Proposal? (yes or no) If Yes, LSU Proposal Number
 Also, if YES, either This application completely matches the scope of work in the grant
 OR More IRB Applications will be filed later

5) Subject pool (e.g. Psychology students)
 *Circle any "vulnerable populations" to be used: (children <18; the mentally impaired, pregnant women, the ages, other). Projects with incarcerated persons cannot be exempted.

6) PI Signature Date (no per signatures)

**** I certify my responses are accurate and complete.** If the project scope or design is later changes, I will resubmit for review. I will obtain written approval from the Authorized Representative of all non-LSU institutions in which the study is conducted. I also understand that it is my responsibility to maintain copies of all consent forms at LSU for three years after completion of the study. If I leave LSU before that time the consent forms should be preserved in the Departmental Office.

Screening Committee Action: Exempted Not Exempted Category/Paragraph 2

Signed Consent Waived? Yes/ No

Reviewer Mathews Signature [Signature] Date 10/24/13

VITA

Xia Liu is a fourth year marketing PhD candidate at Louisiana State University. She earned her Bachelor of Arts degree in English Education from Shandong Normal University in China. She also got a Master of Business Administration from Thunderbird, School of Global Management. She is scheduled to receive the degree of Doctor of Philosophy from Louisiana State University the August, 2014 commencement.

Xia Liu has research interests in the following areas: marketing strategy, social media/digital marketing, marketing analytics and international marketing. Her paper on online luxury consumer behavior was published by the *International Journal of Retail and Distribution Management*. She is also working with the other coauthors to finalize papers for submission to the *Journal of Advertising* and *Journal of Consumer Research*. In addition, she has presented papers at various national conferences. Her teaching interests include marketing strategy, consumer behavior, digital marketing and international marketing. Xia Liu is also actively involved in academic activities and has served as a reviewer for various conferences and journals.