



Information Technology, Cross-Channel Capabilities, and Managerial Actions: Evidence from the Apparel Industry

Jifeng Luo

Antai College of Economics & Management
Shanghai Jiao Tong University
luojf@sjtu.edu.cn

Ming Fan

Foster School of Business, University of Washington
mfan@uw.edu

Han Zhang*

Scheller College of Business,
Georgia Institute of Technology
han.zhang@scheller.gatech.edu

Abstract:

Information technology (IT) has changed the dynamics of competition in the U.S. economy. Firms are gaining competitive advantage by competing on technology-enabled processes. For the retail industry, technology is breaking down the barriers between different retail channels and is making omnichannel retailing inevitable—an integrated sales experience that melds touch-and-feel information in the physical world with online content. Omnichannel retailing is becoming a trend and critical for retailers' success. To keep up with the pace of change, existing retailers will need to create an omnichannel strategy and develop more omnichannel innovations. Based on the theories of the resource-based view (RBV), IT business value, and competitive dynamics, this study examines the factors that affect cross-channel capabilities and managerial actions in the U.S. apparel industry. We collected a longitudinal dataset on public apparel companies from 1995 to 2007. The empirical results reveal that both the quantity and scope of investments in enterprise IT applications were positively related to cross-channel capabilities. Financial resources positively moderated the relationship between enterprise IT applications and cross-channel capabilities. We found that enterprise IT applications increased the frequency and broadened the types of managerial actions. We found that cross-channel capabilities had mixed effects on managerial actions. Whereas market-oriented capabilities such as e-commerce and multi-channel cross-selling capabilities broadened the types of managerial actions, operation-oriented capabilities, such as cross-channel fulfillment, narrow the range of a firm's managerial actions. Our findings provide important implications for managers in apparel and other retail sectors.

Keywords: Cross-channel Capabilities, IT Applications, IT Business Value, Managerial Actions, Omnichannel Retailing.

Kenny Cheng was the accepting senior editor. This article was submitted on February 25, 2015 and went through 2 revisions.

*Corresponding author. Tel: +1 404 894 4373.

1 Introduction

Information technology (IT) allows firms to reconfigure strategic resources and execute managerial actions more effectively, which intensifies competition in many industries (McAfee & Brynjolfsson, 2008). In an increasingly competitive marketplace, products can quickly become obsolete, and competitive positions can rapidly falter. Firms must continue to carry out frequent competitive activities to create and recreate competitive advantage (D'Aveni, 1994). Only those firms that can leverage IT and technology-enabled capabilities to undertake a greater number of managerial actions from more heterogeneous and complex repertoires will continue as sector leaders. Despite the growing link between IT and intensifying competition, little research has investigated the underlying mechanism of how IT combines with other organizational resources to change business processes and help firms cope with intensified competition.

New technologies such as the Internet and in-store technological solutions (e.g., intelligent self-service kiosks) have changed the competitive landscape of the retailing industry. Because customers can move freely between physical stores, PCs, and mobile devices, the retail industry is evolving toward multichannel retailing (Bell, Gallino, & Moreno, 2014; Rigby, 2011). Brynjolfsson, Hu, and Rahman (2013) argue that new technologies and cross-channel retailing (e.g., consumers' ability to shop online and pick up in local stores) make the retail landscape increasingly competitive. Retailers once relied on barriers such as geography and customer ignorance to compete in traditional markets, but technology removes these barriers. It has become critically important for retailers to rethink their competitive strategies in an omnichannel world. This study examines IT applications, cross-channel capabilities, and managerial actions by linking theories in the resource-based view (RBV), IT business value, and competitive dynamics. Our research contributes to the literature by studying how IT allows firms to develop high-level capabilities and how combining IT and firm cross-channel capabilities affects managerial actions in the competitive marketplace.

How IT helps retailers develop cross-channel capabilities to cope with intensified competition is of practical and academic importance. First, cross-channel integration is becoming an operating standard for the retail industry (Kumar & Venkatesan, 2005). According to Rigby (2011), companies must pursue a strategy of omnichannel retailing: an integrated sales experience through all available shopping channels. Many consumers now take for granted the seamless shopping experience that allows them to carry out transactions wherever they are (through a computer, mobile device, catalog, or store visit). Venkatesan, Kumar, and Ravishanker (2007) provide evidence that multichannel shopping is associated with higher customer profitability. Using survey data from 125 multichannel retailers in Singapore, Oh, Teo, and Sambamurthy (2012) found that retail channel integration through using IT allows firms to more efficiently deliver their current products/services and provide more innovative products in the future. The ability to effectively sense, shape, and fulfill customer demand through a customer's channel of choice has become a retailer's new competitive differentiator. Second, IT-enabled omnichannel strategy has become an engine of revenue growth for the companies that process the capabilities. For example, upscale retailer Nordstrom's multichannel strategy allows the company to expand beyond its physical stores to its new Nordstrom Rack stores Nordstromrack.com and flash-scale Hautelook.com channels and to satisfy customers from different segments (Bailey, 2015). Third, enterprise IT and cross-channel capabilities have become catalysts for many innovations and competitive activities (McAfee & Brynjolfsson, 2008). Cross-channel capabilities can integrate the advantage of physical stores with the information-rich experience of online shopping, which enables firms to turn shopping into an entertaining, exciting, and emotionally engaging experience. Along with other complementary organizational resources, a retailer can leverage its IT assets and IT-enabled cross-channel capabilities to launch actions early enough, frequently enough, and broadly enough to change customer perceptions. For example, GAP Inc. launched its new product brands specifically for the online channel. In 2010, Macy's replaced 40,000 in-store registers, and now the new system can allow customers who cannot find an item in their size to search Macy's inventory either online or from other stores and ship the item to their house. The system can also pick the optimal location to send the item (Touryalai, 2013).

To shed light on the relationships among IT, cross-channel capabilities, and firm managerial actions, we collected a longitudinal dataset on the apparel industry in the US from 1995 to 2007. The apparel industry provides a particularly insightful case to investigate the above questions. Because many consumers perceive clothing as products that they have to see, touch, and try on before purchasing, the industry was initially slow to adopt the online channel (De Figueiredo, 2000). Despite the slow take-off, apparel is one of the leading products sold over the Internet today (U.S. Census Bureau, 2009). However, in the apparel industry, retailers' use of the online channel is highly heterogeneous and ranges from full and partial integration to no integration with other channels.

Our study results suggest that both the quantity and scope of investments in enterprise IT applications are positively related to cross-channel capabilities. Financial resources positively moderated the relationship between enterprise IT applications and cross-channel capabilities. We found that enterprise IT applications increased the frequency of and broadened the types of managerial actions. However, we found that cross-channel capabilities had mixed effects on managerial actions. Whereas market-oriented capabilities such as e-commerce and multi-channel cross-selling capabilities broadened the types of managerial actions, operation-oriented capabilities, such as cross-channel fulfillment, narrowed the range of a firm's managerial actions.

This paper proceeds as follows. In Section 2, we review prior literature and provide motivations for this study. In Section 3, we develop the theory and testable hypotheses. In Section 4, we describe the data and our methodology. In Section 5, we present the econometrics results. In Section 6, we discuss our results and, in Section 7, conclude the paper.

2 Literature and Motivation

We draw on the literature on information systems (IS), strategic management, and retail operation and service management. In this section, we review the relevant studies and provide motivation for this research.

Practitioners and IS researchers have long debated IT's business value. Prior studies have employed several theoretical paradigms to examine IT's performance impacts and found mixed results (e.g., Bharadwaj, 2000; Brynjolfsson & Hitt, 1996; Powell & Dent-Micallef, 1997; Santhanam & Hartono, 2003; Stratman, 2007; Wade & Hulland, 2004). Studies have extensively used microeconomic theories to provide empirical specifications for estimating the economic effects of IT (Brynjolfsson & Hitt, 1996). These studies investigated IT value at an aggregate level. Recent studies have begun to examine the underlying mechanisms of how IT affects firm performance. One important research stream applied RBV to explore how IT resources change business operations and create value (Wade & Hulland, 2004). Powell and Dent-Micallef (1997), for example, found that IT resources had no effect on firm performance unless managers used IT to leverage the complementary human and business resources, such as flexible culture and supplier relationships. Bharadwaj (2000) proposed that firms can obtain superior performance by combining IT-related resources into a unique IT capability. Santhanam and Hartono (2003) also found that firms with superior IT capability exhibit better firm performance. Chae, Koh, and Prybutok (2014) reexamine the link between IT capability and firm performance using data from the 2000s, but they found no significant link in their results. In a meta-analysis of IT business value, Kohli and Devaraj (2003) found that the structural variables (such as context, study characteristics, and data sources) influence the likelihood of finding IT impacts on firm performance. Ada, Sharman, and Balkundi (2012) also found that the study outcomes of IT business value change with different methodological decisions. However, their results revealed that two findings are consistent across different conditions: 1) IT is positively associated with firm performance, and 2) firm size moderates the relationship between IT and firm performance.

Most empirical work on IT business value has used overall firm performance (profitability or productivity) as the dependent variable. However, simply examining the relationship between a firm's resources and its overall performance could lead to misleading conclusions (Ray, Barney, & Muhanna, 2004). Firms can have competitive advantages in some business activities and disadvantages in others. Using a highly aggregated dependent variable such as firm performance may neglect the underlying mechanism of how IT combines with other organizational resources to change business processes and competitive tactics.

Several studies in strategic management have addressed this problem by examining the impacts of a firm's resources on its product-development ability (Henderson & Cockburn, 1994), manufacturing effectiveness (Schroeder, Bates, & Junttila, 2002), and customer service (Ray et al., 2004). In this study, we use cross-channel capabilities and managerial actions as dependent variables and examine how IT applications affect these dimensions. Cross-channel capabilities and managerial actions are two key strategic aspects for apparel companies.

First, apparel retailers, along with other retailers, are clearly moving toward multiple channels to create a proliferation of channels through which customers can interact with retailers (Neslin et al., 2006). Customers can now search information and place orders via online channels and pick up products in brick-and-mortar stores. Customers can also place orders in stores using kiosks when the desired products are out of stock. This proliferation of channels has presented challenges for retailers to manage multiple channels effectively. Now, the ability to effectively integrate channels and manage marketing communications with customers is critically necessary to increase customer satisfaction and future growth (Thomas & Sullivan, 2005; Wind & Mahajan, 2002). Instead of cannibalizing the physical channel, companies can make the multiple channels

complement each other (Deleersnyder, Geyskens, Gielens, & Dekimpe, 2002). Multichannel customers usually buy more often and spend more than single-channel customers (Kumar & Venkatesan, 2005; Kushwaha & Shankar, 2005). Multiple channels can also allow retailers to improve customer retention and attract new customers (Venkatesan et al., 2007). However, we lack research on the antecedents of cross-channel capabilities in the literature.

Second, we posit that integrated cross-channel capabilities, combined with firms' IT applications, affect managerial actions in the competitive marketplace. Schumpeter (1934) developed the concept of "creative destruction" to explain the dynamic market process by which firms act and react in pursuing market opportunity. In a highly competitive sector such as the apparel industry, firms must undertake frequent competitive activities over time to create and recreate competitive advantage (D'Aveni, 1994). Studies on competitive dynamics have found that firms that carry out a greater number of total actions from more heterogeneous and complex repertoires experience higher profitability, gain market share, and are less likely to be dethroned by challengers (Ferrier, Smith, & Grimm, 1999; Young, Smith, & Grimm, 1996). Competitive dynamics research has also found that a firm's characteristics (including factors that influence the firm's awareness of the context, motivation to take action, and ability to take action) affect the actions it takes (Chen, 1996; Smith, Ferrier, & Ndofor, 2001). Despite the strong evidence of the effects of competitive activities on firm performance, only a handful of studies have examined IT-enabled managerial actions (e.g., Chi, Ravichandran, & Andrevski, 2010). The Internet and the online channel have clearly redefined the competitive landscape for the retail industry. Thus, we also extend the prior literature in this area and examine the effects of IT applications and IT-enabled channel capabilities on managerial actions in the apparel industry.

3 Theory and Hypotheses

3.1 Defining Enterprise IT Applications and Cross-channel Capabilities

From the RBV perspective, resources are stocks of available factors that a firm owns or controls (Amit & Schoemaker, 1993; Barney, 1992). Resources include various tangible and intangible assets, such as patents and financial and physical assets, that can improve a firm's efficiency and effectiveness (Barney, 1991). Broadly speaking, IT resources can encompass IT-related organizational processes such as supply-chain management and customer-relationship management (CRM) (Bresnahan, Brynjolfsson, & Hitt, 2002). When narrowly defined, IT resources are specific hardware and software systems applied in an organization (Bharadwaj, 2000). In this study, we follow this narrow definition and define IT applications as specific hardware and software systems deployed in a firm. We refer to those IT-related organizational processes as parts of a firm's capabilities. With this narrow lens of IT resources, we pin down the effect of enterprise IT systems themselves.

In contrast to resources, organizational capabilities are "a firm's capacity to deploy resources, usually in combination, using organizational processes, to effect a desired end" (Amit & Schoemaker, 1993, p. 35). There has been an increasing interest in RBV research on the importance of organizational capabilities (Barney, 1992; Collis, 1994; Ray et al., 2004). According to Stalk, Evans, and Shulman (1992), firms need to transform their key business processes into strategic capabilities to meet customer needs. Capabilities represent a higher productivity of the related organizational resources to create value for the customers and the firm. We define cross-channel capabilities as a firm's ability to identify and tailor its offerings to satisfy customer demands through whatever channels customers prefer. Cross-channel capabilities are more than the sum of individual IT systems and related organizational resources; rather, as high-order capabilities, cross-channel capabilities require firms to streamline data, applications, and business processes.

3.2 The Effects of Enterprise IT Applications on Cross-channel Capabilities

In this paper, among other things, we also examine how firms create cross-channel capabilities. Although omnichannel service has emerged as a key strategic issue for most retailers, many technology-related obstacles (Lewis, Whysall, & Foster, 2014) and misalignments with customers' expectations (Banerjee, 2014) exist. To develop cross-channel capabilities, companies first have to make strategic investments in supporting infrastructure that can link together and transcend traditional business units and functions (Stalk et al., 1992). RBV researchers argue that capabilities are usually information based (Itami, 1987) and involve developing, carrying, and exchanging information through different functional groups and employees (Amit and Schoemaker 1993). Cross-channel capabilities are no exception: they rely on IT and require physical and online stores to seamlessly share information. IT systems enable and automate online purchase and

order-fulfillment processes—the foundation of cross-channel operations. Moreover, retailers rely on IT systems to design and transform business processes, such as cross-channel order fulfillment and customer-relationship management. To provide a consistent experience across channels, retailers must integrate their data and create a single order repository for all customers so that they can obtain a holistic view of their customers. IT also enables retailers to selectively market to customer segments, to observe customer responses, and to refine future marketing efforts. Thus, we hypothesize:

H1: Firms with more enterprise IT applications develop stronger cross-channel capabilities.

According to the RBV theory, the strategic value of one organizational resource is linked to the presence of other organizational resources (Stieglitz & Heine, 2007). Two organizational assets complement each other if an increase in one asset enhances the return for the other (Milgrom & Roberts, 1990). Powell and Dent-Micallef (1997) found that IT investments require complementary resources to realize competitive advantage. We argue that developing organizational capabilities, such as cross-channel fulfillment, is costly and requires substantial investment. A firm's financial resources can limit the extent to which it can implement sophisticated cross-channel retailing. Scarcity in financial resources can reduce the marginal effects of IT applications because deploying IT systems requires related investment in redesigning organizational processes and training employees (Bresnahan et al., 2002). By contrast, abundant financial resources allow companies to invest in complementary human and organizational resources. Therefore, we hypothesize:

H2: The relationship between enterprise IT applications and cross-channel capabilities is stronger when organizational financial resources are abundant than when organizational financial resources are scarce.

Cross-channel capabilities require tight integration between customer data, supporting technologies, and business processes (Neslin et al., 2006). For instance, cross-channel fulfillment requires coordination among a firm's many functional departments, including procurement, logistics, distribution, inventory management, and sales. This coordination requires investment in different information systems. Chi, Holsapple, and Srinivasan (2008) demonstrate that the scope of interorganizational systems (IOS), defined as the total number of technological functionalities and services provided by an IOS, can enable greater flexibility in devising competitive activities. Likewise, balanced investments among different IT applications can lead to synergies among different IT applications, which, in turn, can increase a retailer's cross-channel capabilities. A firm that invests in a narrow range of technologies can accumulate only a relatively simple resource base that may support some functional areas but not others. Therefore, we hypothesize:

H3: Firms investing in a more balanced IT-application portfolio develop stronger cross-channel capabilities.

3.3 The Effects of IT and Cross-channel Capabilities on Managerial Actions

We define managerial actions (also called competitive actions) as externally directed, specific, and observable competitive moves that a firm undertakes to enhance its competitive position (Smith et al., 2001). The critical dimensions of managerial actions include 1) volume, which refers to the frequency of actions that firms carry out over a finite time period; 2) complexity, which refers to how wide-ranging a firm's actions are in a certain time frame; and 3) heterogeneity, which refers to the tendency of a firm's action repertoire to depart from industry norms. Much of the competitive dynamics research suggests that firms that carry out a greater number of total actions and have more complex and heterogeneous repertoires of managerial actions have higher profitability and a greater market share (Ferrier et al., 1999; Gnyawali, Fan, & Penner, 2010; Young et al., 1996).

One important element of competitive dynamics research has focused on how firms' characteristics affect the actions they take (Chen 1996; Smith et al. 2001). These characteristics include factors influencing a firm's awareness of the context, its motivation to take action, and its ability to take action. IT applications provide the necessary information and resources that enhance a firm's abilities to understand the context and to take action. First, deploying IT (e.g., business intelligence systems) allows firms to access and analyze market and customer data, to understand competitive challenges and opportunities, and to increase their awareness of the marketplace. Additionally, firms with superior IT resources have the ability and flexibility to effectively launch more frequent, nonconforming, and broad sets of actions. For instance, CRM systems and online stores allow firms to deliver more targeted and effective marketing campaigns. Furthermore, firms with IT resources can process information more efficiently and take quicker actions. Therefore, we hypothesize:

H4: Enterprise IT applications help increase firms' total number of managerial actions, action repertoire complexity, and action heterogeneity.

Research has noted that large firms often have a high degree of structural complexity and bureaucracy (Mintzberg, 1979), which constrain their information-processing capacity (Galbraith, 1977) and the speed of their competitive moves (Smith, Grimm, Gannon, & Chen, 1991). Large firms are also likely to become complacent and inert (Hannan & Freeman, 1984). Prior competitive dynamics literature has suggested that large firms are slower in terms of action timing (Chen & Hambrick, 1995) and have simpler competitive repertoires (Miller & Chen, 1996).

New technologies such as IT, however, can enable a firm to find improvements in the operating models and then make it possible to quickly and easily replicate those improvements across the organization (McAfee & Brynjolfsson, 2008). By enabling a firm to propagate new business processes with much higher fidelity across the organization, enterprise IT applications help reduce the negative effect of structural complexity and bureaucracy associated with firm largeness. In a meta-analysis, Ada et al. (2012) found that large firms benefit more from IT than small firms do. Therefore, we hypothesize the following:

H5: Enterprise IT applications help mitigate the negative effect of firm size on firms' managerial actions.

Cross-channel capabilities can also facilitate strategic actions. The Internet channel provides a new venue to search new approaches to compete more effectively in the marketplace. One can generate more information about customers across different channels and provide a complete view of one's customers: which channels did the customer use for which purpose? Customer-level data enhance awareness of the context of customer actions. In addition, cross-channel capabilities can increase a firm's ability to carry out more frequent, complex, and unpredictable actions by enabling their ability to deploy and build in complex ways (Sambamurthy, Bharadwaj, & Grover, 2003). Firms can launch more actions to interact with consumers through integrated channels. In the past, retailers relied mostly on mass-market ads or promotions. Today, they can send coupon codes to customers' mobile devices. Equipped with cross-channel capabilities, traditional retailers are also ready to transform physical stores (a significant feature that Internet firms lack) from a liability into an asset. One can integrate the online experience and the offline experience into a pleasing and engaging experience. Depending on competitive strategies or operational factors, retailers can promote products via multiple channels or just via the online or physical channel. Thus, we hypothesize:

H6: Cross-channel capabilities help increase a firm's total number of managerial actions, action repertoire complexity, and action heterogeneity.

Figure 1 summarizes our research framework.

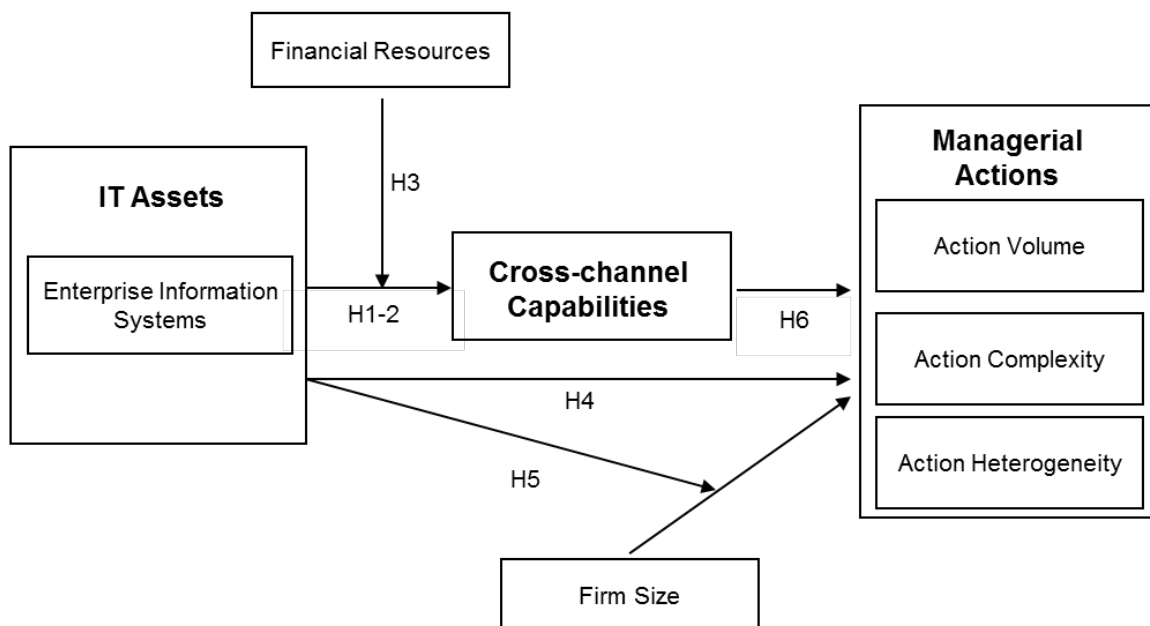


Figure 1. Research Framework

4 Research Method

4.1 Data

We collected longitudinal data for a set of publicly traded apparel retailers. With the longitudinal sample, we could study the changes in companies across different years and eliminate unobservable firm heterogeneity. Our sample is limited to public firms due to the availability of public financial information. First, we identified the relevant North American Industry Classification System (NAICS) codes for the apparel retail industry. We then identified a list of potential sample firms from COMPUSTAT using the six-digit NAICS codes. We complemented the resulting list with sources through EDGAR (a Securities and Exchange Commission site that lists all publicly traded companies), Hoover's Company Records (a database that provides brief information on companies), and *apparelsearch.com* (a website with a clothing retailer directory). We retained firms that became inactive before 2000 from our list. Ultimately, we retained 49 publicly traded firms.

The data for this study came from two sources: 1) public information from news media and 2) COMPUSTAT. First, following previous research (Chi et al., 2010, Ferrier et al., 1999; Young et al., 1996), we used structured content analysis to capture managerial actions from news reports. This method reduces qualitative text to variables and their associated units. Therefore, the method enables researchers to quantitatively test hypotheses (Denzin & Lincoln, 2000). We searched major U.S. and world publications, Web publications, and news wire services using the Lexis-Nexis database for the 1995 to 2007 period. We searched the Lexis-Nexis database using firms' names in combination with keywords (e.g., launch, unveil, or roll out [product or service]). From the keywords appearing in the text of news reports, we could identify and collect articles containing possible actions, including IT-related investment initiatives and project data, cross-channel capabilities, and managerial actions. We counted these exact duplicates of articles once in our coding. We read and analyzed the articles by examining the headline—and, if necessary, the entire article—to decide whether the article was relevant and whether a firm took an IT-related initiative, a cross-channel capability, or a managerial action.

We tested the reliability of our coding process using Perreault and Leigh's (1989) index of reliability. Although Perreault and Leigh (1989) do not provide specific guidelines regarding what value of the index should be considered acceptable, they suggest that 0.70 might be a reasonable value. Two academic experts independently coded the sample of actions into each category. This approach yielded an index value of 0.86, which indicates that the coding process was reliable.

Second, to complement the data we obtained from news media, we also visited the websites and checked the 10K reports of all firms in our dataset to learn more about the specifics of their certain cross-channel retailing actions. For example, we searched each firm's website to see whether it allowed customers to order a product online and pick it up in a store, to order a product online and return it to a physical store, or to order a product online in the actual store (i.e., using kiosks). Third, in situations where the news articles and the additional data sources (i.e., websites and 10K reports) did not provide detailed information for our coding, we called the respective firms to clarify the stories (e.g., whether the consumer can purchase products from its website and, if so, what year that capability began). We also collected financial data from Standard & Poor's COMPUSTAT data. Because some firms entered the industry after 1995 and exited before 2007, the resultant dataset is an unbalanced panel.

4.2 Variables

4.2.1 Enterprise IT Applications

We measured enterprise IT applications as the total number of major initiatives and projects of IT investment in a firm over the 1995 to 2007 period. We considered the IT initiatives and projects as major if the company's news releases or the news media reported them. Such projects included the installation of major IT systems, such as supply chain-management systems, CRM systems, and data-mining tools. We used the number of projects accumulated as a measure of enterprise IT applications in use in a given year. Similar to Chi et al. (2010), we assumed that a firm would continue to use any major IT that it implemented unless later in news reports indicated that the firm replaced or discontinued it.

Specifically, we collected news on IT investments for each firm from three dimensions: 1) IT infrastructure, 2) enterprise systems, and 3) CRM and business analytics. We measured IT infrastructure as the major initiatives on IT investments in point-of-sale (POS) systems, networking, and Web infrastructure. Enterprise systems represent investments in enterprise resource planning (ERP) systems, supply chain-management

systems, and cross-channel order-management systems. CRM and business analytics represent major initiatives and projects on data mining, business intelligence, and CRM systems. Our classification of IT applications is consistent with the approach that Melville, Kraemer, and Gurbaxani (2004) used, which defines IT as hardware and software systems and specific business applications that use the infrastructure.

4.2.2 Balance of IT-application Portfolio

Some firms may intentionally or unintentionally concentrate their investments in a narrow scope of IT technologies. For example, firms may invest more in IT infrastructure but neglect enterprise systems or CRM and business analytics. We define the balance of an IT-application portfolio as the degree to which a firm invested in a balanced repertoire of IT applications in a given year. We calculated a firm's propensity to balance its IT investments using a measure adapted from the Herfindahl index, which research commonly uses to measure the level of diversification across industries (Montgomery, 1985). In our research, IT applications' three dimensions served as the dimension of diversity:

$$1 - \sum_i (I_i / TI)^2, \quad (1)$$

where I_i / TI is the share of the i th IT investment dimension in the total IT applications, $i = 1, 2, 3$, and $\sum_i (I_i / TI)^2$ is the Herfindahl index. The Herfindahl index increases as the firm concentrates on more specific IT applications among the firm's total IT applications. Thus, by contrast to the Herfindahl index, a higher score of our measure on the IT portfolio indicates a more balanced portfolio. Note that the Herfindahl index could have a limitation (i.e., the contribution of a larger investment to the index is larger) (Moschandreas, 1999).

4.2.3 Cross-channel Capabilities

Cross-channel capabilities represent a firm's capability to carry out commerce, fulfillment, and customer service across multiple channels. A retailer's cross-channel capabilities largely depend on the coordination of different business units (Bendoly et al., 2005). Consistent with Bendoly et al. (2005), we operationalized cross-channel capabilities with the following functional areas:

1. The retailer has a website to provide company and product information.
2. The retailer has an online store that conducts transactions.
3. Customers can order online and return goods to physical stores.
4. The retailer has in-store kiosks or other systems that allow online ordering and searching.
5. The retailer allows online orders and in-store pick up.
6. The retailer does product and price coordination among channels.
7. The retailer conducts joint-channel promotions.

We coded binary responses to indicate whether a retailer had abilities in each of the above functional areas for each year (1 = had the ability and 0 = did not have the ability) (Goersch, 2002). In the same way that Gold, Malhotra, and Segars (2001) define knowledge-management capabilities, we calculated the measure of cross-channel capabilities as the sum of functions that the firm is capable of in a given year divided by the total number of functional areas. It measures the strength of cross-channel capabilities on a scale of 0 to 1. We assumed that, once a firm acquires a capability function, it will persist over time.

We further categorized a retailer's cross-channel capabilities in the following three dimensions: 1) e-commerce capabilities, which measure a retailer's ability to provide functional websites and online transactions and correspond to the first two aforementioned functional areas; 2) cross-channel fulfillment capabilities, which are a firm's capacities to fulfill customer orders through a customer's channel of choice (e.g., the option to order online and to pick up in physical stores); and 3) multichannel cross-selling capabilities, which are a firm's abilities to effectively coordinate products, prices, and promotions across channels (i.e., the last two functional areas). We measured the measures of the three capabilities in the same way as cross-channel capabilities.

4.2.4 Managerial Actions

Our measure of managerial actions followed the stream of strategy research on dynamic competition (Smith, Grimm, & Gannon, 1992; Young et al., 1996), which has introduced a direct measure of competitive actions that a firm has undertaken. We collected events for the following four categories used in almost all prior research on competitive dynamics (Ferrier et al., 1999; Smith et al., 1991, 2001; Young et al., 1996): market penetration, marketing campaigns, alliances, and product introduction. Table A1 lists the keywords used, the coding schema, and examples.

We operationalized action volume as the total number of new managerial actions a firm carried out in a given year regardless of type (Ferrier et al., 1999).

Complexity of action repertoire measures managerial action diversity in a firm; that is, the extent to which a firm's activities represent the aforementioned possible types of action events. Following Ferrier et al. (1999) and Basdeo, Smith, Grimm, Rindova, and Derfus (2006), we calculated it using a measure adapted from the Herfindahl index:

$$1 - \sum_j (N_j / TN)^2, \quad (2)$$

where $\sum_j (N_j / TN)^2$ is the Herfindahl index, and N_j / TN is the share of managerial actions in the j th category, $j = 1, \dots, 4$. Firms with high scores carry out a more complex action repertoire geared toward broader action types.

Action heterogeneity refers to a firm's tendency to depart from its industry's norms (Miller & Chen, 1994). Competitors rarely use heterogeneous actions. Following Chi et al. (2010), we operationalized action heterogeneity as the Euclidean distance of firm i 's actions from the industry norm of each action category j :

$$\sqrt{\frac{\sum_j^J (x_{ij} - \bar{x}_j)^2}{J}}, \quad (3)$$

where x_{ij} is the action volume of firm i in the j th category, and $\bar{x}_j = \frac{1}{49} \sum_{i=1}^{49} x_{ij}$, $i = 1, \dots, 49$ is the action norms of the industry. A higher score in this measure indicates greater dissimilarity in the actions of the firm from the industry norm.

4.2.5 Controls

Research has found financial resources and firm size to influence both innovation and managerial actions (e.g., Miller & Chen, 1996; Rogers, 1995; Young et al., 1996). Research has found strong past performance to give rise to a persistent reliance on well-learned organizational routines and to inhibit managerial actions (Ferrier, 2001; Miller & Chen 1994). Therefore, we included the three variables here as control factors. We measured the financial resources variable as the ratio of current assets less inventory to current liabilities (Ferrier 2001; Smith et al., 1992). We used total assets as a measure of firm size (Berger & Ofek, 1995). Consistent with Ferrier (2001), we used each firm's annual return on assets (lagged one year) to control for the effects of past performance. Table 1 shows the definitions of the above variables. Table A2 reports the descriptive statistics and the correlation matrix of the variables.

Table 1. Definitions of Variables

Variable	Definition
Enterprise IT applications	The total number of major IT initiatives and projects accumulated.
Balance of IT-application portfolio	A measure of the scope of IT applications in which a firm invests.
Cross-channel capabilities	Capacity to carry out commerce, fulfillment, and customer service across multiple channels; calculated as the sum of the functional areas.
E-commerce capabilities	A retailer's abilities to provide functional websites and online transactions.
Cross-channel fulfillment Capabilities	A retailer's abilities to fulfill customers' orders through customers' channel of choice.
Multichannel cross-selling capabilities	A retailer's abilities to effectively manage customers across channels.
Action volume	Total number of new managerial actions undertaken by a firm in a given year regardless of action types.
Action complexity	The extent to which a firm's activities in a given year represent different types of action events.
Action heterogeneity	A firm's tendency to carry out actions that depart from its industry's norms; calculated as the Euclidean distance from the industry norms of each action category in a given year.
Financial resources	Slack organizational finance resources; measured as the ratio of current assets less inventory to current liabilities.
Firm size	A variable that represents the size of firms; measured as a firm's total assets (in billions) in a given year.
Past performance	Financial performance of a firm in previous year; measured as the lagged annual return on assets.

4.3 Estimation Models

In our study, we conducted a two-part estimation to understand the relationship between IT applications, cross-channel capabilities, and managerial actions. First, we examined factors affecting the overall cross-channel capabilities. To test Hypotheses 1, 2, and 3, we used cross-channel capabilities as the dependent variable. We use a fixed-effects panel regression model (Greene 2002). The following is the econometric model:

$$CA_{it} = \alpha_0 + \alpha_1 IT_{it} + \alpha_2 FR_{it} + \alpha_3 IT_{it} FR_{it} + \alpha_4 BIT_{it} + \alpha_5 FS_{it} + u_i + e_t + \varepsilon_{4it}, \quad (4)$$

where CA_{it} is firm i 's cross-channel capabilities in year t . Our independent variables include IT applications (IT_{it}), the balance of the IT-application portfolio (BIT_{it}), financial resources (FR_{it}), the interaction term between IT applications and financial resources ($IT_{it}FR_{it}$), and firm size (FS_{it}). u_i denotes the unobservable firm-specific effect, which is time invariant. It accounts for factors that vary across firms but are relatively stable over time within firms, such as organizational culture. e_t denotes the unobservable time effect. It is individual invariant, and it controls for any time-specific effect that is not included in the regressors, such as macroeconomic or industry demand conditions. ε_{4it} denotes the remainder stochastic disturbance term.

Second, we used the following models to examine the factors that affect managerial actions:

$$AV_{it} = \beta_0 + \beta_1 IT_{it} + \beta_2 CA_{it} + \beta_3 FR_{it} + \beta_4 FS_{it} + \beta_5 PP_{it-1} + \beta_6 IT_{it} FS_{it} + \beta_7 f_i + \beta_8 y_t + \varepsilon_{5it} \quad (5)$$

$$AC_{it} = \gamma_0 + \gamma_1 IT_{it} + \gamma_2 CA_{it} + \gamma_3 FR_{it} + \gamma_4 FS_{it} + \gamma_5 PP_{it-1} + \gamma_6 IT_{it} FS_{it} + \gamma_7 f_i + \gamma_8 y_t + \varepsilon_{6it} \quad (6)$$

$$AH_{it} = \lambda_0 + \lambda_1 IT_{it} + \lambda_2 CA_{it} + \lambda_3 FR_{it} + \lambda_4 FS_{it} + \lambda_5 PP_{it-1} + \lambda_6 IT_{it} FS_{it} + \lambda_7 f_i + \lambda_8 y_t + \varepsilon_{7it}, \quad (7)$$

where AV_{it} , AC_{it} , and AH_{it} are the action volume, the complexity of the action repertoire, and the action heterogeneity, respectively. The independent variables include IT applications (IT_{it}), cross-channel capabilities (CA_{it}), financial resources (FR_{it}), firm size (FS_{it}), past performance (PP_{it-1}), the interaction term

between IT applications and firm size ($IT_{it}FS_{it}$), firm dummies (f_i), and year dummies (y_t). ε_{git} denotes the stochastic disturbance term for equation g ($g = 5, 6, 7$). We used seemingly unrelated regression (SUR) to estimate the above system of equations. Here, we have a system of regression equations in which random errors can be correlated. In this case, the efficiency of the estimation can be improved using a joint generalized least-squares method that takes cross-equation correlations into account (Greene, 2002).

5 Results

We estimated Equation 4 using fixed-effects models with robust standard errors clustered by firm. In the preliminary estimation, we also included lagged terms of IT applications. The lag terms were not statistically significant in the estimation, so we dropped them. We also checked the multicollinearity issue using the variance inflation factors (VIFs) in the preliminary estimation. The VIF is an index that measures the extent of the increase in the variance of an estimated regression coefficient owing to collinearity (Belsley et al., 1980). Large VIFs indicate variables are involved in nearly collinear relationships. The VIF statistics in the preliminary estimations indicated that no single variable had a VIF above 5, which is comfortably below the rule-of-thumb cutoff of 10 for multiple regression models that Belsley et al. (1980) suggest. Thus, multicollinearity was not a concern in our analysis.

Table 2 shows the results. The effect of IT applications on cross-channel capabilities was positive and significant ($b = 0.04$, $p < .01$), which supports H1. The interaction effect of IT applications and financial resources was also positive and significant ($b = 0.016$, $p < .01$, Model 2), which supports the complementary effect between IT and financial resources in developing cross-channel capabilities. The estimation results also indicate that the balance of an IT-application portfolio had a positive and significant effect on cross-channel capabilities ($b = 0.39$, $p < .01$, Model 3). These results support both H2 and H3.

Table 2. Factors Affecting Cross-channel Capabilities

Dependent variable: cross-channel capabilities	Model 1	Model 2	Model 3
Constant	-0.01 (0.03)	0.02 (0.03)	0.01 (0.02)
IT applications	0.04*** (0.01)	0.03*** (0.01)	0.014* (0.008)
Financial resources	0.03*** (0.01)	0.01 (0.01)	0.02* (0.013)
Firm size	-0.05** (0.02)	-0.06*** (0.02)	-0.04** (0.02)
IT applications * financial resources	--	0.016*** (0.006)	0.013** (0.005)
Balance of IT-application portfolio	--	--	0.39*** (0.07)
Firm and year dummies	yes	yes	yes
R^2	0.57	0.58	0.65

Note: N = 453. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. We report standard errors in parentheses.

Table 3 reports the estimation results on factors affecting managerial actions. We tested our hypotheses in a system of three seemingly unrelated regressions. Following Baron and Kenny (1986), we also tested the mediating role of cross-channel capabilities (i.e., whether cross-channel capabilities mediate the effects of IT on managerial actions). As the results suggest, IT was positively related to the total number of actions taken by firms in a given year ($b = 0.20$, $p < .01$). IT applications also had positive and significant effects on the complexity of the actions repertoire ($b = 0.01$, $p < .05$) and action heterogeneity ($b = 0.06$, $p < .01$). These results support H4.

The results confirm that larger firms are slow to launch actions and become more focused in their competitive activities. To investigate IT's mitigating effect in reducing the negative effect of firm size, we included one interaction term between IT and firm size in our model. Our results suggest that enterprise IT can help large firms carry out more actions from a complex action repertoire, which supports H5.

Table 3. Factors Affecting Managerial Actions

Dependent variables	Action volume		Action complexity		Action heterogeneity	
Constant	2.21** (1.00)	3.18*** (1.01)	0.15 (0.11)	0.30** (0.013)	0.84*** (0.29)	0.96*** (0.30)
IT applications	0.20*** (0.05)	0.12** (0.05)	0.013** (0.006)	0.01 (0.01)	0.06*** (0.01)	0.04*** (0.01)
Cross-channel capabilities	0.50 (0.50)	0.25 (0.50)	0.05 (0.06)	0.02 (0.06)	0.11 (0.14)	0.05 (0.14)
Financial resources	-0.17 (0.13)	-0.25* (0.13)	-0.02 (0.02)	-0.027* (0.014)	-0.05 (0.04)	-0.06* (0.04)
Firm size	-0.20* (0.12)	-0.61*** (0.17)	-0.01 (0.01)	-0.07*** (0.02)	-0.07* (0.04)	-0.17*** (0.05)
Past performance	0.45 (0.73)	0.62 (0.72)	0.03 (0.08)	0.05 (0.08)	0.11 (0.21)	0.15 (0.21)
IT applications * firm size	--	0.04*** (0.01)	--	0.01*** (0.00)	--	0.01*** (0.00)
Firm and year dummies	yes	yes	yes	yes	yes	yes
R^2	0.39	0.42	0.35	0.38	0.42	0.43

Notes: N = 300. * p<0.1, ** p<0.05, *** p<0.01. We report standard errors in parentheses.

However, we did not find clear-cut significant effects of cross-channel capabilities on managerial actions. One possible reason for this finding is that different components of cross-channel capabilities may have differential effects on managerial actions. Therefore, we disaggregated cross-channel capabilities into three dimensions and investigated the roles of the various components of cross-channel capabilities in influencing managerial actions. Table 4 reports the results.

Table 4. Effects of Different Types of Cross-channel Capabilities

Dependent variables	Action volume		Action complexity		Action heterogeneity	
Constant	0.22 (1.16)	1.07 (1.15)	-0.05 (0.13)	0.11 (0.14)	0.13 (0.33)	0.23 (0.33)
IT applications	0.25*** (0.05)	0.17*** (0.05)	0.02*** (0.006)	0.01 (0.01)	0.07*** (0.01)	0.05*** (0.01)
E-commerce capabilities	2.05*** (0.61)	2.19*** (0.60)	0.19*** (0.07)	0.21*** (0.07)	0.71*** (0.17)	0.75*** (0.31)
Cross-channel fulfillment capabilities	-0.28 (0.65)	-0.89 (0.65)	-0.18** (0.08)	-0.26*** (0.08)	-0.15 (0.18)	-0.31* (0.18)
Multichannel cross-selling capabilities	-0.10 (0.29)	-0.02 (0.28)	0.06* (0.034)	0.07** (0.03)	-0.05 (0.08)	-0.03 (0.08)
Financial resources	-0.11 (0.13)	-0.20 (0.13)	-0.02 (0.015)	-0.03** (0.015)	-0.03 (0.04)	-0.05 (0.04)
Firm size	-0.18 (0.12)	-0.63*** (0.17)	-0.01 (0.01)	-0.07*** (0.02)	-0.06* (0.035)	-0.18*** (0.05)
Past performance	0.38 (0.72)	0.57 (0.71)	0.03 (0.09)	0.06 (0.08)	0.08 (0.20)	0.13 (0.20)
IT applications * firm size	--	0.04*** (0.01)	--	0.01*** (0.00)	--	0.01*** (0.00)
Firm and year dummies	yes	yes	yes	yes	yes	yes
R^2	0.41	0.43	0.37	0.42	0.45	0.47

Notes: N = 300. * p<0.1, ** p<0.05, *** p<0.01. We report standard errors in parentheses.

Overall, e-commerce capabilities had a strong positive association with the volume of managerial actions ($b = 2.05$, $p < .01$). We also found positive effects of e-commerce capabilities on action complexity ($b = 0.19$, $p < .01$) and action heterogeneity ($b = 0.71$, $p < .01$). Regarding action complexity, cross-channel fulfillment capabilities had a negative effect ($b = -0.18$, $p < .05$), whereas the effect of multichannel cross-selling ability was positive ($b = 0.06$, $p < 0.1$). However, the effects of cross-channel fulfillment and cross-selling on action heterogeneity were not significant. Therefore, our results provide mixed support for H6.

6 Discussions

6.1 Antecedents of Cross-Channel Capabilities

Retailers are constantly innovating and changing the ways they serve customers. Although apparel retailers have made progress in developing their cross-channel capabilities, our data suggest that their abilities in cross-channel fulfillment are relatively low and uneven. For example, as of 2007, although approximately 76 p of apparel retailers allowed in-store returns of merchandise purchased online, only 9 percent of stores allow online orders and in-store pickup, and 15 percent of retailers allowed in-store orders of out-of-stock items. In comparison, approximately 60 percent of retailers coordinated prices in both channels, and 75 percent of stores conducted cross-channel promotions.

The goal of channel integration is to create a seamless shopping experience for customers and provide what customers want in the channel of the customers' choice. Doing so requires tight integration among different business units and business processes. To achieve this integration, retailers should have a system that can view and locate inventory in multiple channels and coordinate subsequent logistics operations. We found that IT applications as a whole, including networking, Web infrastructure, and enterprise systems, have a significant effect on cross-channel capabilities. They are the enabling technologies that make channel integration possible.

6.2 IT Applications and Managerial Actions

Our findings also suggest that IT applications consistently enhance the frequency and range of managerial actions. In a hypercompetitive environment, the erosion of profit for each managerial action could happen quickly. The public perceives carrying out more frequent market activities and a broader set of actions as more capable and less predictable (D'Aveni, 1994), and it may require a more complex resource base that confers multiple advantages (Ferrier et al., 1999). Smith et al. (2001) theorized about the relationship between resources, industry structure, and competitive actions. They suggested that researchers can examine how certain configurations of resources affect action and delay reaction and how different resources might be valuable. Strassmann (2005) proposed using IT-induced competitive actions as a new type of IT value measure.

IT investment usually comes with a large cost and is risky. Firms aim to take full advantage of their IT investment dollars and to leverage their IT systems to achieve competitive advantages. We found that superior IT resources in a firm are associated with the frequency of the firm's managerial actions. Companies with more IT applications, such as GAP Inc., Cache, Limited, and Abercrombie & Fitch, have launched more managerial actions that have ranged from market expansion and product introductions to marketing campaigns and promotions. Companies that leverage their IT applications to conduct more managerial actions are, therefore, using existing organizational resources efficiently.

6.3 Channel Capabilities and Managerial Actions

We examined how specific dimensions of cross-channel capabilities are related to managerial actions. Our results indicate that e-commerce capabilities were strongly associated with managerial action, which suggests that firms with a high level of e-commerce capabilities deploy more managerial actions in various ways. GAP Inc. is a typical case. The company has taken actions that many others have not. For example, it has leveraged its multi-channel strategy to introduce new product lines, such as Piperlime and its RED collection. The company's superior e-commerce capabilities have strongly enabled these actions.

We also found that firms' cross-selling capabilities were significantly linked with action complexity, which suggests that they tended to broaden their range of managerial actions. For example, Ann Taylor, a specialty retailer, has invested in a range of customer-service systems. Ann Taylor leveraged the systems' capabilities to introduce its collection series and beauty-care products. The company has also partnered

with The Breast Cancer Research Foundation. During breast cancer awareness month, Ann Taylor sold its ANN Cares cards both online and in stores and entitles its cardholders to discounts at different channels. The company's cross-selling capabilities enabled these campaigns.

We found that cross-channel fulfillment capabilities were negatively related to the complexity of the action repertoire. One explanation for this finding is that firms may fall into "rigidity traps" as the organizational core capabilities may become "core rigidities" (Leonard-Barton, 1992). Firms with a high fulfillment capability may tend to tailor their managerial actions in a manner that exploits this capability but overlooks other actions. An alternative explanation is that operation-oriented capabilities such as cross-channel fulfillment may accentuate incremental, exploitative innovation in the company, which could inhibit experimentation and impede the range of actions that companies take in response to environmental shifts (Benner & Tushman, 2002). By contrast, market-oriented capabilities such as multi-channel cross-selling are more exploratory in nature and may involve a wide range of activities and actions, which, in turn, could lead to more complexity in managerial actions.

7 Conclusion

The study makes several contributions to the literature. Our research is one of the first attempts to empirically study the relationships among firms' IT applications, cross-channel capabilities, and managerial actions. Our results provide insightful implications for managers in the apparel and other retail industries that are looking to leverage the Internet channel for better service and increased customer value. The research also contributes to the literature by examining how IT resources create business value. Prior literature in IT business value has often used aggregate measures of firm performance as dependent variables. We examine the effect of IT applications via an intermediate business process. This approach helps explain how IT creates organizational capabilities and affects managerial actions, which can lead to competitive advantages. Our findings provide actionable guidance for managers to develop strategies and to make decisions on how to invest in IT and how to combine IT with other organizational resources. Third, this study investigates the effect of a firm's IT resources and IT-related capabilities on competitive activities. We found that IT applications are important resources that not only increase the frequency of actions but also broaden the types of actions. Whereas market-oriented capabilities such as e-commerce and multi-channel cross-selling capabilities broaden the range of managerial actions, operation-oriented capabilities such as cross-channel fulfillment can narrow a firm's managerial action range.

As with any research, this paper comes with its limitations, which leaves opportunities for further exploration in future research. First, we focused only on public firms, which may limit the generalizability of our results to private firms. Given that the economy comprises many closely held private firms and overseas rivals, future research could explore the relationships among IT applications, cross-channel capabilities, and managerial actions in a larger sample. Second, the data collected from media may present a publicity issue because firms may not disclose all of their managerial actions. For example, we could have under-counted managerial actions and, therefore, underestimated the effects of IT and cross-channel capabilities on these actions. Third, one could include other factors in our model to extend the understanding of the complementary effect of other organizational resources. For example, top management team heterogeneity is an important factor that affects organizational capabilities. Other possibly interesting factors include IT training and organization structures. Finally, we studied the effects of IT applications and cross-channel capabilities at the level of intermediate business processes. We did not examine their financial performance effects. Because more consumers are now accessing the Internet via mobile devices, the effects of cross-channel capabilities are likely to become larger. Future studies could examine the effects on overall firm performance.

Acknowledgments

We thank the senior editor, Kenny Cheng, for his invaluable guidance. We also thank the three anonymous reviewers for their thoughtful reviews and constructive suggestions during the review process. This research is partially supported by the National Natural Science Foundation of China (Project No. 71201101, 71421002, and 71520107003).

References

- Ada, S., Sharman, R., & Balkundi, P. (2012). Impact of meta-analytic decisions on the conclusions drawn on the business value of information technology. *Decision Support Systems*, 54(1), 521-533.
- Amit, R., Schoemaker, P. J. (1993). Strategic assets and organizational rent. *Strategic Management Journal*, 14(1), 33-46.
- Bailey, S. (2015). Nordstrom's fiscal 2014: Multichannel strategy fuels growth. *Market Realist*. Retrieved from <http://marketrealist.com/2015/03/nordstroms-fiscal-2014-multichannel-strategy-fuels-growth/>
- Banerjee, M. (2014). Misalignment and its influence on integration quality in multichannel services. *Journal of Service Research*, 17(4), 460-474
- Baron R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173-1182.
- Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99-120.
- Barney, J. B. (1992). Integrating organizational behavior and strategy formulation research: A resource based analysis. In P. Shrivastava, A. Huff, & J. Dutton (Ed.), *Advances in strategic management* (pp. 39-62). Greenwich, CT: JAI Press.
- Basdeo, D. K., Smith, K. G., Grimm, C. M., Rindova, V. P., & Derfus, P. J. (2006). The impact of market actions on firm reputation. *Strategic Management Journal*, 27(12), 1205-1219.
- Bell, D. R., Gallino, S., & Moreno, A. (2014). How to win in an omnichannel world. *MIT Sloan Management Review*, 56(1), 45-53.
- Belsley, D. A., Kuh, E., & Welsch, R. E. (1980). *Regression diagnostics: Identifying influential data and sources of collinearity*, New York: John Wiley & Sons.
- Bendoly, E., Blocher, J. D., Bretthauer, K. M., Krishnan, S., & Venkataramanan, M. A. (2005). Online/in-store integration and customer retention. *Journal of Service Research*, 7(4), 13-327.
- Benner, M., & Tushman, M. (2002). Process management and technological innovation: A longitudinal study of the photography and paint industries. *Administrative Science Quarterly*, 47(4), 676-709.
- Berger, P., & Ofek, E. (1995). Diversification's effect on firm value. *Journal of Financial Economics*, 37(1), 39-65.
- Bharadwaj, A. S. (2000). A resourced-based perspective on information technology capability and firm performance: An empirical investigation. *MIS Quarterly*, 24(1), 169-196.
- Bresnahan, T., Brynjolfsson, E., & Hitt, L. (2002). Information technology, workplace organization, and the demand for skilled labor: Firm-level evidence. *Quarterly Journal of Economics*, 117(1), 339-376.
- Brynjolfsson, E., & Hitt, L. (1996). Paradox lost? Firm-level evidence on the returns to information systems spending. *Management Science*, 42(4), 541-558.
- Brynjolfsson, E., Hu, Y. J., & Rahman, M. S. (2013). Competing in the age of omnichannel retailing. *MIT Sloan Management Review*, 54(4), 23-29.
- Chae, H., Koh, C. E., & Prybutok, V. R. (2014). Information technology capability and firm performance: Contradictory findings and their possible causes. *MIS Quarterly*, 38(1), 305-326.
- Chen, M. J. (1996). Competitor analysis and interfirm rivalry: Toward a theoretical integration. *Academy of Management Review*, 21(1), 100-134.
- Chen, M., & Hambrick, D. (1995). Speed, stealth, and selective attack: How small firms differ from large firms in competitive behavior. *Academy of Management Journal*, 38(2), 453-482.
- Chi, L., Holsapple, C. W., & Srinivasan, C. (2008). Digital systems, partnership networks, and competition: The co-evolution of IOS use and network position as antecedents of competitive action. *Journal of Organizational Computing and Electronic Commerce*, 18(1), 61-94.

- Chi, L., Ravichandran, T., & Andrevski, G. (2010). Information technology, network structure, and competitive action. *Information Systems Research, 21*(3), 543-570.
- Collis, D. J. (1994). How valuable are organizational capabilities. *Strategic Management Journal, 15*, 143-152.
- D'Aveni, R. (1994). *Hypercompetition: Managing the dynamics of strategic maneuvering*. New York: Freedom Press.
- De Figueiredo, J. (2000). Finding sustainable profitability in electronic commerce. *Sloan Management Review, 41*(4), 41-52.
- Deleersnyder, B., Geyskens, I., Gielens, K., & Dekimpe, M. G. (2002). How cannibalistic is the Internet channel? *International Journal of Research in Marketing, 19*(4), 337-348.
- Denzin, N. K., & Lincoln, Y. S. (2000). *Handbook of qualitative research* (2nd ed.), Thousand Oaks, CA: Sage.
- Ferrier, W. J. (2001). Navigating the competitive landscape: The drivers and consequences of competitive aggressiveness. *Academy of Management Journal, 44*(4), 858-877.
- Ferrier, W. J., Smith, K. G., Grimm, C. M. (1999). The role of competitive action in market share erosion and industry dethronement: A study of industry leaders and challengers. *Academy of Management Journal, 42*(4), 372-388.
- Galbraith, J. R. (1977). *Organization Design*. Reading, MA: Addison-Wesley.
- Gnyawali, D. R., Fan, W., & Penner, J. (2010). Competitive actions and dynamics in the digital age: An empirical investigation of social networking firms. *Information Systems Research, 21*(3), 594-613.
- Goersch, D. (2002). Multi-channel integration and its implications for retail web sites. In *The Proceedings of European Conference on Information Systems* (pp. 748-758).
- Gold, A. H., Malhotra, A., & Segars, A. H. (2001). Knowledge management: An organizational capabilities perspective. *Journal of Management Information Systems, 18*(1), 185-214.
- Greene, W. H. (2002). *Econometric analysis* (5th ed.). Upper Saddle River, NJ: Prentice Hall.
- Hannan, M. T., & Freeman, J. (1984). Structural inertia and organizational change. *American Sociological Review, 49*(2), 149-164.
- Henderson, R., & Cockburn, I. (1994). Measuring competence? Exploring firm effects in pharmaceutical research. *Strategic Management Journal, 15*, 63-84.
- Itami, H. (1987). *Mobilizing invisible assets*. Boston, MA: Harvard University Press.
- Kohli, R., & Devaraj, S. (2003). Measuring information technology payoff: A meta-analysis of structural variables in firm-level empirical research. *Information Systems Research, 14*(2), 127-145.
- Kumar, V., & Venkatesan, R. (2005). Who are the multichannel shoppers and how do they perform? Correlates of multichannel shopping behavior. *Journal of Interactive Marketing, 19*(2), 44-62.
- Kushwaha, T. L., & Shankar, V. (2005). *Multichannel shopping behavior: Antecedents and implications for channel and customer equity* (working paper). Texas A&M University, College Station.
- Leonard-Barton, D. (1992). Core capabilities and core rigidities: A paradox in managing new product development. *Strategic Management Journal, 12*, 111-125.
- Lewis, J., Whysall, P., & Foster, C. (2014). Drivers and technology-related obstacles in moving to multichannel retailing. *International Journal of Electronic Commerce, 18*(4), 43-68.
- McAfee, A., & Brynjolfsson, E. (2008). Investing in the IT that makes a competitive difference. *Harvard Business Review, 86*(7/8), 98-107.
- Melville, N., Kraemer, K., & Gurbaxani, V. (2004). Information technology and organizational performance: An integrative model of IT business value. *MIS Quarterly, 28*(2), 283-322.
- Milgrom, P., & Roberts, J. (1990). The economics of modern manufacturing: Technology, strategy, and organization. *American Economic Review, 80*(3), 511-528.
- Miller, D., & Chen, M. J. (1994). Sources and consequences of competitive inertia: A study of the U.S. airline industry. *Administrative Science Quarterly, 39*(1), 1-23.

- Miller, D., & Chen, M. J. (1996). The simplicity of competitive repertoires: An empirical analysis. *Strategic Management Journal*, 17(6), 419-440.
- Mintzberg, H. (1979). *The structuring of organizations*. Englewood Cliffs, NJ: Prentice-Hall.
- Montgomery, C. (1985). Product-market diversification and market power. *Academy of Management Journal*, 28(4), 789-798.
- Moschandreas, M. (1999). *Business economics*. London: Cengage Learning EMEA.
- Neslin, S. A., Grewal, D., Leghorn, R., Shankar, V., Teerling, M. L., Thomas, J. S., & Verhoef, P. C. (2006). Challenges and opportunities in multichannel customer management. *Journal of Service Research*, 9(2), 95-112.
- Oh L., Teo, H., & Sambamurthy, V. (2012). The effects of retail channel integration through the use of information technologies on firm performance. *Journal of Operations Management*, 30(5), 368-381.
- Perreault, W. D., & Leigh, L. E. (1989). Reliability of nominal data based on qualitative judgments. *Journal of Marketing Research*, 26(2), 135-148.
- Powell, R. L., & Dent-Micallef, A. (1997). Information technology as competitive advantage: The role of human, business, and technology resources. *Strategic Management Journal*, 18(5), 375-405.
- Ray, G., Barney, J. B., & Muhanna, W. A. (2004). Capabilities, business processes, and competitive advantage: Choosing the dependent variable in empirical tests of the resource-based view. *Strategic Management Journal*, 25(1), 23-37.
- Rigby, D. (2011). The future of shopping: Successful companies will engage customers through "omnichannel" retailing. *Harvard Business Review*, 89(12), 64-76.
- Rogers, E. (1995). *Diffusion of innovations*. New York: The Free Press.
- Sambamurthy, V., Bharadwaj, A., & Grover, V. (2003). Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms. *MIS Quarterly*, 27(2), 237-263.
- Santhanam, R., & Hartono, E. (2003). Issues in linking information technology capability to firm performance. *MIS Quarterly*, 27(1), 125-153.
- Schroeder, R. G., Bates, K. A., & Junttila, M. A. (2002). A resource-based view of manufacturing strategy and the relationship to manufacturing performance. *Strategic Management Journal*, 23(2), 105-117.
- Schumpeter, J. (1934). *The theory of economic development*. Cambridge, MA: Harvard University Press.
- Smith, K. G., Ferrier, W. J., & Ndofor, H. (2001). Competitive dynamics research: Critique and future directions. In M. A. Hitt, R. E. Freeman, & J. S. Harrison, (Eds.), *Handbook of strategic management* (pp. 315-361). Malden, MA: Blackwell Publishers.
- Smith, K. G., Grimm, C. M., & Gannon, M. J. (1992). *Dynamics of competitive strategy*. Thousand Oaks, CA: Sage.
- Smith, K. G., Grimm, C. M., Gannon, M. J., & Chen, M. J. (1991). Organizational information processing, competitive responses, and performance in the U.S. domestic airline industry. *Academy of Management Journal*, 34(1), 60-85.
- Stalk, G., Evans, P., Shulman, E. L. (1992). Competing on capabilities: The new rules of corporate strategy. *Harvard Business Review*, 70(2), 57-69.
- Stieglitz, N., & Heine, K. (2007). Innovations and the role of complementarities in a strategic theory of the firm. *Strategic Management Journal*, 28(1), 1-15.
- Strassmann, P. A. (2005). Real numbers: Taking a bite out of overhead. *Baseline*.
- Stratman, J. K. (2007). Realizing benefits from enterprise resource planning: Does strategic focus matter? *Production and Operation Management*, 16(2), 203-216.
- Thomas, J. S., & Sullivan, U. Y. (2005). Managing marketing communications with multichannel customers. *Journal of Marketing*, 69(4), 239-251.

- Touryalai, H. (2013). How Macy's is winning the retail battle. *Forbes*. Retrieved from <http://www.forbes.com/sites/halahtouryalai/2013/12/24/how-macys-is-winning-the-retail-battle-hint-it-knows-which-u-s-cities-love-cuffed-pants/#3e2e2b044c1f>
- U.S. Census Bureau. (2009). 2007 e-commerce multi-sector "e-stats" report. Retrieved from <http://www.census.gov/estats>
- Venkatesan, R., Kumar, V., & Ravishanker, N. (2007). Multichannel shopping: Causes and consequences. *Journal of Marketing*, 71(2), 114-132.
- Wade, W., & Hulland, J. (2004). The resource-based view and information systems research: Review, extension, and suggestions for future research. *MIS Quarterly*, 28(1), 107-142.
- Wind, Y., & Mahajan, V. (2002). *Convergence marketing: Strategies for reaching the new hybrid customer*. Upper Saddle River, NJ: Prentice Hall.
- Young, G., Smith, K. G., & Grimm, C. (1996). "Austrian" and industrial organization perspectives on firm-level competitive activity and performance. *Organization Science*, 7(3), 243-254.

Appendix

Table A1. Definitions and Measures of Managerial Actions

Categories	Measure	Examples
Market expansion	Count of related articles containing one of these words: international, global, expansion, opening, entry, enter, merge, acquire, acquisition.	<i>The owners of Victoria's Secret say they have taken their first step in a major international expansion plan with a \$710 million friendly takeover bid for La Senza Corp., Canada's leading specialty lingerie retailer.</i>
Marketing campaign	Count of related articles containing one of these words: marketing, ads, spot, promote, distribute, campaign.	<i>IT has retained the consulting services of James P. Frain to spearhead an intensified marketing effort overseeing both direct marketing and advertising, including the planned launch of a Cache expanded customer loyalty program in 2007</i>
Alliance	Count of related articles containing one of these words: ally, alliance, team, cooperate, partnership.	<i>We (Ann Taylor) are excited to begin this partnership with Torex Retail. We believe their Assortment Planning tool will drive our client-centric strategies to new levels and support a more fully integrated planning process.</i>
Promotion	Count of related articles containing one of these words: price, rate, discount, rebate, promotion.	<i>Bebe cardholders will enjoy a range of valuable programs and benefits, including a 10 percent-off promotion on their first purchase.</i>
Product introduction	Count of related articles containing one of these words: new product, new brand, introduce, launch, unveil, roll out [product or service].	<i>Gap maternity collection launch at gap.com exclusively.</i>

Table A2. Descriptive Statistics and Correlations

Constructs	Mean	Min	Max	SD	1	2	3	4	5	6	7	8	9	10	11
1. Enterprise IT applications	2.12	0	20	3.19											
2. Balance of IT-application portfolio	0.15	0	0.67	0.23	0.75										
3. Cross-channel capabilities	0.27	0	1	0.30	0.65	0.71									
4. E-commerce capabilities	0.63	0	1	0.42	0.49	0.55	0.85								
5. Cross-channel fulfillment capabilities	0.13	0	1	0.23	0.64	0.66	0.88	0.61							
6. Multichannel cross-selling capabilities	0.23	0	1	0.41	0.60	0.68	0.91	0.62	0.78						
7. Actions volume	0.57	0	8	1.11	0.31	0.31	0.25	0.24	0.23	0.20					
8. Action complexity	0.04	0	0.75	0.14	0.22	0.23	0.19	0.16	0.16	0.16	0.77				
9. Action heterogeneity	0.31	0.04	2.93	0.34	0.35	0.34	0.31	0.33	0.25	0.23	0.96	0.67			
10. Financial resources	1.25	0.04	6.87	1.06	-0.03	-0.06	0.06	0.02	0.05	0.08	0.02	0.01	0.04		
11. Firm size	0.83	0.01	10.3	1.53	0.47	0.20	0.16	0.12	0.20	0.12	0.18	0.13	0.17	-0.02	
12. Past performance	0.07	-1.21	0.55	0.14	0.07	-0.03	0.02	0.05	0.06	-0.04	0.08	0.08	0.09	0.24	0.15

About the Authors

Jifeng Luo is an associate professor of Management Information Systems in the Antai College of Economics & Management at Shanghai Jiao Tong University, China. He received his Ph.D. in Information Technology Management from Georgia Institute of Technology in 2008. His main research interests are e-commerce, IT business value, IT adoption, online pricing, and social impacts of IS. He has published in *MIS Quarterly*, *Decision Support Systems*, and other academic journals.

Ming Fan is an associate professor in information systems at Foster School of Business, University of Washington. He received his Ph.D. degree in information systems management from the University of Texas at Austin. His research interests are in the area of electronic commerce, use of IT in the financial services industry, and reputation systems in online markets. He is a co-author of the book *Electronic Commerce and the Revolution in Financial Markets*. The Chinese translation of the book was published by Peking University Press. He has published in *Information Systems Research*, *MIS Quarterly*, *IEEE Transactions on Knowledge and Data Engineering*, *Journal of Management Information Systems*, and other journals. He served as an associate editor of *Information Systems Research*, and is a senior editor of *Decision Support Systems* and *Information Systems and e-Business Management*.

Han Zhang is an associate professor of Information Technology Management at the Scheller College of Business, Georgia Institute of Technology. He received his Ph.D. in Information Systems from the University of Texas at Austin. His research focuses on online trust and reputation related issues, online word-of-mouth, and the evolution of electronic markets. He has published in *MIS Quarterly*, *Information Systems Research*, *Journal of Management Information Systems*, *Decision Support Systems*, and other academic journals. He is a senior editor of *Electronic Commerce Research & Applications* and *Information Systems and e-Business Management*.

Copyright © 2016 by the Association for Information Systems. Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and full citation on the first page. Copyright for components of this work owned by others than the Association for Information Systems must be honored. Abstracting with credit is permitted. To copy otherwise, to republish, to post on servers, or to redistribute to lists requires prior specific permission and/or fee. Request permission to publish from: AIS Administrative Office, P.O. Box 2712 Atlanta, GA, 30301-2712 Attn: Reprints or via e-mail from publications@aisnet.org.

Copyright of Journal of the Association for Information Systems is the property of Association for Information Systems and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.