

The effects of employee competencies and IT applications on operations strategy: an empirical study of retail firms in China

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Summary

Purpose – The purpose of this paper is to investigate the relationships between employee competencies, information technology (IT) applications, operations strategy, and business performance.

Design/methodology/approach – Drawing upon the resource-based theory, this study employs a path analytic framework to investigate how employee competencies and IT applications influence the development of competitive operations strategies and business performance for a sample of retail firms in China.

Findings – The findings indicate significant and positive relationships between employee competencies and operations strategy (e.g. low cost, quality and flexibility). IT applications also play a vital role in helping retailers pursue a flexibility strategy. The operations strategies of low cost and flexibility in turn influence business performance.

Originality/value – This study seems to be the first in investigating the impacts of employee competencies and IT applications on operations strategy and performance in the service sector, especially in the Chinese context.

Keywords China, Employees, Competences, Information technology, Operations management, Employee competencies, IT applications, Operations strategy, Retail service industries

Paper type Research paper

1. Introduction

With increasing competition and advances in information technology (IT), firms are facing environments that are extremely complex and dynamic. Today's dynamic and global competitive forces have created a need for revolution in operations strategies to help companies employ appropriate resources that enable innovative designs, production of high quality goods, and speedy responses to changes in the marketplace (Paiva *et al.*, 2008). It is argued that an operations strategy is a vital ingredient for the success of many retailers. However, in today's retail environment the risks associated with strategic errors are significant (Lowson, 2005). The literature on operations strategy argues that the resource-based view (RBV) is a theory fitted to the current competitive trends and provides a frame for operations strategy research (St John *et al.*, 2001). From strategic management, the resource-based theory of competitive advantage focuses on the roles of operations resources (such as employees and IT applications) play in developing a firm's competitive capabilities (Barney, 1991; Wright and McMahan, 1992). IT researchers advocated close coordination between IT and strategy, asserting that IT affects company strategy that strategies have IT implications, and that companies must somehow integrate strategic thrusts with IT capabilities (Bakos and Treacy, 1986). Human resources practices such as employees' skills and knowledge play an important role in the absorption and assimilation of IT capabilities (Powell and Dent-Micallef, 1997). Thus, drawing upon RBV, this

study aims to investigate the links between employee competencies, IT applications, operations strategy and performance.

The generic issue of matching IT applications to strategies has received attention in the literature, but there is hardly any theoretical or empirical research done to match operations strategy (competitive priorities) and technology applications in companies' operations (Kathuria and Igbaria, 1997). Also, the literature is fragmented and far-flung (despite some recent advances), and weighs heavily toward case studies, anecdotes and conceptual frameworks, with insufficient empirical work and minimal synthesis of findings, particularly in service operations strategy research (Powell and Dent-Micallef, 1997). Clearly there is a need for more empirical research in the area of IT applications and operations strategy. On the other hand, the problem of how to integrate performance measurement systems with human resource management (HRM) and modern operations practices such as total quality management or new information technologies has not been adequately addressed (Shepherd and Gunter, 2006). Over years there have been some calls (e.g. Adam and Swamidass, 1989; Roth and van der Velde, 1991; Spring and Araujo, 2009) for more researches on service operations to elucidate specific problems posed by the unique characteristics of services. Therefore, research linking employee competencies, IT applications and operations strategy in the retail sector is worth pursuing.

China provides a particularly interesting setting for this study because of its rapid economic growth. As one of the main service industries in China, the retail sector has been experiencing unprecedented development during the transformation process from a centrally-planned to a market economy. However, the increased competition brought by market and economic reforms requires that companies in emerging economies not only have to develop effective operations strategies but they also need to understand how those strategies influence performance (Amoako-Gyampah and Acquah, 2008). In addition, Jiang *et al.* (2007) stated that China brings new research issues and opportunities to the academic world, especially in the field of production and operations management (POM). However, a review of the literature reveals that relatively little is known about the operations strategies adopted by Chinese retailers.

The remainder of this paper is organized as follows. First, a theoretical framework is proposed building on previous studies. Second, some research hypotheses are developed. Third, the design of this study and the methodological procedures are described. Fourthly, the findings of the study are presented and discussed, and a set of managerial implications are drawn. Finally, we conclude with a summary of findings and conclusions, as well as discuss the main limitations of this study and opportunities for future research.

2. Theories and conceptual framework

2.1 The resource-based view and operations strategy

Over the past few decades a large number of concepts and techniques have been proposed regarding how organizations should develop a suitable strategy. Some of these concepts concentrate on matching an organization's resources and skills with the opportunities and threats created by its external environment (Porter, 1980), while others focus on the organization's resources and capabilities as drivers of competitive advantage (Grant, 1991). Over the past few decades, operations strategy and its development have received a lot of attention in the literature. Operations strategy can be viewed as the effective use of operations capability and technology for achieving business and corporate goals. These goals include profit, innovation, customizations, flexibility, quality, response, delivery reliability and after-sales services (Ahmed *et al.*, 1996). Zhao *et al.* (2002) investigated the importance and strengths relative to primary competitors among 138 companies in China, through a survey among senior executives of these companies. They found that innovativeness, after-sale services, quality, and flexibility are the most important competitive priorities among Chinese companies. Firms seeking to achieve success in fierce market competition must formulate appropriate operations strategies that are suited to the external environment in which they operate, and employ firm resources in ways that



support these strategies (Hayes and Wheelwright, 1984). Many researchers stated that operations strategy focuses on developing specific capabilities called competitive priorities (e.g. Hayes and Wheelwright, 1984; Roth and van der Velde, 1991). Despite the differences in terminology, there is broad agreement that operations strategy can be expressed in terms of at least four basic competitive priorities: low cost, quality, delivery performance and flexibility (Hayes and Wheelwright, 1984; Ward *et al.*, 1998). Thus, we will define operations strategy to include cost, delivery, flexibility, and quality.

Since the end of the 1980s, the resource-based view (RBV) has been extended to the field of strategic analysis and strategic choice by identifying the importance of resources in strategy development (Lowson, 2003). In recent years, the resource-based perspectives of strategy have been applied to issues of production and operations management (Paiva *et al.*, 2008; Schroeder *et al.*, 2002). Zahra and Das (1993) stated that RBV offers an innovative approach to thinking about and developing an operations strategy. A well-articulated resource-based operations strategy should capitalize on a firm's operations resources to attain and sustain competitive advantage (Zahra and Das, 1993). RBV provides research in operations strategy a more fine-grained understanding of how competitive advantage is provided through the resources generated by operations (St John *et al.*, 2001; Paiva *et al.*, 2008). According to this approach, a company's operations strategy must capitalize on, and add to, its resources and capabilities. In this study, we approach retail operations strategy from the perspective of RBV.

2.1.1 Employee competencies and operations strategy. RBV suggests that human resources are an organisation's most important assets in the quest to achieve competitive advantages (Grant, 1991). Hax (1985) further stated that it is important to conduct a broad strategic audit of the human resource functions prior to developing functional strategies. Within strategic business management, both operations strategy (the competitive priorities of quality, delivery performance, flexibility and cost) and the practices of human resource management need to be observed by the whole organisation (Santos, 2000). Some previous studies have found positive links between human resource practices and operations strategy (e.g. Youndt *et al.*, 1996). Jackson and Schuler (1995) presented some features of human resource management focusing on the operations strategy of quality, which allows a differentiation of human resource practices from those aligned with low cost. In addition, most total quality management (TQM) theorists (e.g. Deming, 1982) argued that skill acquisition and development form the core of a successful quality strategy. More specifically, the technical and problem-solving skills of employees tend to be more important in total quality environments because employees must be able to work in teams to diagnose and solve problems (Hayes *et al.*, 1988; Slack *et al.*, 2010). The operations strategy of flexibility requires human-capital-enhancing HR systems that focus on skill acquisition and development in an effort to facilitate adaptability and responsiveness (Upton, 1995). Additionally, some China-related POM research (e.g. Li, 2000; Yu, 2011) has highlighted the important roles of human resource practices in developing competitive operations strategy and improving competitiveness. Li (2000), for example, found that human resource competence (such as job enlargement and employee empowerment) is significantly correlated with performance. Employee competencies, a person's knowledge, skills and abilities, have been considered increasingly important in HR approaches (Spencer and Spencer, 1993). From the HRM perspective, competencies are viewed as capabilities of people (Cardy and Selvarajan, 2006). As with other types of resources and capabilities, employee competencies have the potential to be sources of competitive advantage (Cardy and Selvarajan, 2006). Employee competencies in the operations management category include communication skills, team building, and listening skills (Shewchuk *et al.*, 2005). Hence, in this paper, we will define employee competencies to include team working, employee motivation and leadership, and will investigate the impacts of employee competencies on retail operations.

2.1.2 IT applications and operations strategy. As the field of strategic management has expanded, strategy researchers and practitioners have shown increasing interest in understanding the role of IT in strategy formulation and implementation (e.g. Cooper and



Zmud, 1990), and its impacts on business performance (e.g. Kettinger *et al.*, 1994). Information technology is a tool to enhance the overall strategy of the company as well as to promote competitive advantage in the market (Voss, 2003). Skinner (1985) was one of the first to point out that investment in operations equipment and process technology can do more than achieve low costs. It can also provide superior quality, shorter delivery cycles, lower inventories, shorter new product development cycles and new production economies (Slack *et al.*, 2010; Voss, 2003). In other research endeavours (e.g. Hayes and Wheelwright, 1984; Skinner, 1985), it has been argued that different production systems (IT applications) or process structures have inherent advantages in pursuing certain operations strategies of low cost, quality, flexibility and delivery performance. Some studies (e.g. Sohal *et al.*, 2001; Kathuria and Igbaria, 1997) have examined the impacts of technology applications on developing operations strategy. Sohal *et al.* (2001), for example, found that both the manufacturing and service industries are only achieving moderate benefits from IT investments. They stated that IT departments in service industries have a more direct role in operations strategy development than are the case in manufacturing industries. Technology needs to be aggressively incorporated as part of operations strategy (Kathuria and Igbaria, 1997; Slack *et al.*, 2010). There is little China-related POM research that investigates the impact of IT applications on competitive priorities (Pyke *et al.*, 2002; Jiang *et al.*, 2007). Pyke *et al.* (2002) found that IT adoption is significantly positively correlated with competitiveness and performance of Chinese manufacturers, and that the three competitive priorities of cost, delivery and flexibility are significantly related to financial performance. Using a case study of five retailers in China, Yu (2011) also found that retail technology applications (e.g. POS, EDI, barcode and ERP) and the relevant information systems play important roles in helping retailers develop the operations strategies of cost, quality, and flexibility.

2.2 Retail operations

The service sector has become an important part of the world economy over the past several decades. As a result, a great deal of attention has been devoted recently to the rapidly changing face of the service sector. For instance, a number of service industries are now characterized by low growth, intense competition, rapid technological changes, and spiralling customer expectations (Bharadwaj and Menon, 1993; Spring and Araujo, 2009). Some scholars (e.g. Roth and van der Velde, 1991; Spring and Araujo, 2009) have highlighted the importance of operations as a competitive weapon in service organizations. Roth and van der Velde (1991), for example, suggested many service analogues for manufacturing success factors, including quality, price, convenience, customization, and customer relationships. A service strategy must address how operations will support and mesh with the competitive marketing thrusts of a business. Voss (1986) stated that operations strategy must be changed and adapted to maximize the market criteria for success, the strategic dimensions such as efficiency, price, effectiveness, quality, and flexibility chosen, as demanded by the market. Due to the closeness of the service business to customers, service operations must be extremely sensitive to customers and markets (Adam and Swamidass, 1989; Spring and Araujo, 2009).

As described previously, China's retail market, as one of the main service industries, has experienced exponential growth during the last 20 years. The face of retailing is changing. Since the 1980s a number of major structural changes have been witnessed in China's retail market, including rising operating costs; range and speed/efficiency of operation; increasing consumer awareness; a shortage of skilled labour; and the developments in retail technologies (Hingley *et al.*, 2009; Lo *et al.*, 2001; Gamble, 2006; CCFA, 2010). These changes have brought some challenges for retail operations. Miller and Merrilees (2000) stated that the retail sector is now facing even greater challenges from rapidly evolving technology, changing consumer tastes and patterns and ever-increasing competition than at any time in its robust past. Competition in the retail sector is no longer between products, but encompasses all elements of this mix, including: product offer and positioning, store location, customer service, quality, retail design and store image, retail promotion, retail advertising, price points and other channel members (Lowson, 2005). It is postulated that many of the challenges facing contemporary retailers, of any size, will revolve around:



“the effective management of operations” (Harris and Walters, 1992). A number of studies (e.g. Megicks, 2001; Pal and Byrom, 2003) have emphasised the important role of operations in a retail setting. For example, Megicks (2001) identified six retail operations clusters in his analysis: merchandise and range; service and quality lines; active marketing; low prices and incentives; local involvement; and unique products. More specifically, building on previous studies on retail operations, Pal and Byrom (2003) further developed the retail operations improvement tool contains the five key elements: stock, space, staff, standards, and systems. This model provides managers with a useful guiding framework that can be exploited in the retail operations process. The dynamism and complexity of the retail environment provides a clear indication that any competitive success must be closely linked to operational planning (Lowson, 2005).

2.3 Conceptual framework

Drawing upon the resource-based theory, we developed a conceptual framework through the reconciliation of employee competencies, IT applications, operations strategy, and performance. As presented in Figure 1, the framework postulates that employee competencies and IT applications serve as potential driving forces influencing operations strategy and performance (Wright *et al.*, 1994; Youndt *et al.*, 1996; Powell and Dent-Micallef, 1997; Voss, 2003). As noted above, operations strategy here is characterized by the four familiar competitive priorities of cost, quality, flexibility, and delivery performance. These measurements are discussed in more detail below.

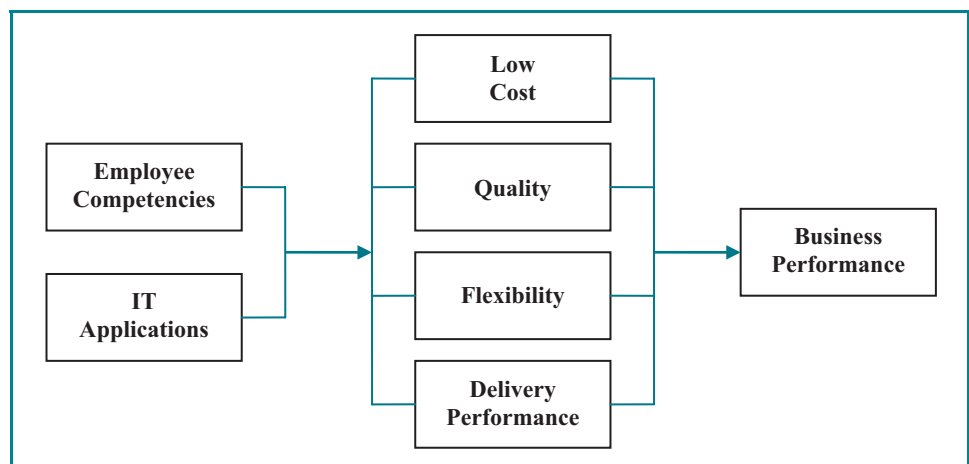
3. Hypotheses development

In accordance with the conceptual framework presented in Figure 1, we develop three hypotheses representing reasonable linkages between employee competencies, IT applications, operations strategy, and business performance.

3.1 Employee competencies and operations strategy

Ackoff (1994) suggested that organisations must rely upon their employees to create the desired future in an unpredictable environment. Human resources can be a formidable weapon in achieving competitive superiority (Grant, 1991). It has been widely argued that people provide companies with an important source of sustainable competitive advantage (Pfeffer, 1994; Wright *et al.*, 1994). It is essential to consider human resources during the development of corporate strategy because of the need to explore people-related strategies at an early stage (Lynch, 2003). As noted earlier, some empirical studies (e.g. Youndt *et al.*, 1996) have examined the important effects of employee competencies on operations

Figure 1 A conceptual framework of employee competencies, IT applications, operations strategy and performance



strategy. Youndt *et al.* (1996), for example, found that a human resource system focused on human capital enhancement was directly related to multiple dimensions of operations strategy. For example, quality and operational flexibility tend to require enhanced employee skills, thereby necessitating a human-capital-enhancing approach to HR that focuses on skill acquisition and development. By conducting interviews with human resource professionals of eight Baldrige National Quality Award-winning companies, Blackburn and Rosen (1993) developed a human resource profile of best practices for TQM. The authors found that bottom-line payoffs for successful integration of HRM practices and TQM goals show up in reduced costs, increased product reliability, greater customer satisfaction, and shorter product development cycles. Other research findings have shown that a flexibility strategy depends much more on people than on technical factors *per se* (Hayes *et al.*, 1988; Upton, 1995). According to Jackson and Schuler (1995), companies that pursue flexibility and innovation strategies may be characterized by some features, including jobs that allow employees to develop skills that can be used in other positions in the company, and broader career paths to reinforce the development of a broad range of skills.

In retailing, quality improvement that is not dependent on the immediate interaction with the staff, such as cleanliness of the store, control of freshness of fruits and vegetables, and frequency of stock-outs, is also dependent on the work of the employees. For example, salespeople have an important impact on the Chinese customer's perception of the store and its quality (Gamble, 2006). As services are intangible, the direct interaction with personnel is important for customers' quality evaluations (Bitner, 1990). Employee behaviour thus has an indirect and a direct effect on quality and speed of services. Although it is frequently acknowledged that employee competencies play central roles in linking employee capabilities with strategic decision making and performance, the specific form of this relationship is still open to debate (Youndt *et al.*, 1996), particularly in the area of operations strategy. Empirical studies on the role of employee competencies on operations strategy in the Chinese context are quite rare. Thus, the following hypothesis is proposed.

H1. Employee competencies have significant positive effects on operations strategy.

3.2 IT applications and operations strategy

Technology is frequently discussed as a major strategic variable in service operations. Technology can assist a company to gain strategic advantages in the form of improved delivery speed, increased quality and reliability, and increased new services that the customer could not envision (Adam and Swamidass, 1989). Previous empirical studies have examined the impacts of technology applications on developing operations strategy (e.g. Sohal *et al.*, 2001; Kathuria and Igbaria, 1997). Building on Parsons' (1983) work, Kathuria and Igbaria (1997) developed a theoretical model that seeks to help managers and practitioners to align IT applications with operations strategy (low cost, product flexibility, volume flexibility, quality of design and product features, quality of conformance, delivery reliability, and delivery speed). Fletcher (1995) found positive links between IT and the strategies of marketing, sales and innovation in new product/service development. Mathe and Dagi (1996) argued that IT applications contributed to the success of the implementation of international strategies in service industries. Voss (2003) also found that companies can reduce costs, improve product and service quality, enhance dependability, and increase flexibility by employing IT substantially. However, Sohal *et al.* (2001) found that companies in manufacturing and service industries are only achieving moderate benefit from their IT applications. They identified that economic factors, insufficient top management support, and difficulty to justify costs as the greatest impediments to IT success in both industries. Powell and Dent-Micallef (1997) also found that IT alone does not produce sustainable performance advantages in the retail industry, but that some retailers could reduce transaction costs by leveraging intangible and complementary human resources through appropriate use of IT.

The introduction of technology plays a critical role in managing retail operations. Retailers now spend lots of money in their yearly budgets on IT, mostly to track merchandise and operations, automate transactions, and optimize inventory levels and other supply chain



decisions (Raman *et al.*, 2001). Thanks to these information efficiencies and synergies, the retailers can reduce costs, improve product and service quality, enhance dependability, or increase flexibility (Powell and Dent-Micallef, 1997; Cox and Brittain, 2000; Yu, 2011). However, most previous studies focused heavily on manufacturing case studies and conceptual frameworks, with insufficient quantitative study in the retail sector (Powell and Dent-Micallef, 1997). Thus, we test the following hypothesis.

H2. IT applications have significant positive effects on operations strategy.

3.3 Operations strategy and business performance

The existence of a relationship between operations strategy and business performance has long been supported by the operations strategy literature, especially in the manufacturing environment (e.g. Swamidass and Newell, 1987; Anand and Ward, 2004; Ward and Duray, 2000; Amoako-Gyampah and Acquah, 2008). Swamidass and Newell (1987), for example, found that the operations strategy of flexibility is positively related to business performance. Anand and Ward (2004) found that the implementation of mobility-flexibility in operations strategy results in manufacturing performance (market share and sales growth). Ward and Duray (2000) identified strong links between the operations strategy of quality and business performance. Some empirical studies in the manufacturing sector have also found a positive relationship between quality and various measures of business performance (Flynn *et al.*, 1995).

Building upon the investigation of the unique characteristics of services, some retail academics have suggested the importance of competitive priorities of low price, quality and speed for retail success. Berry *et al.* (1997) stated that low price is a key strategy for high-performance retailers. A low cost strategy leads to improvements in operational efficiencies that a retailer can use to reduce its price and all things being equal achieve an increase in market share and sales growth. Moreover, quality plays an important strategic role in service firms, and service quality in the retail experience has become the most important purchase-determining condition (Bharadwaj and Menon, 1993; Berry *et al.*, 1990). Some empirical studies (e.g. Bharadwaj and Menon, 1993) have found positive relationship between service quality and market share or profitability. Additionally, speed of service has become a competitive weapon for retailers to survive in an increasingly dynamic market. Time seems to be the factor most critical to customers' shopping experience (Berry *et al.*, 1997). Decreasing waiting time in line allows a retailer to achieve a higher level of customer satisfaction that can potentially increase performance outcomes, such as market share and sales. Moreover, while keeping cost low and quality high, a retailer with high operational flexibility is expected to respond faster to market changes and thus achieve higher performance. Thus, we test the following hypothesis.

H3. Operations strategy has a significant positive effect on business performance.

4. Methods

4.1 Sample

Data for this study were obtained from a primary survey of retail firms in China. The sample was made up of retail firms taken from *Market Statistical Yearbook* (2007) which is the official publication of the National Bureau of Statistics of China (NBS, 2007). The sample consisted of retailers operating their business in food and non-food sectors.

4.2 Questionnaire survey

Before executing the survey (see Appendix), a pre-test was undertaken with five experienced retail managers in China to ensure that the questions were clear, meaningful, relevant and easy to interpret. And minor changes to the scales were made accordingly. The retail firms were initially contacted by telephone and emails before the questionnaires were sent out. The initial contact revealed that lack of time and concerns about confidentiality protection were the most common reasons for non-participation. A total of 318 retail firms replied and agreed to participate in the study. Questionnaires and prepaid self-addressed



envelopes were posted to these retailers. Each questionnaire was accompanied by a cover letter indicating the purpose of the study and potential contributions. The letter also assured complete confidentiality to the respondents. Additionally, to encourage participation and improve the response rate, the respondents were promised a summary of findings of our study. Follow-up calls were also made to remind and encourage the retailers to complete and send back the questionnaires and to clarify any questions or concerns that the firms had. A total of 122 completed questionnaires were received. After screening, we found that 16 of the 122 questionnaires had not been completed properly and were discarded, thus leaving 106 responses for use in the subsequent analyses. The respondents typically carried the title of president, operations manager and general manager in-charge of retail operations function. Most of them have been in their position for more than five years, which indicates that our informants were knowledgeable about the issues under study. We checked for non-response bias by testing the firm size and industry type, and found no significant statistical differences between respondents and non-respondents (Armstrong and Overton, 1977). In addition to collecting data on the main study variables, we also collected demographic data on the firms including industry type and firm size. The respondent retailers operated in five different sector groups (such as food and grocery, clothing and footwear, furniture, electrical and office, and health and beauty retailing). Retailing in China is a labour-intensive sector, about 20 percent of the responding retailers had 5,000 or more employees, and about 50 percent of firms had fewer than 1,000 employees. However, the small sample size in some of the groups did not permit comparison across the different sectors with regard to the stated objectives of the research.

4.3 Measures

As noted earlier, measures used in this study were developed based on previous studies (e.g. Cardy and Selvarajan, 2006; Powell and Dent-Micallef, 1997; Ward *et al.*, 1995; Slack *et al.*, 2010; Cao and Dowlatshahi, 2005) and interviews with five senior retail managers (such as operations manager, HR manager and IT manager) in China. All five managers had more than seven years of experience in retail sales and operations. Employee competencies refer to good team working, responsible leadership, good educational background, and a high degree of self-motivation (Spencer and Spencer, 1993; Pfeffer, 1994; Wright and McMahan, 1992; Wright *et al.*, 1994; Cardy and Selvarajan, 2006). The items were measured using a five-point scale (ranging from 1 = strongly disagree to 5 = strongly agree). We included four items to measure IT application in retail operations. The retail technologies mainly include point-of-sale (POS), barcode technology, electronic data interchange (EDI), and computer-based systems for retail management (Cox and Brittain, 2000; Powell and Dent-Micallef, 1997). The items were measured on five-point Likert scales from 1 (not at all) to 5 (extensive).

For the purposes of this study, four familiar competitive priorities (low cost, quality, delivery performance and flexibility) were considered to measure operations strategy. Three questions (e.g. reducing overhead costs, or inventory level, and increase equipment utilization) were used to assess low cost (Ward *et al.*, 1995; Slack *et al.*, 2010). Quality was measured by four questions. The questions focused on providing appropriate specification good/service, improving good/service performance and reliability, implementing extremely strict good/service quality control procedures, and increasing private brands sales (Hingley *et al.*, 2009; Ward *et al.*, 1995; Yu and Ramanathan, 2011). Flexibility in the retail sector involves the introduction of wide range of new goods and services, adjusting capacity rapidly, and handling variations in customer delivery schedules (Aranda, 2003; Slack *et al.*, 2010). Delivery performance measures consisted of providing reliable delivery, decreasing waiting time in line, and improving after sales service (Yu and Ramanathan, 2011; Ward *et al.*, 1995; Slack *et al.*, 2010). All items were measured on five-point Likert scales from 1 (strongly disagree) to 5 (strongly agree).

The appropriate way to measure performance has been debated extensively in the literature. The appropriateness of the performance measure to use may depend on the circumstances unique to the study (Swamidass and Newell, 1987). In this study, business performance was measured using four single items perceptual measures, including market



share, sales growth, profits growth, and return on investment (Swamidass and Newell, 1987; Cao and Dowlatshahi, 2005; Yu and Ramanathan, 2011). Business performance measures were often used in the retail and operations literature to assess the effects of competitive priorities of quality, speed and cost (e.g. Bharadwaj and Menon, 1993; Amoako-Gyampah and Acquah, 2008; Anand and Ward, 2004). In accordance with these prior operations management studies, our respondents were asked to assess their performance relative to the performance of main competitors over the last three years on a five-point scale (ranging from 1 “significantly lower” to 5 “significantly higher”).

5. Results

5.1 Principal component analysis (PCA)

A principal component analysis (PCA) with varimax rotation was first undertaken on employee competencies, IT applications, operations strategy, and business performance measurements to examine the underlying dimensions of the construct (Hair *et al.*, 2006). The PCA results reported in Table I show that all of the items had significant factor loadings ($p < 0.01$). The factor analysis displays all factors with eigenvalues greater than one and

Table I Factor loadings of employee competencies, IT applications, operations strategy and performance (PCA)

Variables	Mean	SD	Factor loadings	Cronbach alpha
<i>1. Employee competencies^a</i>				0.661
Responsible leadership	4.009	0.723	0.772	
Team working	3.952	0.785	0.760	
Highly motivated	3.801	0.844	0.774	
Good educational background	2.924	0.943	0.524	
<i>2. IT applications^b</i>				0.792
Barcode technique application	4.358	1.212	0.858	
Point-of-sale system application	4.000	1.279	0.871	
Electronic data interchange application	3.434	1.345	0.800	
Computer and internet in retail operations	3.415	0.993	0.584	
Operations strategy ^c				
<i>3. Low cost</i>				0.644
Reduce overhead costs	4.198	0.709	0.796	
Reduce inventory level	4.198	0.695	0.800	
Increase equipment utilization	4.103	0.702	0.622	
<i>4. Quality</i>				0.591
Provide appropriate specification of goods/services for customers	4.311	0.735	0.780	
Improve goods/services performance and reliability	4.245	0.687	0.790	
Make extremely strict goods/services quality control procedures	4.103	0.872	0.657	
Increase private brands (PBs) sales	3.452	1.374	0.511	
<i>5. Flexibility</i>				0.672
Change the variety of goods/services in a given time	3.707	0.861	0.690	
Respond quickly to shift in demand, to increase/decrease operational capacity	3.877	1.039	0.813	
Change planned delivery dates to meet emergent requirements	3.726	1.055	0.780	
<i>6. Delivery performance</i>				0.853
Decrease waiting time in line	4.037	0.882	0.803	
Meet delivery promises	4.273	0.834	0.913	
Improve after sales service	4.245	0.766	0.908	
<i>7. Business performance^d</i>				0.764
Market share	3.198	1.072	0.694	
Sales growth	3.481	0.853	0.847	
Profits growth	3.132	0.862	0.801	
Return on investment	3.235	0.900	0.744	

Sources: ^aSpencer and Spencer (1993); Pfeffer (1994); Wright *et al.* (1994); Cardy and Selvarajan (2006); ^bCox and Brittain(2000); Powell and Dent-Micallef (1997); ^cWard *et al.* (1995); Slack *et al.* (2010); ^dSwamidass and Newell (1987); Cao and Dowlatshahi (2005); Yu and Ramanathan (2011)

factor loadings greater than 0.50 on a single factor for each of the constructs, providing support for unidimensionality (Hair *et al.*, 2006). Hair *et al.* (2006) also suggested that such a within scale PCA also provides additional evidence of convergent validity.

Cronbach's alpha coefficient was used to examine the reliabilities among the items within each factor. A Cronbach's alpha coefficient higher than 0.60 is generally viewed as being acceptable for an exploratory study such as this one (Nunnally, 1978; Byrne, 2001). Nunnally and Bernstein (1994) also recommended a cut-off point of 0.60 for new scales. In this study, Cronbach's alphas were calculated for each dimension of its construct and are reported in Table I. As shown in this table, it is clear that both employee competencies and IT applications have Cronbach's coefficient alpha values greater than 0.60, representing an acceptable significant level of internal validity (Nunnally, 1978). Alpha coefficients for the four operations strategies are 0.644, 0.591, 0.672, and 0.853, respectively. These values are either close to or exceed the 0.60 criterion generally considered adequate for this empirical work (Hair *et al.*, 2006; Nunnally, 1978; Nunnally and Bernstein, 1994). In addition, Table I also shows that Cronbach's coefficient for business performance (0.764) is higher than 0.60, representing an acceptable significant level of internal validity (Nunnally, 1978).

Because the scales are unidimensional, a single set of factor scores can be used to represent each scale. Factor scores are obtained by multiplying the observed standardized values of each variable by the corresponding standardized factor loading. The result is a set of standardized factor scores, with one score for each scale on each observation (Ward *et al.*, 1995). The correlation matrix of the final scales is reported in Table II. It includes correlation among all the scales items (employee competencies, IT applications, operations strategy, and business performance) for the confirmatory factor analysis.

5.2 Confirmatory factor analysis (CFA)

Confirmatory factor analysis (CFA) was used to assess the overall model fit and the reliability and validity of each multi-item scale (first-order factor) (Byrne, 2001; Hair *et al.*, 2006). As shown in Table III, the results of CFA provided significant support for the employee competencies and IT applications conceptualizations ($\chi^2/df = 1.114$; RMSEA = 0.033; CF1 = 0.990). Table III also indicates a good fit for the four-factor (low cost, quality, flexibility and delivery performance) solution of operations strategy. Hence, these results are considered significant in statistical terms.

Establishing reliability is necessary but not sufficient to establish construct validity (Hair *et al.*, 2006). Hence convergent and discriminant validity were also assessed in this study. Convergent validity was assessed by the magnitude of factor loadings of IT applications, employee competencies, operations strategy and performance (Hair *et al.*, 2006). The results of principal component analysis show that all factor loadings were greater than 0.50, and had positive signs ($p < 0.01$). Discriminant validity was examined using Chi-square difference test (Hair *et al.*, 2006). The results indicate that all χ^2 differences between the factors were significant ($p < 0.01$), providing evidence of discriminant validity between each measurement scale.

Table II Correlation matrix

Scale	1	2	3	4	5	6	7
1. Employee competencies	(0.661)						
2. IT applications	0.052	(0.792)					
3. Low cost	0.369**	-0.053	(0.644)				
4. Quality	0.414**	0.001	0.291**	(0.591)			
5. Flexibility	0.418**	0.209*	0.179	0.187	(0.672)		
6. Delivery performance	0.136	0.074	0.165	0.139	0.075	(0.853)	
7. Business performance	0.383**	0.127	0.302**	0.246*	0.248*	0.179	(0.764)

Notes: * $p < 0.05$; ** $p < 0.01$; The numbers in parentheses are Cronbach's coefficient alphas



Table III Summary of fit statistics

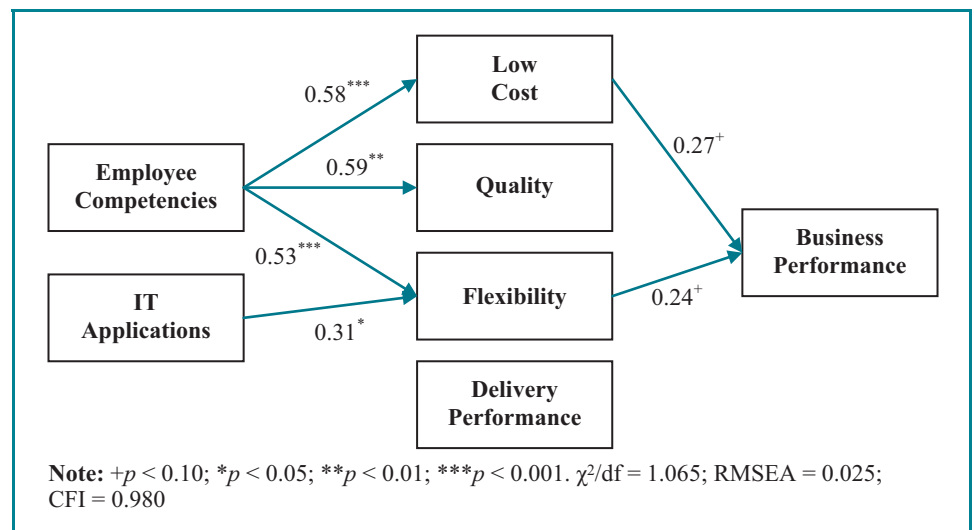
Variables	Variance explained (%)	Cronbach alpha
<i>Operations resources^a</i>		
1. Employee competencies	51.190	0.661
2. IT applications	61.893	0.792
<i>Operations strategy^b</i>		
5. Low cost	58.572	0.644
6. Quality	62.783	0.591
7. Flexibility	60.454	0.672
8. Delivery performance	77.870	0.853

Notes: ^aGoodness of fit statistics: $\chi^2 = 20.045$; $df = 18$; $(\chi^2/df) = 1.114$; RMSEA = 0.033; CFI = 0.990; ^bGoodness of fit statistics: $\chi^2 = 79.731$; $df = 59$; $(\chi^2/df) = 1.351$; RMSEA = 0.058; CFI = 0.938

5.3 Path analyses

To test the hypothesized links in our conceptual framework, a path analytic approach was used in this study (Byrne, 2001; Hair *et al.*, 2006). Path analysis offers some distinct advantages including the identification of direct and indirect effects in a complex system of variables, and the convenience with which intervening variables could be included in the model (Byrne, 2001; Shah and Goldstein, 2006). The results of path analyses using AMOS 6 for the responding companies are reported in Figure 2. The fit statistics for the model show that χ^2/df (1.065) was below the suggested maximum of 3, and an RMSEA of 0.025 was less than 0.05, indicating a good fit. CFI (0.980) values above 0.90 also tend to suggest a very good fit. Overall, the fit measures indicate a good fit of the model to the population.

In Figure 2, the path coefficients (standardized regression coefficients) are shown on the arrows. The path analytic model indicates that employee competencies have positive and significant effects on the operations strategies of low cost ($\beta = 0.58$, $p < 0.001$), quality ($\beta = 0.59$, $p < 0.01$), and flexibility ($\beta = 0.53$, $p < 0.001$). Thus this result strongly supports our first hypothesis. The data also suggest that IT applications have a significant impact on a flexibility strategy ($\beta = 0.31$, $p < 0.05$). However, IT applications do not appear to have any direct effect on the operations strategies of low cost, quality and delivery performance among retailers in China. Hence, *H2* is partially supported. In addition, Figure 2 also shows

Figure 2 Path model of employee competencies, IT applications, operations strategy and performance

that the operations strategies of low cost ($\beta = 0.27, p < 0.10$) and flexibility ($\beta = 0.24, p < 0.10$) are significantly related to business performance. These findings support *H3*. The implications of these findings are discussed below.

6. Discussion and implications

6.1 Empirical support for the conceptual framework

As mentioned above, we observed several significant paths between employee competencies and operations strategy made by the participating retailers. Employee competencies such as good team working, good educational background, and high level of motivation play significant roles in developing the operations strategies of low cost, quality and flexibility. Retail companies with high employee competencies have the ability to reduce costs, provide customers with high quality goods and services, and introduce new and wide range of goods and services. People are the vital resources for retail companies to survive and achieve sustainable competitive advantages in today's fiercely competitive marketplace. For instance, salespeople with product knowledge and good sales skills can be essential to retailers' competitiveness (Gamble, 2006). In China's retail sector, competencies of sales staff are one of the most important factors that affect customers' purchasing decisions in supermarkets and department stores. Salespeople play important roles in providing customers with high quality services. The retail industry in China is labour-intensive and the employee turnover is very high. In particular, employees such as checkout staff and sales assistant have the highest level of labour turnover (Gamble, 2006; CCFA, 2010). Most retailers endeavoured to reduce labour costs through enhancing employee competencies and loyalty. Retailers with high employee motivation and loyalty might have the capability of reducing labour cost and providing better quality services for customers. Our findings are consistent with those of some previous studies about the vital roles of employee competencies during the strategic operations decision-making process. Santos (2000), for example, stated that human resource management is linked to strategic choices of quality, flexibility and cost reduction by the use of a functional approach. In a retail context, the most important aspect for a company is the ability to attract, educate, motivate, and retain high-quality employees. This strengthens a retailer's creativity to implement customer-driven merchandising and competitive operations strategies.

Our path analysis presented in Figure 2 also suggests that IT applications provide retailers in China with the ability to pursue a flexibility strategy. The introduction of technology plays a critical role in the management of retail operations. Over the last few years, most leading retailers in China have made significant advances in retail technologies. Many retailers have begun to put heavy emphasis on introducing retail technologies (such as POS and EDI), to achieve competitive advantages in today's competitive and dynamic marketplace. This finding is consistent with some previous studies' (e.g. Voss, 2003) conclusion about the relationship of technology adoption with operational flexibility. However, the path model indicates that IT applications seem to have no significant direct effects on other three operations strategies of low cost, quality and delivery performance. This is not surprising when we examine the current development of China's retail market. China's retail industry is still a low technology-based sector. Although some information technology has been introduced by some leading retailers, the trend is not true for the whole of retail companies in China, particularly in small- and medium-sized retailers. Due to the shortage of funding or lack of top management support, many SME retailers face the difficulties in introducing retail technology (CCFA, 2010). Moreover, there has been much debate in the literature about whether IT applications can produce sustainable competitive advantages. Powell and Dent-Micallef (1997), for example, argued that technology alone is not sufficient to ensure competitive advantage as its fast evolution and the ready availability of substitutes erodes any advantage a company has. Retailers in China still need to make their best efforts to obtain more competitive advantages and great benefits from IT applications, for example, getting top management support and providing relevant IT training courses for employees (Sohal *et al.*, 2001).



As shown in Figure 2, the path analytic model suggests that low cost and flexibility strategies are significantly related to business performance. In other words, retailers could improve performance through a low cost strategy. Currently, the cost of doing business in China is going up (Hingley *et al.*, 2009; CCFA, 2010). In response to the rising cost of doing business in China, retailers seek to improve performance (such as market share and sales growth) through the competitive priority of low cost. Furthermore, as discussed earlier, employee competencies enables retailers to be more efficient in cost reduction. This finding is consistent with the discoveries of Ward and Duray (2000) and Anand and Ward (2004) who found significant links between a low cost strategy and manufacturing performance. In addition, surviving in today's highly competitive and rapidly changing environment often requires retailers to introduce retail technology that could provide the right kind of flexibility to succeed in their specific environment, thus improving performance outcomes. Generally, flexibility is one capability that retailers can develop to cope with a dynamic environment in which the behaviours of customers and suppliers are difficult to predict. The competitive priority of flexibility, including introducing new goods/services, offering wide range of goods/services and providing appropriate goods/services to meet customer special demands in different seasons (e.g. national holidays and Chinese new year), could enable retailers to improve their performance. This finding is consistent with a number of empirical studies in manufacturing environments that suggest a positive relationship between a flexibility strategy and performance (e.g. Swamidass and Newell, 1987; Anand and Ward, 2004). Therefore, it can be noted that low cost and flexibility strategies can give companies in both the manufacturing and service industries a distinct competitive advantage in today's competitive marketplace and provide operational support for the competitive strategy.

The operations strategies of quality and delivery performance, however, do not appear to influence business performance. This finding is somewhat contrary to some empirical studies that suggest a positive relationship between quality and performance (e.g. Flynn *et al.*, 1995). A possible explanation for this inconsistency is that the shopping habits and lifestyle of Chinese consumers are very different from that of western countries. Chinese consumers largely emphasise the economics of their purchase and are cost conscious. As noted previously, when purchasing for home consumption, most Chinese consumers tend to make their purchasing decisions based on the price, and buy whatever is least expensive. Price competition is becoming more and more intense in the Chinese retail market (CCFA, 2010; Yu, 2011). On the other hand, Chinese consumers are becoming more aware of a wide variety of new products. To respond to the unique shopping behaviour, retailers in China are likely to place extreme emphasis on competitive priorities of low cost and flexibility, and then allocate their scarce resources accordingly. Companies are generally forced to make trade-offs between various competitive priorities, "operations focus" (Slack *et al.*, 2010) can help companies make choices regarding which priorities should receive the greatest investment of time and resources (Skinner, 1974; Boyer and Lewis, 2002). In addition, retail chains compete on different bases, even in highly dynamic environments. In this study, more than 70 percent of retailers responding to our questionnaires operate their business in grocery, clothing and footwear and health beauty and pharmacy retailing. The majority of those retailers do not provide home delivery services. Delivery may not be an important concern for them comparing with electrical appliances and furniture retailing. Therefore, it can be noted that retailers in China extremely emphasize on low cost and flexibility strategies, to improve performance outcomes.

6.2 Managerial and theoretical implications

This study makes a contribution to the understanding of operations strategy on two fronts. On a theoretical front, this study fills a gap in the existing operations management literature. As mentioned above, there is very limited work that examines the effects of employee competencies and IT applications on retail operations strategy, particularly in the Chinese context. On a practical front, the findings of this study have a number of managerial implications that could provide valuable insights for retailers to develop operations strategy in a highly competitive environment. First, it is necessary for retail firms to understand the important roles of employee competencies and IT applications in developing operations



strategy and improving performance. Second, employee competencies (such as good team working and high level of motivation) are important competitive operations resources for retailers to pursue low cost, quality, and flexibility strategies. Third, information technology is a critical component of the retail sector. Retailers in China still need to make their best efforts to pursue competitive operations strategy and obtain great benefits from IT applications. Finally, to improve performance, firms need to be flexible and agile, by improving their employee competencies, by introducing retail technology and finding ways to provide innovative goods and services to fulfil customer demand. The implications could also provide insights for companies in other developing countries that have economic conditions similar to those of China.

7. Conclusions

This study has investigated the links between employee competencies, IT applications, operations strategy, and performance for a sample of retail firms in China. In general, our results are in line with the suggestions of the resource-based theory. Our path models have suggested that employee competencies such as good team working and employee motivation play significant roles in helping retailers pursue low cost, quality and flexibility strategies. Retail technology applications help retailers develop a flexibility strategy. Operations strategy (low cost and flexibility) in turn influences business performance.

This study has some limitations. The model developed is not exclusive; future research can explore additional factors that may influence strategies and performance in the retail sector, such as firm size (big versus small retailer), retail characteristics (food versus non-food retail sector), and firm nationality (local versus foreign retailer). Operations strategy in this study was characterized by four familiar competitive priorities of cost, quality, flexibility, and delivery performance. However, the traditional four critical success factors in operations have counterparts in service organisations (Roth and van der Velde, 1991). Future study may identify more foremost critical success factors for service firms. Moreover, future research can explore the unique characteristics of service operations in other service industries (e.g. banking, insurance, tourism, and hospitality sectors) and also confirm the results obtained in this research.

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Appendix. Major questionnaire items

1. General information:
 - Number of employees.
 - Retail sectors.
2. Employee competencies:
 - Responsible leadership.
 - Team working.
 - Highly motivated.
 - Good educational background.
3. IT applications:
 - Barcode technique application.
 - Point-of-sale system application.
 - Electronic data interchange application.
 - Computer and internet in retail operations.
4. Operations strategy:
 - Low cost:
 - reduce overhead costs;
 - reduce inventory level;
 - increase equipment utilization.
 - Quality:
 - provide appropriate specification of goods/services for customers;
 - improve goods/services performance and reliability;
 - make extremely strict goods/services quality control procedures;
 - increase private brands (PBs) sales.
 - Flexibility:
 - change the variety of goods/services in a given time;
 - respond quickly to shift in demand, to increase/decrease operational capacity;
 - change planned delivery dates to meet emergent requirements.
 - Delivery performance:
 - decrease waiting time in line;
 - meet delivery promises;
 - improve after sales service.
5. Business performance:
 - Market share.
 - Sales growth.
 - Profits growth.
 - Return on investment.

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