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## **Determinants of Outsourcing Performance in Container Terminal Operations: A Moderated Mediation Model**

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## **Abstract**

This study empirically examines the determinants of the performance of outsourcing from a container terminal practitioner's perspective. We attempted to examine the effects of container terminal operators' outsourcing management capabilities, outsourcing providers' basic and specific capabilities, communication quality, partnership quality on outsourcing performance. Data is collected from 145 practitioners in container terminal operators at Port of Kaohsiung in Taiwan. A moderated mediation model was developed for data analysis. The research findings showed that firms' outsourcing management capability positively influenced outsourcing providers' basic and specific outsourcing capability, and that outsourcing providers' basic and specific outsourcing capability positively influenced outsourcing performance. Specifically, the results also indicate that communication quality and partnership quality had moderating effects on the indirect effect of outsourcing management capabilities on outsourcing performance through outsourcing providers' basic and specific outsourcing capability. Theoretical and managerial implications from the research findings on outsourcing management for container terminal operators are discussed.

**Key Words:** Container terminal, Outsourcing management capability, communication quality, partnership quality, outsourcing performance

## **1. Introduction**

Container terminals play an important role in international trade and global supply chains (Lu et al., 2016; Vaggelas, 2019; Yang and Yip, 2019). In terms of volume, more than 80 per cent of the global merchandise trade is handled by sea through container terminals at seaports (UNCTAD, 2019). There were 793.26 million TEUs handled in container ports worldwide in 2018 (UNCTAD, 2019). Global container port throughput rose by 4.7% in 2018, decreased from 6.7% in 2017. Nevertheless, the outlook of the

global container market remains challenging, given the heightened uncertainty of trade policy and the impacts of coronavirus spreading out.

Container terminal refers to an area where container cargo is transferred between sea and land by container ships, rails, and trucks (Lu and Kuo, 2016). Notably, many container terminal operators adopt the way of outsourcing in order to achieve their distinct advantages in business. For example, most loading and discharging operations of dedicated container terminals at the Port of Kaohsiung are outsourced to external stevedoring companies (Lu et al., 2016). In addition, there is a number of outsourced workers employed at ports in Indonesia (Devita, 2014). The activities of outsourcing in container terminal operations include stevedoring for cargo loading and discharging, tallying, trucking, repair and maintenance, container yard controlling, gate-house controlling, warehousing, collecting and managing information technology (Lu and Kuo, 2016; Yang, 2015). Outsourcing can be utilized to cope with the demand and uncertainty of an organization and create more benefits for firms in a range of business areas (Harland et al., 2005; Handley, 2012). Thus, the outsourcing performance significantly impacts the efficiency, cost and benefits of container terminal operations.

Outsourcing has been defined as *“the concept of looking for expertise to handle certain business functions outside the existing firm”* (Embleton and Wright, 1998, p.95).

Outsourcing is the procurement of services or products from sources that are external to the organization (Lankford and Parsa, 1999). However, the success of outsourcing has often depended on effective outsourcing management (Lee and Kim, 1999; Romero, 2011), the capabilities of outsourcing providers (Lahiri et al., 2012; Zhu et al., 2017), closer cooperative relationships (Lee and Kim, 1999; Chen et al., 2010; Romero, 2011; Lahiri et al., 2012; Rhodes et al., 2014; Chiu et al., 2015; Barrar and Gervais, 2016), as well as smooth communication (Lu, 2003; Romero, 2011). Specifically, enhancing the

quality of partnership between firms and outsourcing providers is becoming a more important strategy for maximizing competitive advantages (Lu, 2003). A good partnership will have a high level of trust, sharing of benefits and risks, transparent information exchange, and a joint commitment to achieving success (Lee and Kim, 1999; Lee, 2001; Tallman and Chae, 2011). In addition, good communication is critical for stimulating organizations to act, since actions rely on the transfer of information or ideas between organizations (Jacobs et al., 2016). Communication with clear and transparent communication channels is required to enable outsourcing activities to be performed successfully within organizations (Mohr and Spekman, 1994; Romero, 2011).

While many extensive studies have examined the crucial successful factors of outsourcing (Lee and Kim, 1999; Logan, 2000; Embleton and Wright, 1998; Khong, 2005; Han et al., 2008; Rhodes et al., 2014), risk (Harland et al., 2005), customer service management (Khong, 2005), and its relationship with firm capabilities and strategies (Harland et al., 2005; Bustinza et al., 2010a, Handley, 2012), the determinants of outsourcing and its impacts on performance have rarely been studied in the container terminal industry. The container terminal industry has unique characteristics that differentiate it from traditional industries, and therefore make a separate study of its outsourcing indispensable. First, while studies of the outsourcing in traditional industries have focused only on organizational outsourcing management, in container terminal, an outsourcing provider's capabilities is also an issue that can affect outsourcing performance. The determinants of outsourcing performance should be expanded to include not only how outsourcing management capabilities of an organization affect the performance, but also how outsourcing providers' capabilities affect the outsourcing performance. Second, the environment of container terminal is

more complex than traditional industries in terms of its task characteristics, because mutual cooperative relationship and communications are crucial. In this context, strict adherence to formal management and processes can only partially ensure the enhancement of outsourcing performance. In the container terminal industry where uncertainty is high, effective outsourcing performance necessitates accurate communication and cooperative decision making. In uncertain situation, formal management and processes that should assure performance cannot encompass all possible daily works of outsourcing providers.

In this paper, we demonstrate that the quality of communication and partnership with outsourcing providers have an important role in explaining the effects of outsourcing management capability of an organization on outsourcing performance. We aim to contribute to the literature on capabilities and container terminal outsourcing in five ways. First, we propose that improving the outsourcing management of firms will increase the capabilities of outsourcing providers in container terminals. Prior research views outsourcing as a means to increase performance, reduce costs, and improve efficiency by gaining access to specialized resources and capabilities (Weigelt, 2009). Nevertheless, some researchers argue that outsourcing can lead to the depreciation of firm capabilities or diminish collaboration among activities (Bettis et al., 1992; Weigelt, 2009). Weigelt (2009) has found that outsourcing can have negative effects on firm performance. Although outsourcing providers may provide container terminal services, it is not fully guaranteed that such services can meet its customers' requirements. Improving outsourcing management may help to alleviate this problem.

Second, we emphasize that identifying the existing capabilities of outsourcing management and providers, will help to build outsourcing management capabilities for

external providers. Thus, this research contributes to an emerging research stream that attempts to gain a better understanding of outsourcing management capabilities. That firms have unique, valuable, and inimitable capabilities which are theoretically grounded and empirically supported (Barney, 1991; Kuo et al, 2017; Lu, 2007). Whether this holds true with respect to a firm's outsourcing management capabilities, however, remains in question.

Third, this study differs from Zhu et al.'s (2017) research, which investigates how the capabilities of outsourcing providers affect outsourcing performance. Zhu et al. (2017) proposed that a firm's outsourcing management process plays a moderating role in the influence of outsourcing providers' basic and advanced capabilities on outsourcing performance. We examine that a firm's outsourcing management capability will be positively related to outsourcing providers' basic and specific capabilities, which in turn will reinforce the effectiveness of their performance in operations.

Fourth, we also propose that partnership quality and communication quality have a moderating influence on outsourcing performance. Over the past several years, there has been a growing number of research that examines outsourcing management and its influence on performance (Bustinza et al., 2010a; Handley, 2012; Lahiri et al., 2012; Zhu et al., 2017). However, less attention has been paid to the partnership quality and communication quality nor their relationship with outsourcing performance. As various organizations cooperate, they would encounter more communication and partnership problems. We extend past outsourcing research by examining new constructs (i.e., partnership quality and communication quality) to predict outsourcing performance. Finally, we examine partnership quality and communication quality as potential moderators of the relationship between supplier's basic and specific outsourcing

capabilities as well as outsourcing performance. We add to the relevant literature by proposing that good partnership quality and communication quality may increase the positive effects of outsourcing management on outsourcing performance.

## **2. Theoretical model and development of hypotheses**

Drawing on the theory of resource-based view (RBV) (Barney and Arikan, 2001), we propose a moderated mediation model, which jointly examines outsourcing provider's basic and specific outsourcing capabilities as the mediating mechanism, and partnership quality and communication quality as the moderators of the relationships between outsourcing provider's outsourcing capability, and outsourcing performance (see Figure 1).

**<Insert Figure 1 about here>**

### ***2.1 Resource-based view***

The resource-based view (RBV), which looks at their internal abilities of firms as resources of sustainable competitive advantage, is widely used to explain why some firms perform better than others (Nath et al., 2010; Talaja, 2012). Amit and Schoemaker (1993, p.35) define resources as “*stocks of available factors that are owned or controlled by the firm.*” A resource is composed of tangible components, such as financial and physical assets, equipment, land, and buildings; and of intangible components, which include human resources, client trust, the reputation of the firm, and know-how (Nath et al., 2010). Capabilities refer to the abilities of a firm to employ their resources so as to coordinate functional activities and enable the firm to attain desired objectives (Yang, 2015). Resources and capabilities include anything that can create values for a firm; particularly valuable are those rare, inimitable, and non-substitutable (Barney, 1991; Ramanathan et al., 2016). Firms can adopt the RBV to strengthen their

capabilities by assessing their available resources and applying organizational processes to perform tasks or activities (Gavronski et al., 2011). Since the RBV is useful in identifying organizational capabilities, it is applicable to outsourcing management, where it can help to explain the relationship between the outsourcing management capability of a firm and performance within the organization (Handley, 2012; McIvor, 2009).

## ***2.2 Outsourcing management capability***

Outsourcing relies on outside capability, and it usually occurs when one aspect or section of an organizational function is subcontracted to an outside supplier who has the ability to accept the firm's business. It includes subcontracting, joint venturing, project management, and strategic partnership (Maley et al., 2015). In the process of restructuring, organizations often need to assess whether they have achieved their expected goals by reviewing their decisions and possibly making new decisions to carry out their outsourcing activities (Žitkienė and Blusytė, 2015). Outsourcing management capability is crucial to the success of outsourcing activities.

According to RBV theory, capabilities can be defined as “*complex bundles of skills and accumulated knowledge, exercised through organizational processes, which enable firms to coordinate activities and make use of their assets*” (Day, 1994:38). Capability is the ability to make use of resources to perform certain activities or tasks (Hafeez et al., 2002). In this study, outsourcing provider's capabilities are divided into two different categories: basic outsourcing and specific outsourcing. Based on the resource-based view, the study maintains that a container terminal operator with a high level of ability to utilize and deploy the capabilities of outsourcing providers to satisfy customers' service needs will achieve superior outsourcing performance.



Outsourcing management capability involves the integration of external resources provided by various vendors and the use of specific strategic applications to achieve organizational goals (Bharadwaj et al., 2010; Lei and Hitt, 1995). In this study, outsourcing management capability is defined as an organization's ability to manage, systematically process, and evaluate the skills, knowledge, technology, services, and manpower of an external company to employ these assets for a particular function and for an agreed-upon price and period (Harland et al. 2005). External outsourcing is conducted to perform certain activities so that firms can concentrate on their own core competencies (Bharadwaj et al., 2010).

### ***2.3 The impact of outsourcing management capability on outsourcing providers' capabilities***

Outsourcing management capability is crucial within an organization, since it affects the performance of a firm (May, 1998). As mentioned earlier, effective outsourcing management will assist to identify and foster long-term relations with external suppliers, generate a mutually beneficial outcome and performance (Han et al., 2008), and cut the cord with those suppliers that do not perform. Zhu et al. (2017) indicate that the outsourcing management process includes a formal process to select third party service providers (3PL), the ability to evaluate the logistics of outsourcing, management of outsourcing contracts with 3PL, and a systematic process to control 3PL. Organizations need to review their outsourcing decisions and take correct approaches to carry out their outsourcing activities (Žitkienė and Blusytė, 2015). A container terminal operator will conduct outsourcing management by selecting outsourcing providers, systematically processing, managing and controlling outsourcing providers, and evaluating their performance with respect to organizational goals.

The capabilities of outsourcing providers in container terminal operations can be categorized into two groups: basic outsourcing and specific outsourcing. Basic outsourcing capability refers to low-level or basic outsourcing activities, which firms provide. The focus of basic outsourcing is efficiency (Liu et al., 2015). Outsourcing providers need to adjust to the client's specific requirements, and provide modular processes alongside standard operations to reach economies of scale (Halldórsson and Skjøtt-Larsen, 2004). In container terminal operations, basic outsourcing usually includes a standard set of activities provided by outsourcing providers. These activities may include ship stowage planning and control, gate operation, cargo loading and unloading, consolidation, equipment repair and maintenance, and so on (Kim et al., 2013; Liu et al., 2015; Lu and Wang, 2016; Wee et al., 2010).

By contrast, specific outsourcing refers to a high level of professional outsourcing (Liu et al., 2015), such as responding well to unexpected changes in demand, keeping costs down, supplying better human resources, managing a warehouse, and designing work processes (Wee et al., 2010; Zhu et al., 2017). Whereas efficiency and flexibility are the primary concerns of basic outsourcing, the major consideration in specific outsourcing is the ability to enhance responsiveness to changes in the environment, while reducing operational problems. In particular, outsourcing providers require advanced knowledge, experience and integrative skills to achieve their goals (Halldórsson and Skjøtt-Larsen, 2004).

Outsourcing management can be viewed as a unique firm capability (Hall, 1992). The criticality of this capability lies in the fact that the level of involvement placed upon outsourcing by senior management determines the relative allocation and management of outsourcing, and influences how outsourcing providers perform to satisfy their customer requirements (Novack et al., 1996). Zhu et al. (2017) has proposed

interactions and moderating effects between the outsourcing management process, which includes basic and advanced outsourcing, and outsourcing performance. However, if firms effectively and continuously manage outsourcing providers' activities, providers will provide better services in order to meet customers' requirements. Chen et al. (2010) have stated that the involvement of a firm's top management is a prerequisite to enhance supply chain collaboration between partners. When top management understands outsourcing activities and shares information with outsourcing providers, the capabilities of outsourcing providers increase. Thus, this study argues that a firm's outsourcing management capability is an antecedent instead of a moderator of basic and specific outsourcing capabilities. Based on RBV, we therefore propose the following:

Hypothesis 1: Container terminal operators' outsourcing management capabilities positively influence outsourcing providers' basic operational capabilities.

Hypothesis 2: Container terminal operators' outsourcing management capabilities positively influence outsourcing providers' specific operational capabilities.

#### ***2.4 The impact of outsourcing providers' capabilities on outsourcing performance***

A majority of previous studies on outsourcing has confirmed its importance in achieving high performance (Lahiri et al., 2012; Narasimhan et al., 2010; Rhodes et al., 2014; Teo and Bhattacharjee, 2014; Zhu et al., 2017). More specifically, if a firm accomplishes valuable, rare, inimitable, and non-substitutable (VRIN) resources and capabilities, it will achieve sustainable and competitive advantages as well as superior performance (Barney, 1991; Talaja, 2012). Through outsourcing, firms can decrease their capital investment in physical assets, manpower, and equipment. Lahiri et al. (2012) investigated the influence of outsourcing providers' internal and relational resources and capabilities on performance in India. The results indicate that the

selection of proper outsourcing providers can lead to better economic performance. Zhu et al. (2017) evaluated the effects of basic outsourcing and advanced outsourcing on logistics' outsourcing performance in China. Basic outsourcing was found to have a direct influence on outsourcing performance in the logistics industry. It follows that a high level of capability among outsourcing providers might also improve the outcome of specific outsourcing. Accordingly, this research hypothesizes the following:

Hypothesis 3: The basic capabilities of outsourcing providers positively influence outsourcing performance in container terminal operations.

Hypothesis 4: The specific capabilities of outsourcing providers positively influence outsourcing performance in container terminal operations.

### ***2.5 The moderating effect of partnership quality***

Partnership refers to an inter-organizational relationship to accomplish the shared goals of the participants (Lee, 2001). A partnering relationship can be thought as a relationship between clients and vendors formed in order to achieve mutual goals (Lee, 2001). Collaborative participation allows outsourcing vendors to build mutual specifications of operational and cooperative effort; thus, partnership quality (e.g. trust and commitment) plays a significant role in enhancing the sustainability of operational outcomes (Han et al., 2008). Partnership quality can be demonstrated by how well the result of a partnership matches the partnership's expectations (Lee and Kim, 1999, p.34). Kim et al. (2013) have suggested that, for a good partnership to exist, the parties should share mutual beliefs, be aware of the expectations regarding their responsibilities, and know their respective obligations in outsourcing relationships.

While partnership quality is built on shared norms, cooperation, and mutual belief, it also includes the consideration of short-term and long-term stability, plans and goals

(Handley, 2012). Managing good relationships between the client and vendor is essential for successful outsourcing (May, 1998). As mentioned earlier, Lahiri et al. (2012) found that partnership quality is a valuable relational resource that allows suppliers to gain insight into the nature of their cooperative relationship with clients. A close partnering relationship will strengthen the influence of a firm's outsourcing management on outsourcing performance (Rhodes et al., 2014).

In order to provide good quality services for container carriers, terminal operators seek to develop close partnerships with outsourcing providers. Good partnership quality reflects a high degree of trust and commitment between clients and suppliers and will reinforce the influence of basic and specific outsourcing capability on performance (Liu et al., 2015). Therefore, this study hypothesizes the following:

Hypothesis 5: Partnership quality strengthens the positive influence of basic outsourcing capability on outsourcing performance in container terminal operations.

Hypothesis 6: Partnership quality strengthens the positive influence of specific outsourcing capability on outsourcing performance in container terminal operations.

### ***2.6 The moderating effect of communication quality***

Communication is the social act of transmitting messages to others and generating comprehension in a meaningful way (Duncan and Moriarty, 1998). The quality of communication is defined as "*the degree to which the content of the communication is transferred among the virtual team*" (Chang et al., 2011, p.309). Conveying information from one organization to another requires a high level of communication skills. In teams with good communication quality, the members convey information in a timely manner, understand organizational tasks in detail, feel confident in their ability to resolve complex problems, and utilize different approaches to perform investigations. Effective

communication skills also encourage on-site employees to experiment on the latest ideas (Yang et al., 2016). Schoop et al. (2010) contend that an excellent quality of communication includes three styles: one of positivity; one of intimacy, and one of control. A positive management style leads, through words and actions, to cheerfulness, support, and agreeability. Intimacy occurs when communicators share, disclose, and express their thoughts and feelings with one another. Control is the ability to collectively manage communication through meta-communication and coherent conversation. It involves transparency and shared intent.

Specific outsourcing capabilities in container terminal operations usually involve collaborative design, collaborative planning, assistance to improve work quality, the provision of good human-resources management and warehouse management, and the improvement and optimization of work processes (Dulebenets, 2017; Wee et al. 2010; Zhu et al., 2017). A high quality of communication, which is timely, accurate, credible, and effective, can help outsourcing providers adhere to rules and procedures and follow clearly designated lines of authority. Following this line of reasoning, this study proposes that the relationship between outsourcing providers' capabilities and outsourcing performance in container terminal operations is strengthened by a high quality of communication. The following hypotheses state this:

Hypothesis 7: Communication quality strengthens the positive influence of basic outsourcing capability on outsourcing performance in container terminal operations.

Hypothesis 8: Communication quality strengthens the positive influence of specific outsourcing capability on outsourcing performance in container terminal operations.

### **3. Methodology**

### ***3.1 Sampling***

This study empirically evaluates the determinants of outsourcing performance by analysing the perception of container terminal operators at the Port of Kaohsiung in Taiwan. The Port of Kaohsiung was ranked the 15th largest global container port with 10.4 million TEUs in 2018 (UNCTAD, 2019). According to a report from the Ministry of Transportation and Communications (2019) in Taiwan, Kaohsiung port accounted for 68.17% of Taiwan's container throughput in 2018. In this study, the selection of participants was based on information obtained from the Taiwan International Ports Corporation Ltd. and from directors or those who held higher positions at the Association of Container Freight Station at Kaohsiung port. We focused the sampling on firms from six major container terminals at the Port of Kaohsiung: American President Line (a part of the CMA CGM group), Evergreen, HMM, OOCL, Wan-Hai, and Yang Ming Line.

In order to increase the response rate, we phoned the directors of the Human Resources Departments at these six container terminals to obtain permission to distribute questionnaires. We explained that the information gathered in the survey would be treated in the strictest confidentiality. No individual or corporate information would be identifiable from the survey form. In March 2018, a total of 300 questionnaires was sent to participants who held various positions in terminal operations and outsourcing activities. We asked the participants to return the questionnaires in the freepost envelopes provided. The initial survey received 95 usable questionnaires. A follow-up survey was sent two weeks after the initial survey. Additional 50 usable responses were obtained. Thus, the overall response rate for this study was 48%.

In terms of respondents' job titles, approximately 40% of the respondents held the position of manager or higher. Given that a large number of respondents had higher

positions, it is clear that the respondents had enough work experience to respond adequately to the questions. Regarding their length of work experience in the terminal industry, 6.9% of respondents had less than 5 years, 33.8% had 6-10 years, 41.4% had 11-20 years, and 18% had 21 years or above. Overall, 59.4% of respondents had more than 10 years of experience working in terminals.

With regard to the number of employee, 10.3% of responding companies had less than 50 employees, 33.1% had 51-100 employees, 38.6% had 101-500 employees, and 18% had 501-1,000 or more employees. This suggests that the majority of respondents worked in a large size terminal (with more than 100 employees) with outsourcing that had been fully developed. The profiles of the respondents are summarized in Table 1.

**<Insert Table 1 about here>**

### ***3.2 Non-response bias***

A non-response bias test was conducted in this research (Armstrong and Overton, 1997). Respondents were divided into two groups based on the first and second mailings. A t-test was used to the perceived differences of 31 measurement items between these two groups. Only three measurements showed statistically significant differences ( $p < 0.05$ ). Furthermore, we tested and found that there were no significant differences in measurements between the groups in terms of job titles ( $p = 0.784$ ), terminal work experience ( $p = 0.973$ ), and the number of employees ( $p = 0.299$ ). Thus, the non-response bias was not concerned in this research.

### ***3.3 Common method variance***

Due to the use of self-reported data in this study, we needed to consider the possibility of common method variance (CMV) bias, which would affect the validity of the research outcomes. To minimize CMV bias, this study applied two tests. First, Harman's single-factor test was used to examine the existence of covariance between



the predictor and criterion variables (Perols et al., 2013). Factor accounting was found to be 37.03% (less than 50%); thus, no single factor emerged and no covariance of independent or mediating variables was suggested. Second, this study used confirmatory factor analysis (CFA) to test the fit indices. The single-factor model revealed that 31 measurement items had a significantly poor fit ( $\chi^2(405) = 1369.840$ , NFI = 0.527, CFI = 0.608, AGFI = 0.487, and  $p < 0.000$ ), indicating that CMV was not a problem. CMV bias is principally caused by interactions of variables and an underestimation of the importance of interaction coefficients (Narasimhan et al., 2013). Based on the results of the test, we evidenced the study to be free of CMV.

### ***3.4 Measurements***

A questionnaire survey approach was adopted based on the recommendation of Iacobucci and Churchill (2015). The respondents rated their level of agreement with 31 measurement items on a five-point Likert-type scale, where 1 represents “strongly disagree” and 5 “strongly agree.” Due to the need for confidentiality, it was very difficult to obtain actual performance figures. Accordingly, a perceptual measure was utilized in this study to accurately measure the outsourcing performance of container terminal operations. To adapt the measurement instruments, this study employed related items found in the literature and interviewed shipping experts to examine outsourcing management. The extent of respondents’ agreement with management scales is reflected in Appendix A.

The dependent variable, *outsourcing performance*, is a multidimensional measure of outsourcing effectiveness. Effectiveness-based performance measurements are appropriate because of this study’s focus on the operations of terminal outsourcing. The five evaluating measurements were adapted from Maley et al. (2015), and Suweero et al. (2017). Maley et al. (2015) stated that outsourcing performance can be improved by

cash flow, operational cost, and reduced capital. Conserving management time, reducing workload, improving management control, and reducing capital were the indices for outsourcing performance used by Suweero et al. (2017).

Outsourcing management capability (OM) represents the level of managerial procedures for terminal outsourcing. The seven items used in this study were adapted from previous research by Han et al. (2008), Handley (2012), Khong (2005), Kim et al. (2013), Lahiri et al. (2012), Narasimhan et al. (2010), and Suweero et al. (2017). The items included capabilities of outsourcing partners (Han et al., 2008; Khong, 2005); effectiveness of information management (Kim et al., 2013; Lahiri et al., 2012); understanding of core values (Handley, 2012); systematic processes to manage outsourcing contracts (Han et al., 2008; Narasimhan et al., 2010); systematic processes to control outsourcing partners (Han et al., 2008; Suweero et al., 2017); efficient management of human resources (Lahiri et al., 2012); and full evaluations of outsourcing projects (Handley, 2012).

Communication quality (CQ) is the nature of information flow between different organizations. The five measurement items adopted in this study included timely communication; accurate communication (Han et al., 2008; Narasimhan et al., 2010); complete communication (Han et al., 2008; Rhodes et al., 2014); credible communication (Han et al., 2008); and effective communication (Khong, 2005).

Partnership quality (PQ) refers to the level of cooperation between different organizations. The four main measurement items used in this study were the following: mutual decision-making (Han et al., 2008; Lahiri et al., 2012); mutual resolution of problems (Han et al., 2008; Kim et al., 2013); long-term commitment to the relationship (Handley, 2012; Kim et al., 2013; Rhodes et al., 2014); and information exchange (Kim et al., 2013).

Basic outsourcing capability (BT) refers to simple or general operations that often need extensive manpower to perform. The five measurement items were primarily an adaptation from terminal outsourcing experts, including Liu et al. (2015), Wee et al. (2010), and Kim et al. (2013). These items included terminal container handling, information integration and maintenance, ship-stowage planning and control, gate operations, ship loading and unloading operations, and general cargo handling.

Specific outsourcing capability (ST) is more extensive than basic outsourcing in that it requires more skills and knowledge pertaining to container shipping operations. Vendors with ST need to provide professional outsourcing services and complete further training by container terminal operators. The six measurement items of ST in this study were drawn from previous studies, and included the ability to give fast responses to unexpected changes, keep costs down, maintain a good supply of manpower (Wee et al., 2010), manage warehouses, and improve work processes (Zhu et al., 2017).

The decision to outsource is an important strategy within an organization. Respondents who held high positions within their companies, had many years of work experience, and had possible tenure were more likely to be involved in the development of outsourcing strategies in their businesses. These respondents were also more likely to have extensive practical experience involving outsourcing. Thus, we considered respondents' job titles, years of work experience, and tenure in their current companies as control variables in the study model.

### ***3.5 Research methods***

This study explores the effects of outsourcing management capability, communication quality, partnership quality, basic outsourcing capability, specific outsourcing

capability, and outsourcing performance in container terminal operations. The four-step analytical process of our research methods are illustrated in Figure 2. First, we used an exploratory factor analysis (EFA) to identify the critical constructs from numerous measures (Hair et al., 2018). Subsequently, a confirmatory factor analysis (CFA) was employed to test how well the measured variables represent the constructs (Hair et al., 2018). CFA was also used to test the reliability and validity of the number of factors and the fitness of the model. A hierarchical regression analysis, structural equation modelling (SEM) and PROCESS approach (Hayes, 2017) were conducted to examine the relationships between the variables of communication quality, partnership quality, basic outsourcing capability, and specific outsourcing capability, as well as the test of research hypotheses (Lomax and Hahs-Vaughn, 2013). Windows statistical packages of SPSS 25.0, AMOS 25.0 (Blunch, 2013), and PROCESS 3.0 (Hayes, 2017) were used in the analyses.

**<Insert Figure 2 about here>**

## **4. Results of empirical analyses**

### ***4.1 Level of analysis***

The analysis was conducted at the unit level because the determinants of outsourcing performance were gathered from six different container terminals. An analysis at the unit level requires aggregation of the individual questionnaire responses to the unit level. Therefore, for each container terminal we calculated the mean scores of outsourcing management capability, communication quality, partnership quality, basic outsourcing capability, and specific outsourcing capability. We tested the homogeneity of responses by conducting a one-way analysis of variance (ANVOA) with respect to the six different dimensions. The results indicated that the differences between these six

container terminals were insignificant, at the 0.05 level of significance (see Appendix B), suggesting that even though participants had different positions in the container terminal industry, as managers, supervisors or general employees, within each container terminal they had homogeneous perceptions of the six different dimensions.

#### ***4.2 Exploratory factor analysis***

The purpose of using EFA is to clarify the scales and assure reliability with eigenvalues greater than 1.0. by utilizing a separate data set to extract the initial measurement model. Thus, EFA with the VARIMAX rotation test was conducted to evaluate the model of 31 measurement items. Barlett's Test of Sphericity (2761.15,  $p < 0.000$ ), and the Kaiser-Meyer-Olkin (KMO) (0.9), confirmed their suitability for further analysis (Hair et al., 2018). The results of EFA are shown in Table 2.

**<Insert Table 2 about here>**

Cronbach's alpha and corrected item-total correlation coefficients (CITC) were assessed to test the reliability of questionnaire items and the internal consistency of constructs. To prove reliability, the value of CITC is required to be higher than 0.3 and the value of Cronbach's alpha is required to be higher than 0.7 (see Table 3).

**<Insert Table 3 about here>**

#### ***4.3 Confirmatory factor analysis***

CFA was employed to validate the survey scales. The validity of the model was evaluated for uni-dimensionality, content validity, and structural reliability. Relationships were established among six latent variables, including outsourcing management capability, communication quality, partnership quality, basic outsourcing capability, specific outsourcing capability, and outsourcing performance. The authors used the CFA approach to test each construct individually. Seven observed measures

(OM1 to OM7) were situated on outsourcing management capability; five (CQ1 to CQ5) on communication quality; four (PQ1 to PQ4) on partnership quality; five (BT1 to BT5) on basic outsourcing capability; five (ST1 to ST5) on specific outsourcing capability; and five (OP1 to OP5) on outsourcing performance. The researchers proceeded with the CFA approach, and then assessed the constructs. The CFA test exhibited a good model fit after being appropriately revised to accommodate the survey data ( $\chi^2/f = 1.12$ ; Goodness of Fit (GFI) = 0.834; Adjusted Goodness of Fit (AGFI) = 0.803; Comparative Fit Index (CFI) = 0.971; Incremental Fit Index (IFI) = 0.972; Root Mean Square Residual (RMR) = 0.041; Root Mean Square Error of Approximation (RMSEA) = 0.035). A satisfactory level of holistic model fit was established via CFA (Hair et al., 2018).

#### ***4.4 Convergent validity and item reliability***

Four tests were conducted to demonstrate convergent validity in this study. First, critical ratio (CR) scales were used to evaluate the statistical significance of the measurement items. For this test, CR values higher than 1.96 or smaller than -1.96 denote validity at a 0.05 significance level (Hair et al., 2018). As shown in Table 4 below, the CR values of the measurement items were significant with uni-dimensionality. Second, all items were located on their respective constructs with a significance level of  $p < 0.01$ , and an  $R^2$  value below 0.3. Third, all constructs examined had composite reliabilities of 0.81 or above, as shown in Table 5 below. Composite reliability should reach at least 0.7 (Hair et al., 2018), and high composite reliability indicated internal consistency. Fourth, all AVE values of this study ranged from 0.50 to 0.65, as also shown in Table 5. The average variance extracted (AVE) is the average squared wholly standardized factor of loading or average communality, and an AVE value higher than 0.5 is a rule of thumb for sufficient convergence. Finally, this study also used AVE to evaluate the

discriminant validity of the constructs. When the square root of AVE for a particular construct is higher than all other cross-correlations, the independence of the constructs is established. All the items were retained in our model, as they demonstrated adequate evidence of convergent and discriminant validity.

**<Insert Table 4 about here>**

**<Insert Table 5 about here>**

#### ***4.5 Hypothesis testing***

A hierarchical regression analysis of the moderating effects was applied to test the research hypotheses (Jaccard et al., 1990). As shown in Table 6, except for Model 3, the regression results of the *F*-values of nine regression models were significant ( $p < 0.01$ ). First, we put control variables into the regression model, including job title, length of business operations, and terminal work experiences. Results indicated that, in Model 3, Model 4, and Model 5, the influence of control variables on outsourcing performance was not significant. Second, the effects of outsourcing management capability on basic and specific outsourcing capabilities were tested in Model 1 and Model 2. Results indicated that outsourcing management capability had a positive influence on basic outsourcing capability ( $\beta = 0.476, p < 0.01$ ) and specific outsourcing capability ( $\beta = 0.512, p < 0.01$ ). Thus, Hypotheses 1 and 2 were supported. The dependent variable of outsourcing performance and independent variables of basic outsourcing capability and specific outsourcing capability were analysed in Model 4 and Model 5. The results revealed that basic outsourcing capability ( $\beta = 0.262, p < 0.05$ ) and specific outsourcing capability ( $\beta = 0.288, p < 0.01$ ) were positively associated with outsourcing performance. Thus, Hypotheses 3 and 4 were supported.

**<Insert Table 6 about here>**

Third, we tested the interactions of communication quality and partnership quality in the regression models of Models 6 to 9. If the interactions were significant, this would prove that communication quality and partnership quality had a moderating effect on the relationships between basic and specific outsourcing capabilities, on the one hand, and outsourcing performance on the other. In Models 6 and 7, communication quality ( $\beta = 0.599, p < 0.01$ ) and partnership quality ( $\beta = 0.371, p < 0.05$ ) positively moderated the relationship between basic outsourcing capability and outsourcing performance. The moderating effects of communication quality ( $\beta = 0.643, p < 0.05$ ) and partnership quality ( $\beta = 0.404, p < 0.05$ ) examined in Models 8 and 9 had a significant impact on specific outsourcing capability and outsourcing performance. Figures 3 to 6 illustrate a positive relationship between basic and specific outsourcing capabilities with outsourcing performance when the quality of communication or partnership was high rather than low. Thus, hypotheses 5, 6, 7, and 8 were supported. The relationship between communication quality/partnership quality and outsourcing performance was tested in Model 10 and Model 11 with positive and significant results. Thus, the moderating effects proposed by hypotheses 5, 6, 7, and 8 were supported.

**<Insert Figure 3 about here>**

**<Insert Figure 4 about here>**

**<Insert Figure 5 about here>**

**<Insert Figure 6 about here>**

In addition, we conducted a simple slopes test using PROCESS (Hayes, 2017). Table 7 displays the results. The t-values of moderation effects were all significant ( $p < 0.05$ ), indicating that CQ and PQ had a significant impact on the relationships between



basic/specific outsourcing capability and outsourcing performance. Hence, hypotheses 7 and 8 were further supported.

**<Insert Table 7 about here>**

In addition, we adopted AMOS and PROCESS statistical analyses (Hayes, 2017) based on the nonparametric bootstrapping processes to test the mediating effects. These two programs invoked bootstrapping to check the statistical significance of the indirect effects in mediation models with bias corrected confidence intervals. Table 8 shows that all the indirect effects of outsourcing management capability on outsourcing performance were significant. For example, the lower level of confidence (LLCI) and upper level of confidence (ULCI) for basic outsourcing capability (BT) is between 0.05 and 0.23 in PROCESS, and between 0.08 and 0.43 in SEM with AMOS. The confidence interval of these indirect effects did not contain a zero, which supports the occurrence of mediating effects of BT and ST on the relationships between outsourcing management capability and outsourcing performance. Figure 7 also illustrates the results of SEM ( $\chi^2 = 239.158$ , GFI = 0.876, AGFI = 0.847, CFI = 0.978, IFI = 0.978, RMR = 0.042, RMSEA = 0.035), which point to an indirect effect of outsourcing management capability on outsourcing performance via BT and ST.

**<Insert Table 8 about here>**

**<Insert Figure 7 about here>**

## **5. Discussion and implications**

Drawing on the RBV, this study empirically developed a conceptual model to explain the relationships among outsourcing management capability, basic outsourcing capability, specific outsourcing capability, communication quality, partnership quality, and outsourcing performance in container terminal operations. The main findings of this study are that outsourcing management capability has a direct impact on

outsourcing providers' basic and specific outsourcing capabilities, which in turn have a significant impact on outsourcing performance. We conclude that outsourcing management capability is the driver for terminal outsourcing performance. Additionally, our study findings indicate that communication quality and partnership quality moderate the relationships between basic and specific outsourcing capabilities on the one hand, and outsourcing performance on the other. These results indicate that container terminals need to pay attention to communication and the development of partnerships with outsourcing providers in order to enhance their outsourcing performance.

### ***5.1 Contributions***

This study contributes to the literature in port and maritime studies by examining the linkages among outsourcing management capabilities, outsourcing providers' capabilities, communication quality, partnership quality, and outsourcing performance. First, this study uses the RBV to explain the determinants of outsourcing performance. While past studies (Gordon et al., 2005; Lu et al., 2016) fail to examine the factors affecting outsourcing performance in container terminal operations, this study provides a comprehensive approach to predict outsourcing performance.

Second, this study provides evidence for the direct impact of a firm's outsourcing management capability on outsourcing providers' basic and specific capabilities, which in turn affect outsourcing performance. This finding differs from that of Zhu et al. (2017), who propose that OMP (outsourcing management process) moderates the relationship between outsourcing capabilities and outsourcing performance. The current study provides evidence for a direct effect of outsourcing management on the capabilities of outsourcing providers in the port and transportation industries.

Third, outsourcing providers' basic and specific outsourcing capabilities were found to have a positive relationship with outsourcing performance, which is consistent with Zhu et al.'s (2017) study. We found that outsourcing providers' specific outsourcing capability had a greater effect on outsourcing performance than their basic outsourcing capability. We conclude that container terminal operators need to be concerned with the specific outsourcing capabilities of their providers in order to enhance outsourcing performance.

Fourth, many studies (Bustinza et al., 2010b; Plugge and Bouwman, 2013; Sinkovics and Roath, 2004; Weight, 2009) have looked at the effect of capabilities on performance in the logistics outsourcing context. This study contributed to the new constructs that were added with a deeper discussion on how the conceptual relationships are better understood. We found that communication quality and partnership quality strengthen the effects of basic and specific outsourcing capabilities on outsourcing performance in container terminal operations. The results revealed that higher partnership quality can strengthen the relationship between outsourcing activities and performance, giving evidence that this relationship is moderated by partnership quality. While extant RBV studies and outsourcing management research have usually considered the supply chain or manufacturing chain as the unit of evaluation when examining the effects of communication quality, partnership quality, and outsourcing capabilities on outsourcing performance, this study contributes to the literature by exploring the contributors to outsourcing performance in the context of container terminal operations, which may provide unique findings.

Finally, this study used PROCESS and SEM with bootstrap techniques to examine the moderating and mediating effects of dependent and independent variables. These two

techniques allowed us to examine these effects with a greater degree of precision, thereby lending support to our findings.

### ***5.2 Managerial implications***

This study provides several practical implications for container terminal operators that execute or manage outsourcing activities. First, the findings indicate that outsourcing management capabilities have indirect effects on outsourcing performance; therefore, it is important to develop and execute these capabilities. Outsourcing management capability refers to complex bundles of systematic processing and evaluation, exercised through an organizational structure, which are used in managing outsourcing providers. Management capabilities enable firms to coordinate activities and make use of outsourcing providers' capabilities to accomplish organizational goals. If container terminal operators have formalized and systematic processes or skills to manage outsourcing providers, they can generate high outsourcing performance.

Second, outsourcing management capability was found to have a positive effect on outsourcing providers' capabilities. A firm's outsourcing management capability affects not only the basic outsourcing capability of providers, but also their specific outsourcing capability. We suggest that container terminal operators execute systematic processing and management to assess providers' ship and yard operations, human capital, warehouse management, and the design and plan of work processes to ensure the skills and capabilities of providers are adequate.

Third, the results of the research indicate that specific outsourcing capability positively affects outsourcing performance. Through interviewing container terminal practitioners, this study found that specific outsourcing capability may be influenced by several factors and requires a high level of working skills. We suggest outsourcing providers to

continue developing qualified personnel to enhance outsourcing capabilities through the education of marketing analysis and forecasting to respond to the unexpected changes in demand, professional training of human capital, enhancement of warehouse management and the design and optimization of work processes to reduce the operations costs.

Finally, this study found that communication quality and partnership quality strengthen the influence of outsourcing capabilities on outsourcing performance. We suggest that container terminal managers can endeavour to create technology devices with timely platform for outsourcing providers' interactions and emergency responses. Encouraging outsourcing providers to adopt online communication channel (such as email, social media and live chat) will help container terminal managers to spend less time on phones, and focus more on dealing with customer service requirements and organizational long-term strategies instead. These online communication tools should be accurate, timely, effective, and credible. Through the development of online communication platform, it can effectively integrate and handle complex information to strengthen the communication quality with outsourcing providers. In addition, this research suggests container terminal operators to establish an ongoing partnership with outsourcing providers. This involves a long-term commitment as well as a mutual sharing of information and decision-making for business objectives.

### ***5.3 Limitations and future research***

Although this study provides important findings for container terminal operations, there are limitations. The first limitation of this study pertains to the sample. Although this research gathered information from about 40% of the population in an international port, the sample reflected the specific behavior of people at one specific location; therefore,

the generalizability of the findings is constrained with respect to firms in other industries of outsource services, such as terminal operations at airports, airlines and shipping companies, health care facilities, the retail industry, hotels, or the logistics industry. Second, because the data was gathered at one time, the findings may not be as robust as those collected from longitudinal method. Future research might achieve a more productive use of test data in a longer time-series model. Third, this study was restricted to the effects on outsourcing performance of outsourcing management capabilities, outsourcing providers' capabilities, partnership quality and communication quality. It would be interesting for future studies to consider the influence of corporate culture, values, and beliefs, particularly as these pertain to people who interact at different ports. Finally, outsourcing management capability pertains to how operation management is used. It is not confined to the relationship between communication and partnership. Future research could study how other capabilities, such as information-technology capability (Mishra et al., 2013), operational risk (Nguyen and Wang, 2018), external collaboration (Lu et al., 2016), joint learning capability (Bryan et al., 2018), organizational motivation (Pang and Lu, 2018), and process integration (Perols et al., 2013), affect outsourcing management capability and performance in the market.

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## Appendix A

### Measurement scales

Code	Items	Mean	S.D.
<b>OM</b>	<b>Outsourcing management capability</b>		
OM1	My company has formalized processes to select the right outsourcing partners.	3.76	0.95
OM2	My company manages information systems efficiently.	3.72	0.87
OM3	My company has systematic processes to manage outsourcing contracts.	3.90	0.77
OM4	My company understands its organization's core and non-core capabilities very well.	3.94	0.78
OM5	My company has systematic processes to control outsourcing partners.	3.79	0.84
OM6	My company efficiently manages internal and outsourced human resources.	3.91	0.84
OM7	My company fully evaluates outsourcing projects before taking outsourcing decisions.	4.05	0.83
<b>CQ</b>	<b>Communication</b>		
CQ1	The communication between my company and its outsourcing providers is timely.	4.14	0.77
CQ2	The communication between my company and its outsourcing providers is accurate.	4.02	0.73
CQ3	The communication between my company and its outsourcing providers is complete.	4.03	0.77
CQ4	The communication between my company and its outsourcing providers is credible.	4.00	0.83
CQ5	The communication between my company and its outsourcing providers is effective.	3.74	0.96
<b>PQ</b>	<b>Partnership quality</b>		
PQ1	My company and its outsourcing providers make joint decisions to meet business objectives.	3.90	0.79
PQ2	My company and its outsourcing providers solve most problems together.	4.01	0.73
PQ3	My company and its outsourcing providers have a long-term commitment to their relationship.	4.05	0.76
PQ4	My company and its outsourcing providers exchange information that helps the establishment of business planning.	3.99	0.77
<b>BT</b>	<b>Basic outsourcing</b>		
BT1	Outsourcing providers provide good information, integration and maintenance service.	3.61	0.86
BT2	Outsourcing providers provide good ship stowage planning and controlling service.	3.80	0.97
BT3	Outsourcing providers provide good gate operation service.	3.88	0.91
BT4	Outsourcing providers provide good ship loading and unloading service.	3.03	0.75
BT5	Outsourcing providers provide good general cargo handling service.	3.99	0.84
<b>ST</b>	<b>Specific outsourcing</b>		
ST1	Outsourcing providers have the ability to respond well to unexpected changes in demand.	3.63	0.97
ST2	Outsourcing provides help to keep costs down.	3.64	0.98
ST3	Outsourcing providers help to supply good human resources.	3.70	0.77
ST4	Outsourcing providers help with warehouse management.	3.89	0.59
ST5	Outsourcing providers help with the design and optimization of work processes.	3.61	0.84
<b>OP</b>	<b>Outsourcing performance</b>		
OP1	My company reduces workload through outsourcing.	4.04	0.99
OP2	My company improves the problems of management control through outsourcing.	3.13	0.97
OP3	My company reduces capital expenditure through outsourcing.	3.90	0.99
OP4	My company improves cash flow through outsourcing.	3.95	0.84
OP5	My company reduces operational costs through outsourcing.	4.14	0.89

## Appendix B

### A unit analysis by one-way ANOVA

Constructs	Six container terminals						F-value	P-value
	A	B	C	D	E	F		
OM	4.08	3.74	3.83	3.88	3.94	3.92	0.62	0.69
CQ	4.12	3.97	3.94	4.03	4.14	3.70	0.77	0.57
PQ	4.21	3.94	3.86	4.07	4.09	3.85	1.10	0.36
BT	3.92	3.83	3.81	3.80	3.88	3.98	0.17	0.97
ST	3.95	3.69	3.59	3.71	3.81	3.58	0.78	0.54
OP	4.35	4.21	3.87	3.97	4.28	3.82	1.64	0.15



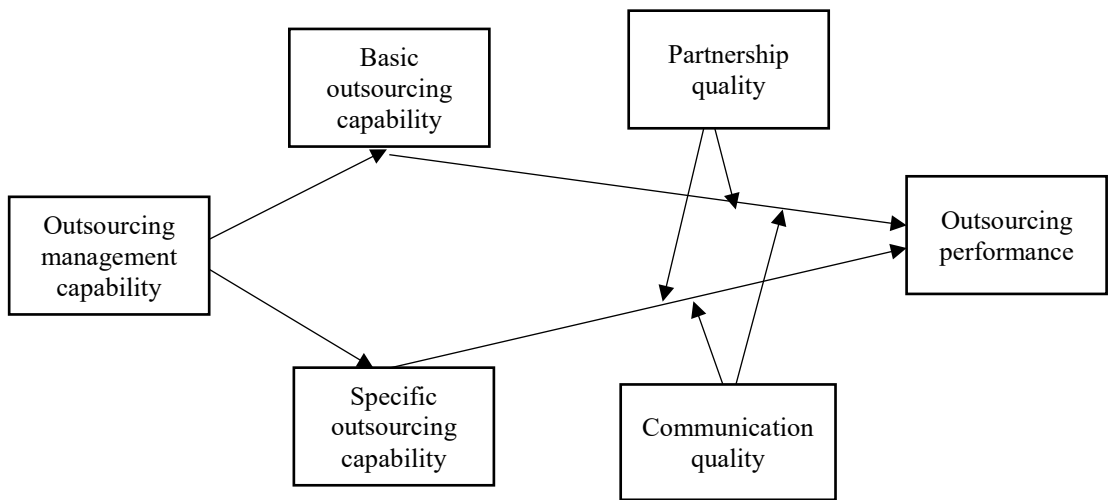


Figure 1. The conceptual model

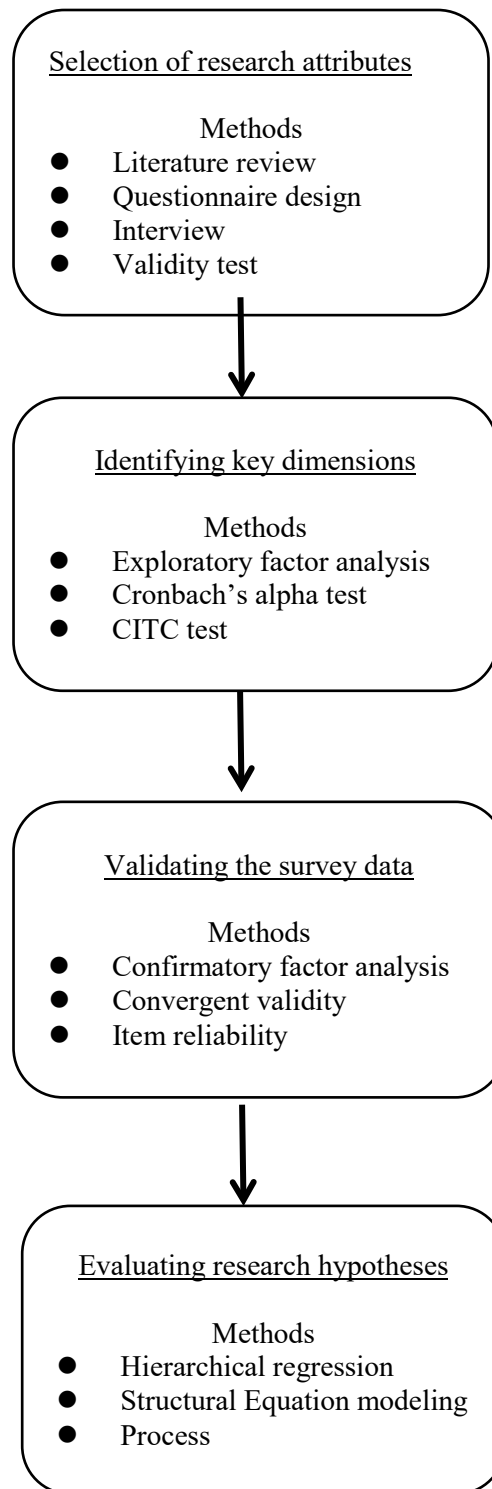
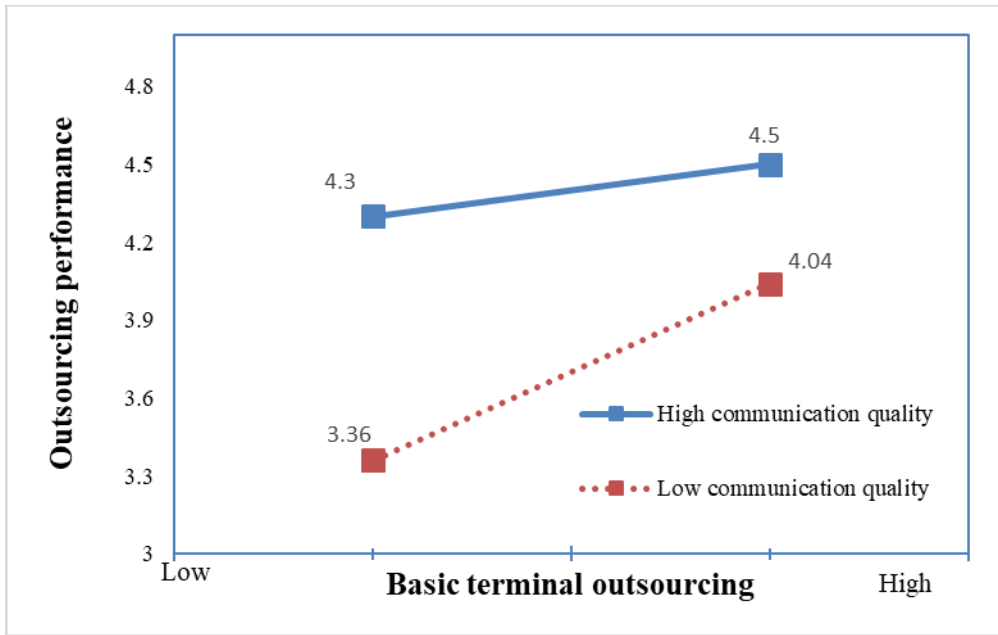
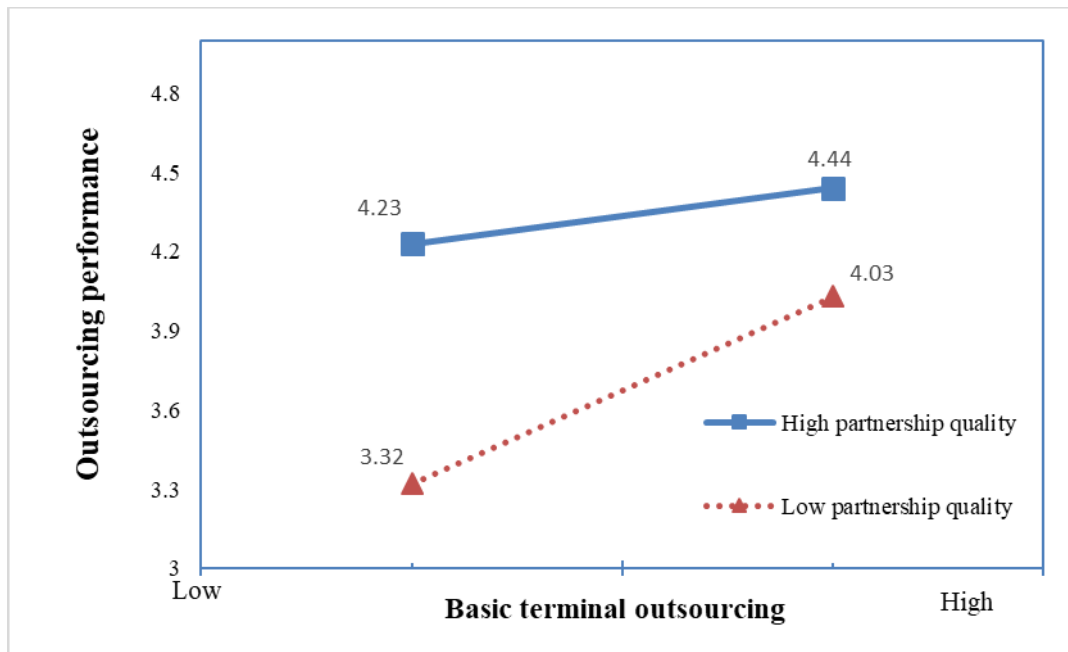


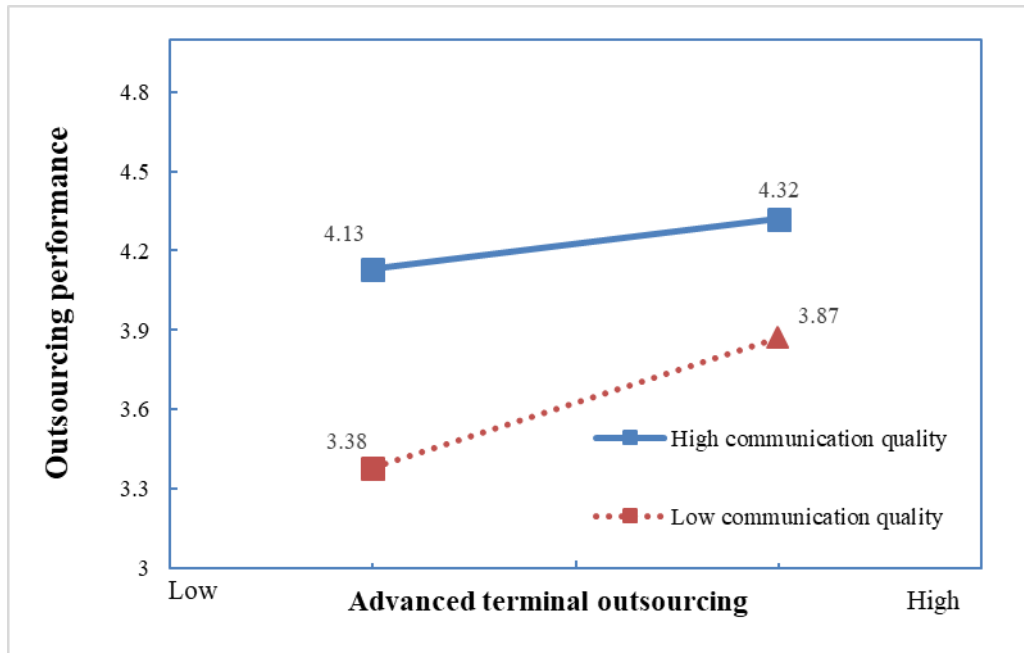
Figure 2. Analytical steps



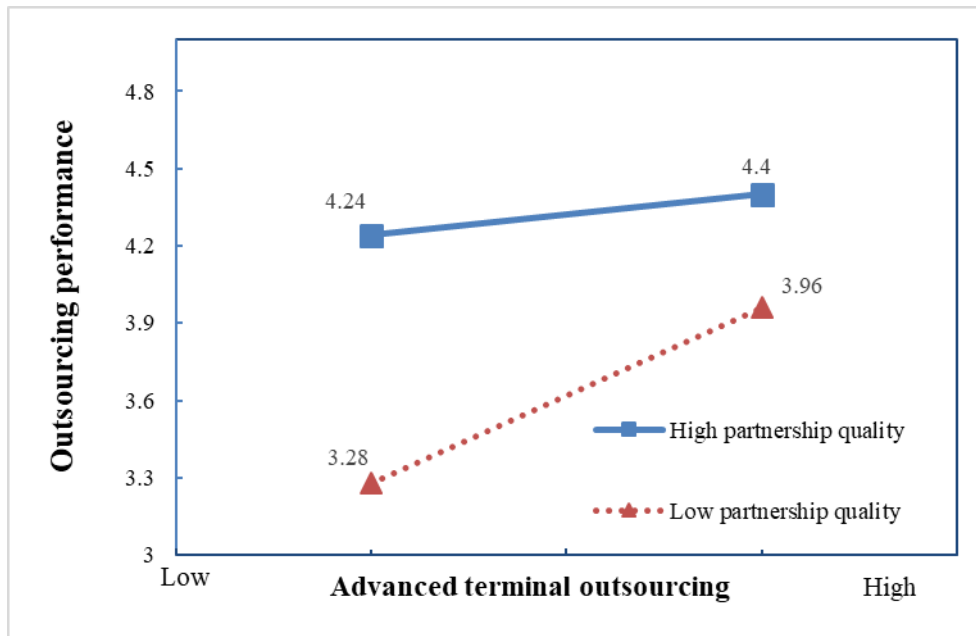
**Figure 3.** The moderating effect of communication quality on basic outsourcing capability and outsourcing performance.



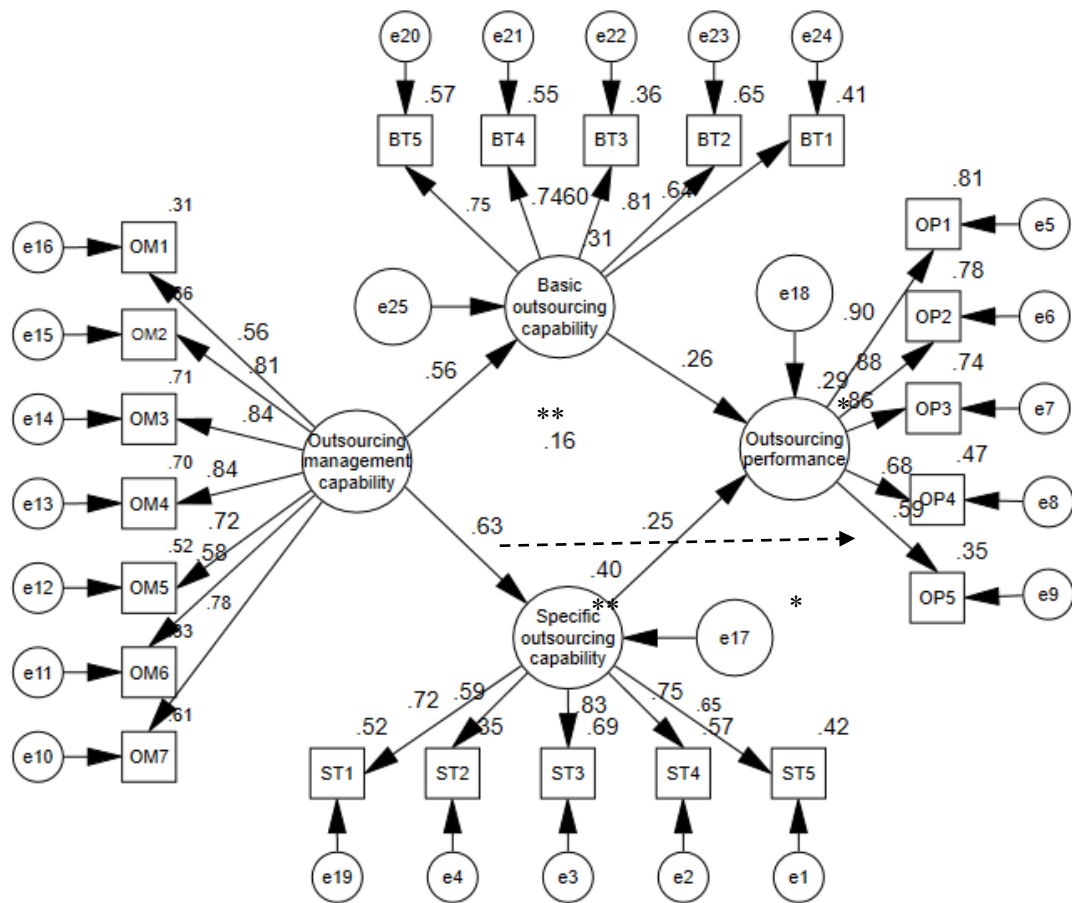
**Figure 4.** The moderating effect of partnership quality on basic outsourcing capability and outsourcing performance.



**Figure 5.** The moderating effect of communication quality on specific outsourcing capability and outsourcing performance.



**Figure 6.** The moderating effect of partnership quality on specific outsourcing capability and outsourcing performance.



**Figure 7.** The mediating effects of outsourcing providers' basic outsourcing capability and specific outsourcing capability.

Note: \*  $p < 0.05$ ; \*\*  $p < 0.001$ ;  $\chi^2 = 239.158$ , GFI = 0.876, AGFI = 0.847, CFI = 0.978, IFI = 0.978, RMR = 0.042, RMSEA = 0.035, Bootstrap estimates = 0.302, Bootstrap error = 0.093.

**Table 1: Profile of respondents**

<b>Job title</b>	<b>Number of respondents</b>	<b>Percentage of respondents</b>
Vice president or higher	10	6.9
Manager	49	33.8
Director	60	41.4
General employees	12	8.3
IT representatives	14	9.7
<b>Terminal work experience (years)</b>		
Less than 6 years	6	4.1
6-10	18	12.4
11-15	46	31.7
16-20	59	40.7
21 or above	16	11.0
<b>Number of employees</b>		
Less than 51 people	15	10.3
51-100	48	33.1
101-500	56	38.6
501-1,000	24	16.6
More than 1,000	2	1.4
<b>Length of business operations (years)</b>		
Less than 6 years	0	0
6-10	6	4.1
11-20	28	19.3
21-30	34	23.4
31 or more	77	53.1
<b>Ownership pattern</b>		
Local firm	64	44.1
Foreign-owned firm	59	40.7
Foreign local firm	22	15.2



**Table 2: Exploratory factor analysis**

Items	F1	F2	F3	F4	F5	F6
<b>Outsourcing management capability</b>						
OM3 My company has systematic processes to manage outsourcing contracts.	0.76					
OM4 My company understands its organization's core and non-core capabilities very well.	0.75					
OM5 My company has systematic processes to control outsourcing partners.	0.73					
OM2 My company manages information systems efficiently.	0.73					
OM7 My company fully evaluates outsourcing projects before taking outsourcing decisions.	0.66					
OM1 My company has formalized processes to select the right outsourcing partners.	0.61					
OM6 My company efficiently manages internal and outsourced human resources.	0.58					
<b>Outsourcing performance</b>						
OP1 My company reduces workload through outsourcing.		0.87				
OP2 My company improves the problems of management control through outsourcing.		0.83				
OP3 My company reduces capital expenditure through outsourcing.		0.81				
OP4 My company improves cash flow through outsourcing.		0.70				
OP5 My company reduces operational costs through outsourcing.		0.63				
<b>Communication quality</b>						
CQ2 The communication between my company and its outsourcing providers is accurate.			0.83			
CQ3 The communication between my company and its outsourcing providers is complete.			0.77			
CQ1 The communication between my company and its outsourcing providers is timely.			0.74			
CQ5 The communication between my company and its outsourcing providers is effective.			0.71			
CQ4 The communication between my company and its outsourcing providers is credible.			0.65			
<b>Specific outsourcing capability</b>						
ST1 Outsourcing providers have the ability to respond well to unexpected changes in demand.				0.76		
ST3 Outsourcing providers help to supply good human resources.				0.72		
ST4 Outsourcing providers help with warehouse management.				0.71		
ST5 Outsourcing providers help with the design and optimization of work processes.				0.66		
ST2 Outsourcing provides help to keep costs down.				0.64		
<b>Basic outsourcing capability</b>						
BT2 Outsourcing providers provide good ship stowage planning and controlling service.					0.84	
BT4 Outsourcing providers provide good ship loading and unloading service.					0.71	
BT1 Outsourcing providers provide good information integration and maintenance service.					0.71	
BT5 Outsourcing providers provide good general cargo handling service.					0.70	
BT3 Outsourcing providers provide good gate operation service.					0.70	
<b>Partnership quality</b>						
PQ4 My company and its outsourcing providers exchange information that helps the establishment of business planning.						0.69
PQ3 My company and its outsourcing providers have a long-term commitment to their relationship.						0.67
PQ2 My company and its outsourcing providers solve most problems together.						0.64
PQ1 My company and its outsourcing providers make joint decisions to meet business objectives.						0.64
Eigenvalues	4.35	3.73	3.60	3.19	3.15	2.45
Cumulative percentage variance (%)	14.04	26.07	37.69	47.99	58.13	66.04

**Table 3: Reliability of test result**

	No. of items	Mean	S.D.	Cronbach's alpha	Range of corrected item-total correlation
Outsourcing management capability	7	3.87	0.81	0.89	0.543- 0.786
Communication quality	5	3.99	0.84	0.89	0.559- 0.864
Partnership quality	4	3.93	0.76	0.84	0.518- 0.748
Basic outsourcing capability	5	3.86	0.87	0.83	0.544- 0.727
Specific outsourcing capability	5	3.70	0.83	0.83	0.543- 0.715
Outsourcing performance	5	4.03	0.96	0.96	0.556- 0.847

**Table 4: Parameter estimate, standard errors, critical ratios, and R<sup>2</sup> values for the final model**

Contracts and items	Standardized path loadings	Standard error <sup>a</sup>	Critical ratio <sup>b</sup>	R <sup>2</sup>
Outsourcing management capability (OM)				
OM1	0.56	0.12	6.79	0.31
OM2	0.82	0.10	10.40	0.68
OM3	0.85	0.09	11.12	0.72
OM4	0.83	0.09	10.83	0.69
OM5	0.71	0.10	8.96	0.51
OM6	0.58	0.11	7.17	0.34
OM7	0.78	- <sup>c</sup>	- <sup>c</sup>	0.61
Communication quality (CQ)				
CQ1	0.81	0.14	7.53	0.66
CQ2	0.95	0.15	8.23	0.89
CQ3	0.91	0.15	8.09	0.83
CQ4	0.70	0.15	6.81	0.48
CQ5	0.59	- <sup>c</sup>	- <sup>c</sup>	0.35
Partnership quality (PQ)				
PQ1	0.56	0.09	6.86	0.31
PQ2	0.88	0.08	12.35	0.77
PQ3	0.72	0.10	9.69	0.52
PQ4	0.84	- <sup>c</sup>	- <sup>c</sup>	0.71
Basic outsourcing capability (BT)				
BT1	0.64	0.41	7.02	0.41
BT2	0.81	0.16	9.01	0.65
BT3	0.60	0.15	6.45	0.36
BT4	0.74	0.14	6.65	0.54
BT5	0.76	- <sup>c</sup>	- <sup>c</sup>	0.58
Specific outsourcing capability (ST)				
ST1	0.71	0.18	7.12	0.51
ST2	0.56	0.17	6.11	0.34
ST3	0.84	0.15	7.94	0.71
ST4	0.75	0.11	7.47	0.56
ST5	0.65	- <sup>c</sup>	- <sup>c</sup>	0.42
Outsourcing performance (OP)				
OP1	0.90	0.22	7.96	0.81
OP2	0.88	0.21	7.87	0.78
OP3	0.86	0.23	7.71	0.74
OP4	0.69	0.17	6.67	0.47
OP5	0.59	- <sup>c</sup>	- <sup>c</sup>	0.35

Note: <sup>a</sup> S.E. is an estimate of the standard error of the covariance.

<sup>b</sup> C.R. is the critical ratio obtained by dividing the estimate of the covariance by its standard error. A value exceeding 1.96 represents a level of significance of 0.05.

<sup>c</sup> Indicates a parameter fixed at 1.0 in the original solution.

**Table 5: Average variance extracted, composite reliability and correlation analysis among constructs**

Measure	AVE <sup>a</sup>	Construct reliability <sup>b</sup>	OM	CQ	PQ	BT	ST	OP
OM	0.55	0.89	<b>1</b> <sup>c</sup>					
CQ	0.65	0.90	0.33**	<b>1</b>				
PQ	0.58	0.84	0.39**	0.37**	<b>1</b>			
BT	0.51	0.84	0.23**	0.08**	0.16**	<b>1</b>		
ST	0.50	0.83	0.26**	0.26**	0.30**	0.13**	<b>1</b>	
OP	0.63	0.89	0.19**	0.31**	0.24**	0.16**	0.19**	<b>1</b>

Note: \*\* Correlation is significant at the 0.01 level.

<sup>a</sup> Average variance extracted (AVE) = (sum of squared standardized loading)/[(sum of squared standardized loadings)+(sum of indicator measurement error)]; indicator measurement error is calculated as 1-(standardized loading)<sup>2</sup>.

<sup>b</sup> Construct reliability = (sum of standardized loadings)<sup>2</sup>/[(sum of standardized loadings)<sup>2</sup>+(sum of indicator measurement error)]; indicator measurement error is calculated as 1-(standardized loading)<sup>2</sup>.

<sup>c</sup> The square root of the shared variance between the constructs and their measures are provided in the diagonal (in bold).

**Table 6: Regression analysis results (standard  $\beta$  coefficients)**

Dependent variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
	BT	ST	Outsourcing performance (OP)								
Step 1: Control variables											
Job title	0.020	- 0.15	- 0.138	- 0.156	- 0.147	- 0.152*	- 0.177*	- 0.157	- 0.177*	-0.152*	-0.184*
Length of business operations	- 0.194*	- 0.46	0.043	0.068	0.031	0.106	0.072	0.094	0.069	0.088	0.053
Terminal work experiences	0.179**	0.034	- 0.001	- 0.114	- 0.077	- 0.151	- 0.116	- 0.141	- 0.116	-0.142	-0.104
Step 2: Main effects											
Outsourcing management capability(OM)	0.476**	0.512**		0.319**	0.296**	0.053	0.118	0.051	0.121	0.021	0.084
Basic outsourcing capability (BT)				0.262*		- 0.146	- 0.021	0.248*	0.203*	0.243*	0.199*
Specific outsourcing capability (ST)					0.288**	0.148	0.184*	- 0.230	- 0.058	0.133	0.170*
Communication quality (CQ)										0.418**	
Partnership quality (PQ)											0.284*
Step 3: Moderating variables											
BT x Communication quality (CQ)						0.599**					
BT x Partnership quality (PQ)							0.371*				
ST x Communication quality(CQ)								0.643*			
ST x Partnership quality(PQ)									0.404*		
F-value	12.587**	12.600**	1.216	10.091**	10.635**	12.715**	9.990**	12.405**	9.938**	14.068**	10.774
R <sup>2</sup>	0.265	0.265	0.025	0.266	0.277	0.394	0.338	0.388	0.337	0.418	0.355
$\Delta R^2$	0.243	0.244	0.004	0.240	0.251	0.363	0.304	0.357	0.303	0.388	0.596
Durbin–Watson	2.190	2.021	1.585	1.717	1.787	1.879	1.806	1.882	1.802	1.912	1.185

\* Significant at  $p < 0.05$  level.\*\* Significant at  $p < 0.001$  level.

**Table 7: Test on the slopes of the moderation effects**

Moderated effect	Boost SE	t-value	LLCI	ULCI
BT → CQ → OP	0.11	-2.23**	-0.45	-0.03
BT → PQ → OP	0.11	-2.13**	-0.45	-0.02
ST → CQ → OP	0.10	-2.27**	-0.41	-0.03
ST → PQ → OP	0.13	-2.51**	-0.57	-0.07

Note: \*\* Significant level at  $p < 0.01$ ; SE: Standard Error; LLCI – lower level of confidence interval; ULCI – upper level of confidence interval.

**Table 8: Results of the indirect effects of outsourcing management capabilities on outsourcing performance**

Indirect effect	Indirect effects	Boost SE	Boot LLCI	Boot ULCI
<i>PROCESS</i>				
OM → BT → OP	0.14*	0.05	0.05	0.23
OM → ST → OP	0.18*	0.05	0.08	0.29
<i>SEM with AMOS</i>				
OM → BT → OP	0.24*	0.09	0.08	0.43
OM → ST → OP	0.27*	0.11	0.06	0.50

Note: \* Significant level at  $p < 0.05$ ; SE: Standard Error; Boot LLCI – bootstrapping lower level of confidence interval;

Boot ULCI – bootstrapping upper level of confidence interval.