

# Examining the competitive impact of management capabilities and Web-enabled direct procurement

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**Abstract**—Manufacturing firms can strengthen competitive direct procurement advantages by implementing Web-enabled direct procurement and developing appropriate management capabilities. This study investigated how Web-enabled direct procurement and management capabilities influence competitive direct procurement advantage. This study conducted an empirical survey with a valid sample of 114 manufacturing companies in Taiwan to evaluate the research model of this study. The results revealed that information-sharing, commitment-building, and integrated planning capabilities significantly influence the competitive direct procurement advantage. Moreover, this study observed that Web-enabled direct procurement alone does not directly influence the competitive direct procurement advantage. Web-enabled direct procurement plays a complementary role in reinforcing the effect of management capabilities.

**Keywords**—Commitment-building capability, competitive direct procurement advantage, information-sharing capability, integrated planning capability, Web-enabled direct procurement.

## I. INTRODUCTION

IN today's competitive business landscape, establishing effective direct procurement mechanisms is becoming vital for competitive success because it reflects a firm's ability to flexibly respond to market changes [13][14]. Direct procurement refers to the acquirement of raw materials and subassemblies that are used in manufacturing a product. Studies have increasingly engaged in direct procurement strategies that are useful for creating competitive direct procurement advantage (e.g., [3][13][18][21][26][42]). However, few studies have focused on investigating the relationships among competitive direct procurement advantage, Web-based direct procurement systems, and management capabilities required in the context of direct procurement.

Web-based information technology (IT) allows firms to make direct procurement management more effective by facilitating information management and enhancing information flow [7][16][23]. The literature on IT-enabled direct procurement has emphasized how Web-based systems contribute to competitive direct procurement advantages (e.g., [14][16][23][25][26][27][41]). The literature has mainly focused on the direct effects of Web-based system on direct procurement performance; less attention has been placed on the moderating effects of Web-based systems. Moreover, the

literature is silent on how Web-enabled direct procurement shapes the role of management capabilities in creating a competitive direct procurement advantage. An understanding of how Web-enabled direct procurement influences management capabilities is valuable for IT managers who wish to improve the fit between the characteristics of Web-based direct procurement systems and the task characteristics of direct procurement management.

Management capability in direct procurement is the ability of firms to plan, organize, and control activities pertaining to purchasing direct materials [3][39]. Manufacturing firms must recognize the management capabilities in direct procurement that should be developed. Failure to develop management capabilities results in a lack of appropriate capabilities to implement business solutions [31]. Hence, this study suggests that clarifying management capabilities in direct procurement is crucial for assisting manufacturing firms in more efficiently allocating their resources to create a competitive advantage. Drawing upon the dynamic capabilities perspective, this study suggests that creating competitive direct procurement advantages requires three crucial management capabilities: information-sharing, commitment-building, and integrated planning capabilities.

Information-sharing capability refers to the ability to develop mechanisms for promoting an accurate information flow between the focal firm and its direct material suppliers [5][28]. Commitment-building capability is defined as the ability to establish the direct material suppliers' willingness to invest in the relationship with the focal firm [10][43]. Integrated planning capability refers to the ability to align direct procurement activities with business requirements [23][28]. Information sharing capability, commitment-building capability, and integrated planning capability can be regarded as the critical, direct sources of superior direct procurement performance [9][17]. Web-based direct procurement systems provide the platform that can help firms streamline direct procurement processes, align direct material suppliers' activities, and govern relationship with direct material suppliers. Web-enabled direct procurement affects the efficiency and effectiveness of direct procurement processes through embedding Web-based system applications into direct procurement processes. As such, this study proposes that Web-enabled direct procurement moderates the impact of information sharing capability,

commitment-building capability, and integrated planning capability on competitive direct procurement advantage.

The rest of the paper is organized as follows. This study begins by presenting the theoretical background and hypotheses development of this study. Next, this study describes the research methodology, including the data collection procedure, construct operationalization and measurement, and the results of hypothesis testing. The study then concludes the paper with a discussion of the research findings, highlight this study's implications for future research and practice and offer suggestions for future research.

## II. CONCEPTUAL BACKGROUND AND RESEARCH MODEL

### A. *Web-enabled Direct Procurement*

Web-based platform provides a hypermedia network, which substantially reduces communication and information exchange constraints. Using XML-based protocols, Web-based IT contains platform-agnostic interpretable metadata about the interface. This platform-agnostic interface allows enterprises to build a cost-effective system integration infrastructure and create a universal computing environment in which the enterprise systems of all trading firms can share data [6][40]. Web-based IT can significantly benefit firms' procurement processes through its flexible IT platform [9][32]. Numerous advantages of Web-enabled direct procurement have been reported, such as savings in communication, search and negotiation costs, speed and ease of integration of different enterprise systems, and the provision of real-time information about procurement transactions [16][27].

The platform nature of Web-based IT allows firms to better interact with direct material suppliers [25][40]. The advantage of increasing interaction with direct material suppliers enables firms to conduct complex and communication-intensive direct procurement processes. The functionality of Web-based direct procurement systems is the fundamental factor that determines its use to improve firms' direct procurement management [26][38]. A suitable functionality of Web-based IT for direct procurement must support procurement management processes, procurement transactions, and inter-organizational cooperation to achieve an effective procurement lifecycle [9][23]. Implementing well-designed Web-enabled direct procurement not only allows firms to effectively conduct procurement cycle activities, but also enables the firms to enhance their decision-making capabilities with respect to direct procurement.

### B. *Research Model and Hypotheses*

Firms can increase their product competitiveness by integrating their direct material suppliers' resources and capabilities [2][11]. Whether the benefits of supplier integration can be achieved depends on how well firms can interact and cooperate with their suppliers in direct procurement processes. Thus, to obtain the benefits of direct procurement, firms must not only streamline their procurement processes but also strengthen the governance of their complex interactions with

direct material suppliers [9][17]. Moreover, firms must coordinate the activities of direct material suppliers to ensure interoperability and seamless process synchronization [3][34]. Direct procurement requires intensive communication and interaction between firms and their direct material suppliers to ensure the alignment of activities on both sides. Hence, this study suggests that creating competitive direct procurement advantages requires firms to develop information sharing capability, commitment-building capability, and integrated planning capability.

Developing a robust capability of managing direct procurement processes allows firms to achieve excellent performance in direct procurement [3][26]. Effectively managing direct procurement processes requires a firm to develop integrated planning capability. The integrated planning capability is the ability to align direct procurement activities with a firm's business requirements. Firms with an effective integrated planning capability can reduce mistakes in direct procurement, systematically integrate the procurement requirements of direct materials, and improve the overall planning for direct procurement, inventory, and production management [17][23].

This study argues that firms can create competitive direct procurement advantage from a superior integrated planning capability. According to the resource-based view (RBV), the study suggests that the integrated planning capability is a strategic asset in creating competitive advantages because it satisfies the conditions of value, heterogeneity, inimitability, and immobility. The ability to integrated plan direct procurement processes allows a firm to benefit from time and cost savings (i.e., value) [9][40]. Moreover, the ability to increase the efficiency of the procurement flow and to align procurement activities with business requirements is not equally distributed in the market (i.e., heterogeneity). The integrated planning capability is complex and accumulates over time (i.e., inimitability), and this capability can be regarded as a firm's business knowledge deeply embedded in its organizational management practices (i.e., immobility). Thus, this study proposes the following hypothesis:

Hypothesis 1 (H1): Firms with a superior integrated planning capability have a competitive direct procurement advantage over their rivals.

Enhancing the capability of governing relationships with direct material suppliers allows firms to improve direct procurement performance [11][15]. Establishing close relationships with suppliers requires a firm to develop commitment-building capability. The commitment-building capability is the ability to establish the direct material suppliers' willingness to invest in the relationship with the firm. Firms with an effective commitment-building capability can enable their direct material suppliers' identification with them [10][43]. Commitment-building capability can be developed gradually in a firm through its interactions with their direct material

suppliers [11][44]. In the context of direct procurement, a firm that has developed a robust commitment-building capability can increase its direct material suppliers' willingness to make investments and sacrifices to satisfy the firm's specific requirements.

This study argues that firms can create a competitive direct procurement advantage from a superior commitment-building capability. The ability to effectively govern relationships with direct material suppliers (e.g., increasing commitment to the firm) allows a firm to take advantage of partnership benefits (i.e., value). Moreover, the ability to increase commitment is heterogeneity in the market. The commitment-building capability is complex and accumulates over time (i.e., inimitability). This capability is co-created by firms and their direct material suppliers, and is deeply embedded in the firm's supplier management practices (i.e., immobility). Thus, this study proposes the following hypothesis:

Hypothesis 2 (H2): Firms with a superior commitment-building capability have a competitive direct procurement advantage over their rivals.

Developing the capability to coordinate direct material suppliers to meet a firm's procurement schedule enables the firm to improve procurement performance [5][27]. Effectively coordinating suppliers requires the development of information-sharing capability. The information-sharing capability is the ability to develop mechanisms for promoting an accurate information flow between the focal firm and its direct material suppliers. Information sharing allows a firm and its suppliers to be informed in advance of changing needs so that they can work together to solve problems [5][7].

This study argues that firms can create a competitive direct procurement advantage from a superior information-sharing capability. Establishing robust inter-organizational coordination mechanisms (e.g., enhancing information sharing between a firm and its suppliers) allows firms to cope with market changes (i.e., value) [7][21]. Moreover, the ability to implement information-sharing mechanisms to coordinate the activities of suppliers is heterogeneity in the market. The information-sharing capability is complex and accumulates over time (i.e., inimitability), and is developed through a series of social exchanges between firms and their direct material suppliers (i.e., immobility). Thus, this study proposes the following hypothesis:

Hypothesis 3 (H3): Firms with a superior information-sharing capability have a competitive direct procurement advantage over their rivals.

Web-enabled direct procurement allows a firm to create a suitable environment for effectively conducting direct procurement activities, leading to a competitive advantage. These gains are derived from using a Web-based direct procurement system to place, confirm, and track orders with

suppliers, and from allowing direct material suppliers to manage product catalogs online (i.e., value) [26][27]. Moreover, the ability to implement Web-enabled direct procurement is heterogeneity in the market. The knowledge of how to implement Web-enabled direct procurement is complex and accumulates over time (i.e., inimitability) [14][40], and is deeply embedded in the firm's IT implementation practices (i.e., immobility). Thus, the following hypothesis is proposed:

Hypothesis 4 (H4): Firms with a superior Web-enabled direct procurement have a competitive direct procurement advantage over their rivals.

Web-enabled direct procurement helps firms improve the timeliness and accuracy of their transaction information, allowing them to plan and manage their production operations and inventory levels [29][35]. The emergence of benefits resulting from implementing Web-enabled direct procurement means that capability in integrated planning can be enhanced. Web-enabled direct procurement enhances integrated planning by allowing firms to reengineer their internal processes and streamline their processes of procurement, production, and inventory, resulting in benefits such as reducing mistakes in direct procurement and the systematic integration of direct material procurement requirements [17][28]. Hence, Web-enabled direct procurement can be employed to foster integrated planning capability through complementary effects. Thus, this study proposes the following hypothesis:

Hypothesis 5a (H5a): Web-enabled direct procurement moderates the impact of the integrated planning capability on competitive direct procurement advantages.

Web-enabled direct procurement helps firms increase interactions with their suppliers and improves mutual understanding [7][39]. The emergence of benefits resulting from Web-enabled direct procurement means that a firm's capability of developing close relationships with its direct material suppliers can be enhanced. For example, Web-enabled direct procurement allows firms to electronically communicate with direct material suppliers, enabling the firms to effectively develop appropriate interaction methods for different suppliers. Using the appropriate interaction method to govern relationships improves the structure and quality of social ties between firms and their direct material suppliers [35][45]. Hence, this study suggests that Web-enabled direct procurement can be employed to foster a firm's commitment-building capability through complementary effects. Thus, this study proposes the following hypothesis:

Hypothesis 5b (H5b): Web-enabled direct procurement moderates the impact of the commitment-building capability on competitive direct procurement advantages.

Web-based IT for procurement capitalizes on rich media

interfaces and hypermedia architectures, enabling the sharing of complex information [25][28]. The information exchange platform provided by Web-based direct procurement systems enables firms to enhance the efficiency and quality of inter-organizational information sharing [7][39]. Implementing inter-organizational information sharing on a Web-enabled IT platform allows for the sharing of strategic and operational information, and allows for all shared functions to be brought together as a cohesive whole, providing the visibility required for quick and accurate decision making and timely adjustments [7][26]. Web-enabled direct procurement can be used to foster information-sharing capability through complementary effects. Thus, the following hypothesis is proposed:

Hypothesis 5c (H5c): Web-enabled direct procurement moderates the impact of the information-sharing capability on competitive direct procurement advantages.

Following the hypotheses, this study proposes a research model (Figure 1) and evaluates it empirically in the direct procurement context. The research model integrates five latent constructs that are prominent in the literature of procurement management, strategic management, supply chain management, and inter-organizational coordination. The focus of the research model is on the role of information sharing capability, commitment-building capability, and integrated planning capability in creating firms' competitive direct procurement advantage. When considering the importance of the three management capabilities in the direct procurement context, this study regards Web-enabled direct procurement as a complement to moderating the impact of management capabilities on competitive direct procurement advantage.

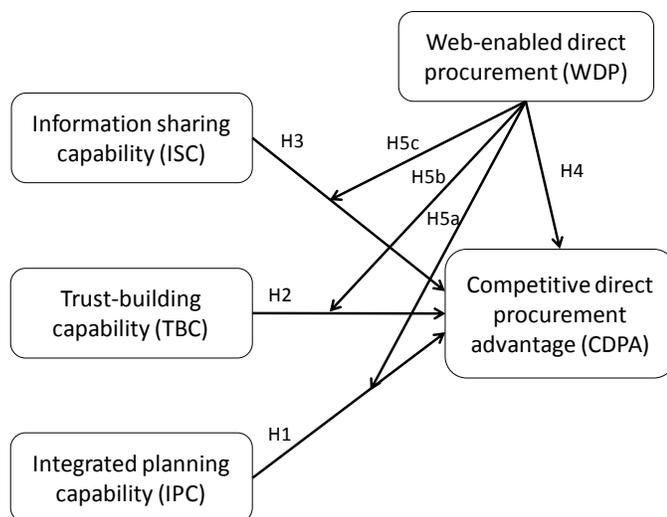


Fig. 1 research model

### III. RESEARCH METHODOLOGY

#### A. Measures

Table 1 summarizes the operational definitions of latent constructs in the research model. To construct a pool of items to measure the latent constructs, several tests were administered in stages. This study began by developing a structured questionnaire for measuring the latent constructs in the research model. All construct items were evaluated using 7-point Likert-type scales.

Table 1 operational definitions of latent constructs

Construct	Definition
Web-enabled direct procurement (WDP)	A firm's ability in using a Web-based direct procurement system to manage direct procurement activities.
Integrated planning capability (IPC)	A firm's ability to align direct procurement activities with its business requirements.
Commitment-building capability (CBC)	A firm's ability to establish direct material suppliers' willingness to invest in the relationship with the firm.
Information sharing capability (ISC)	A firm's ability to develop mechanisms for promoting an accurate information flow between its and direct material suppliers.
Competitive direct procurement advantage (CA)	A firm's ability to create strategic advantages over their industry rivals in direct procurement management.

This study measured Web-enabled direct procurement on a 4-item scale adapted from the literature on Web-based inter-organizational systems and procurement systems (e.g., [7][14][27][29][38][40]). These measures asked respondents to evaluate their firm's ability in using a Web-based direct procurement system to manage direct procurement activities. Specifically, Web-enabled direct procurement was operationalized using items indicating the extent to which firms used a Web-based direct procurement system to assist in (a) transmitting purchase orders, (b) inquiring about the progress of a direct procurement, (c) confirming orders with direct material suppliers, and (d) negotiating with direct material suppliers.

The integrated planning capability was defined as the ability to align direct procurement activities with business requirements. This study measured the integrated planning capability on a 4-item scale adapted from the literature on procurement management (e.g., [9][24][36][38][40][42]). Specifically, the integrated planning capability was operationalized using items indicating the degree to which firms (a) executed overall planning for direct procurement, inventory, and production management; (b) jointly planned direct procurement and other business processes; (c) systematically integrated direct procurement requirements; and (d) coordinated activities of direct procurement, inventory, and production management.

The commitment-building capability reflected the ability to establish the direct material suppliers' willingness to invest in the relationship with the focal firm. This study measured the commitment-building capability on a 4-item scale adapted from the literature on supply chain management and inter-organizational relationships (e.g., [3][9][10][11][12][16][44]). Specifically, the commitment-building capability was

operationalized using items indicating the degree to which firms felt their direct material suppliers (a) believed the relationship with them was worth making the maximum effort to maintain, (b) intended to maintain the relationship with them indefinitely, (c) would be willing to continue investing in a relationship with them, and (d) felt like a part of their family.

This study defined the information-sharing capability as the ability to develop mechanisms for promoting an accurate information flow between the focal firm and its direct material suppliers. This study measured the information-sharing capability on a 4-item scale adapted from the literature on supply chain management and inter-organizational coordination (e.g., [2][5][7][19][37][40][44]). Specifically, the information sharing capability was operationalized using items indicating the degree to which firms and their direct material suppliers (a) informed each other in advance of changing needs, (b) exchanged timely information, (c) provided any information to each other that might help the other party, and (d) kept each other informed about events that may affect the other party.

To measure the competitive direct procurement advantage, this study used four items adapted from the literature on procurement management and supply chain management (e.g., [3][13][23][38][40][43]). These measures asked respondents to evaluate their firm's ability to create strategic advantages over their rivals in direct procurement management. Specifically, the competitive direct procurement advantage was operationalized using items indicating the extent to which firms had a higher performance than their key competitors in (a) reducing production lead times, (b) dealing with demand uncertainties, (c) responding to market demands, and (d) lowering the inventory costs of direct materials.

### B. Data Collection

A mail survey was conducted to collect data from 500 randomly selected manufacturing firms in Taiwan based on the directories of the Fortune 1000 manufacturers in Taiwan, published in May 1 2011 by CommonWealth Magazine. Key informant method was used and only purchasing managers of the firms were requested to respond to the questions. Previous studies argue that key informants as appropriate respondents if chosen based on the key informants' knowledge of the research issues and their formal role in the organization [4][20]. The key factor in respondent (i.e., informant) selection was the respondent's position within his or her organization, with preference given to respondents knowledgeable about direct procurement management and interaction with suppliers.

This survey, which yielded 114 valid responses (incomplete responses and missing values were removed), was available for eight weeks (22.8% valid response rate). The characteristics of the responding firms are depicted in Table 2. The sample included different types of businesses, with 77.4% of the firms from the computer system and electronics industries, reflecting the significance of the two sectors in Taiwanese manufacturing. Table 2 also demonstrates that the sample consisted of medium to large firms, but mainly medium firms. Moreover, the average work experience (i.e., purchasing management) of employees

was 5.29 years in their current position, indicating adequate informant knowledge.

Table 2 characteristics of the respondents

Characteristic	Number	Percentage (%)
Number of working years in current position		
Less than 2	3	0.026
2 - 3.9	37	0.325
4 - 5.9	22	0.193
6 - 7.9	45	0.395
8 - 9.9	6	0.053
Over 9.9	1	0.008
Industry type of your company		
Chemical industry	5	0.043
Computer system industry	31	0.273
Electronics industry	57	0.501
Food industry	2	0.017
Machinery industry	9	0.079
Steel industry	5	0.043
Vehicle industry	3	0.026
Others	2	0.018
Number of employees in your company		
Less than 100	1	0.008
101 - 500	37	0.325
501 - 1000	55	0.483
1001 - 2000	9	0.079
2001 - 3000	12	0.105
Over 3000	0	0

## IV. DATA ANALYSIS AND RESULTS

The method of partial least squares (PLS) was used to test the hypothesized relationships among the study variables shown in Figure 1. Data analysis by PLS was performed with SmartPLS 2.0 (M3) software [30].

### A. Evaluating the Measurement Model

Table 3 shows that all item loadings are above 0.79 (ranging from 0.795 to 0.899), which is higher than the 0.707 threshold, indicating that more than half of the variance is captured by the constructs. The internal consistency reliability of each construct was assessed by Cronbach's alpha and composite reliability (CR). A score of 0.70 or above is an acceptable value of internal consistency for exploratory research [1]. Table 3 shows the Cronbach's alpha (ranging from 0.821 to 0.894) and CR values (ranging from 0.845 to 0.913) for each construct. All indicators are above the recommended level of 0.70, indicating adequate internal consistency.

Table 4 shows the average variance extracted (AVE) and the square root of the AVE, along with the correlations between the constructs. Convergent validity is considered adequate when the AVE values pertaining to each construct are higher than the suggested threshold value of 0.50, and this condition was satisfied in all cases (with actual values ranging from 0.671 to 0.755). Moreover, as shown in Table 4, comparison of the square root of the AVE with the correlations among the constructs indicates that each construct is more closely related

to its own measures than to those of other constructs, thus supporting discriminant validity.

Table 3 factor loadings and reliability estimates

Construct	Item	Factor loading	Cronbach's Alpha	Composite Reliability (CR)
(WDP) Web-enabled direct procurement	WDP1	0.837	0.842	0.866
	WDP2	0.811		
	WDP3	0.829		
	WDP4	0.803		
(IPC) Integrated planning capability	IPC1	0.862	0.894	0.913
	IPC2	0.857		
	IPC3	0.899		
	IPC4	0.885		
(CBC) Commitment-building capability	CBC1	0.795	0.821	0.845
	CBC2	0.832		
	CBC3	0.827		
	CBC4	0.819		
(ISC) Information sharing capability	ISC1	0.871	0.856	0.882
	ISC2	0.835		
	ISC3	0.833		
	ISC4	0.816		
(CA) Competitive advantage in direct procurement	CA1	0.838	0.825	0.847
	CA2	0.803		
	CA3	0.806		
	CA4	0.815		

Table 4 convergent and discriminant validity

Construct	Average variance extracted (AVE)	WDP	IPC	CBC	ISC	CA
WDP	0.693	<b>0.832</b>				
IPC	0.755	0.391	<b>0.868</b>			
CBC	0.671	0.257	0.126	<b>0.819</b>		
ISC	0.724	0.403	0.207	0.287	<b>0.851</b>	
CA	0.700	0.087	0.409	0.425	0.453	<b>0.837</b>

Note:

Diagonal elements (bold) are the square roots of AVE

Average variance extracted (AVE):  $\Sigma(Li^2) / [\Sigma(Li^2) + \Sigma(\text{Var}(Ei))]$

$Li$  = factor loading,  $\text{Var}(Ei)$  = error variance

### B. Testing the Structural Model

Two structural models were built to estimate this study's hypotheses involving moderating effects. The first model contained only main effects and allowed for the testing of H1, H2, H3 and H4. The second model added the interactive effects of Web-enabled direct procurement to the three management capabilities, which allowed for the testing of H5a, H5b and H5c. The PLS results are shown in Table 5.

The first model (Model 1) tested for the impact of Web-enabled direct procurement and the three crucial management capabilities on competitive direct procurement advantage. The results shown in Model 1 of Table 5 provide strong evidence for hypotheses 1 to 3, but no evidence for hypothesis 4. Three management capabilities have significantly positive effects on competitive direct procurement advantage. The path coefficients are 0.263 (t-value = 2.279 > 1.962, p-value < 0.05), 0.295 (t-value = 2.507 > 1.962, p-value < 0.05)

and 0.341 (t-value = 3.064 > 2.581, p-value < 0.01), respectively. Hence, in terms of the RBV, integrated planning capability, commitment-building capability and information-sharing capability can be considered to be distinctive capabilities, which are able to explain performance heterogeneity, thus representing three important sources of a competitive direct procurement advantage.

However, from Model 1, this study found that Web-enabled direct procurement cannot significantly influence competitive direct procurement advantage. The path coefficient is 0.189 (t-value = 1.935 < 1.96, p-value > 0.05), which means that Web-enabled direct procurement is not able to directly influence competitive direct procurement advantage. This finding may result from the fact that information systems are, by themselves, typically imitable. Hence, this study suggests that Web-enabled direct procurement alone cannot satisfy the long-term performance heterogeneity condition.

The second model (Model 2) contains interaction effects between Web-enabled direct procurement and the three management capabilities. In PLS, the magnitude of interaction effects can be evaluated through a hierarchical procedure similar to that employed for ordinary least squares regression, where the explanatory power (i.e., the explained variance  $R^2$ ) of the model with the main effects is compared to that of the full model (considering both main effects and interactions) [8]. Model 2 confirms H5a, which assumes a moderating effect of the Web-enabled direct procurement on the relationship between integrated planning capability and competitive direct procurement advantage. The path coefficient is 0.165 (t-value = 1.981 > 1.962, p-value < 0.05). H5b is also confirmed by our analysis because the interactive term between commitment-building capability and Web-enabled direct procurement has a significantly positive effect on competitive direct procurement advantage. The path coefficient is 0.173 (t-value = 1.986 > 1.962, p-value < 0.05). H5c is also confirmed because the interactive term between information-sharing capability and Web-enabled direct procurement has a significantly positive effect on competitive direct procurement advantage. The path coefficient is 0.178 (t-value = 1.994 > 1.962, p-value < 0.05).

Table 5 results of PLS models

Hypothesis	Exogenous variables	Model 1	Model 2
H1	IPC	0.263 (2.279)*	0.209 (2.001)*
H2	CBC	0.295 (2.507)*	0.267 (2.395)*
H3	ISC	0.341 (3.064)**	0.291 (2.649)**
H4	WDP	0.186 (1.935) <sup>ns</sup>	0.085 (1.021) <sup>ns</sup>
H5a	WDP * IPC		0.165 (1.981)*
H5b	WDP * CBC		0.173 (1.986)*
H5c	WDP * ISC		0.178 (1.994)*
$R^2$		0.499	0.603
$\Delta R^2$			0.104
F values			0.207*

Notes: <sup>ns</sup> p > 0.05, \*p < 0.05, \*\*p < 0.01

Furthermore, the effect size of interaction in Model 2, calculated as  $f = (R^2_{\text{Full}} - R^2_{\text{main}}) / (1 - R^2_{\text{main}})$ , is  $f = 0.207$ , and can be interpreted as a 'medium to large' effect (Cohen et al.

2003). This study finds that the F-test for the increase in  $R^2$  from 0.499 to 0.603 when interactive terms (Web-enabled direct procurement \* integrated planning capability, Web-enabled direct procurement \* commitment-building capability, and Web-enabled direct procurement \* information-sharing capability) were added to the model is significantly different from zero ( $p$ -value < 0.05). Hence, the Web-enabled direct procurement can be considered a complementary factor that can significantly moderate firms' integrated planning capability, commitment-building capability and information-sharing capability.

## V. CONCLUSION

Through an empirical study of 114 manufacturing firms, this study found that firms can create a competitive direct procurement advantage if they have superior integrated planning capability, commitment-building capability and information-sharing capability. Although there is no empirical support for the direct effect of Web-enabled direct procurement on the competitive direct procurement advantage, there is empirical support for the positive moderating effects of Web-enabled direct procurement.

This study raised several crucial implications for both research and practice. The study identified three essential management capabilities that contribute to creating a competitive direct procurement advantage. Although previous studies have investigated competitive direct procurement advantage goals, they have paid less attention to the management capabilities that are crucial for creating the competitive advantage. This study filled the gap by investigating the capabilities required to succeed in managing direct procurement, and subsequently analyzed how such management capabilities affect the competitive direct procurement advantage. By investigating the management capabilities that contribute to developing a competitive direct procurement advantage, this study provides insight into how this competitive advantage can be created.

Another implication of this study is related to the role of Web-enabled direct procurement in creating a competitive direct procurement advantage. This study developed and tested a conceptual model for assessing the direct and moderating effects of Web-enabled direct procurement on 114 manufacturing firms from various sectors. This study found that Web-enabled direct procurement does not directly influence competitive direct procurement advantages; however, in evaluating the moderating effects, this study found that Web-enabled direct procurement plays a crucial complementary role in reinforcing the effect of management capabilities on competitive direct procurement advantages.

Finally, although the research model was proposed based on theoretical inference and was tested through an empirical survey, a limitation should be taken into consideration when generalizing the results of this study. This study used a key informant method for data collection. There are many advantages for using the key informant method, such as it can be

performed in a short time and it is useful to reach target respondent groups [22][33]. Although this method has its advantages, it also suffers from the limitation that the data reflect the opinions of one person. Future studies could consider research designs that allow for data collection from multiple respondents within an organization.

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