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Supply chain collaboration aligns order-winning strategy with business outcomes

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Supply chain dyad;
Structural equation modelling;
Business performance;
Thailand

Abstract The paper aims to find out whether appropriate choice of collaboration will enable the required order-winners, leading to improved business outcomes. Structural equation modelling (SEM) was employed with cross-sectional data to test the hypothesised relationships among order-winners, modes of collaboration, and business outcomes. Results indicate that firms that focus on flexibility, quality, and delivery should develop strategic collaboration with suppliers to achieve market and innovation improvement. Cost- and quality-focussed firms should develop operational collaboration to achieve resource efficiency. The model allows managers to understand the right alignment of external suppliers while working on their own order-winners being pursued to win business performance.

Introduction

Managing supply chains has become increasingly strategic for firms as competition is now more between supply chains rather than individual firms (Hult, Ketchen, & Arrfelt, 2007; Whipple & Frankel, 2000). While the firm, being a chain partner, is making every attempt to become competitive through multifactor performance enhancement, this is unlikely to be achieved until manufacturing strategies are aligned appropriately with business strategies (Cousins, 2005). The need for such alignment between manufacturing and business strategies does exist, but it raises a question about what mode of collaboration benefits this in the long term. Scholars in extant literature have drawn attention to buyer–supplier collaboration for long term performance improvement where the focus is on issues either at buyers' or at suppliers' level (Cannon, Doney, Mullen, & Petersen, 2010; Koufteros, Vickery, & Dröge, 2012). This study focuses on the manufacture (buyer) side of the collaboration. Before we pitch our research on this collaboration, we would like to bring in three theories that we deem appropriate and provide the basis for this paper. First, the strategy–structure–performance (SSP) paradigm argues persuasively that a firm's strategy must be designed to satisfy the needs of customers, and the supply chain strategy needs to be complementary with that of the supply chain partners' (Defee & Stank, 2005). We extend this SSP supply integration concept in our research arguing that choice of manufacturing strategies can enhance business outcomes if

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they can be coupled with supplier collaboration. We consider a manufacturer-supplier dyad in this research. Second, the strategic focussed outcomes model (SFOM) proposed by Cousins (2005), and in support of the above SSP framework, proposes that firms pursue inter-organisational collaboration essential for the order-winning strategies being practised. The order-winning concept used in this research goes beyond the order-winners used in Cousins's model. Third, Fisher's (1997) model on the choice of supply approach emphasises the types of product (i.e. functional or innovative) that decide the modes of collaboration. We extend Fisher's model of efficient supply approach and market responsive approach in combination with the above two theories in the context of manufacturers inviting external suppliers to collaborate.

Although the above three theories have addressed the buyer–supplier collaboration framework separately, the challenge is how to organise all three into an over-archial model which is novel in this study. A set of order-winning strategies pursued by buyers (i.e. manufacturers) is yet to be studied in this relationship. Cousins (2005) considers cost-focussed strategy as playing merely a cost-reduction role in the short term, whereas differentiation strategy (i.e. careful management of resources and capabilities) would see supply as strategic. Although Cousins's model focuses on cost as order-winner, other order-winning criteria such as quality, delivery and flexibility are beyond the scope of Cousins's study. Further, Koufteros et al. (2012) examine the strategic selection of suppliers again based on resource-based capability (i.e. RBV) similar to Cousins (2005). These two studies have followed the SSP paradigm directed to cost- and RBV-focussed manufacturing strategy but have not covered other order-winners essential for full customer satisfaction. We submit that order-winning driven collaboration (i.e. operational and strategic) is the contribution of this research. A recent study by Hung, Hung, and Lin (2015) examines the relationship of order-winners, in the form of competitive priorities, with firm performance significantly moderated by strategic alliance in the context of the Taiwan electronic industry. In our understanding, no study so far has addressed an integrated model where dyadic collaboration pursues order-winners with business outcomes.

This paper therefore moves a step further by correlating the order-winners, modes of collaboration, and business outcomes within a sample of Thai manufacturers. The Thai manufacturing industry is diversified, and mainly assembly-focussed, anchoring on low-cost labour competitiveness (Prajogo, Laosirihongthong, Sohal, & Boon-itt, 2007). The industry is highly vulnerable to competition from other Asian countries. Phusavat and Kanchana (2007) argue for value-chain improvement across the Thai manufacturing industry. Prajogo et al. (2007) add that Thai SME manufacturers urgently need to improve their strategies to cope with ever changing competition in the region. This forces Thai manufacturers to seek collaboration with external suppliers in order to improve the currently low competitive advantage of the industry. To the best of our knowledge, an empirical study on Thai manufacturers' supplier collaboration is not yet documented in literature.

Therefore, in this paper, we examine the modes of collaboration that manufacturers require so that their manufacturing strategy achieves the order-winners for their customers. It is believed that the right mode of collaboration will deliver those critical order-winners, and improve business performance. The paper is organised as follows. First, manufacturing strategy with order-winners, modes of collaboration, and business outcomes are discussed along with associated hypotheses based on relevant literature. Second, the research methodologies are described, including sampling and measurement. Third, results for the confirmatory factor analysis, test for reliability and validity, hypothesised structural path model, and hypothesis testing are presented. The findings and managerial implications are then explored with directions for future research.

Literature review

Manufacturing strategy with order-winners

Skinner's (1969) pioneer work on the manufacturing-business strategy points out that the former drives the components of the latter. A clear understanding of what constitutes manufacturing strategy could lead to an appropriate choice of manufacturing processes. On the other hand, if a firm fails to recognise the relationship between manufacturing decisions and business strategy, it may become saddled with a non-competitive production system which is expensive and time-consuming to change (Skinner, 1969). Manufacturing strategy (MS) is a sequence of decisions over time enabling a firm to achieve a desired manufacturing structure, infrastructure and set of specific capabilities (Hayes & Wheelwright, 1984), and to determine the choice of a firm's investment in process and infrastructure (Hill, 2000). Manufacturing strategy is vital for a firm to stay ahead of others and hence remain competitive.

The choice of order-winners is considered to be an important part of the strategy of a manufacturing firm for success. Going beyond competing in the market as a "competitive priority", order-winning strategy aims to win customer orders by linking manufacturing to customer needs (Hill, 2000). Competitive priorities can be conceptualised as the generalisation of an order-winning strategy. Various types of order-winning strategies have been studied (Frohlich & Dixon, 2001; Phusavat & Kanchana, 2007), of which four generic criteria are widely accepted. These are cost, quality, delivery, and flexibility (Fabbe-Costes & Jahre, 2008; Hayes & Wheelwright, 1984; Peng, Verghese, Shah, & Schroeder, 2013). When a piece of research aims to collect data from more than one industry, these order-winners give the framework a wider suitability for various types of manufacturers' conditions. Further, the cumulative capability model (Ferdows & De Meyer, 1990) argues that order-winners can be developed simultaneously with quality being at the core of strategy making. The definitions of these order-winners are summarised below (Fabbe-Costes & Jahre, 2008; Ferdows & De Meyer, 1990; Trent & Monczka, 2003).

- Cost-focussed: the capability to produce and distribute products at low cost
- Delivery-focussed: the capability to meet the promised schedule with speed and high reliability in delivering product to customer

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- Quality-focussed: the capability to manufacture and distribute products with high performance, durability and reliability
- Flexibility-focussed: the capability to react to customer-demanded changes in product, change in product mix, modification to design, fluctuations in material, change in sequence and also to react quickly to specific customer orders when they are requested.

Lee, Padmanabhan, and Whang (1997) suggest that supplier capabilities are essential to a firm's competitive success and that the firm must work to develop a very close partnership with the supplier. While the collaboration with suppliers becomes important, the orientation of the relationship should also match the strategic perspectives of a particular firm (Kanda & Deshmukh, 2008). Many researchers show that supply management can create value through coordinated activities among the participants to reduce the costs associated with the duplication of effort, leading to better customer service (Barringer & Harrison, 2000; Kampstra, Ashayeri, & Gattorna, 2006; Sahay, 2003). For example, a firm focussing on just-in-time strategy would require more clear communication and cost information from its partner (Kumar, 1996), while, a firm aiming for cost reduction would require less information sharing with its supplier (Wagner & Lindemann, 2008). It is, in fact, a "strategic choice" reflecting the value proposition of the management and the political process through which such decisions are made (Hunt & Morgan, 1995). Further, Cousins (2005) puts purchasing as a tactical weapon responding to a firm's strategic direction. Manufacturers who are able to match their strategies with the correct mode of supplier collaboration will transform those capabilities into sources of competitive advantage.

Collaboration between manufacturer and supplier

A close relationship between manufacturers and their suppliers is called "supplier–manufacturer collaboration". As this research focuses on manufacturing and the design of supplier collaboration driven by specific strategy, this study shortens the formal term to "supplier collaboration". The terms such as integration, collaboration, cooperation and coordination are semantically different but are used as complementary to each other in the supply chain context as they comprise similar elements (Kanda & Deshmukh, 2008). However, a recent study by Leuschner, Rogers, and Charvet (2013) has separated collaboration from integration. However, both terms are used interchangeably in this paper. In fact, collaboration is a long-term relationship between supply chain partners to gain mutual benefits. It refers to "the integration of all activities associated with the flow and transformation of goods, information, and the associated funds, through improved supply chain relationships of all involved entities" (p. 314, Kampstra et al., 2006). The idea behind collaboration is that it is not possible for a company to compete alone successfully in today's competitive market because of increased customer demand and intense competition. Strategic choice theory states that collaboration between firms can take many forms depending on the strategic reason behind the relationship.

The dominant stream of research within the field of supplier collaboration over the last decade has been exploring the link between collaboration and organisational performance. Empirical research suggests that an appropriate supplier–manufacturer relationship can create additional benefits in the manufacturer's performance as well as in overall supply chain performance. Therefore, a manufacturer with a smaller number of suppliers and closer relationships could gain higher profits rather than by performing a larger number of weak-linked, short-term transactions. Theoretically, chain members who become involved in collaborative efforts outperform those with less involvement in collaboration (Barratt & Oliveira, 2001; Simatupang & Sridharan, 2002). The comparative theory of competition suggests that a strong relationship is an important resource or asset that can result in higher performance and gain a comparative advantage if it is not easily replicable by competitors (Hunt & Morgan, 1995). Transaction cost economics applied to the supplier–manufacturer link shows that a strong relationship crafted in response to uncertainty and asset specificity has positive performance implications (Heide & Stump, 1995).

Burnes and New (1996) offer two levels of collaboration which have become the scope of collaboration for this study. First, "operational collaboration" focuses on the day-to-day interaction between a dyad. Such collaboration is geared towards transaction-efficiency improvement (Vereecke & Muylle, 2006). Successful criteria are the ability to deliver on time and to specification (Burnes & New, 1997). With this level of collaboration, improvements are focussed on each firm's individual pursuit of operational excellence. Second, "strategic collaboration" refers to collaboration of a much deeper nature explicitly focussing on achieving matching goals in order to reach mutual benefits with an exchange partner (Johnson, 1999). At this strategic level there is less day-to-day interaction but more concentrated development of capability, depth of management, and overall costs awareness (Burnes & New, 1997). Cousins (2005) has used these two types of collaboration between buyer and supplier, however with a focus on cost- and RBV-focussed strategies. The use of set of order-winners as explained in the earlier section is not used in the Cousins' model, and not evidenced in literature as well. The focus on order-winners (e.g. cost, quality, delivery and flexibility) as the manufacturing strategies in order to align with business outcomes (see next section) through appropriate choice of collaboration types is not documented in literature, to the best of our knowledge.

Business outcomes

The literature clearly demonstrates the influence of supplier collaboration on firm performance. Many positive organisational performances are expected to come from close supplier relationships. Successful collaborative inter-firm relationships are considered to yield significant benefits as follows: inventory reduction, better quality, improved delivery, reduced costs, compressed lead time, faster product-to-market cycle time, higher flexibility, increased customer service, and market share increase (Corbett, Blackburn, & Van Wassenhove, 1999; Mentzer, Foggin, & Golicic, 2000).

The term business performance is a multi-faceted and intricate issue (Banomyong & Supatn, 2011; Beamon, 1999; Bhagwat & Sharma, 2007). Researchers found that collaboration with suppliers has the potential to enhance firm's performance in various aspects. In a global sample of 322 manufacturers, Frohlich and Westbrook (2001) found that

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manufacturers focussing on strong integration with either suppliers or customers, the so-called supplier-facing and customer-facing companies, demonstrate improved performance across all measurements. Similarly, Vereecke and Muylle (2006) analysed performance improvement through supply chain collaboration by collecting data from 374 firms in the engineering and assembly industries across 11 European countries. The study revealed a limited performance improvement when a manufacturing firm engaged in only one side of collaborative effort: supplier or customer collaboration. The full benefits of collaboration come from a large-scale effort in which both the supplier and the customer are approached.

Business outcomes are considered a consequence of the type of collaboration and the order-winning strategy being used. Four types of outcomes are used to measure performance in this study: resource efficiency, market development, relationship development, and innovation development (Beamon, 1999; Cousins, 2005; Prajogo et al., 2007). Resource efficiency is concerned with bottom line contributions such as cost reduction and efficiency improvement (Cousins, 2005). Market development outcomes comprise improvements within the market. They include improving market share, expanding product distribution, increasing product availability, better pricing policy and, as a consequence, an increase in profit (Cousins, 2005). Relationship development outcomes are related to improve relationships between the manufacturer and the supplier. An increase in trust and commitment is the foundation of a successful long-term relationship between the manufacturer and the supplier (Kumar, 1996), which leads to several long-term benefits such as generating long-term competitive strength, more interest in final customer needs, and faster innovation development (Zineldin & Jonsson, 2000). The development of the relationship includes activities such as developing a risk-and-reward sharing system, increasing the level of mutual involvement, expanding visibility between businesses, higher trust and commitment, and increasing the level of involvement in solving problems.

Finally, innovation development outcomes are focussed on the degree to which firms improve products and processes. These include shortening the time to develop products, developing new or more effective processes, increasing the number of new products launched each year, and providing better product quality. The first two business outcomes are related to short-term improvement when a firm faces "confronting" situations, while the latter two are related to a long-term perspective of development. Cao and Zhang (2011) claim that supply chain collaboration directly improves firm performance in terms of growth of sales; return on investment; and growth and profit margin. Collaboration is positively associated with operational performance. The supply chain member who has a higher level of collaboration practice is able to achieve better operational performance and innovative activities (Simatupang & Sridharan, 2002).

Conceptual framework and development of hypotheses

Drawing on the discussion in earlier sections, a conceptual framework is adapted from the SSP supply integration framework (Defee & Stank, 2005) and the strategic focussed outcomes model (SFOM) (Cousins, 2005). The framework (Fig. 1) represents the strategic supplier collaboration approach used for this study. Three sets of variables are linked. The first set order-winning strategy consists of the four generic order-winning criteria used to represent the strategy of manufac-

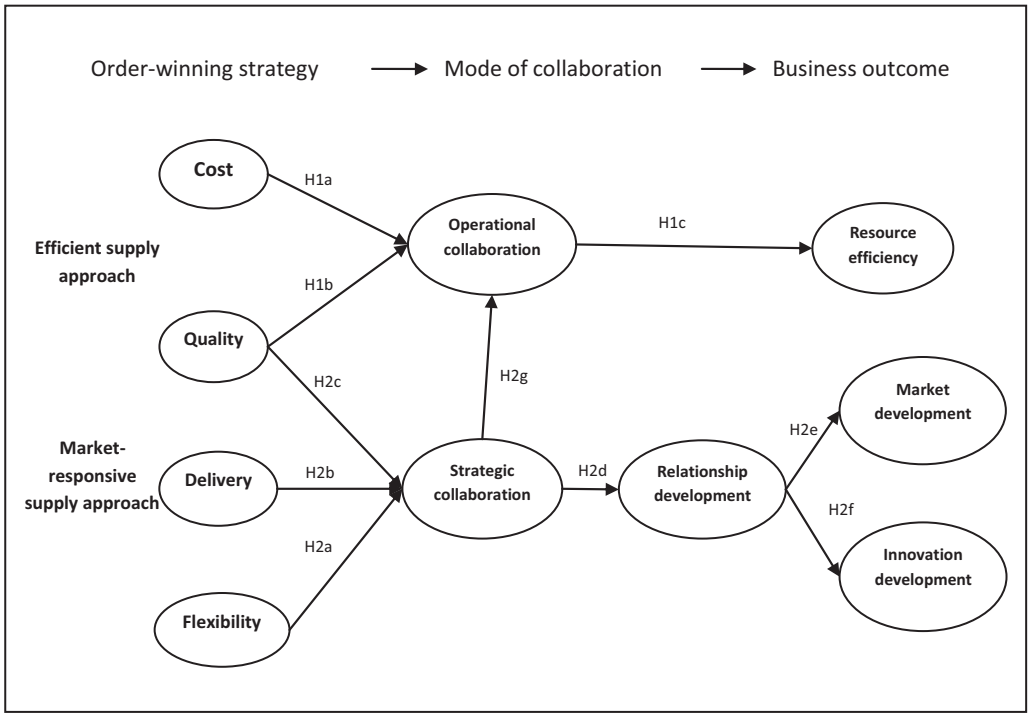

Figure 1 Hypothesised model.

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turers to win business. The second is a pair of modes of collaboration, either operational or strategic, which drives the type of collaborative behaviour between manufacturer and supplier. The third is the four dimensions of business outcomes measuring the performance of the collaborative efforts. The arrows represent the various hypothesised relationships among the indicators and the criterion variables.

The model posits that it is the order-winning strategy of the manufacturing firm that predicts the mode of supplier collaboration and, in turn, helps achieve desired business outcomes. In accordance with the literature, two possible supplier collaboration approaches were developed based on the order-winners being pursued by the manufacturing firm: the efficient supply approach, and the market-responsive supply approach (Chopra & Meindl, 2007; Fisher, 1997; Selldin & Olhager, 2007). Fisher (1997) argues for efficient supply approach for order-winners such as cost and quality, whereas the market-responsive approach argues for speed/delivery, flexibility and quality while selecting suppliers. This paper is framed as a test of Fisher's (1997) idea in the Thai context of manufacturer–buyer collaboration. Details of both approaches are discussed in the next section. A number of relevant hypotheses are proposed as well.

Efficient supply approach

The efficient supply approach uses strategies aimed at creating the highest physical efficiency at the lowest possible cost in the supply chain. An example of this approach could be firms producing commodity products with predictable demand (Fisher, 1997). In order to achieve such efficiencies, non-value-added activities should be eliminated; scale economies should be pursued (Hines, Holweg, & Rich, 2004); optimisation techniques should be deployed to get the best capacity utilisation in production and distribution; and information linkages should be established to ensure accurate, and cost-effective transmission of information across the supply chain (Lee, 2002). The purpose of an efficient supply chain is to coordinate the flow of materials and services so as to satisfy demand exactly with minimum inventories, as well as maximising efficiency of the supply chain members (Rossin, 2007). The efficient supply approach pulls together the two order-winning strategies that are cost- and quality-focussed. Manufacturers pursuing this approach aim to maximise resource utilisation, while maintaining their product quality without increasing costs.

With cost constraints, collaboration would be limited to the operational level in order to facilitate routine operations such as developing and sharing forecasts of customer demand, sharing production planning and schedules, and the common use of logistical and transport equipment. Such firms would require less value sharing in other areas with their suppliers (Wagner & Lindemann, 2008). These firms expect short-term benefits by solving confronting problems for particular situations leading to better financial performance (Reiner & Hofmann, 2006) and maintaining a secure position in the commodity market (Miles, Snow, Meyer, & Coleman, 1978). Thus order winning strategies and supplier collaboration strategies are the companies' choices and co-determined in order to achieve a positive business outcome. Failure to make such a consistent choice, would adversely impact the performance. So the hypotheses can be formulated as below:

H1 (a & b). Through the choice of cost and quality as order-winners, manufacturers will have positive support for operational collaboration.

Resource efficiency is the primary goal for intended business outcomes. Operational collaboration in the areas of information integration and logistical integration could yield greater benefits to resource utilisation in production. In summary, these firms try to lower production costs whilst maintaining the qualifying level of quality at the lowest possible cost in order to achieve resource efficiency. So it can be posited that:

H1c. Operational collaboration is positively associated with resource efficiency.

Market-responsive supply approach

Firms responding to the order-winners of flexibility, delivery and quality, on the other hand, develop their supply process strategically linking in to market-responsive approach. Quality is important for both the effective and the responsive supply approaches (Fisher, 1997; Selldin & Olhager, 2007). In keeping with the sand-cone model (Ferdows & De Meyer, 1990), quality capability is seen as the foundation of other capabilities such as cost, delivery, and flexibility.

These firms search continuously for market opportunities and respond quickly to customer needs to achieve market success. For example, a firm that produces highly innovative products faces higher uncertainty and less predictable customer demand than that with commodity products. Order-winners of these firms react quickly to market demand by positioning inventories and capacities to hedge against uncertainties in demand (Rossin, 2007). For example, firms use build-to-order and mass customisation processes to be responsive to specific requirements of customers (Lee, 2002). Closer relationships with key suppliers are a tactical tool to help them achieve their goals. Responding to their order-winners, these firms need to implement joint strategic planning to achieve common objectives (Vachon, Halley, & Beaulieu, 2009). The statement above leads to the following hypotheses for the responsive supply approach:

H2 (a, b & c). Through the choice of flexibility, delivery, and quality as order-winners, manufacturers will have positive support for strategic collaboration.

Market-responsive firms reduce uncertainty by developing a closer relationship with the supplier to obtain better long-term outcomes for market and innovation development. In some cases, specific goals such as new product development or new market entry are agreed upon when the relationship between them is being developed. It is essential for such firms to maintain their customer acceptance and competitive advantage in the long run by product and process innovation or a high level of customisation. Therefore, the following hypotheses can be formulated:

H2d. Strategic collaboration will focus on relationship development with suppliers, and in turn,
H2 (e & f). Relationship development will lead to market development and innovation development.

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Operational collaboration is likely to be enhanced between partners who trust each other because they work together frequently to achieve the same "stretching" goals for the businesses along the chain. Consequently we expect effective strategic collaboration to provide fertile conditions in which operational collaboration can be effected. Hence the final hypothesis is formulated as:

H2g. Strategic collaboration supports the achievement of operational collaboration.

Methodology

Sample and data collection

Following the Huber and Power (1985) guidelines on how to get quality data from key informants, a survey was developed using the Dillman (1978) method and administered in Thailand in 2009. A five-point Likert scale with one being "strongly disagree", three as "neutral" and five being "strongly agree" was used. Manufacturing firms registered in "Factory Directory in Thailand 2008" (Factory Directory, 2008) were the population for this study. Data collection was conducted across four major manufacturing industries in Thailand by mail survey. The sampling frame consisted of a random selection of 800 supply chain professionals from the above directory with 184 completed responses being returned, resulting in an effective response rate of 23 per cent. This was the result of reminder e-mails and phone calls sent out to those who had not responded after two weeks of initial despatch. The final respondents comprised mainly managers (60%), executives (17%) and supervisors (11%) of whom 38% had more than 10 years of experience and 62% less than 10 years. They represented the age group between 31 and 40 years (37%), 41 and 50 years (36%) and more than 50 years (10%). Most of the respondents were graduates (63%) and postgraduates (33%). The industry distribution of the respondents was Agribusiness and food processing (27%), Electric and Electronic Machinery (24%), Textiles (15%), Automotive and Transport machinery (16%), and Other sectors (18%). To ensure the research design quality, a pilot test was conducted with supply chain management professionals. Difficulties with wording, issues with item sequencing and ambiguity were then revised before the survey was administered to the full sample.

The Armstrong and Overton (1977) extrapolation method was used to assess the degree of non-response bias. Responses were divided into two waves—the responses received before reminders and those received after reminders. We conducted independent sample t-test with mean responses to each of the variables included in the model. These calculations were made under the assumption that those who responded late were similar to non-respondents (Armstrong & Overton, 1977). There were no significant differences between the groups. Therefore, non-response bias is, likely, not an inhibitor in our analyses.

Measures

The measures of four order-winning criteria used in this study are grounded in previous studies. The scale items are adapted from the measures originally used in prior manufacturing capabilities studies (Boyer & Lewis, 2002; Miller & Roth, 1994; Ward, McCreery, Ritzman, & Sharma, 1998). Cost-, quality-, delivery- and flexibility-focussed strategies were initially measured using a 6-item, 5-item, 5-item and 6-item scale, respectively. Operational collaboration and strategic collaboration are adapted, using a 6-item and 7-item scale respectively, from a scale developed by Cousins (2005). Resource efficiency used a 6-item scale; market development used five items; relationship development used six items; and innovation development used six items. These latter scales are adapted from those developed by Beamon (1999); Cousins (2005); Prajogo et al. (2007).

A group of supply chain academics was employed to check any misunderstanding or ambiguities of expression in the questionnaire. The group provided feedback on clarity, applicability and contextual relevance of the items to ensure content validity. Difficulties with question wording, problems with leading questions, and bias due to the order of questions were removed through this process. A panel of supply chain doctoral students completed the questionnaire and provided feedback regarding instrument clarity and time required for completion. The feedback was incorporated and then the final version of the questionnaire was distributed to the full industrial sample.

Results

Measurement validation

After data collection, each measure was examined for item-to-total correlation (Churchill, 1979). No scale item was deleted at this stage as no correlation coefficient was more than 0.73 which falls within threshold value 0.8 (Hair, Black, Babin, & Anderson, 2010) and the dataset was free from multicollinearity. Exploratory factor analysis (EFA) indicates that all the major variables in the study were unidimensional scales. Further, confirmatory factor analysis (CFA) reconfirmed the unidimensionality through one factor congeneric model test in AMOS 20 resulting in poor goodness-of-fit indices.

Harman's one-factor test is a widely used approach to assess common method variance (CMV) (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), as a source of bias that might affect relations among the constructs. Exploratory factor analysis ensured that a single factor was not obtained from the factor analysis of all scale items, nor that a single factor accounted for most of the covariance in the indicators and criterion variables. The above congeneric model through CFA with non-significant goodness-of-fit indices confirmed the absence of CMV. Therefore, CFA suggested that the CMV was not a cause of concern in our analysis. The indices for Harmon's one-factor congeneric model with 37 items were: $\chi 2$ (DF = 630) = 1959.202, p-value = 0.000; $\chi 2/df = 3.11$, GFI = 0.570, AGFI = 0.520, TLI = 0.533, CFI = 0.558, NFI = 0.467, RMR = 0.052, RMSEA = 0.107.

The proposed model comprises 10 multi-item constructs with a total of 37 scale items. We used AMOS 20 to run the CFA. The CFA estimates an a priori measurement model where the observed variables are mapped onto respective latent constructs (Peng, Schroeder, & Shah, 2008). The CFA results for

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Table 1 Scale items, confirmatory factor analysis (CFA) factor loadings, composite reliability (CR), average variance extracted (AVE).

Construct	Scale items	Factor loading*	CR	AVE
A. Scale and factor loading of order-winners from CFA (N = 184)				
Cost (α = .64)	1. Running equipment at peak efficiency (C1)	.66	.74	.49
	2. Improving labour productivity (C2)	.57		
	3. Improving labour productivity (C3)	.59		
Quality	4. Offering high product performance (Q1)	.56	.75	.52
(α = .71)	5. Offering product with high durability (Q2)	.49		
	6. Conformance of final product to design specification (Q3)	.50		
	7. Ability to provide product support effectively (Q4)	.76		
Delivery	8. Providing short time delivery (D1)	.67	.86	.60
(α = .77)	9. Dependability delivery promise (D2)	.71		
	10. Delivery accuracy (D3)	.81		
	11. Delivery availability (the probability that item will be available in stock at order time) (D4)	.54		
Flexibility	12. Ability to make design changes in the existing product (F1)	.61	.84	.65
(α = .75)	13. Ability to adjust volume rapidly within a short time period (F2)	.84		
	14. Ability to change product mix rapidly within a short time period.(F3)	.71		
B. Scale and factor loading of mode of collaboration factors from CFA (N = 184)				
Operational	15. Linking order and replenishment (OC1)	.62	.82	.54
collaboration	16. Share production planning & schedule information (OC2)	.57		
(α = .79)	17. Common use of logistical equipments /transportation (OC3)	.54		
	18. Move towards joint capacity management (OC4)	.84		
Strategic	19. Develop mutual goals and objectives (SC1)	.73	.91	.68
collaboration	20. Joint new product development (SC2)	.72		
(α = .86)	21. Share production engineering knowledge and capability (SC3)	.74		
	22. Working together to enable new market entry (SC4)	.73		
	23. Develop mutual performance measurement (SC5)	.79		
C. Scale and factor loading of firm business outcome from CFA (N = 184)				
Resource efficiency	24. Reduce our production cost (B1)	.70	.84	.57
(α = .76)	25. Reduce level of inventory(B2)	.60		
	26. Shortened production lead time (B3)	.71		
	27. Streamline supply chain processes (B4)	.64		
Relationship	28. Increase visibility of partner's business (R1)	.66	.89	.72
development	29. Increase the level of trust with each other (R2)	.86		
(α = .81)	30. Increase the level of commitment with each other (R3)	.80		
Market	31. Expand channel of product distribution (M1)	.75	.90	.75
development	32. Increase level of product availability to the market (M2)	.87		
(α = .83)	33. Better pricing policy (M3)	.75		
Innovation	34. Increase ability to develop existing product (I1)	.83	.92	.73
development	35. Develop more or new effective processes (I2)	.82		
(α = .87)	36. Provide wider range of product and service (I3)	.72		
	37. Introduce greater number of new products each year (I4)	.75		

*p < .001.
CFA model: χ^2 (p value) = 88.447 (0.067), df = 70, χ^2/df = .1.264, GFI = 0.937, AGFI = 0.906, NFI = 0.885, TLI = 0.965, CFI = 0.973, RMSEA = 0.038.
CFA model: χ^2(p value) = 41.711(.019), Bollen–Stine p = 0.169, df = 25, χ^2/df = 1.668, GFI = 0.952, AGFI = 0.914, NFI = 0.945, TLI = 0.966, CFI = 0.977, RMSEA = 0.060.
CFA model: χ^2(P value) = 93.649 (.021), Bollen–Stine p = 0.328, df = 338, χ^2/df = 1.377, GFI = 0.932, AGFI = 0.894, NFI = 0.930, TLI = 0.972, CFI = 0.979, RMSEA = 0.045.

overall model fit of order-winner strategies, mode of collaboration, business outcome, and the factor loadings of first order scale items are presented in Table 1 (A, B, C). The goodness-of-fit (GOF) indices statistics for all three CFA suggest that all models fit well. All GOF indices are above the recommended cut-off points except NFI = 0.885 for order-winners which is marginally low and accepted as fit. All factor loadings are greater than 0.50 (p < .01) (Anderson & Gerbing, 1988), with the exception of one factor of "Quality", which was marginal at 0.49, and was retained.

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Analysis of reliability and validity

We assessed the reliability of the 10 latent constructs by using Cronbach alpha and construct reliability (CR). Cronbach alpha values vary from 0.64 to 0.87 (Table 1 A,B,C). The minimum acceptable value is 0.7 (Hair et al., 2010). However, the lower limit of acceptability is considered to be around 0.6 (Cronbach, 1951; Nunnally, 1978). This shows a reliable internal consistency among the scale items loaded on to their respective latent constructs. The CR estimates for these latent constructs ranged from 0.74 to 0.92 (Table 1 A, B, C). Since the values are above 0.7, this indicates that the constructs have good composite reliability (Fornell & Larcker, 1981). The CFA provides a stringent test of convergent and discriminant validity (Fornell & Larcker, 1981). The first approach to assess convergent validity examines factor standardised loading for each indicator. All first order items are significantly loaded on their respective latent variables and well above the recommended value of 0.5 ($p < 0.001$) (Anderson & Gerbing, 1988). It indicates that 10 latent constructs appear to have convergent validity (Table 1 A,B,C). The second is a more rigorous test of convergent validity by assessing the average variance extracted (AVE). The AVE value of 0.5 indicates good convergent validity (Fornell & Larcker, 1981). As shown in Table 1 A, B, C, most of AVE estimates were above 0.5 except for sub-construct "cost-focus" which is marginally at 0.49. The evaluation of the measurement model is based both on statistical principles and known theory justification. The combination of theoretical justification and the statistical significance of the relationships among order-winning strategy, mode of collaboration and business outcomes, means that the constructs have adequate convergent validity.

Discriminant validity is examined by the factor loading examination, and the pattern and structure coefficients (Thompson, 1997). It examines the difference between the pattern and structure coefficients. The pattern coefficients are found to be higher than all the structure coefficients. The pattern coefficients are the standardised factor loading while structure coefficients are the influence of each factor on the items not hypothesised to comprise that factor. Further, the highest correlation coefficient of these 10 constructs is 0.64 which is below 0.8, so the latent constructs have discriminant validity (Anderson & Gerbing, 1988). The results distinguish well among these 10 constructs, confirming acceptable discriminant validity.

Overall, the findings provide reasonable strong evidence in support of reliability, convergent validity and discriminant validity of the constructs ready for the structural path analysis. Table 2 presents mean, standard deviation (SD), and correlation coefficients. Also provided are the Cronbach alpha values italicised along the diagonal.

Measurement model and hypothesis testing

The path model produced the following fit result: χ^2 (p value) = 44.604(.004), Bollen-Stine p = .072(>0.05), df = 23, χ^2/df = 1.939, GFI = 0.957, AGFI = 0.898, CFI = 0.967, NFI = 0.936, TLI = 0.935, RMSEA = 0.072. All the fit measures are above or close to the recommended cut-off points. This suggests that the specified model adequately captures the hypothesised relationship among all variables. Table 3 provides the results of the hypotheses testing and Fig. 2 presents the complete empirical SEM path model with standardised loadings. All significant relationships are accepted. The p-value associated with χ^2 statistics is 0.004 which should ideally be more than 0.05 (Hair et al., 2010). However, we tested the model by running the bootstrap (Bollen & Stine, 1992) to get Bollen–Stine p value of 0.072 which is more than 0.05. Since all other measures are acceptably fit, we believe that, overall, an adequate level of fit is obtained.

Each of the hypotheses will now be discussed in turn. Hypothesis H1a stated that through the choice of cost as an order-winner, manufacturers were positively associated with suppliers by operational collaboration. The SEM structural path from cost focus to operational collaboration shows a positive and significant link. Therefore, H1a is accepted. H1B stated that through the choice of quality as an order-winner, manufacturers were positively associated with suppliers by operational collaboration. The path model shows a positive and significant relationship between quality and operational collaboration. H1b is also accepted. H1c stated that operational collaboration is positively associated with resource efficiency. The path analysis shows a significant and

Table 2 Mean [b], standard deviation (SD), and construct correlation coefficients[a]

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10
Cost	4.2	.52	*.64*									
Quality	3.80	.70	.33	*.71*								
Delivery	4.39	.54	.33	.38	*.77*							
Flexibility	3.52	.77	.37	.48	.38	*.75*						
Operational collaboration	3.56	.45	.30	.42	.31	.34	*.79*					
Strategic collaboration	3.54	.25	.22	.41	.37	.40	.64	*.86*				
Resource efficiency	4.11	.65	.14	.22	.19	.25	.38	.42	*.76*			
Relational development	3.99	.48	.15	.25	.22	.33	.32	.48	.55	*.81*		
Market development	3.73	.59	.12	.21	.19	.25	.31	.48	.58	.54	*.83*	
Innovation development	3.77	.72	.14	.25	.22	.28	.36	.56	.45	.58	.61	*.87*

[a]All correlation coefficients are significant at $p < .001$.
[b]Items measured on a 5-point Likert scale (1 = strongly disagree, 3 = neither agree or disagree, 5 = strongly agree).
Cronbach alpha values are *italicised* along the diagonal.

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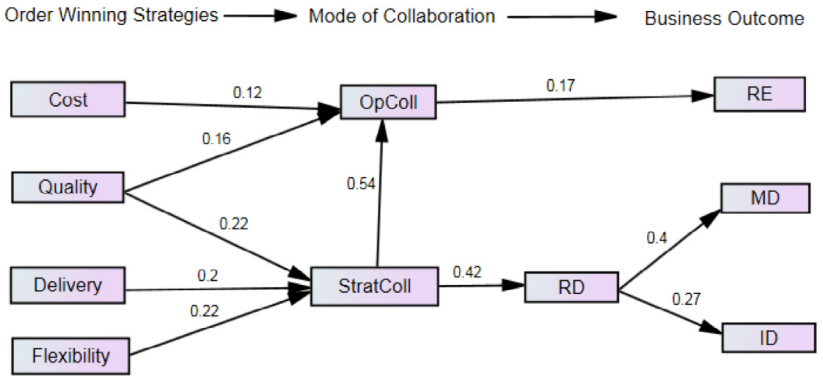
Table 3 Path analysis parameter estimates.

Paths	Standardised parameters	Unstandardised t-values
Main effects		
Cost → Operational collaboration	.12	1.31***
Quality → Operational collaboration	.16	2.63**
Quality → Strategic collaboration	.22	2.96**
Delivery → Strategic collaboration	.20	2.87**
Flexibility → Strategic collaboration	.22	2.92**
Operational collaboration → Resource efficiency	.17	2.89**
Strategic collaboration → Operational collaboration	.54	9.04*
Strategic collaboration → Relational development	.42	6.02*
Relational development → Market development	.40	5.87*
Relational development → Innovation development	.27	4.26*
Covariance effects		
Cost ↔ Quality	.33	4.26*
Cost ↔ Delivery	.33	4.26*
Cost ↔ Flexibility	.37	4.68*
Quality ↔ Delivery	.38	4.80*
Quality ↔ Flexibility	.48	5.85*
Delivery ↔ Flexibility	.38	4.77*

*p < .001, **p < .01, *** p < .05.



Note: OpColl- Operational collaboration, StratColl- Strategic collaboration, RD- Relational development, RE- Resource efficiency, MD- Market development, ID- Innovation development

Figure 2 Structural path model.

positive link between operational collaboration and resource efficiency. H1c is also supported.

The second hypothesis (H2) proposed that firms employing flexibility, delivery and quality as order-winning criteria would develop their supply process towards a responsive supply approach. Hypotheses H2 (a, b, c) stated, respectively, that through the choice of flexibility, delivery and quality as order-winners, the manufacturer was positively related to strategic collaboration with suppliers. The SEM model shows a significant and positive link with strategic collaboration. Hence H2a, H2b and H2c are supported. Hypothesis H2d stated that strategic collaboration was positively associated with relationship development with suppliers that in turn would be positively associated with market development (H2e) and innovation development (H2f). The SEM path analysis shows that all these links are significantly and positively associated with each other. So H2d, H2e and H2f are accepted. We also postulated that strategic collaboration supported the achievement of operational collaboration (H2g). The path model also supported this link. The model also had an additional path from relationship development, significantly and positively linked, to resource efficiency outcome. Further, strategic collaboration also significantly and directly linked to improvement in market and innovation development. This is consistent with the study by Peng et al. (2013). (The latter relationships are not shown in the SEM path model (Fig. 2), corresponding to the hypothesised model presented earlier in Fig. 1).

The study, therefore, suggests that operational collaboration will lead to improvement in resource efficiency. Strategic collaboration also appears to strengthen relationship development, and ultimately market and innovation

development. The following section discusses these findings and suggests implications for managers.

Discussion

The paper examines the applicability of both strategy–structure–performance (SSP) and strategic choice theories in the context of the Thai manufacturing sector. It explores the extent to which manufacturing strategies adopted by firms will influence the business performance by choice of an appropriate collaboration type with suppliers. The results support the argument that the tailoring of manufacturing strategy to achieve particular order-winners decides whether the mode of collaboration should be operational or strategic. Such a choice should ultimately affect the level of business outcome that the respondents wish to achieve. The use of cost and quality as order-winning strategies are likely to direct their collaboration towards an efficient supply approach by developing operational collaboration with suppliers. This will tend to improve resource efficiency while satisfying the end customer needs without quality compromise. The cost-focussed (or transaction cost) approach will move the firm to an advantageous position in the commodity market rather than in an innovative market.

Alternatively, the respondents perceive that flexibility, delivery and quality as their order-winning strategy will help manage their supply chain through a market-responsive approach. This approach allows for a long-term strategic view of the business. By developing strategic collaboration with a key supplier, it is likely that firms achieve quick delivery responses to unpredicted demand from customers, resulting in the long-term benefits of market improvement, and innovation development. The development of flexibility and delivery are perceived as the main order-winning criteria by firms moved on a customer-driven path to achieve customer orders. The quick response to the change in customer demand is appropriate when cost efficiency is not the key to success in the market. Examples include highly innovative products, such as computer equipment. These markets reflect the characteristics of innovative products with unpredictable demand, short product lifecycle, high product variety and higher price margins than commodity products.

A quick response to the market is the key to success in markets requiring innovative products. Improving the capability, for example, delivery speed and flexibility of the product and process could increase the rate of response to customer demand and coping with demand uncertainty. In addition to internal integration, strategic collaboration could be used to develop these capabilities. Setting up mutual goals and objectives between partners (such as manufacturer and supplier) provides the big picture for future strategic direction, smoothening the production operations by reducing the barrier caused by the interfaces between those two firms. Sharing production engineering knowledge and capability improves operational process and product design. Therefore, to cope with demand uncertainty, smooth flow and visibility across every interface between supplier and manufacturer is believed to be important. Early involvement of the supplier in product and process design is important to deal with such uncertainty. For example, the use of modular design as a postponement tactic in the production process cannot be very effective without cooperation in the early stage between the supplier and the manufacturer. In some cases, joint development teams are established to penetrate a new market. Collaboration with a local supplier is a good practical example when a multi-national firm uses it to gain some local benefits and use the supplier experience and market know-how to enter a new market.

Relationship development is likely an important process to support strategic collaboration. An increase in trust, commitment and visibility appears to enhance market development and innovation development. These relationship elements provide a less formal atmosphere between the manufacturer and the supplier, and more confidence in the partner with a higher degree of common value sharing. The close relationship enables both parties to focus on the long-term benefits of working together. In short, the market-responsive approach with delivery, flexibility and quality as order-winners is perceived as more strategic.

Both hypotheses, H1 and H2, are accepted, implying that all the relevant constructs are significantly associated indicating positive causation. From the SEM path model, it is clear that the order-winners are associated with modes of collaboration and business outcomes and show the direction of causation. As a result of the model, respondents perceive that manufacturing strategies indicate the preferred collaboration structure the firm should adopt. This alignment of manufacturing strategies to organisational structure will bring in a range of business benefits. It represents a clear relationship among strategy, structure, and performance (SSP).

Implications

This research examines the role of order-winning strategy in predicating the preferred type of relationship with suppliers. It addresses the existing knowledge gap in determining the influence of order-winners via manufacturing strategy on the structure of collaboration between manufacturers and suppliers. Preferably suppliers should align with what the manufacturer requires to satisfy the latter's performance in the market, such as timing of delivery. The research extends the theory of strategic choice and the strategy-structure-performance paradigm which posit that firms commonly behave within the boundary of their own interest. From the results, the respondents believe that firms will determine their relationships with suppliers according to the direction of their own focussed competitive strategy. Hence the supply management approach derived here is considered a tool to create value by securing the help of suppliers to win orders from customers.

It is important for practitioners to understand that manufacturing strategy must align with business strategy. This research implies that any misalignment will result in the firm not achieving its full potential in business outcomes. The strategists of firms are required to ensure the right type of collaboration with suppliers. Such supply management could become a tool for a firm to reach its expected goals. Better performance will only be achieved if strategic intent and structure (i.e. modes of collaboration) are aligned. However, the study does not indicate that firms have to choose between these two modes of collaboration, they could be complementary. But the model illustrates the link of particular manu-

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facturing priorities to specific collaboration practices leading firms to focus on a particular type of collaborative activity to achieve their goal.

Conclusion

The paper depicts a clear relationship between specific order-winning strategy, the modes of collaboration, and the business outcomes. Different collaboration structures based on customer-driven order-winning criteria are being used by manufacturers to meet their ultimate objectives. Therefore, the most important finding from this study is that only the right combination between manufacturing strategy and type of supplier relationship can lead to an excellent outcome. A mismatch between those two could lead to unresolved results. The research model provides guidelines for firms to follow using a supply management approach as the strategic tool to reach their goal. Operational collaboration might limit outcomes from the relationship while strategic collaboration could lead to the full range of benefits for manufacturer–supplier cooperation. However, the key success factor, as the respondents believe, is that firms have to use the right type of collaboration, matching it with the main objectives. The type of collaboration could change over time depending on the change of strategy.

The limitations of the study point to a future research agenda. On the methodological side, the research setting and survey undertaken among respondents in one country could limit the generalisability beyond the sampling frame of the study. While the CFA and SEM path model employed do have good theoretical support and exhibit robustness in analysis, future research through a larger sample size would increase the statistical power of the model. An alternative model (saturated model) could also be tested with a larger dataset. Further, longitudinal data could improve our current understanding of the path relationships and help further study on causations. Qualitative case studies in future could explore more issues in the SSP process. On the theoretical side, since the nature of competition is dynamic, order-winning criteria may be switched when competitive conditions change. From the strategic choice perspective, collaborative behaviour should be changed to match order-winning strategy. This leads to an interesting question about how the firm transforms its collaborative structure in order to realign with such a strategic change. A case study looking at the process of transformation would be worthwhile to study a firm's ability to develop such change or to study the constraints that a firm needs to overcome in order to match collaboration practice to the change in strategy. Only a dyadic relationship between manufacturing firm and supplier was considered in this research. The study of triad relationships from supplier, manufacturer to customer or network-like relationships could provide a bigger picture of collaboration in the supply chain. Future research can accommodate additional order-winners/competitive priorities such as customer service, responsiveness and time to market (Phusavat & Kanchana, 2007).

In conclusion, this research sheds some light on the formation of inter-organisational relationships based on strategic choice theory. Our model shows that firms focussed on flexibility and delivery dimensions should develop strategic collaboration with suppliers in order to respond quickly to customer demand and achieve long-term benefits. Significant relationships are found between order-winning strategies, mode of collaboration and business outcomes. Driven by the right order-winning strategies, firms can achieve competitive advantage through strategically focussed collaboration.

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