


# Ambidextrous Learning in Buyer-Supplier Relationships: The Role of Strategic and Operational Information Sharing


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## ABSTRACT

Achieving competitive advantage in a dynamic environment requires firms to exploit their current capabilities and explore new opportunities through innovation. Organizational learning theory refers to these two types of focused learning activities as exploitation and exploration, and jointly as ambidextrous learning. Suppliers can play an important role in the learning process. This research focuses on the role of strategic and operational information sharing between buyers and suppliers in promoting ambidextrous learning. Based on a survey of supply chain managers in U.S. manufacturing firms, the findings indicate that sharing operational information promotes exploitative performance, while sharing strategic information promotes exploratory performance. Both exploitative and exploratory performance improvements positively relate to the buyer's financial performance, but these relationships are moderated by the buyer's product innovation strategy. Exploratory performance is particularly important for firms pursuing a high innovation strategy to maximize financial performance.

## KEYWORDS

Ambidextrous Learning, Exploitation and Exploration, Financial Performance, Supply Chain Management

## INTRODUCTION

Information is necessary to reduce uncertainty, maintain efficient operations, and develop innovative new products, services, processes, and strategies (Huber, 1991; Lee et al., 1997; Li et al., 2014). Firms whose strategies involve complex interorganizational relationships face an even greater challenge, as pertinent information exists not only within the firm's boundaries, but also in external entities (Kilpi et al., 2018). The integration of this information has become more complex due to the increasing number of individuals and organizations involved in supply chains, the increasing asymmetry of information, and uncertainty as to how to structure information and relationships for future information requirements (Becker, 2001). A firm's strategic suppliers – those who are integrated with

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an organization strategically, operationally, and technologically (Hult et al., 2007) – can be important sources of information as manufacturers navigate the uncertain and dynamic business environment (Andersen et al., 2020). Data and information rich organizations that effectively use information to increase organizational learning have been found to be top performers (Davenport, 2013); thus, it is critically important for firms to leverage their supply chains for information.

Information sharing in supply chain relationships has been linked to such organizational benefits as cost reductions (Sahin & Robinson, 2005), improved delivery performance (Zhou & Benton, 2007), and increased financial performance (Berezinets et al., 2020). Most research concerning information sharing in buyer-supplier relationships has focused on the quality of information shared or the willingness to share information (Li et al., 2005), while other studies have focused on the scope of information shared (Grant, 1996). Prior research has examined information sharing in buyer-supplier relationships for improved performance; however, the aggregated information scope measures used in this research did not make a distinction between operational and strategic content (e.g., Li et al., 2014; Gulati & Sytch, 2007). This study focuses on making the operational-strategic distinction in order to explain the effects of organizational learning on supply chain performance.

Organizational learning theory focuses on two types of learning: exploration, which includes activities focused on searching for new ideas or innovations; and exploitation, which focuses on operational efficiency and execution (March, 1991). This study makes the operational-strategic distinction to explain how the information shared between suppliers and buyers can impact both exploitative and exploratory performance and finally the buyer's financial performance. The goal of this study is to examine how to balance exploitative and exploratory organizational learning (i.e., ambidexterity) to achieve strategic goals and to maximize the firm's financial performance. The authors intend to show that ambidextrous learning should be aligned with a firm's product innovation strategy.

## **THEORETICAL MODEL AND HYPOTHESES**

Organizational learning theory states that organizations adapt to changing conditions in the business environment by continuously learning and applying the lessons learned to achieve superior performance (Huber, 1991). An appropriate balance between exploration and exploitation in organizational learning is required. Exploitation, which focuses on the efficient management of current processes is shorter term and less risky, as opposed to exploration, which seeks new ideas and innovations and yields longer term outcomes and entails more risk (March, 1991). The successful balancing of the two forms of learning to maximize the firm's desired goals is known as ambidexterity (Chandrasekaran et al., 2012; Lennerts et al., 2019).

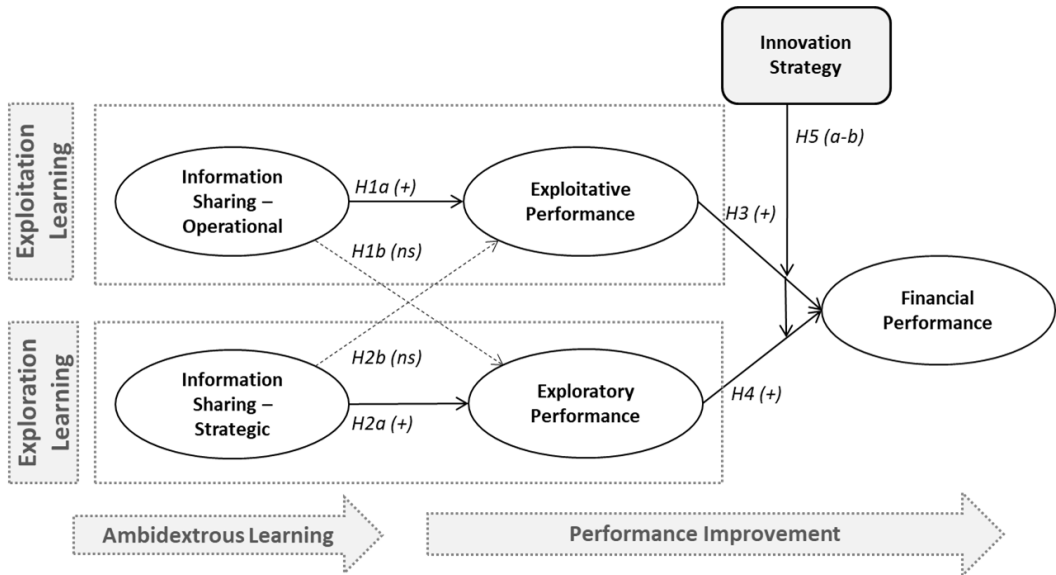
### **Operations Management Application of Organizational Learning Theory**

From an operations management perspective, the benefits of ambidexterity include achieving efficiency, flexibility, and product innovation (Menor et al., 2007; Kristal et al., 2010; Saenz et al., 2014). Researchers have studied exploitation and exploration in conjunction with the operational and strategic dimensions of relationships (Sanders, 2008), and with consideration to temporal distinctions (short-term versus long-term) of shared information (Im & Rai, 2008). In the present study, the authors define exploratory learning as the pursuit of opportunities to gain competitive advantages along the dimensions of product improvement, process improvement, and quality improvement, leading to strategic performance improvement. The authors define exploitative learning in terms of operational efficiency to gain the ability to respond to customer requests in a timely manner, delivery reliability and process flexibility leading to exploitation of current capabilities. The aim of this study is to explore how the supply chain management (SCM) function can play a role in determining a firm's ambidexterity (Gualandris et al., 2018; Andersen et al., 2020).

The conceptual model, based on organizational learning theory, is shown in Figure 1. The authors posit that ambidextrous learning can be achieved when organizations integrate operational and

strategic information from their suppliers. The authors argue that when firms achieve exploitative and exploratory performance, they gain a competitive advantage and improve their financial performance. More complex environments typically require more information and greater exploratory knowledge to respond to external changes (Tushman & Nadler, 1978). Thus, the authors expect exploration to be particularly important for firms pursuing a strategy based on innovation. The hypotheses are detailed below.

Figure 1. Conceptual model



### Operational Information Sharing and Exploitative Performance

Consistent with Kristal et al. (2010) and Im & Rai (2008), the authors define exploitative performance in terms of operational efficiency. Exploitative performance is defined as the ability to respond to customer requests in a timely manner, and it requires capabilities for delivery reliability and process flexibility. The authors follow Rosenzweig et al. (2003) and measure these capabilities using variables such as delivery speed, accurate estimates of delivery dates, on-time performance, and the ability to quickly make changes to product mix and volume.

The authors propose that sharing operational information in buyer-supplier relationships promotes exploitative learning, which supports short-term exploitative performance. Information flowing from suppliers can help managers plan their own operations, predict potential problems, and make more accurate promises to their customers (Schoenherr & Swink, 2012; Kilpi et al., 2017; Liu et al., 2021). Receiving timely information can also allow firms to quickly make changes to their schedules, thus increasing their flexibility (Saenz et al., 2018). For example, the sharing of schedule and inventory information can potentially lead to improved coordination-related outcomes such as a reduction of the bullwhip effect (Yu et al., 2001), increased supply chain responsiveness (Zhou & Benton, 2007), and improved inventory management and cost control.

Strategic information sharing, conversely, focuses on long-term exploratory learning and knowledge such as understanding sales trends, creating new business opportunities, and planning for new products (Sanders, 2008). Exploratory learning promotes joint flexibility and adaptation over time (Ireland & Webb, 2007; Saenz et al., 2018) leading to increased exploratory performance. The

long-term nature of strategic information is inconsistent with short-term exploitative performance; therefore, strategic information sharing is not expected to have a significant effect on exploitative performance.

Hypothesis 1a: *Operational information sharing is positively related to exploitative performance*

Hypothesis 1b: *Strategic information sharing is not significantly related to exploitative performance*

### **Strategic Information Sharing and Exploratory Performance**

The authors follow Kristal et al. (2010) in defining exploratory learning as the pursuit of opportunities to gain long-term operational advantages. Exploratory learning has been operationalized in operations management research in terms of product and process innovation (Saenz et al., 2014), improvements to the supply chain, and novel approaches to supply chain problems (Kristal et al., 2010). Since this study focuses on the role of suppliers, the authors have operationalized exploratory performance using a scale developed by Kotabe et al. (2003) that measures the supplier's contribution to the buyer's performance along the dimensions of product improvement, process improvement, and quality improvement.

Whereas operational information sharing is related to current, short term issues, strategic information sharing is related to long term issues such as product and process design. The diverse knowledge that is brought together and recombined when firms interact can provide the basis for innovation (Carlile, 2004), which is often an objective that buyers seek from their suppliers (Krause et al., 2001). Discussion of these complex issues can help to ensure that both firms uniformly understand the current changes in technology, products, and markets. Additionally, frequent discussion of these issues can be used to reconcile conflicting perceptions of the business environment and identify areas where the firms may be deficient or where they have mutual opportunities to improve products and processes. By integrating strategic supplier knowledge, the supplier can have a direct impact on the firm's product and process design, product quality, and lead time performance. Operational information, on the other hand, does not directly relate to long term, strategic issues, and is therefore, not expected to have a significant effect on exploratory performance.

Hypothesis 2a: *Strategic information sharing is positively related to exploratory performance*

Hypothesis 2b: *Operational information sharing is not significantly related to exploratory performance*

### **Financial Performance**

Although exploitative and exploratory performance reflect positive outcomes for the firm, an assumption should not be made that these outcomes necessarily lead to positive financial performance (Ray et al., 2004). Flynn et al. (2010) found that inconsistencies in research on supply chain integration could be resolved by analysing the individual elements of integration, rather than the construct as a whole. Also, it was determined that the individual elements of supply chain integration had different impacts on operational performance and business performance. Niranjana et al. (2018) found that information sharing does not directly affect firm performance and considered the mediating effects of flexibility which includes elements of exploitative and exploratory performance.

In this study the authors test the effects of exploitative performance and exploratory performance on financial performance. In terms of exploitative performance, if a firm consistently makes deliveries as promised and is flexible in changing its outputs, the firm is more likely to satisfy customers and decrease costs, thus leading to continued revenue streams and increased financial performance. Regarding exploratory performance, if a firm is able to continuously innovate to update its products and services due to supplier relationships, the firm can perform better than their competitors, thus ensuring positive financial performance.

Hypothesis 3: *Exploitative performance positively affects financial performance*

Hypothesis 4: *Exploratory performance positively affects financial performance*

## Product Innovation Strategy

Firms can achieve differentiation and compete effectively by following an innovation-focused strategy (Droge et al., 2008), which is defined in this research based on whether the firm's new product was designed to be first to market and whether it was based on early market signals about an opportunity (Lawson et al., 2012). Making a distinction between exploitative knowledge needs and exploratory knowledge needs is particularly important for firms with a product differentiation strategy. Whereas a firm that is pursuing a cost leadership strategy can succeed by exploiting its current position through the efficient execution of its established strategy, firms seeking product innovation must consistently be aware of opportunities as well as renew and realign their resources to facilitate innovation efforts (Teece, 2007; Vanpoucke et al., 2014).

The authors argue that when firms pursue a strategy based on being innovative, it becomes increasingly important for them to generate knowledge through supplier relationships. Supply chain partners can help a firm to achieve innovation by aiding in the interpretation of customers' needs to ensure that the right products are being manufactured and marketed (Fisher, 1997). Relationships with suppliers extend the ability of a firm to draw upon the knowledge residing in supply chain partners to improve their products and processes and thus increase financial performance through consensus decision-making (Tushman & Nadler, 1978). When firms pursue innovation, although exploitation of current capabilities is somewhat value-added, the ability to explore and develop successful new innovations is more directly related to the financial success of the organization, and therefore, exploratory performance takes on additional importance.

Exploitative performance, conversely, drives financial performance through the efficient manufacturing and delivery of products to support existing revenue streams. Hence, in firms pursuing an innovation strategy, existing revenue streams are relatively less important than the development of innovative new products. Therefore, the authors argue that the efficiency that comes with exploitation contributes less to financial performance when firms are pursuing an innovation strategy and is more beneficial in a low innovation environment.

Hypothesis 5a: *Innovation strategy negatively moderates the exploitative performance to financial performance relationship*

Hypothesis 5b: *Innovation strategy positively moderates the exploratory performance to financial performance relationship*

## METHODOLOGY

### Survey

In this research, previously validated scales were used with minimal adaptation to ensure reliability and validity, and to avoid instrumentation bias (Churchill, 1979). The delivery performance/process flexibility scale from Rosenzweig et al. (2003) and buyer performance scale from Kotabe et al. (2003) were adapted to measure exploitative performance improvement ('*Meeting delivery dates*', '*Rapidly change product mix*') and exploratory performance ('*Improve product design through this relationship*'). Financial performance was measured using a scale from Green et al. (2012). Two items of the Lawson et al. (2012) scale ("*This product was intended to be 'first to market'*" and "*This product was a response to early market signals about an opportunity*") were used to measure product innovation-focused strategy.

The information sharing constructs were developed using Gulati and Sytch's (2007) information sharing scope scale. Rather than treating information scope as a broad reflective construct as in

Gulati and Sytch (2007), the authors viewed it as a multifaceted formative construct. By viewing information scope as a formative variable, rather than a reflective latent variable, we recognize that there may be different drivers for sharing different types of information. From exploratory factor analysis (EFA), two formative variables emerged from the data as logical groupings of types of data along the dimensions of operational and strategic information.

Best practices in survey design were followed to minimize potential bias (Dillman, 2009), and additional statistical analyses were performed to investigate the possibility of bias in the sampled data. A pilot study consisted of a panel of experts comprised of three academics and four practitioners, who reviewed the survey for face validity. Based on their feedback, minor modifications were made to the wording of questions.

An EFA showed that all items load onto the appropriate factors instead of a single factor. According to Harman's test, the amount of shared variation among survey variables in the unrotated EFA solution constrained to a single factor was not substantial (31.62%). Finally, inclusion of a common latent factor in the confirmatory factor analysis resulted in a slight change in the standardized regression weights (0.09 or less compared to the threshold of 0.20). Hence, common method variance was negligible with no emergence of a single factor.

## **Data Collection**

The survey was mailed to 1,500 supply chain managers at U.S. manufacturing firms identified through the Hoovers Decision Makers list. After two weeks, every targeted individual who had not responded was contacted by phone. Out of the 1,500 surveys mailed, the total number of surveys that reached a potential respondent was 1,013. Of these potential respondents, 100 usable surveys were received, resulting in an effective response rate of 9.9%. The effective response rate of 9.9% is relatively low, indicating that non-response bias could be a problem. However, relatively low response rates have become more common as survey fatigue has set in with many managers. Recent recommended standards (Carter et al., 2008) and publications in major journals (e.g. Braunscheidel & Suresh, 2009, Kristal et al., 2010) indicate that response rates of around 10% are acceptable.

To test for non-response bias, early responses were compared to late responses under the assumption that late responders are somewhat representative of non-respondents (Lambert & Harrington, 1990), and no significant differences were found. Additional tests of the annual revenue and number of employees of the responding and non-responding organizations detected no significance differences suggesting that responding organizations were representative of the sampling frame (Diaz De Rada, 2005). These findings indicate that non-response is not a significant problem. Finally, to avoid historical bias, the data was collected over a short period of approximately three months (DeVellis, 2003).

## **Sample**

The final sample consisted of 100 usable responses from the target population. Respondents have an average tenure of 9.7 years in an SCM position and are employed by various firms in the U.S. manufacturing industry. According to the Manufacturing Institute (2014), small and medium firms dominate the US manufacturing sector. Companies with annual revenues smaller than \$50 million accounted for 67.3% of the sample suggesting that the collected sample is representative of the US manufacturing industry.

## **Modelling Procedures**

To test for the effects of information sharing on firm performance, a holistic modelling approach using PLSPM was chosen. PLSPM has become popular in business research, as this estimator uses distribution-free permutation tests and bootstraps when testing hypotheses for complex models with limited sample size (Henseler et al., 2016; Ringle et al., 2012). Unlike covariance-based structural equation modelling, PLSPM is able to test relationships between formative and reflective latent

variables (Diamantopoulos & Winkelhofer, 2001). The research model was estimated using XLSTAT software, version 19.

Hypotheses 1–4 were tested using the complete data set and hypotheses 5a and 5b were tested using high and low innovation-focused strategy subsamples. Membership in the subsample groups was determined based on the respondents' answers to the two innovation strategy questions. Respondents with an average score of 5 or more on a 7-point scale were included in the high innovation-focused strategy group ( $n=40$ ) and the remaining respondents formed the low innovation-focused strategy group ( $n=60$ ). The average scores of the innovation-focused strategy were relatively uniformly distributed and the authors felt comfortable splitting the sample. Prior to exploring the differences between high and low innovation-focused firms, the group invariance of the measurement instrument was established by examining the measurement models of subsamples. Then, differences in the path estimates between the two innovation subsamples were examined following testing procedures recommended by Chin & Dibbern (2010). When the moderator is not continuous, traditional analysis involving estimation of interaction terms in structural equation modelling might yield misleading results (Joreskog, 1994); hence, a multi-group analysis (Joreskog, 1971; Byrne, 1994) was employed. For a robustness check, the moderating effect of innovation strategy was tested by including interaction terms (Henseler & Fassott, 2010) between both exploratory and exploitative performances and innovation-focused strategy.

## Measurement Model

To confirm the validity and reliability of the measurement scales, measurement models for high and low innovation firms and the combined sample were analysed next. Measurement invariance revealed no significant difference when a permutation test compared measurement estimates for the two innovation strategy subsamples. Table 1 presents statistics evaluating the reliability and consistency of the scales for the complete sample.

From Table 1, a Dillon-Goldstein's  $\rho_c$  composite reliability coefficient (Wertz et al., 1974) was calculated for three reflective scales and exceeded a threshold of 0.7, suggesting unidimensionality and reliability (Fornell & Larcker, 1981). Values of the average variance extracted (AVE) of these constructs were above 0.5, indicating that the convergent validity requirement is met (Peng & Lai, 2012). The item loadings and cross-loadings were examined to test construct validity (Hair et al., 2006) and no instances of substantial cross-loadings were found. Finally, inter-construct correlations did not exceed corresponding square roots of AVEs, indicating that discriminant validity was established.

The sampled companies actively shared operational information (High:  $M=6.02$  vs. Low:  $M=5.64$ ,  $p\text{-value}>0.100$ ). Companies focused on 'first to market' product innovation, however, shared significantly more strategic information (High:  $M=4.75$  vs. Low:  $M=4.11$ ,  $p\text{-value}=0.032$ ). This strategic information as defined by proprietary technical details, manufacturing process information, and design information in both subsamples was the least shared ( $M=3.84$ ,  $M=4.10$ ,  $M=4.16$  respectively, see Table 1).

## Structural Models

Table 2 summarizes the structural model estimates for the complete sample (Hypotheses H1-H4). All three models had acceptable values of goodness-of-fit indices (Wetzels et al., 2009) and sizable values of  $R^2$  suggesting sufficient explanatory power and predictive power of the model. The amount of variation in financial performance explained,  $R^2$ , in complete sample was 24.4% and its values ranged from 19.3% in low-innovation subsample to 45.0% in high innovation-focused group. As shown in Table 2, the relationships hypothesized in H1a, H2a, H3, and H4 were positive and significant, thus, fully supporting these hypotheses. The alternate paths (H1b and H2b) were found to be positive, but insignificant. Thus, these hypotheses were also supported.

To test the moderating effect of product innovation strategy (Hypotheses H5a and H5b), one thousand permutations were used to identify significant differences between path estimates in the models for the two innovation groups. Paths from exploitative and exploratory performance to

**Table 1. Measurement model**

Constructs and items	M	SL	$\rho_c$	AVE
<b>Information Sharing – Operational</b> (formative):			-	-
How frequently do you and your supplier exchange information regarding the following subjects?				
Quality Information	5.74	.997		
Inventory Information	5.50	.421		
Schedule and delivery information	6.23	.670		
<b>Information Sharing – Strategic</b> (formative):			-	-
How frequently do you and your supplier exchange information regarding the following subjects?				
Manufacturing process information	4.10	.748		
Proprietary technical information	3.84	.676		
Design information	4.16	.831		
Production capacity	4.70	.872		
<b>Exploitative Performance:</b>			.925	.675
Indicate the level of your business unit's performance, compared to that of your main competitors over the past three years:				
Order fulfilment speed	5.19	.846		
Manufacturing throughput time	4.83	.611		
Meeting delivery due dates	5.29	.811		
Ability to rapidly change delivery date	5.15	.876		
Ability to rapidly change output volume	5.06	.898		
Ability to rapidly change product mix	5.06	.856		
<b>Exploratory Performance:</b>			.937	.832
In the last 2-3 years, we have continued to be able to...				
Improve product design performance through this partnership	4.92	.917		
Improve process design through this partnership	4.63	.900		
Improve product quality through this partnership	5.17	.918		
<b>Financial Performance:</b>			.951	.830
Indicate the level of your business unit's performance, compared to that of your main competitors over the past three years:				
Return on investment	4.98	.903		
Return on sales	4.94	.930		
Profit growth	5.04	.844		
Return on assets	4.92	.964		

Note: M item mean; SL standardized loading; AVE average variance extracted, percentage of variance of item explained by the latent variable;  $\rho_c$ , Dillon-Goldstein composite reliability (Wertz et al., 1974);  $n = 100$ . Standardized loadings of formative constructs are reported for information purposes; composite reliability and commonality (AVE) for these constructs are not reported.

Table 2. PLSPM structural model estimates

	Complete sample (n=100)			Hypotheses Results
	Path	SE	R <sup>2</sup>	
<u>Exploitative Performance:</u>			.080	
Info Sharing Operational-> Exploitative Perf	.261**	.10		H1a supported
Info Sharing Strategic -> Exploitative Perf	.052	.10		H2b supported
<u>Exploratory Performance:</u>			.232	
Info Sharing Operational-> Exploratory Perf	.123	.10		H1b supported
Info Sharing Strategic -> Exploratory Perf	.425**	.09		H2a supported
<u>Financial Performance:</u>			.244	
Exploitative Perf -> Financial Perf	.217**	.09		H3 supported
Exploratory Perf -> Financial Perf	.390**	.09		H4 supported
<i>Indirect effects</i>				
Info Sharing Operational -> Financial Perf	.105**	.05		
Info Sharing Strategic -> Financial Perf	.177**	.06		
<u>Goodness-of Fit (GoF):</u>				
Absolute GoF	.360			
Relative GoF	.747			

Note: n=100; \*\* significant at 5% level; significance of standardized path coefficients were obtained using bootstrap with 1000 resamplings; bootstrapped standard errors (SE) of the estimates were included for completeness.

financial performance, were significantly different between the high and low innovation-focused firms. Furthermore, financial performance in low innovation-focused firms was significantly positively impacted by exploitative performance (path coefficient=0.357,  $p$ -value<0.05); while no significant effects of exploratory performance were detected (path coefficient=0.199,  $p$ -value>0.05). The opposite result was found in the high innovation-focused group, in which exploratory performance was strongly and significantly related to financial performance (path coefficient=0.681,  $p$ -value<0.05), while the path from exploitative performance was insignificant (path coefficient=-0.026,  $p$ -value>0.05).

As a robustness check, the moderating effect of product innovation strategy was further tested by including interaction terms between both exploratory and exploitative performances and innovation-focused strategy measured as a continuous latent variable as defined by Lawson et al. (2012). As manufacturing firms focus increasingly on product innovation, exploratory performance becomes more important (significant positive interaction between product innovation strategy and exploratory performance  $\beta$ =0.119,  $p$ -value=0.028) while the importance of the exploitative performance diminishes (significantly negative interaction between product innovation strategy and exploitative performance  $\beta$ = -0.106,  $p$ -value=0.039). Hence, hypotheses H5a and H5b were supported.

## DISCUSSION

### Theoretical Implications and Comparisons with Prior Studies

Theorists have long been proponents of sharing information between buyers and suppliers to build organizational capabilities for firms' success (Grant, 1996). In the context of buyer-supplier relationships and the growing volume of data available (Davenport, 2013), the sharing of valuable information between organizations is central to organizational learning. However, the relationship between the types of information shared and the resulting organizational knowledge and its impact on performance has not received adequate attention and is therefore unclear. The novelty of this study is to bridge this gap by testing an empirical link between the two contextual types of information sharing and the resulting performance along the dimensions of ambidextrous organizational learning, thus elucidating the specific contributions of each that drive financial performance. The study also addresses the impact of a firm's stated product innovation strategy and the way the strategy guides the firm's knowledge-sharing choices and their indirect contribution to financial performance.

This study has demonstrated that performance along both dimensions of ambidextrous organizational learning - exploitation and exploration - can be achieved through focused information sharing between buyers and suppliers. Sharing operational information improves exploitative performance leading to operational efficiency, while sharing strategic information is a key factor of exploratory performance leading to innovative products and processes. Thus, the buyer's strategic focus is critical to the decision of how to achieve ambidexterity through balancing the amount of exploitative versus exploratory information shared.

In a post hoc analysis, the authors found that information sharing had an indirect effect on financial performance (see Table 2). The financial performance of the firms with a high innovation focus was driven indirectly by the amount of strategic information shared, and not by the amount of operational information shared. For firms following a low innovation strategy, engaging in operational information sharing can drive financial performance via exploitation. A unique contribution of this work is the insight that firms following a high innovation strategy can improve their financial performance by engaging in strategic information sharing, which promotes innovation.

Any competitive advantage based on efficiency can only be temporary, as it will eventually be eroded by competitors (Blackburn, 2012). This research has provided evidence that exploitative performance leads to financial performance; however, this finding holds true only for firms that are not pursuing an innovation strategy. Hence, when firms seek innovation, the ability to explore new opportunities is more effective than the ability to exploit current capabilities. These findings suggest that a focus on exploration through sharing strategic information will maximize the financial performance for firms following an innovation strategy in the long-term. However, implementing some degree of short-term performance improvement supports the long-term lag in developing innovations. This is illustrated in the importance-performance maps of financial performance predictors, both direct and indirect, presented in Figure 2. Respondents from high innovation-focused firms indicated high levels (rescaled means of latent predictors) of information sharing and exploitative/exploratory performance. However, only strategic information sharing and exploratory performance significantly impact (total = direct + indirect effects) financial performance in those firms.

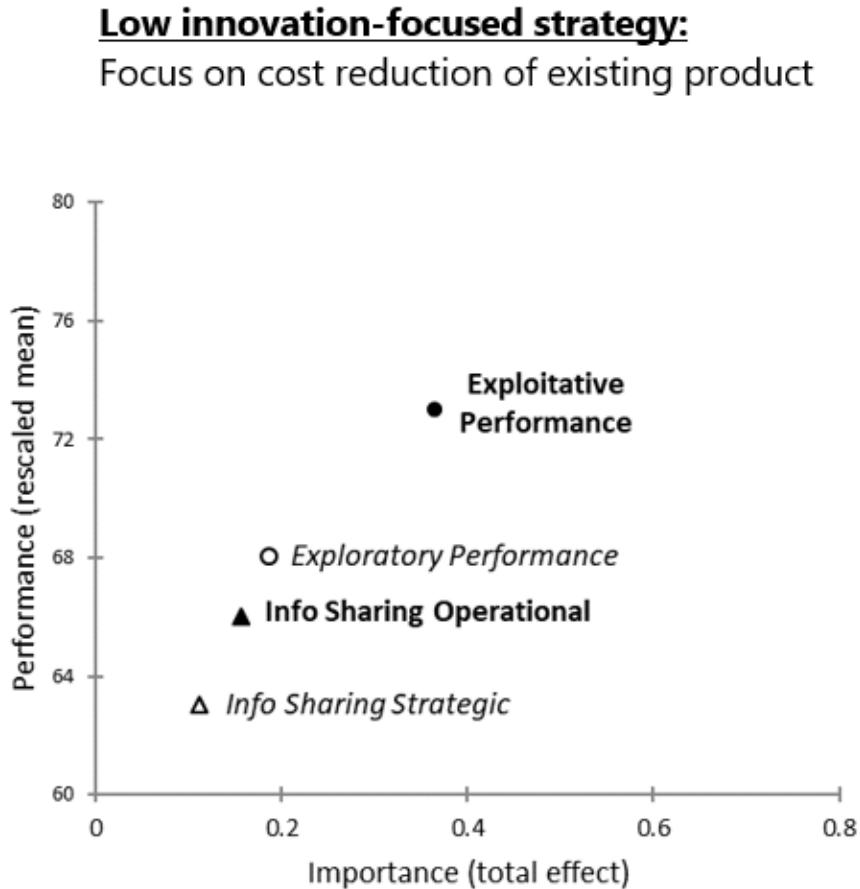
Low innovation-focused strategy: High innovation-focused strategy:

Focus on cost reduction of existing product Focus on 'first-to-market' product development

Note: Predictors with significant bootstrapped total (direct+indirect) effects at 5% level are shown in bold

Exploitation and exploration have generally been viewed as trade-offs, but research suggests that "persistent success" is possible if a firm can perform both tasks (March, 1991, p. 205). In this study, the unique theoretical contribution is that the authors have added empirical results to the discussion of this unresolved issue of whether pursuing both dimensions of ambidexterity can lead to superior performance. The authors have built upon prior research (e.g., Chen et al., 2018) by demonstrating

Figure 2a. Importance-performance maps of financial performance predictors

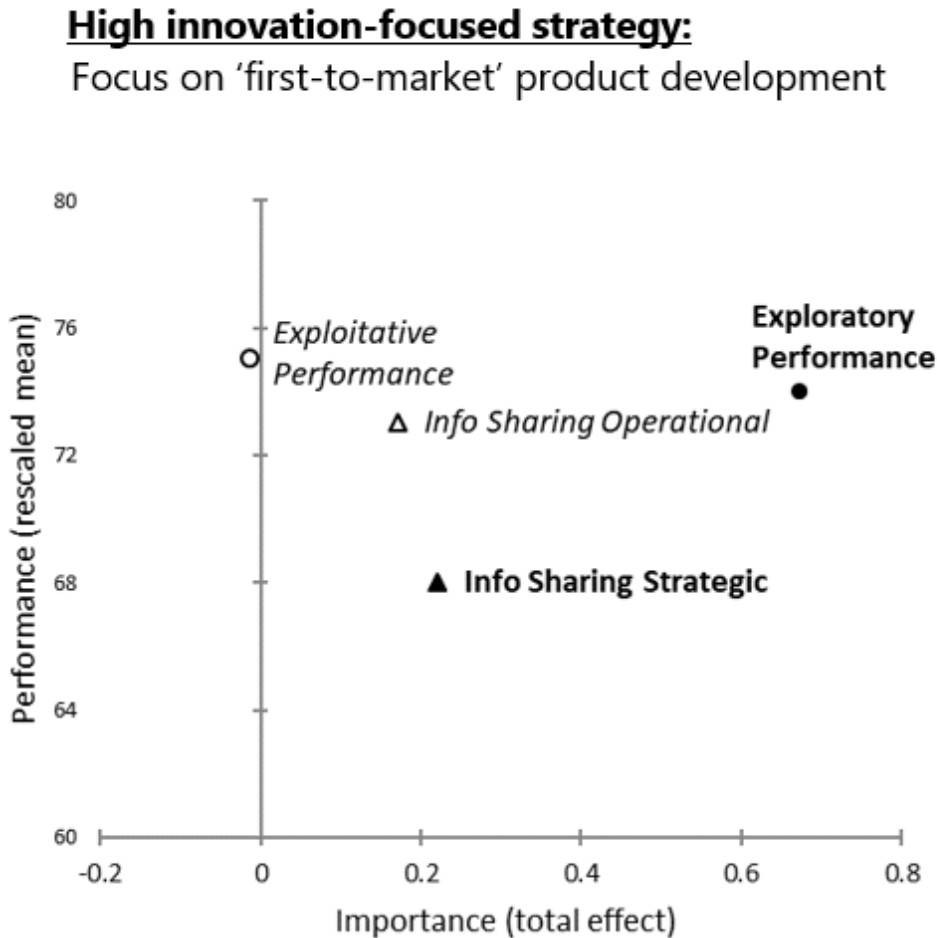


that firms that exchange operational and strategic information with suppliers report organizational learning along both of these dimensions. Moreover, the authors have highlighted the fact that for firms pursuing a strategy of innovation, the value of exploitation knowledge and performance is diminished, while exploration knowledge remains critical to organizational financial performance.

The ability to learn from suppliers can be viewed as a form of dynamic capability that allows the firm to sense and seize opportunities more quickly than their rivals (Teece, 2007). The findings of this study explain the differential effects of sharing different types of information and the importance of alignment with the firm's strategy. Pursuing innovation outcomes is a strategic choice; this study has demonstrated that firms that have chosen to share strategic information have aligned their processes with their innovation strategy to achieve superior performance.

To reveal the novelty of this research, the authors summarize below the comparisons of the findings of prior studies with this study and highlight the specific research contributions. Empirical research has not, thus far, provided definitive evidence of how and under what conditions the information exchanged promotes different types of learning and whether this learning results in improved firm

Figure 2b. Importance-performance maps of financial performance predictors



performance. The authors have expanded this area of research by explaining the differential effects of sharing different types of information (strategic and operational) and the importance of alignment with the firm's strategy.

Prior research has shown the importance and effects of sharing high quality information (e.g., Gulati & Sytch, 2007; Gosain et al., 2004; Li et al., 2014); however, the breadth and scope of information was a concern. These issues were related to a broad definition of information scope, possible information overload, and the inability to quickly identify relevant information (Gosain et al., 2004; Saeed et al., 2005). Silva et al. (2020) argued that supplier partnerships and other supply chain management practices have an impact on firm performance and Andersen et al. (2020) found that the purchasing function can facilitate organizational ambidexterity. This study has contributed to these findings by discussing the role of information sharing in promoting the two elements of ambidexterity.

Prior studies on ambidextrous learning and practices did not extend to the role of suppliers and organizational financial performance (e.g., Im & Rai, 2008; Kilpi et al., 2017). This study explains how firms can improve their financial performance by engaging in strategic information sharing, which promotes innovation. Niranjana et al. (2018) found no direct link between information sharing

and firm performance, and this study has shown an indirect link between information sharing and firm performance through exploratory and exploitative performance. Wang et al. (2019) state that frequent communication with suppliers can lead to innovation ambidexterity, and subsequently to business performance, but did not include the level of detail as in this study, considering the types of information shared and the relationships between strategic alignment and the effects of ambidexterity on firm performance. Furthermore, whereas Lennerts et al. (2019) found that balancing exploration and exploitation leads to success, this study provides further insight by explaining how firms can achieve exploration and exploitation performance independently.

## Managerial Implications

This study suggests that acquiring operational and strategic information contributes to the firm's success, and the ability to appropriately balance information acquisition to support exploitative and exploratory learning can improve performance and provide a competitive advantage to manufacturing firms. The results of this study indicated that managers share strategic information at a relatively low level compared to operational information. However, strategic information sharing resulted in a strong and significant effect on exploration performance and an indirect effect on financial performance. This finding is consistent with Sirén et al. (2012, p.19), who referred to an "exploitation trap", in which exploitation is favored over exploration. Therefore, there is an opportunity for firms to improve their financial outcomes by more fully engaging in strategic information sharing with suppliers.

In the rapidly changing competitive landscape of the 21<sup>st</sup> century, it is important for managers to focus on achieving consistent, short-term operational performance, as well as product and process innovation for long-term performance. If firms limit their information exchange to operational information, which is more easily codifiable and transferable (Nonaka, 1994), they may limit the benefits that they receive. Firms that move beyond operational information to share strategic information can achieve some of the major benefits sought by supply chain managers. For example, exploration, not exploitation, was found to be useful in a crisis situation (Osiyevsky et al., 2020). Managers need to prioritize sharing long-term strategic information, which is considered more difficult to codify and transfer. Despite the difficulties encountered in sharing this type of information, these efforts will be more beneficial long-term and create a greater impact on financial performance.

An important criterion for effective information sharing is for top management to define the firm's strategy, which includes exploratory information from key suppliers and developing strong relationships with them. The strategy should be clearly communicated through all channels in the organization, including the supply chain function (Green et al., 2012), so that the suppliers are encouraged and incentivized to share the necessary types of information as suggested by this study. Kiil et al. (2019) proposed a mapping of information flows to support performance outcomes, which provides a systematic structure to clarify what information is available and how it can be utilized. The strategy should be revisited periodically to determine if the focus should change depending on the competitive environment, based on assessment of internal data and information possessed by supply chain partners who have a broader external view. To achieve a sustainable competitive advantage, policymakers and practitioners may need to consider options for balancing exploitation and exploration such as revised governance structures (Bocquet & Mothe, 2015) and punctuated equilibrium (Chen et al. 2015), which provides longer periods of exploitation and shorter periods of exploration.

The authors suggest that for firms with an innovation strategy, buyers should focus on automating information sharing via integrated systems since this study found that access to digitally enabled information, in general, appears to facilitate information transfer and exchange. Should there be a shift in the firm's strategic focus, not having readily accessible data might put the organization at a competitive disadvantage and impact financial performance. In a business ecosystem subject to disruptive forces from technology to globalization, a firm's ability to adapt and modify strategy may be critical for survival.

## **LIMITATIONS AND FUTURE RESEARCH**

Respondents in this study are employees of manufacturing firms that represent the buyer side of a buyer-supplier relationship, and the responses reflect the employees' perceptions of a key supplier. No responses from the supplier side of the buyer-supplier dyad were included in this study. Thus, the findings may not be generalizable to all buyer-supplier dyads. Future research should examine these interactions from the perspectives of both the buyers and their key suppliers. Longitudinal studies might provide stronger empirical evidence of the impact of information sharing on buyer-supplier performance over time. Another limitation of this study is the use of self-reported measures of a buyer financial performance relative to competitors. Future research should utilize secondary measures of firm's performance derived from financial statements.

This research found a link between information sharing and financial performance, suggesting that research exploring the impact of information sharing on financial performance and its determinants may increase our understanding of this relationship. Future studies can consider further typological distinctions in the content of information shared, beyond operational and strategic dimensions, which can support Kiil et al.'s (2019) notion of mapping information in a systematic structure based on content. Additionally, increasing information sharing across multiple tier supply chain relationships (Yoon et al., 2020) can potentially increase exploratory and exploitative performance, and should be included in future research studies.

## **CONCLUSION**

Manufacturing firms conduct both exploratory and exploitative learning via supply chain relationships. This study has validated the value of ambidextrous learning pursuant to sharing both operational and strategic information in buyer-supplier relationships. The unique contribution of this empirical work is to test the relationship between the two contextual types of information sharing and the resulting performance along the dimensions of ambidextrous organizational learning. An additional insight is that exploratory learning through sharing strategic information is particularly important when firms have an innovation-focused strategy. This is demonstrated by the fact that a product innovation strategy positively moderates the relationships between exploratory and financial performance and accelerates the effect of exploratory performance on firms' financial performance. Business managers and practitioners should note that firms that exchange operational and strategic information with suppliers report organizational learning along both these dimensions. In addition, they need to prioritize sharing strategic information for innovation, long-term performance, and improving financial outcomes. The authors are hopeful that this study provides the basis for future work in ambidextrous organizational learning in multiple-tier supply chain relationships, and firm performance.

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