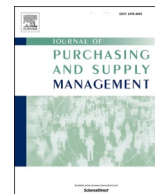




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The dual role of supply base knowledge in organizational integration and competitive performance

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ABSTRACT

While prior research has established the instrumental role of *supply base knowledge* (SBK) – a buying firm's internally accumulated knowledge of its suppliers' capabilities, resources, and performance – in decision-making, its potential to elevate the strategic influence of the purchasing function through symbolic value remains underexplored. This study introduces a novel dual-role framework, positioning SBK both as an instrumental resource that enhances purchasing's impact on strategic decision-making and as a symbolic asset that legitimizes its role within the organization. Using data from 229 manufacturing plants across 15 countries, we apply PLS-SEM analysis to examine these mechanisms. Our findings reveal that SBK not only enhances purchasing's strategic involvement and firm performance but also serves as a key enabler for supplier integration in NPD. By distinguishing between instrumental and symbolic knowledge use, this study extends prior literature on purchasing knowledge and internal integration, offering a more nuanced perspective on how firms can leverage SBK for both competitive advantage and organizational legitimacy.

1. Introduction

As firms increasingly leverage external resources to manage complex market dynamics and achieve competitive advantages, the development and use of supply market intelligence have become essential (Axelsson et al., 2005; Monczka, 2010; Tanskanen et al., 2017; Van Weele, 2010). The purchasing and supply management (PSM) function plays a critical role in acquiring this knowledge about suppliers and supply markets (Lorentz et al., 2020; Zsidisin et al., 2015). Comprehensive supplier knowledge is referred to in the literature as 'external supply knowledge' (Kilpi et al., 2018), 'supply market scanning' (Zsidisin et al., 2015) and 'supply market intelligence' (Lorentz et al., 2020). In this study, we use *supply market intelligence* (SMI) as an umbrella term for a buying firm's knowledge of external supply and suppliers, and we use *supply base knowledge* (SBK) to refer specifically to a buying firm's knowledge about the resources and capabilities of its current suppliers.

Fully capitalising on SBK requires robust internal integration, in which insights from SBK are synthesised with existing organisational knowledge to address complex, non-routine challenges that often require cross-functional expertise (Parker et al., 2019; Schutz et al.,

2019; Zsidisin et al., 2015). This synthesis reflects a combinative capability that enables firms to turn their collective knowledge into a competitive asset by aligning it with organisational, technological and market opportunities (Castellani et al., 2022; Kogut and Zander, 1992). Through such innovative adaptation, firms can drive new initiatives and improve their operational performance (Brockman and Morgan, 2003).

Despite recognition of the importance of SBK, the mechanisms through which it contributes to organisational integration and performance remain underexplored. The purpose of this study is to fill this void and shed light on the role of SBK in fostering a firm's organisational integration and, in turn, enhancing its competitive performance. In this study, we focus on SBK, since previous research (Kilpi et al., 2018) underscored that the supply base is a primary source of actionable external knowledge that is essential for a firm's continuous improvement and opportunity exploration.

Intra-firm knowledge integration is closely linked to the discourse on the contribution of the purchasing function to a firm's strategic decision-making (e.g., Gonzalez-Benito, 2007; Hespings and Schiele, 2015; Rozemeijer, 2008) and new product development (NPD; e.g., Picaud-Bello et al., 2022; Schiele, 2010; Van Poucke et al., 2016). Previous

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studies have indicated that purchasing knowledge has a positive effect on performance when integrated into a firm's strategic decision-making (Schutz et al., 2019) and NPD (Van Poucke et al., 2016). Furthermore, the literature provides evidence that SMI is an antecedent of internal integration, which is positively related to external integration and supplier performance (Zsidisin et al., 2015). Furthermore, the empirical study of Kilpi et al. (2018) showed that the organisational status of the PSM function drives the performance impact of both supply market and supply base knowledge.

The process of acquiring and exploiting supplier and supply market knowledge and its impact on integration and performance has been explained through two theoretical perspectives: the information processing theory (IPT; Lorentz et al., 2020; Zsidisin et al., 2015) and the knowledge-based view (KBV; Kilpi et al., 2016). The IPT explanation posits that SMI improves performance by balancing information processing needs with capacity (Lorentz et al., 2020), which is necessary given the uncertainties inherent in task characteristics and market dynamics (Galbraith, 1974, 1977; Tushman and Nadler, 1978). KBV, a subset of the resource-based view, conceptualizes the firm as an institution for integrating knowledge, and knowledge itself as the most strategic resource of the firm (Grant, 1996). Empirical evidence broadly supports the connection between knowledge and performance (Barney, 1991; Harlow, 2008) in the context of purchasing knowledge (Schutz et al., 2019) and, specifically, in relation to SMI (Kilpi et al., 2018; Zsidisin et al., 2015).

Both the IPT and KBV explanations are associated with the *instrumental* use of SMI, as their purpose is to solve a management problem (Menon and Varadarajan, 1992). In contrast, knowledge use can also be *symbolic* – that is, for ‘legitimizing and sustaining previously held dispositions’ (Menon and Varadarajan, 1992, 56). Such a symbolic and perhaps less rational way of using knowledge leads us to explore the term *information behaviour* (IB) for describing ‘the many ways in which human beings interact with information, in particular, the ways in which people seek and utilize information’ (Bates, 2004; 2007). In the management context, IB was seminaly discussed by Feldman and Marcha (1981), who focused on the collection and use of information in organisations for decision-making. They contrasted the rational gathering, storage, communication and use of information – rigorously evaluating their precision, relevance and reliability against their cost – with the biased type of information processing that they described as involving ‘some strange human behavior’ whereby ‘[M]ost organisations and individuals often collect more information than they use or can reasonably expect to use in the making of decisions’ (p. 174).

Feldman and Marcha (1981) suggested that among the more important reasons for these strange behaviours, in addition to natural cognitive limitations or simple mistakes in information collection, are that information serves as a ‘symbol of competence and reaffirmation of social virtue’ and as a signal of ‘appropriate decision making’, contributing to the ‘maintaining of [the] information posture’ of organisational units (177, 179). Therefore, the implied overconsumption of information is proposed as a prominent IB in organisational life that leads to various inefficiencies. Having identified the two types of main organisational uses of function-specific knowledge – instrumental and symbolic – we developed models with hypothesised associations to examine and contrast the use of function-specific knowledge in organisations.

Recognising both instrumental and symbolic roles of knowledge, this study introduces a novel dual-role framework that conceptualizes SBK not only as an instrumental resource that strengthens purchasing's influence on strategic decision-making and supplier involvement in new product development (NPD) but also as a symbolic asset that legitimizes purchasing's role within the organization. We argue that SBK signals competence and expertise, allowing purchasing to elevate its strategic positioning and gain influence in firm-level decision-making processes. This perspective extends prior research by demonstrating that SBK is not merely a functional asset for decision-making but also a mechanism for increasing purchasing's strategic visibility and credibility within the

firm.

Our primary research question is: *How does SBK contribute to internal and external integration, thereby impacting organisational performance outcomes? Internal integration* is defined as the extent to which a firm structures its processes into collaborative and manageable workflows to fulfil customer requirements (Zhao et al., 2011). In contrast, *external integration* reflects the degree of collaboration with key supply chain partners (Zhao et al., 2011). The *organisational performance outcomes* referred to in this study are defined as the cost and delivery efficiencies achieved by the buying firm.

To answer our primary research question, we propose two models with which to explain SBK's role in organisational integration and firm performance. The *instrumental SBK model* suggests that SBK strengthens the relationships between purchasing involvement, firm performance and supplier involvement in NPD. The *behavioural SBK model* posits that SBK facilitates purchasing involvement in strategic decision-making, which, in turn, enhances firm performance and fosters supplier involvement in NPD, improving NPD effectiveness and efficiency. These hypotheses were tested using data from the fourth round of the High-Performance Manufacturing (HPM) survey, which includes responses from 229 manufacturing plants in the electronics, machinery and automotive sectors in 15 countries.

This study contributes to both theory and practice in PSM in several ways. First, it provides new empirical insights into the symbolic role of SBK in promoting the involvement of purchasing in strategic decision-making, complementing prior research that emphasised SBK's instrumental value. Second, this study expands the understanding of SBK's instrumental role by empirically examining how SBK moderates the impact of purchasing involvement on strategic decision-making effectiveness and supplier participation in NPD. Finally, this study extends previous findings on SBK's positive impact on supplier and purchasing performance by offering new empirical evidence of SBK's effects on the cost and delivery performance of the buying firm.

2. Hypotheses and model development

In this section, we present our development of the research hypotheses and of the two complementary research models based on the identified two types of knowledge use. Drawing on the previous discussion on the types of function-specific knowledge use, we structured the hypothesis development into subsections focusing, first, on the common (backbone) associations across the alternative models; second, on the instrumental explanation; and third, on the symbolic explanation. Notably, our research models focus on a subset of function-specific knowledge in purchasing (cf. Schütz et al., 2020): SBK. This concept is defined as the specialist-accumulated expertise regarding the characteristics, resources and capabilities of the suppliers actively managed by the buying firm (cf. Choi and Krause, 2006).

2.1. Common associations across the alternative explanations

In this section, we establish the fundamental associations between the key constructs that are common across the alternative research models. This foundational structure focuses on the construct of *purchasing involvement in strategic decision-making*, with both operational and strategic performance implications. This focal construct is defined as the extent to which the function is involved in the strategic planning activities of a business unit at the top level, such as in making make-or-buy decisions, strategic sourcing initiatives or collaborative NPD efforts with suppliers. Such involvement implies the ability to recognise, influence and support internal stakeholder and firm priorities (Nair et al., 2015). Indeed, performance outcomes are hypothesised as associated with the strategic level (i.e., the manufacturing facility, business units etc.), in contrast to observing outcomes at the purchasing function or even at the spending category level. We recognise that high purchasing involvement in strategic decision-making implies an elevated status (an

adjacent concept), recognition (Patrucco et al., 2019) and a strategic role in the organisation (e.g., Cousins et al., 2006), which is more important than a formally recognised position in the organisation (Luzzini and Ronchi, 2016).

First, regarding the operational performance implications (cf. Srinivasan and Swink, 2018), Zimmermann and Foerstl (2014) have shown the general contribution of purchasing practice to a firm’s operational performance. Specifically, the practice of the strategic involvement of purchasing has been shown to contribute to manufacturing competitiveness, covering both cost- and speed-related aspects, such as delivery (e.g., Van Poucke et al., 2016; Yang et al., 2013). Purchasing status, as an adjacent concept to strategic involvement, has been shown to improve supply cost performance through improved customer attractiveness from the supplier perspective (Patrucco et al., 2019). Strategic purchasing integration has also been shown to be associated with faster purchasing decision-making (Kaufmann and Gaeckler, 2015), further contributing to speed performance. Generally, the early participation of purchasing at a high level allows it to support the firm’s priorities with its sourcing and supply management-related decision-making (Nair et al., 2015), leading to better alignment and performance outcomes (Baier et al., 2008). Drawing on this extant body of knowledge, we state the following hypothesis (H):

H1. Purchasing involvement in strategic decision-making is positively linked to (a) cost performance and (b) speed performance.

Second, in terms of the strategic performance implications of purchasing involvement, in this study, we focused specifically on the efficiency and effectiveness of NPD (cf. Johnsen, 2009; Suurmond et al., 2020). We hypothesised a chain of associations, in which purchasing involvement first leads to involvement of suppliers in NPD, which then leads to related performance outcomes. Regarding the first step in this

chain, Takeishi (2001) and Zhao et al. (2011) have shown the importance of internal coordination of, for example, strategic priorities in achieving better component development performance with external supplier involvement, suggesting the association of the key involvement variables. In other words, the better informed purchasing is of the future needs of the organisation, the more it can commit the right suppliers to collaborative efforts. Indeed, it has been shown that the status of the purchasing function, which is closely linked to the function’s strategic involvement, as previously suggested, contributes to the proficiency of supplier collaboration (Patrucco et al., 2019). Thus, we state the following hypothesis:

H2. Purchasing involvement in strategic decision-making is positively linked to supplier involvement in NPD.

Through strategic and early involvement of suppliers, purchasing can better enhance, guide and encourage the suppliers’ innovation efforts (Pihlajamaa et al., 2019; Schiele et al., 2020) and ultimately align these efforts with the organisation’s strategic priorities, leading to improved firm-level outcomes (Baier et al., 2008; see also Petersen et al., 2003). These outcomes span the efficiency sphere (e.g., time to market, unit manufacturing cost and research & development budget) and the effectiveness sphere (e.g., speed of new product introduction, product capability and performance, and product innovativeness; cf. Johnsen, 2009). Specifically, a meta-analysis of a large body of evidence suggested that the extent of supplier involvement is positively associated with both the efficiency and effectiveness of NPD (Suurmond et al., 2020). Thus, we state the following hypothesis:

H3. Supplier involvement in NPD is positively linked to (a) NPD efficiency and (b) NPD effectiveness.

Having formulated these hypotheses on the foundational

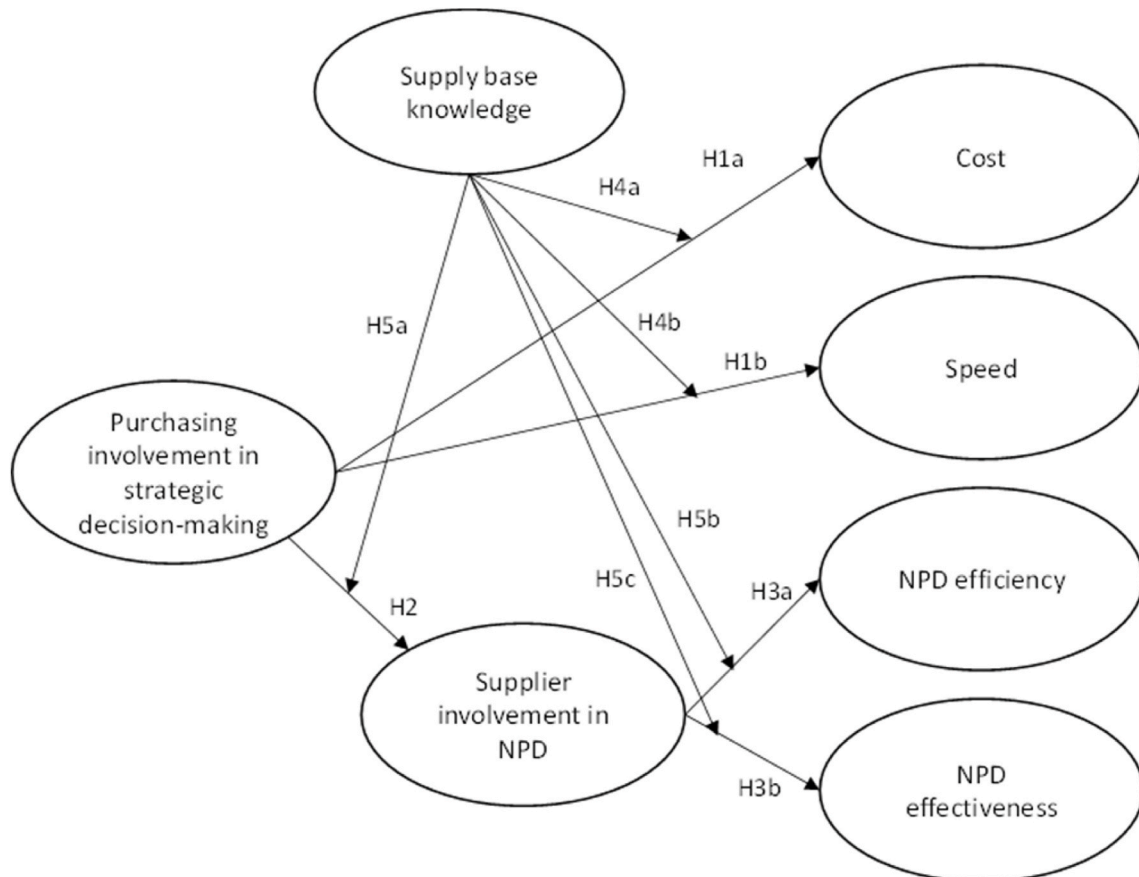


Fig. 1. Research model of instrumental knowledge use. H: hypothesis; NPD: new product development.

associations between the strategic involvement of purchasing and a firm's operational and strategic outcomes (which is the common backbone of the research models; Fig. 1), we discuss next the alternative explanations of SBK use in the strategic-level context.

2.2. Instrumental explanation of supply base knowledge (SBK) use

The core argument for the instrumental explanation of SBK use is that knowledge of supplier characteristics, resources and capabilities enables more informed decision-making, ultimately enhancing performance and other organizational outcomes. Therefore, the type of variable associations discussed in this section pertains to positive moderation, as the hypotheses in this section generally suggest that the combination of purchasing activities and purchasing involvement in strategic decision-making with SBK yields more favourable outcomes. In other words, in the spirit of combinative capability (Kogut and Zander, 1992), purchasing is actively involved in the strategic planning process and brings its knowledge of the supply base to the collective pool of knowledge so that it can be strategically applied to the top-level decision-making of a business unit.

In this context, we suggest that the combination of purchasing activities and purchasing involvement in strategic decision-making with SBK is associated with higher operational performance, such as in terms of cost and speed (cf. Srinivasan and Swink, 2018). Joshi (2009) explained the need to emphasise knowledge and control of supplier capabilities as follows: '[M]anufacturing firms seek continuous supplier performance improvement because this outcome makes them more competitive in downstream markets' (133). Schütz et al. (2020) has shown the link between broader purchasing knowledge (including commercial, technical and market knowledge) and savings performance at the purchasing manager level, and that this link is enhanced by purchasing integration into strategic planning processes. Patrucco et al. (2019) also showed the links between purchasing knowledge, purchasing status and supply cost performance. Kilpi et al. (2018) have shown a positive association between SBK acquisition and exploitative orientation for efficiency, which is supported by the recognised status of the purchasing function. Therefore, the literature appears to suggest the interplay of SBK and strategic involvement of the purchasing function in achieving cost-related outcomes; but in this study, we emphasise the ability of such interplay to enhance a firm's top-level combinative capability. In other words, purchasing will be better able to contribute to the cost performance of a business unit if it is involved in strategic decision-making and equipped with SBK. Under these conditions, purchasing would be able to make the right sourcing and partnering decisions based on its knowledge of the most capable entities (e.g., for production and research & development) and of the most committed suppliers in terms of collaboration (Joshi, 2009), with which the buying organisation transacts under conditions of mutual dependence (Terpend and Krause, 2015).

Although in buyer-supplier relationships, competitive incentives are aligned with improving suppliers' time-based outcomes, such as the speed of supplier delivery (Terpend and Krause, 2015) – facilitated, for example, by performance measurement systems (Maestrini et al., 2018) – committed buyer-supplier collaboration is also conducive to lead time compression. Strategically involved purchasing, equipped with deep knowledge of suppliers, can steer decision-making in terms of selecting and developing strategic external resources and, thus, align business strategy with purchasing strategy and practices (Baier et al., 2008). This alignment may provide better support for time-based advantages, which are crucial in the current turbulent operating environment (Patrucco and Kähkönen, 2021). Thus, we state the following hypothesis:

H4. SBK positively moderates the relationship (a) between purchasing involvement in strategic decision-making and cost performance, and (b) between purchasing involvement in strategic decision-making and speed performance.

The role of SBK in supporting top-level decisions for improved strategic performance may be even more pronounced in the context of NPD. A potential intermediate outcome of strategically involved purchasing, using deep SBK, is the increased involvement of the best-fitting suppliers in NPD. Regarding the added value of such knowledge, the embeddedness of purchasing with suppliers implies high-bandwidth relational linkages and, thus, the ability of purchasing to access novel knowledge regarding suppliers' capabilities (cf. Aral and Van Alstyne, 2011; Johnsen et al., 2022). Such embeddedness may involve, for example, engagement in the complex activities of enhancing suppliers' innovativeness, guiding suppliers' innovation processes and encouraging suppliers to share their innovations (Pihlajamaa et al., 2019). Strategically involved purchasing, leveraging accumulated knowledge of suppliers' potential to contribute to NPD, allows for the selection and development of the right strategic partners for this key activity of organisations (cf. Koufteros et al., 2007).

Apart from the intermediate outcome of involving suppliers by leveraging SBK, applying SBK to supplier involvement allows for NPD management to enhance efficiency and effectiveness (cf. Johnsen, 2009). These types of outcomes of purchasing- and supplier-enabled NPD have been observed, for example, by Petersen et al. (2005). However, interorganisational arrangements for supplier involvement may also be plagued by causal ambiguity (e.g., a lack of clarity regarding why a given action results in a given outcome; Potter and Lawson, 2013) and by complex task interdependencies requiring information exchange and mutual adaptation (Yan and Nair, 2016). Such challenges may reduce the efficiency outcomes of the collaboration. However, we suggest that the application of deep SBK, acquired, for example, through experiential learning from past collaboration projects (Yan and Nair, 2016), allows for better control of supplier capabilities for improved outcomes, both in terms of effectiveness and efficiency (cf. Joshi, 2009). Thus, we state the following hypothesis:

H5. SBK positively moderates the relationship (a) between purchasing involvement in strategic decision-making and supplier involvement in NPD, (b) between supplier involvement in NPD and NPD efficiency and (c) between supplier involvement in NPD and NPD effectiveness.

2.3. Symbolic explanation of SBK use

As a basis for a more detailed discussion, we generally note that purchasing knowledge in areas such as technologies, daily operations and human issues enhances the status of purchasing in an organisation. This elevated status is due to top management's support for purchasing, its appreciation of purchasing's perspectives and its recognition of purchasing as equal to other functions (Patrucco et al., 2019). The core argument for the symbolic explanation of SBK use is that knowledge of supplier characteristics, resources and capabilities is a symbol of competence and enables purchasing to maintain an informed position, highlighting its potential for strategic relevance within an organization (cf. Feldman and Marcha, 1981). Essentially, SBK use raises the level of strategic involvement of purchasing. Therefore, SBK serves as the initiating driver of the foundational structure hypothesised earlier. This knowledge is associated with purchasing involvement in strategic decision-making, which, in turn, is associated with both operational and strategic outcomes. In other words, from the perspective of combinative capability (Kogut and Zander, 1992), SBK primarily serves as the catalyst or entry point for integrating other types of purchasing knowledge into the collective knowledge pool (cf. Schütz et al., 2020). This integrated knowledge can then be strategically applied to the top-level decision-making of a business unit.

In this context, the results of Zsidisin et al. (2015) appear quite relevant, as they suggest the beneficial impact of supply market scanning (and the implied knowledge) on the internal integration of the purchasing function. In other words, the function may 'push' its external knowledge on markets and suppliers as a salient symbol and signal of

competence as it seeks to achieve access to, and a role in, early-phase decision-making (see also Lorentz et al., 2020) to avoid unfavourable path dependencies. Notably, this IB perspective is in contrast to the explanatory research that seeks to examine the direct associations of purchasing-related external knowledge acquisition and market scanning with various aspects of performance (e.g., Cousins et al., 2011; Kilpi et al., 2018). Thus, we state the following hypothesis (Fig. 2):

H6. SBK is positively linked to purchasing involvement in strategic decision-making.

3. Methods

3.1. Data collection

The explanatory survey-based approach was chosen because it allows for systematic examination of the relationships between key constructs across a diverse and international sample of manufacturing plants. Given that our research objective is to investigate how supply base knowledge, purchasing involvement in strategic decision-making, and supplier involvement in new NPD impact operational and NPD performance, this method provides a structured means to test theoretically derived hypotheses across large-scale, cross-sectional data.

The data used in this study is a subset from the fourth round of the HPM project, which benchmarked manufacturing plants in the electronics, automotive and machinery sectors in 15 countries. HPM is an international research project that was initiated in 1991 to collect data on global manufacturing plant operations (Schroeder and Flynn, 2001). It is regularly updated through successive rounds. The latest, fourth round spanned 2012 to 2016. Our sample comprised data from 229 manufacturing plants in 15 countries (Table 1). Stratified sampling was used to obtain a representative number of manufacturing plants for the combination of each country and industry. The data was collected by the local universities of each country. We collected the data from the plants that were in Finland. The data are on multiple respondents from each plant who represented different functions.

To secure a substantial participation rate in the HPM survey, there were preliminary communications with plant managers, requesting

Table 1
Sample profile.

Country	No. of manufacturing plants			Total
	Electronics	Machinery	Automotive	
Brazil	2	4	3	9
Chile	6	13	4	23
Finland	6	5	4	15
Germany	3	8	8	19
Israel	3	0	0	3
Italy	5	17	5	27
Japan	6	5	9	20
Korea	8	4	11	23
Sweden	1	2	0	3
Spain	6	5	5	16
Switzerland	2	4	2	8
Taiwan	19	10	1	30
UK	1	4	2	7
USA	3	3	2	8
Vietnam	8	5	5	18

their cooperation in the survey. The overall response rate was approximately 60 %, but this rate varied across different countries. In each manufacturing plant, data were gathered from 24 informants using 12 different questionnaires for different functions and hierarchical levels. For each questionnaire, there were 2 informants who were considered to be best informed about the topic of that particular questionnaire. A survey coordinator who was fully aware of the positions of the staff was appointed in each plant to help the researchers to identify the appropriate informants and to coordinate the distribution and collection of questionnaires. For example, for the constructs used in this study, questions on SBK and purchasing involvement in strategic decision-making were answered by two purchasing professionals; on supplier involvement and NPD efficiency items, by two NPD managers; and on NPD effectiveness, as well as speed and cost performance, by general plant managers. Consequently, the research design had a low likelihood of suffering from common method variance (Flynn et al., 2018). If there were items with multiple respondents, we followed previous studies that utilize the HPM survey data (e.g. Cao et al., 2015; Turkulainen et al., 2017) and averaged responses to obtain a single value. To accommodate

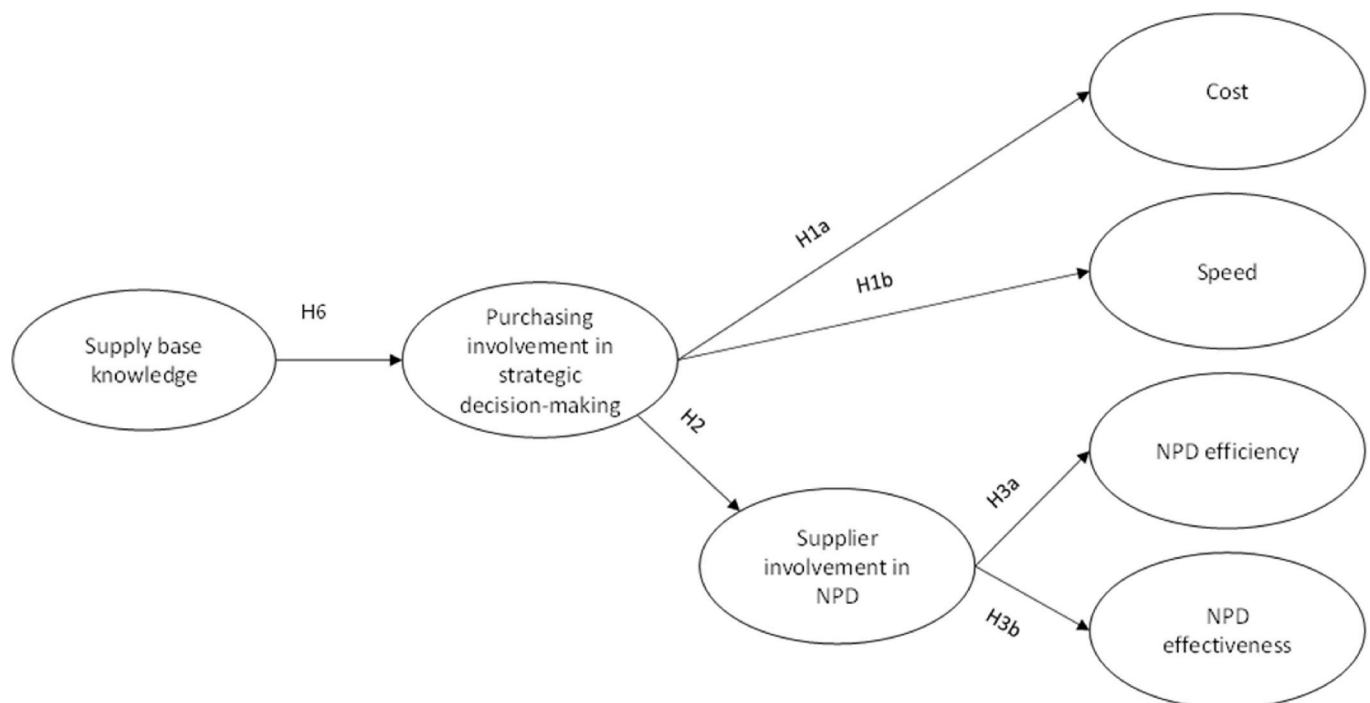


Fig. 2. Research model of symbolic knowledge use. H: hypothesis; NPD: new product development.

the linguistic diversity of the sample, the questionnaires were administered in the native language of each country involved. Rigorous translation and back-translation procedures were employed to maintain the consistency and reliability of the data across all the countries involved. Only complete responses were included. Given that all measurement items in this study were based on Likert-scale responses, the presence of outliers was inherently limited.

3.2. Measurement items

The measurement items used in this research comprised a subset of the HPM survey. Seven multi-item scales were used. The construct operationalisation is shown in Table 2.

Table 2
Measurement items and descriptive statistics.

Construct and items	Mean	St.dev.
<i>Supply base knowledge (reflective), SBK</i>		
SUPKNWN02 Understanding our supplier's production processes is a high priority for us.	3.987	0.779
SUPKNWN04 We are very familiar with our suppliers' product characteristics.	4.028	0.672
<i>Purchasing involvement in strategic decision making (reflective), STRDMN</i>		
STRDMN01 The purchasing function is involved in our plant's strategic planning activities.	3.980	0.862
STRDMN04 Purchasing plays an important role in strategic planning at this plant.	4.079	0.786
<i>Supplier involvement in NPD (reflective), SINVLM</i>		
Please indicate the extent to which you agree or disagree with each of the following statements about product development projects in your plant. 1 = Completely disagree, 2 = Somewhat disagree, 3 = Neither agree nor disagree, 4 = Somewhat agree, 5 = Completely agree		
SINVLN01 Suppliers are involved early in product design efforts.	3.534	0.968
SINVLN02 We partner with suppliers for the design of new products.	3.767	0.893
SINVLN03 Suppliers are frequently consulted during the design of new products.	3.644	0.924
SINVLN04 Suppliers are an integral part of new product design efforts.	3.913	0.960
<i>NPD effectiveness (formative), NPDeffe</i>		
Please consider products that were recently launched. How successful were they, in terms of reaching their goals? 1 = Significantly worse, 2 = Somewhat worse, 3 = About the same, 4 = Somewhat better, 5 = Significantly better		
GLOBLX09 Speed of new product introduction into the plant (development lead time)	3.370	0.992
GLOBLX10 Product capability and performance	3.851	0.750
GLOBLX12 Product innovativeness	3.695	0.841
<i>NPD efficiency (formative), NPDeffi</i>		
Please consider products that were recently launched. How successful were they, in terms of reaching their goals? 1 = Significantly worse, 2 = Somewhat worse, 3 = About the same, 4 = Somewhat better, 5 = Significantly better		
SUCCSX06 Time to market	3.238	0.845
SUCCSX08 Unit manufacturing cost	3.217	0.822
SUCCSX09 R&D budget	3.219	0.816
<i>Speed performance (reflective), SPEED</i>		
Please circle the number that indicates your opinion about how your plant compares to its competitors in its industry, on a global basis. 1 = Poor, much worse, 2 = somewhat below, 3 = Average, 4 = Somewhat better, 5 = Superior, much better		
GLOBLX03 On time delivery performance	3.908	0.801
GLOBLX04 Fast delivery	3.787	0.797
GLOBLX08 Cycle time (from raw materials to delivery)	3.669	0.804
<i>Cost performance (reflective), COST</i>		
Please circle the number that indicates your opinion about how your plant compares to its competitors in its industry, on a global basis. 1 = Poor, much worse, 2 = somewhat below, 3 = Average, 4 = Somewhat better, 5 = Superior, much better		
GLOBLX23 Labor cost	3.238	1.038
GLOBLX24 Labor productivity	3.563	0.816
GLOBLX27 Operating expense	3.366	0.784

All measures were adapted from previous literature. Most of the items used in this study had been used during previous data collection rounds of the HPM project. The survey instrument had been pilot-tested with several plant managers to improve clarity. For the dependent variables, the first set, drawn from Srinivasan and Swink (2018), involved operational performance, which was divided into two conventional dimensions of cost and speed. Cost was operationalized as labor cost, labor productivity and operating expense while speed was operationalized as on time delivery performance, fast delivery and cycle time. The second set, drawn from Suurmond et al. (2020), measured NPD effectiveness (i.e., the product's quality and technical performance) and efficiency (i.e., the development process, such as its speed and use of resources). For both constructs, the causality direction was from the indicators to the construct; therefore, the measurement model was formative.

The independent variables included SBK, purchasing involvement in strategic decision-making and supplier involvement in NPD. The SBK construct was inspired by Kilpi et al. (2018), who divided supply knowledge into supply market knowledge and SBK. Following the definition of SBK in this study as knowledge about the resources and capabilities of current suppliers, the selected measurement items also tapped into this dimension. Therefore, SBK is operationalized in this study as an understanding of supplier's production processes and products. The construct of purchasing involvement in strategic decision-making was drawn from Yang et al. (2013) and measured the level of involvement of the purchasing function in the strategic planning at the plant. This construct measures the extent to which the function is involved in the strategic planning activities of a business unit at the top level, where decisions are made regarding strategic sourcing or supplier collaboration on NPD, for example. Based on Danese and Filippini (2010), supplier involvement in NPD was measured using four items that captured how actively suppliers were engaged in the NPD process.

3.3. Analysis methods

In this study, we used partial least squares structural equation modelling (PLS-SEM) for hypotheses testing. PLS-SEM is well-suited for models that include both reflective and formative constructs and it is advantageous when working with prediction-oriented research and moderate sample sizes (Hair et al., 2014; Diamantopoulos and Winklhofer, 2001). In this study, two outcome variables (NPD efficiency and NPD effectiveness) were modeled formatively. While covariance-based SEM (CB-SEM) can technically accommodate formative constructs through causal-formative indicators (Bollen and Diamantopoulos, 2017), doing so requires the use of specific model constraints for identification (Guenther et al., 2023). In contrast, PLS-SEM can estimate such models without additional constraints, and it was therefore selected as an appropriate method for our model.

To improve the estimation of reflectively measured constructs, we also utilised consistent PLS (PLSc) for the analysis of the common factor model. PLSc is an advancement of the conventional PLS (Dijkstra and Henseler, 2015). It enhances the accuracy of the reflectively measured construct estimates generated by the conventional PLS algorithm by using a reliability coefficient known as the *Dijkstra-Henseler's rho*.

The moderating effect of SBK posited in H4 and H5 were tested with bootstrap multigroup analysis (MGA). The sample was divided into the low ($N = 89$, mean = 3.46) and high ($N = 140$, mean = 4.37) SBK groups based on the mean of their composite scores (4.01), after which bootstrap MGA was conducted (Hair et al., 2014) to test if the path coefficients of the low and high SBK groups differed significantly. In this method, group-specific bootstrap estimates from each bootstrap sample were compared, with a p -value below 0.05 indicating differences at $p < 0.05$ between specific path coefficients across the two groups (Henseler et al., 2015).

To assess the robustness of our results, we complemented the main PLS-SEM analysis with several additional methods. First, we conducted a

confirmatory factor analysis (CFA) of the reflective constructs to evaluate the adequacy of the measurement model. The CFA results demonstrated acceptable model fit and significant factor loadings (Appendix A). Second, we estimated a partial structural model using covariance-based SEM (CB-SEM), which included only the five reflective constructs. The model exhibited acceptable fit, and the structural paths were consistent with those obtained using PLS-SEM (Appendix B). Third, for the two formative constructs (NPD efficiency and NPD effectiveness), we applied two-stage least squares (2SLS) regressions to test their structural relationships. The 2SLS results supported the significance and directionality of the original PLS-SEM estimates (Appendix C).

Finally, to assess the robustness of the moderating effects of supply base knowledge (SBK) (H4 and H5), we complemented the initial multigroup analysis with a two-stage moderated regression approach. In this method, SBK was treated as a continuous moderator, and interaction terms were created using mean-centered variables. The results were consistent with the original MGA findings by supporting H5a–c and showing no evidence of moderation for H4a–b (Appendix D).

3.4. Psychometric properties of the measurement scales

The internal consistency, reliability and construct validity of the reflective constructs of SBK, purchasing involvement in strategic decision-making, supplier involvement in NPD, speed performance and cost performance were assessed following Hair et al. (2014). In Table 3, both the PLS and PLS_c values are reported. The factor loadings exceeded the recommended threshold of 0.6. All the reflective constructs demonstrated acceptable reliability, consistency and convergent validity (average variance extracted [AVE] > 0.50, alpha > 0.70, composite reliability > 0.70 and $\rho_A > 0.70$; Dijkstra and Henseler, 2015; Fornell and Larcker, 1981; Garver and Mentzer, 1999).

Two tests were employed to evaluate the discriminant validity of the reflective variables. First, the square root of AVE was compared with the measurement error-adjusted interconstruct correlations (Voorhees et al., 2016). For all the reflective constructs, the square root of AVE, which is

displayed on the diagonal in Table 3, was greater than the zero-order correlations with the other constructs (in the lower part of Table 4), which implies discriminant validity (Fornell and Larcker, 1981). Furthermore, all the construct item loadings were significantly higher than the cross-loadings with the other factors.

The heterotrait–monotrait (HTMT) test was used in this study for its superiority in assessing discriminant validity compared to the traditional constrained Phi approach (Henseler et al., 2015). The HTMT ratios of the reflective constructs are presented in the upper part of Table 4, above the diagonal. All of them fell below the threshold of 0.85, proving discriminant validity (Henseler et al., 2015).

For the formative constructs, we used the evaluation criteria suggested by Hair et al. (2014) and analysed the significance of their factor weights and collinearity. All outer weights were significant (Table 3), except for that of the item GLOBLX12, the *p*-value of which was 0.063. None of the items demonstrated a high variance inflation factor (VIF) value, which indicates the absence of high collinearity.

Table 4

Results of the discriminant validity test of the reflective constructs with the Fornell–Larcker criterion (below the diagonal) and the heterotrait–monotrait (HTMT) ratios (above the diagonal).

	SBK	STRDMN	SINVLM	SPEED	COST
SBK	<i>0.749</i>	0.739	0.563	0.337	0.391
STRDMN	0.516	<i>0.910</i>	0.326	0.739	0.313
SINVLM	0.409	0.268	<i>0.850</i>	0.212	0.444
SPEED	0.233	0.210	0.180	<i>0.841</i>	0.663
COST	0.265	0.248	0.362	0.492	<i>0.823</i>

The square root of AVE appears on the diagonal in italic. Inter-construct correlations are below the diagonal. HTMT ratios are above the diagonal.

Table 3

Measurement construct assessment results.

Variables	Outer loadings		Outer weights		VIF	CR	AVE	Cronbach's α	ρ_A
	PLS	PLS _c	PLS	PLS _c					
<i>Supply base knowledge</i>									
SUPKNWN02	0.797	0.644	0.697	0.797	1.110	0.793	0.561	0.708	0.796
SUPKNWN03	0.770	0.621	0.695	0.794	1.600				
SUPKNWN04	0.824	0.697	0.636	0.636	1.111				
<i>Purchasing involvement in strategic decision makin</i>									
STRDMN01	0.904	0.783	0.730	0.730	1.765	0.907	0.829	0.794	0.797
STRDMN04	0.917	0.841	0.768	0.736	1.765				
<i>Supplier involvement in NPD</i>									
SINVLN01	0.871	0.728	0.770	0.770	2.520	0.882	0.723	0.872	0.882
SINVLN02	0.867	0.836	0.710	0.710	2.311				
SINVLN03	0.868	0.909	0.737	0.737	2.162				
SINVLN04	0.792	0.690	0.656	0.656	1.785				
<i>NPD efficiency</i>									
SUCCSX06	0.652	0.652	0.502	0.502	1.224	n/a	n/a	n/a	n/a
SUCCSX08	0.704	0.704	0.531	0.531	1.283				
SUCCSX09	0.887	0.887	0.642	0.642	1.284				
<i>NPD effectiveness</i>									
GLOBLX09	0.891	0.891	0.745	0.745	1.147	n/a	n/a	n/a	n/a
GLOBLX10	0.646	0.646	0.578	0.578	1.621				
GLOBLX12	0.629	0.629	0.451	0.451	1.498				
<i>Speed performance</i>									
GLOBLX03	0.854	0.852	0.751	0.751	1.658	0.806	0.708	0.794	0.806
GLOBLX04	0.873	0.726	0.684	0.684	2.012				
GLOBLX08	0.795	0.667	0.653	0.653	1.602				
<i>Cost performance</i>									
GLOBLX23	0.871	0.813	0.753	0.753	1.733	0.799	0.678	0.764	0.799
GLOBLX24	0.821	0.634	0.697	0.697	1.374				
GLOBLX27	0.869	0.812	0.750	0.750	1.731				

The *p*-values of all loadings and weights are below 0.05, except for those of GLOBLX12.

4. Results

4.1. Results of structural model

Hypotheses H1, H2, H3 and H6 were tested with a structural model. First, the VIF values of each predictor variable were assessed for collinearity. The values were below 5, indicating that multicollinearity was not a problem (Hair et al., 2012). The path coefficients implied positive and significant relationships between the proposed hypotheses, thus supporting the hypotheses. For both PLS and PLSc, the path coefficients and t-statistics obtained through the bootstrapping procedure are displayed in Fig. 3. The results of PLS and PLSc were aligned, supporting the robustness of the results. The standardised root mean square residual value, which estimated the fit of the model, was 0.069, which is below the recommended threshold of 0.08 (Hu and Bentler, 1999).

The relationships between purchasing involvement in strategic decision-making and cost performance and speed performance were significant, supporting H1a and H1b. Purchasing involvement in strategic decision-making was also positively related to supplier involvement in NPD, supporting H2. H3a was also supported, suggesting a positive association between supplier involvement in NPD and NPD efficiency; and H3b was likewise supported, suggesting a relationship between supplier involvement in NPD and NPD effectiveness. The relationship between SBK and purchasing involvement in strategic decision-making was positive and statistically significant, supporting H6.

Next, the predictive accuracy and relevance of the structural model were assessed with the coefficients of determination (R^2 values) and Stone-Geisser's Q^2 values, respectively. Based on the R^2 values, the model explains a moderate share of variance for purchasing involvement in strategic decision-making and NPD efficiency, while for the other constructs, the R^2 was weak (Table 5). The effect size can be considered small because the f^2 values were mostly between 0.046 and 0.363. The Q^2 values were larger than zero, which indicates the predictive relevance of the model (Peng and Lai, 2012).

Table 5
 R^2 and f^2 , and Q^2 values for the structural model assessment.

	R^2	f^2	Q^2
STRDMN	0.266 (0.575)	0.363	0.209
SINVLN	0.072 (0.099)	0.078	0.067
SPEED	0.044 (0.069)	0.046	0.025
COST	0.061 (0.096)	0.065	0.029
NPDeffi	0.150 (0.167)	0.177	0.024
NPDeffe	0.049 (0.056)	0.052	0.007

PLSc values in parentheses.

4.2. Moderation analysis

The results of the bootstrap multigroup analysis to assess the moderating effect of SBK in order to test H4 and H5 are presented in Table 6.

For cost (H4a) and speed (H4b), there were no statistically significant differences between low and high SBK groups. The high- and low-SBK groups significantly differed in terms of the relationships between purchasing involvement in strategic decision-making and supplier involvement in NPD (H5a), supplier involvement in NPD and NPD efficiency (H5b), and supplier involvement in NPD and NPD effectiveness (H5c) at $p < 0.05$.

In conclusion, the results support H1, H2, H3, H5a, H5b and H5c but not H4a–b. The results of the moderation analysis are presented graphically in Fig. 4, and the results of hypotheses testing are summarised in Table 7.

4.3. Discussion of findings

The results of the analysis supports both H1a and H1b, i.e. purchasing involvement in strategic decision-making is positively linked to cost and speed performance. This finding is aligned with the studies suggesting an association of purchasing practice with firm's operational performance (e.g. Srinivasan and Swink, 2018; Zimmermann and

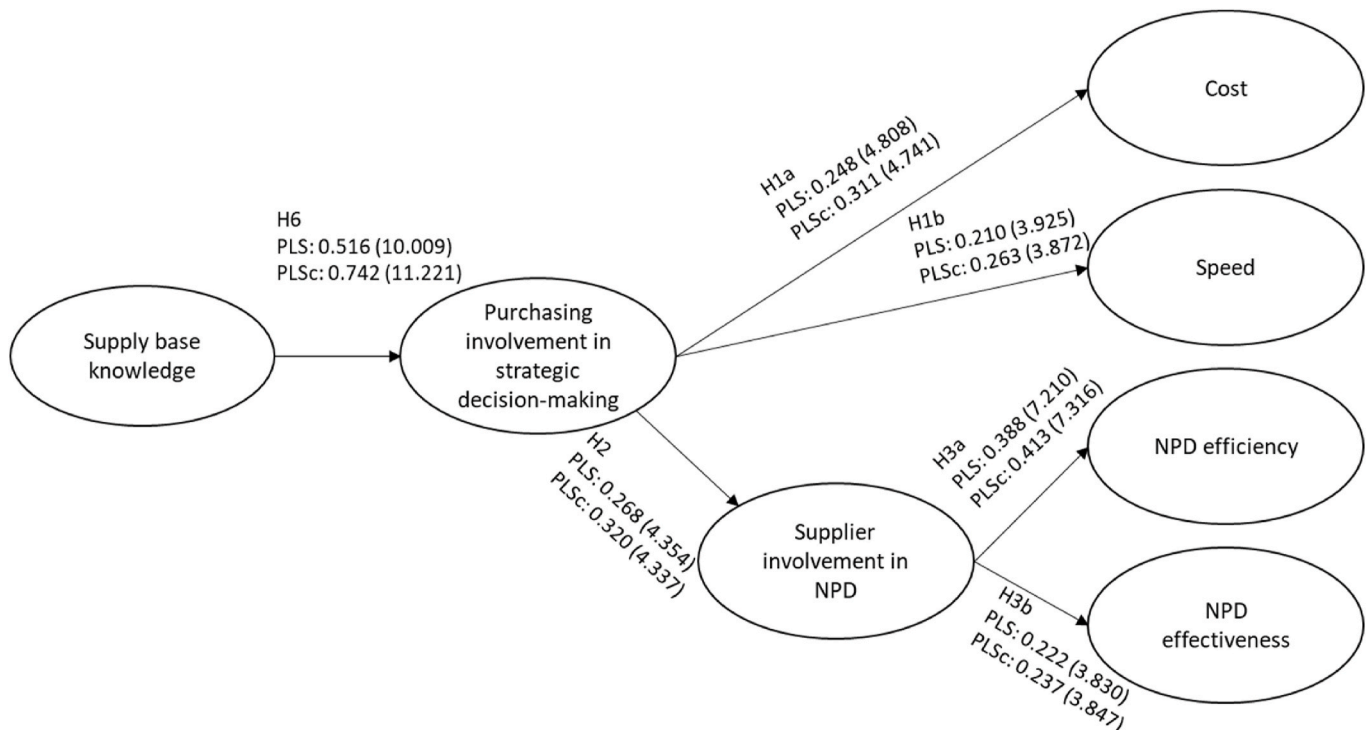


Fig. 3. Results of the hypothesis testing on symbolic knowledge use (t-statistics in parentheses). H: hypothesis; PLS: partial least squares; PLSc: consistent PLS; NPD: new product development.

Table 6
Results of the multigroup analysis for moderating effect of supply base knowledge.

Path	Group 1: High SBK		Group 2: Low SBK		Low vs. High
	β	CI	β	CI	p-value
STRD -> COST	0.269	0.113–0.379	0.177	–0.426–0.365	0.413
STRD -> SPEED	0.203	–0.196–0.303	0.247	–0.233–0.366	0.695
STRD -> SINVLN	0.283	0.081–0.441	0.065	–0.281–0.339	0.021
SINVLN -> NPDefficiency	0.432	0.289–0.522	0.265	–0.507–0.373	0.015
SINVLN -> NPDeffectiveness	0.281	0.105–0.379	0.104	–0.0426–0.365	0.041

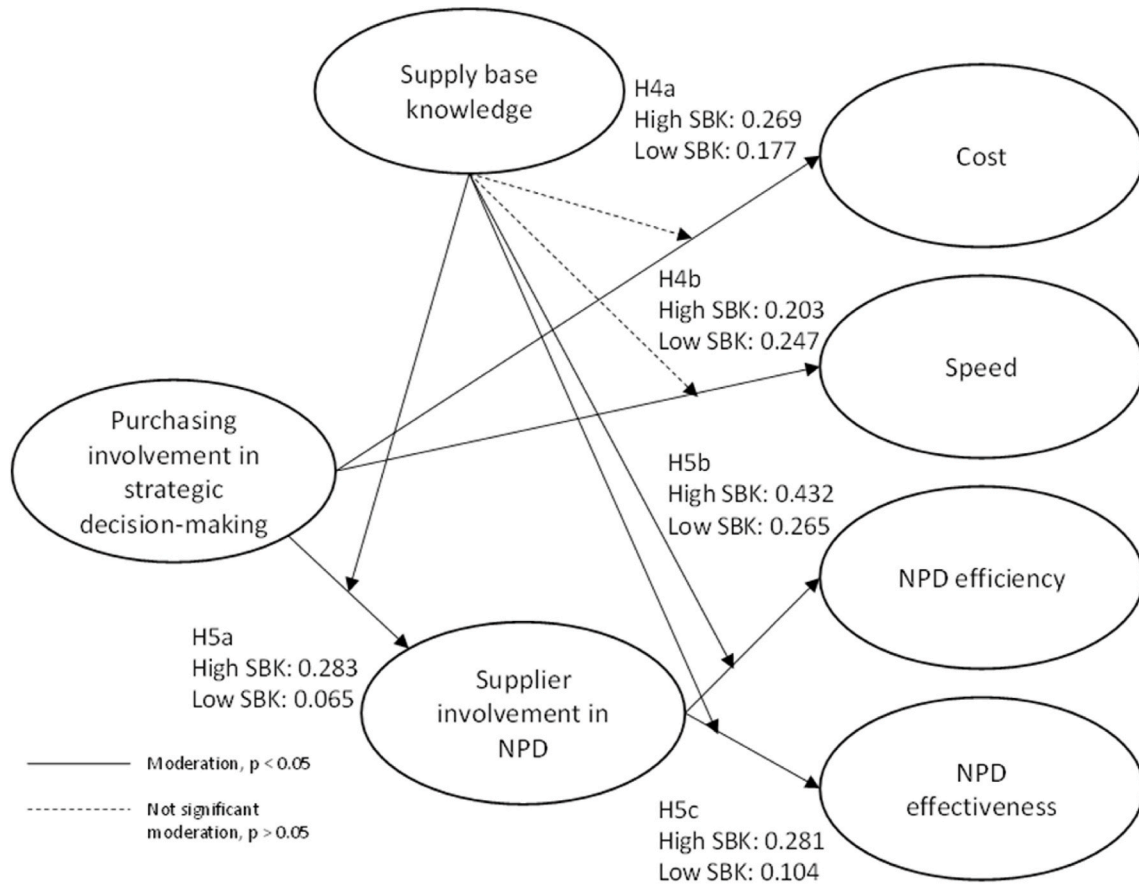


Fig. 4. Results of the hypothesis testing of instrumental knowledge use. SBK: supply base knowledge; NPD: new product development.

Foerstl, 2014), and manufacturing competitiveness, for example in terms of cost and speed (e.g., Van Poucke et al., 2016; Yang et al., 2013). Furthermore, our findings directly support the existing evidence on the beneficial effect of purchasing status on supply cost performance (Patrucco et al., 2019), and on the role of strategic purchasing integration in contributing to faster purchasing decision-making (Kaufmann and Gaeckler, 2015), and thus speed outcomes. Generally, the findings support the idea that purchasing involvement in strategic decision-making allows it to better support the firm’s priorities (cf. Nair et al., 2015), leading to better alignment and operational performance outcomes (cf. Baier et al., 2008).

Support was also found for H2, i.e. purchasing involvement in strategic decision-making is positively linked to supplier involvement in NPD. This finding is aligned with Takeishi (2001) and Zhao et al. (2011), who emphasise the role of internal coordination of strategic priorities in achieving beneficial outcomes from external supplier involvement, whereas the findings again directly support the observations from the work of Patrucco et al. (2019), which suggests the beneficial impact of purchasing function’ status on the proficiency of supplier collaboration. Fully appreciating the strategic priorities of the firm, gained through

involvement in decision-making, thus allows purchasing to make the right calls in terms of the way suppliers are involved in NPD.

For H3, only partial support was found, i.e. supplier involvement in NPD is positively linked to NPD efficiency, but not to NPD effectiveness. The confirmed association with efficiency echoes the conclusions of Suurmond et al.’s (2020) meta-analysis. Conversely, our investigation did not validate the expected relationship between supplier involvement in NPD and NPD effectiveness, which diverges from the results of Suurmond et al. (2020). A possible explanation for this discrepancy is that we did not distinguish between the moment and the extent of supplier involvement, which, according to Suurmond et al. (2020), is crucial for explaining NPD effectiveness.

Based on our analysis, H4 was not supported, i.e. supply base knowledge does not positively moderate the relationships between purchasing involvement in strategic decision-making and cost, nor between involvement and speed performance. In more detail, the associations were positive, but not statistically significant. It is here important to recognise the findings that show the beneficial effect of purchasing knowledge in general on cost and speed performance (e.g. Schütz et al., 2020; Patrucco et al., 2019), and also, more specifically, the beneficial

Table 7
Summary of the hypotheses testing.

H1: Purchasing involvement in strategic decision-making is positively linked to (a) cost performance and (b) speed performance.	Supported
H2: Purchasing involvement in strategic decision-making is positively linked to supplier involvement in new product development (NPD).	Supported
H3: Supplier involvement in NPD is positively linked to (a) NPD efficiency and (b) NPD effectiveness.	Partially supported (H3a supported)
H4: Supply base knowledge (SBK) positively moderates the relationship (a) between purchasing involvement in strategic decision-making and cost performance, and (b) between purchasing involvement in strategic decision-making and speed performance.	Not supported
H5: SBK positively moderates the relationship (a) between purchasing involvement in strategic decision-making and supplier involvement in NPD, (b) between supplier involvement in NPD and NPD efficiency and (c) between supplier involvement in NPD and NPD effectiveness.	Supported
H6: SBK is positively linked to purchasing involvement in strategic decision-making.	Supported

effect of supply base knowledge on exploitation and efficiency (Kilpi et al., 2018), and note, that the in contrast to our study, the observed beneficial effects of these studies take place at the purchasing level. Thus, our analysis failed to confirm the idea that purchasing will be better able to contribute to cost and speed performance of an entire *business unit* if it is involved in strategic decision-making and equipped with SBK. Perhaps such effects are elusive to observation and may be diluted as they trickle downstream through the internal supply chain from purchasing to business unit level operational outcomes. The process for achieving such outcomes may also not be always cross-functional in nature, suggesting less opportunities for leveraging the combinative capability, offered by the involvement in high-level decision making.

Regarding H5, our findings suggest, first, that SBK improves the impact of purchasing involvement in strategic decision-making on supplier involvement in NPD. Indeed, strategically involved purchasing, leveraging accumulated knowledge of suppliers' potential to contribute to NPD, allows for the selection and development of the right strategic partners for this key activity of organisations (cf. Koufteros et al., 2007). Second, the findings show that SBK improves the impact of supplier involvement in NPD on NPD efficiency and effectiveness, as strategic outcomes. Interestingly, SBK may well be the mechanism that allows the organization to wrestle with the many challenges associated with supplier involvement in NPD (e.g. Potter and Lawson, 2013; Yan and Nair, 2016), thus supporting the efficiency and effectiveness outcomes from the collaboration. Application of deep SBK, acquired through experiential learning from past collaboration projects (Yan and Nair, 2016), may indeed allow for better control of supplier capabilities for improved outcomes (cf. Joshi, 2009). In general, these findings align with the argument that knowledge has instrumental value (e.g., Eisenhardt et al., 2000; Wernerfelt, 1984) and showcase the relevance of combinative capability that integrates purchasing knowledge with other function-specific knowledge bases. The involvement of the purchasing function in a firm's strategic decision-making process enables the combination of purchasing knowledge with knowledge in other functions, which particularly enhances the strategic outcomes associated with NPD due to its cross-functional nature.

Finally, our results showed a strong positive relationship between SBK and purchasing involvement in strategic decision-making, confirming H6. This supports the IB argument that SBK symbolises the competence of the purchasing function and signals its strategic relevance. Thus, SBK may serve as the 'entry ticket' of the purchasing function into strategic decision-making, bringing the entire purchasing knowledge and skill set to this process. This observation is aligned with

the previous literature suggesting the beneficial impact of supply market knowledge on the internal integration of the purchasing function (Zsidisin et al., 2015; see also Lorentz et al., 2020). However, this interpretation of the results has some limitations. It may be that in firms with high SBK and where purchasing is involved in strategic decision-making, SBK did not enable such involvement but, instead, the purchasing function is putting more effort into acquiring SBK because it better understands the need for SBK, which implies reverse causality. It is also possible that high SBK with purchasing involvement in strategic decision-making can be explained by a third latent variable, such as the high skill level of purchasing personnel.

5. Conclusions

5.1. Theoretical contributions

This study contributes to the literature on SMI (e.g., Handfield, 2006; Kilpi et al., 2018; Lorentz et al., 2020; Zsidisin et al., 2015) and on enhancing purchasing and supplier involvement in strategic decision-making and NPD (e.g., Atuahene-Gima, 1995; Carr and Pearson, 2002; Pihlajamaa et al., 2019; Schiele, 2010; Suurmond et al., 2020; Wynstra et al., 1999) by offering a nuanced understanding of the dual role of SBK in fostering organisational integration and enhancing firm performance. By empirically examining both the instrumental and symbolic roles of SBK through two distinct models, we provide novel insights into how SBK acts as a critical component of the purchasing function's knowledge base, impacting strategic decision-making and supplier involvement in NPD.

First, our results provide new empirical insights into the symbolic role of SBK in promoting the involvement of purchasing in strategic decision-making, complementing prior research that emphasised SBK's instrumental value. This symbolic role aligns with IB theories, which suggest that information can serve as a symbol of expertise and credibility, reinforcing the legitimacy of a function within an organisation (Feldman and Marcha, 1981; Menon and Varadarajan, 1992). The current study built on this perspective by showing that SBK can function as purchasing's 'entry ticket' into involvement in strategic decision-making, enabling purchasing to bring its comprehensive skill set and insights into the firm's higher-level discussions. This combinative capability can then work its magic for competitively consequential outcomes (cf. Kogut and Zander, 1992).

The observed symbolic role of SBK in the purchasing function's gaining of access to cross-functional integration and a voice in top management decision-making also sheds light on the antecedents of the status of the purchasing function (Pearson et al., 1996). Cousins et al. (2006) found that the status of the purchasing function is associated with a strategic role and high-performance outcomes. Furthermore, according to Luzzini and Ronchi (2016, 793), 'top management support and the purchasing [function's] participation [in] strategic processes facilitate the adoption and deployment of purchasing practices. In short, for the purchasing function, status matters; however, Luzzini and Ronchi (2016, 793) warned that 'the actual recognition of the purchasing function is much more important than its formal position within the organization chart'. This aligns with our results on the dual role of SBK: as a symbol, facilitating access and integration; and as an instrument, supporting the achievement of competitively consequential outcomes (cf. Kogut and Zander, 1992). Perhaps quite obviously, symbolic posturing with external knowledge alone is insufficient for achieving long-term gains in status, whereas successful contribution to combinative capability may ultimately reinforce status. In summary, we contribute to the understanding of how the purchasing function may build up its status in an organisation.

Second, we expand the understanding of SBK's instrumental role by empirically examining how it moderates the impact of purchasing involvement in strategic decision-making on operational outcomes, on supplier participation in NPD, as well as on the associated efficiency and

effectiveness -effects of the latter. In other words, we addressed the question: is strategically involved purchasing better equipped to contribute to beneficial outcomes, if a high level of SBK is present? The results are mixed, as they suggest that SBK enhances supplier involvement and NPD efficiency and effectiveness, as strategic outcomes, while they fail to establish a statistically significant moderating effect of SBK on the link between purchasing involvement in strategic decision-making and business unit performance in terms of operational outcomes of cost and speed. SBK appears to only matter for strategic, or competitively consequential outcomes, where the combinative capability, offered as an opportunity by the strategic involvement, must and can be leveraged due to the cross-functional context, such as NPD. This implies that while SBK may directly enhance the strategic role of purchasing, its influence on firm performance outcomes is fully realized through its deeper integration with other functions. This complements the findings of Kilpi et al. (2018) and Schutz et al. (2019) that purchasing knowledge-based assets yield greater returns when used in combinative processes within an organisation.

In sum, this study contributes to a more comprehensive understanding of SBK's dual roles – instrumental and symbolic – in the purchasing and supply chain literature. By identifying these dual roles, we provide valuable insights into how firms can leverage SBK not only as a resource for solving managerial challenges but also as a strategic asset that enhances the influence of purchasing within the firm. These contributions offer a foundation for further investigation into how the strategic use of knowledge in purchasing can drive broader organisational integration and performance.

5.2. Managerial implications

This study underscores the critical importance of developing deep insights into the supplier base within purchasing organisations. To harness the full strategic potential of purchasing knowledge proposed by our findings, purchasing organisations should proactively acquire and effectively integrate SBK into their strategic decision-making processes. These efforts may require significant investment of managerial time and resources, such as in developing analytics capability in purchasing and acquiring knowledge of the associated methods, technology, governance, and culture (Öhman et al., 2021). While the actual return on investment may be difficult to calculate, our results suggest the following benefits.

First, a firm's demonstration of the capability to acquire knowledge about suppliers, and of the associated analytics capability, may be expected to support the integration of such knowledge into strategic decision-making within the firm. We call this the *entry ticket effect*, which allows the purchasing function to elevate its status and achieve a higher level of integration into strategic decision-making. However, a high status comes with higher expectations of purchasing acting as a key strategic player.

Appendix A. Confirmatory factor analysis of reflective constructs

To assess the robustness of the measurement model, we conducted a confirmatory factor analysis (CFA) on the reflective constructs. The results (Table E1) indicate an acceptable model fit, with goodness-of-fit indices supporting the adequacy of the measurement model (CFI = 0.963, TLI = 0.952, $\chi^2/df = 1.592$, RMSEA = 0.051). All factor loadings are statistically significant at the $p < 0.05$ level and range from 0.679 to 0.919.

Table E1
Confirmatory factor analysis of reflective constructs

Variables	Unstandardized factor loading	Completely standardised factor loading	t-value
<i>Supply base knowledge</i> ($\alpha = 0.713$; $CR = 0.703$; $AVE = 0.542$)			
SUPKNWN02	1	0.883	a
SUPKNWN03	1.252	0.919	6.426
SUPKNWN04	1.086	0.884	5.920

(continued on next page)

Second, it is indeed not enough for purchasing to act as a mere spectator in the strategic decision-making arena. Its supplier knowledge must be leveraged, which, as stated, requires managerial time and resources for supporting and participating in decision-making. Nevertheless, our results suggest that when SBK is effectively combined with relevant knowledge from other functions, it may significantly boost the competitive performance of the firm in terms of cost, speed and NPD. Hence, investment in SBK may be expected to enhance performance.

Furthermore, the involvement of the purchasing function in strategic planning not only aligns it more closely with the firm's strategic priorities but also sharpens its focus on targeted SBK acquisition, as required. Therefore, this strategic engagement may create a virtuous cycle that will enhance the purchasing function's strategic role and the firm's strategic performance.

5.3. Limitations and further research

This study had some limitations. First, it drew only on manufacturing firms for data, suggesting limited generalisability. Second, the measures of the HPM dataset were not designed for this study. Third, further research may seek to test the hypotheses in a broader purchasing context, covering, for example, the service and public sectors. Fourth, primary data collection is also recommended. Fifth, the data collection was cross-sectional in nature, implying the need for caution when drawing conclusions regarding the causality between the studied constructs. Sixth, purchasing integration into cross-functional and top-level decision-making may reveal capability gaps in SBK acquisition and analytics. Addressing these gaps will necessitate the development of the associated capability, and qualitative inquiries may be well suited to exploring this possible two-way relationship and the implied beneficial dynamics for analytics capability. Seventh, as Schiele et al. (2021) implied, without purchasing involvement in strategic decision-making, involving suppliers in NPD may not yield optimal outcomes. Therefore, future research may investigate the moderating role of purchasing involvement in NPD. Finally, future research may seek to expand the scope of this study by going beyond SBK to SMI, thereby identifying more broadly the benefits of using external knowledge in purchasing.

CRedit authorship contribution statement

Kari Tanskanen: Investigation, Writing – original draft, Writing – review & editing, Conceptualization. **Sini Laari:** Formal analysis, Writing – original draft, Writing – review & editing. **Harri Lorentz:** Writing – review & editing, Conceptualization, Investigation, Writing – original draft.

Declaration of competing interest

All authors declare that they have no conflicts of interest.

Table E1 (continued)

Variables	Unstandardized factor loading	Completely standardised factor loading	t-value
<i>Purchasing involvement in strategic decision making</i> ($\alpha = 0.687$; $CR = 0.663$; $AVE = 0.496$)			
STRDMN01	1	0.881	a
STRDMN04	0.985	0.843	8.135
<i>Supplier involvement in NPD</i> ($\alpha = 0.872$; $CR = 0.874$; $AVE = 0.634$)			
SINVLN01	1	0.847	a
SINVLN02	0.896	0.822	14.137
SINVLN03	0.901	0.799	13.643
SINVLN04	0.833	0.711	11.69
<i>Speed performance</i> ($\alpha = 0.794$; $CR = 0.799$; $AVE = 0.570$)			
GLOBLX03	1	0.719	a
GLOBLX04	1.112	0.803	10.359
GLOBLX08	1.034	0.741	9.812
<i>Cost performance</i> ($\alpha = 0.757$; $CR = 0.769$; $AVE = 0.527$)			
GLOBLX23	1	0.727	a
GLOBLX24	0.734	0.679	8.747
GLOBLX27	0.799	0.768	9.461

$\chi^2/df = 1.592$; CFI = 0.963; TLI = 0.952; RMSEA = 0.051, p-value = 0.049; a = fixed for scaling.

Appendix B. Covariance-based SEM of reflective constructs

To address concerns regarding the use of PLS-SEM, we estimated a partial model using covariance-based SEM (CB-SEM). This robustness test included only the five reflective constructs from the original model. The two formative constructs (NPD efficiency and NPD effectiveness) were excluded due to the incompatibility of formative indicators with CB-SEM assumptions.

The results of the CB-SEM model (see Figure E2) show the structural paths that are all statistically significant and closely aligned with the original PLS-SEM results. The fit indices of the partial model are: CFI = 0.903, TLI = 0.877, RMSEA = 0.068. These findings support the robustness and stability of the originally reported structural relationships.

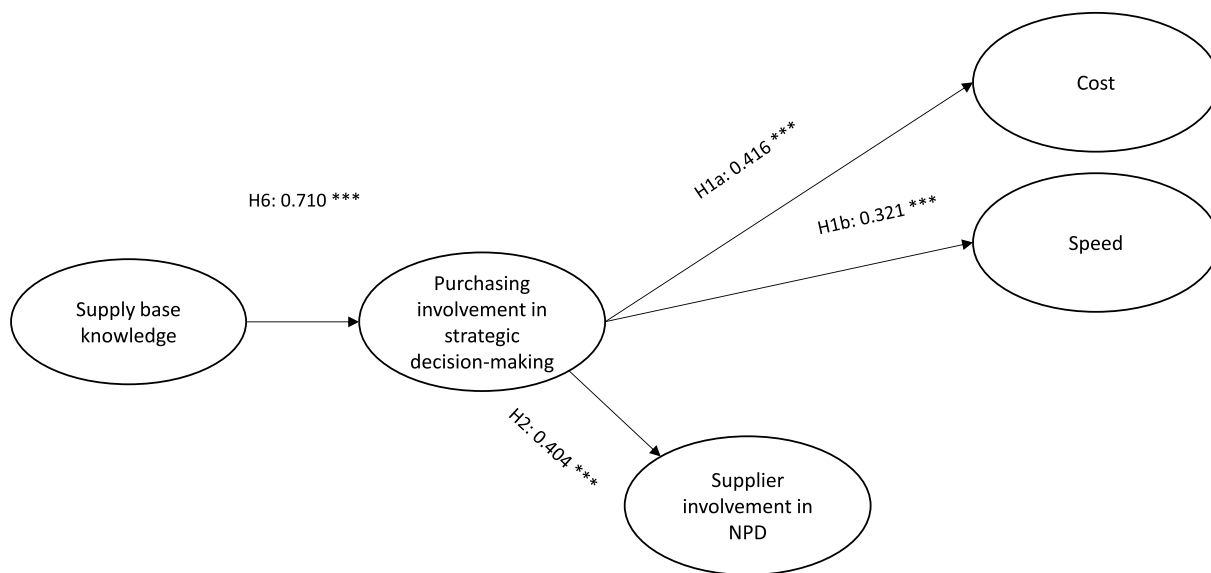


Fig. E2. Robustness test using covariance-based SEM (reflective constructs only).

Appendix C. Two-Stage Least Squares (2SLS) robustness checks for formative constructs

Given that two key outcome constructs of NPD efficiency and NPD effectiveness are modeled formatively, and such constructs cannot be estimated via covariance-based SEM (Appendix B), we applied a partial robustness check using Two-Stage Least Squares (2SLS) regression. This analysis focuses on structural paths where the formative constructs act as dependent variables.

To assess the robustness of our results to potential endogeneity, we conducted Two-Stage Least Squares (2SLS) regressions. In the first stage, supplier involvement in NPD was regressed on supply base knowledge and purchasing involvement in strategic decision-making. The predicted values were then used in second-stage regressions predicting NPD effectiveness and efficiency. Results show that supplier involvement remained a significant predictor of both NPD effectiveness ($\beta = 0.311$, $p < 0.001$) and NPD efficiency ($\beta = 0.181$, $p = 0.006$). These results support the robustness of the original PLS-SEM results.

Appendix D. Robustness tests of moderation effects using SBK as a continuous moderator

To test the robustness of the moderation effects originally tested with multigroup analysis (MGA), we conducted a two-stage moderation analysis where we used SBK as a continuous moderator. Interaction terms were created from mean-centered variables, and linear regressions were performed

in SPSS. The interaction terms were included in the models predicting cost, speed, supplier involvement in NPD, NPD efficiency, and NPD effectiveness.

All construct scores were calculated as the mean of their respective indicators, regardless of whether the construct was reflective or formative. For formative constructs, the mean serves as a practical composite representation, which acknowledges the fact that indicators contribute distinct dimensions to the construct (Hair et al., 2022).

Table E3
Regression results for moderation effects of SBK

	Dependent variables		
	Cost (H4a)	Speed (H4b)	SINVLM (H5a)
STRDM_c	0.240 ***	0.155**	0.170**
SBK_c	0.130	0.140	0.364***
Interaction	0.135	0.122	0.191**
Adj. R ²	0.096	0.052	0.123
F	9.105***	5.152***	11.663***
df	3	3	3

	Dependent variables	
	NPDEffi (H5b)	NPDEffe (H5c)
SINVLM_c	0.155***	0.271***
SBK_c	0.125	0.184***
Interaction	0.187**	0.182**
Adj. R ²	0.061	0.172
F	5.970	16.790
df	3	3

*p < 0.1, **p < 0.05, ***p < 0.01.

Unstandardized coefficients.

The results show that SBK significantly moderates the relationships between STRDM and SINVLM (H5a), and between SINVLM and both NPD efficiency (H5b) and NPD effectiveness (H5c). These results are consistent with the original PLS-MGA findings. No significant moderation effects were observed for cost or speed (H4a, H4b).

These findings reinforce the original PLS-MGA results and provide further support for H5a-c, while H4a and H4b remain unsupported.

Data availability

Data will be made available on request.

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