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Information sharing and integration of buyer-supplier relationship in small suppliers' performance

Abstract

Despite a growing scholarly interest in performance measurement systems (PMS) for collaborative networks, the literature highlights the success of co-operation from the buyer's perspective, with far less attention given to the supplier's perspective (Yeniyurt et al., 2014). In addition, only limited empirical research has been conducted on PMS in small and medium-sized enterprise networks (Bititci et al., 2012). This study investigates how information sharing and supplier integration in a buyer-supplier relationship (BSR) affect suppliers' performance in the context of small firms. Information sharing includes both providing information (to a buyer) and receiving information (from a buyer). According to the results, neither BSR integration nor information sharing are associated with suppliers' overall or financial performance. However, BSR integration showed a positive association with suppliers' non-financial performance. Moreover, information sharing (both providing and receiving) in the innovation perspective showed a positive association with suppliers' non-financial performance.

1. Introduction

Entrepreneurship is one of the cornerstones of society. For example, in Finland, the vast majority of enterprises (98 percent) are small and employ fewer than ten people. In addition, small and medium-sized enterprises (SMEs) create the majority of new jobs in Finland (Official Statistics of Finland, 2016). It can be argued that economic growth and the well-being of society depend on the success of SMEs; therefore, it is important to improve SME performance. SMEs may be differentiated from larger companies with many respects and Hudson, Smart and Bourne (2001) summarize the key aspects of differentiation as: personalized management, with little devolution of authority; severe resource limitations in terms of management and manpower, and also finance; reliance on a small number of customers, and operating in limited markets; flat, flexible, structures; high innovatory potential; a reactive, fire-fighting mentality; and informal, dynamic, strategies. These characteristics influence many strategic and structural factors in SMEs. Large and small firms alike are susceptible to liabilities of size and age with respect to strategic entrepreneurship, but for different reasons (Aldrich and Auster, 1986). Ketchen, Ireland, and Snow (2007, 371) argued that large firms emphasize operational effectiveness, which undermines their ability to explore opportunities and small firms' limited knowledge and lack of market power inhibit their ability to derive value from opportunities.

The performance of SMEs is greatly influenced by the network in which the company operates (Brownhilden, 2018). One important aspect of networks is the buyer-supplier relationship (BSR), a concept investigated by many different studies. Those studies have found that the level of integration within the BSR varies between inter-organizational networks. Vesalainen and Kohtamäki (2015)

suggested three dimensions—the economic, structural, and social—can explain the level of integration. Partnership and transactional relationships are the two extremes of the integration level. Partnership indicates an extensive BSR integration when all three dimensions are present to a great degree. Research suggests that because larger companies consider SMEs easy to replace, their buyers are reluctant to form partnerships with SMEs (Arend and Wisner, 2005). However, the nature of the relationship between a firm and its customers and suppliers has important business implications for all firms, irrespective of size (Morrissey and Pittaway, 2006). Large firms tend to be skilled at establishing competitive advantage: Small firms, in turn, have stronger opportunity-seeking skills. The strategic entrepreneurship literature highlights that a firm's pursuit of superior performance via simultaneous opportunity-seeking and advantage-seeking activities (Ireland, Hitt and Simon, 2003). Smaller firms may wish to form some type of collaborative relationship with one or more larger firms to access capabilities and resources to foster exploiting an innovation. Alternatively, large firms may wish to organize communities that include small firms so that cross-market product and service applications can be more easily identified and developed (Ketchen et al., 2007).

In addition to integration level in a BSR, information sharing is an important factor in a BSR and has been found to improve both supplier and buyer performance (He et al., 2013; Paulraj et al., 2008). Supply chain partners coordinate their processes through information sharing in order to facilitate supplier-customer interactions (Marinagi et al. 2015). Information sharing is the capturing and disseminating of timely relevant information for planning and controlling supply chain operations. Information sharing is critical to the efficiency, effectiveness, and competitive advantage of the supply chain (Stock and Lambert, 2001). Information sharing means that a supplier both provides information for a buyer and receives information from that buyer (Caglio and Ditillo, 2012; Trkman and Desouza, 2012; Zhou and Benton, 2007; He et al., 2013). However, information sharing carries a large range of different risks (e.g.,

fears of diminishing profit margins for suppliers, or suppliers being persuaded to change buyer) which can limit information sharing in a BSR (Trkman and Desouza, 2012). As a consequence, SMEs can face a situation of power asymmetry within the supply chain.

If firms decide to share information, they have various modes of information sharing available within the BSR. Information can be shared via an inter-organizational system (IOS) where databases and information systems are shared between buyer and supplier. However, there are BSRs that have individual systems sharing information through modes other than an IOS. In such a BSR, information might be shared in face-to-face informal meetings, or through formal visits or training sessions (Modi and Mabert, 2007; Trkman and Desouza, 2012). Small firms generally have limited financial resources to invest in an IOS, which creates potential challenges to information sharing. In addition, buyers can be reluctant to share confidential customer information with their suppliers, although they might try to force suppliers to deliver such information to the buyer. Such a situation means that information might be shared despite a supplier not being willing to do so (cf. Okungwu et al., 2015). Consequently, there are inevitably potential challenges around information sharing in any BSR involving a small firm, which makes it essential to recognize the power structures that exist between buyer and seller (Cox 2001).

The abovementioned challenges mean that buyers or suppliers may have their own performance measurement system (PMS) that is not integrated with that of the partner firm. A PMS may produce different information from alternative perspectives such as the financial, internal processes, learning and growth, as well as on customers. Numerous studies have found that PMS information is beneficial for firm performance (e.g., Franco-Santos et al., 2012), including that of small firms (Lavia Lopéz and Hiebl, 2015); however, small firms have unique characteristics compared to larger firms (Ates et al., 2013; Lavia Lopéz and Hiebl, 2015), which pose challenges for PMS implementation in practice. Furthermore, in the BSR context, a powerful buyer may force a small supplier to use a specific PMS or at least to

deliver specific information for the use of the buyer (e.g., He et al., 2013). In contrast, a small-sized supplier cannot force a powerful buyer to deliver information to assist the supplier. This kind of power inequality may result an unbalanced information sharing in BSR.

From the strategic decision-making perspective, Henri (2006) stated that a PMS may be used as a learning machine (Burchell et al., 1980) and as a problem-solving tool (Vanderbosch, 1999). Henri (2006) tested the relationship between organizational culture and one component of a management control system, namely the PMS. The author uses two attributes of PMS: the diversity of measurement (i.e., a broad set of financial and non-financial measures) and the nature of the use (i.e., monitoring, attention focusing, strategic decision-making, and legitimization). According to Henri (2006) the diversity of measurement is important because it makes cause-and-effect relationships transparent and deters managers from improving one measure at the expense of others (see also Hoque and James, 2000). Nevertheless, there is no single theory or clear agreement about the factors and contexts influencing the use of PMS (Ittner and Larcker, 2001).

Despite numerous studies of the BSR, PMS, and information sharing, there remains limited understanding of how these factors affect a supplier's performance in the small-firm context. Innovation-related research has highlighted suppliers' willingness to share information coupled with higher levels of trust in the buyer (Corsten et al., 2011), which in turn improve the operational performance of collaborative BSRs (Autry and Golicic, 2010). Kwon and Suh (2005) argued that shared information and trust among trading partners are required for effective supply chain planning and successful supply integration. Rashed, Azeem, and Halim (2010) explored the combined effect of information sharing and knowledge sharing on suppliers' operational performance, and showed that information sharing is a prerequisite for knowledge sharing and that a close BSR is a vital factor in fostering the supplier's operational performance.

The main purpose of this study is to investigate how BSR integration and information sharing relate to a supplier's performance. The study focuses on small-sized manufacturing firms and complements earlier BSR integration studies such as that of He et al. (2013) in dividing information sharing into the distinct aspects of providing and receiving information. Furthermore, we expand on earlier studies (e.g., He et al., 2013; Kim et al., 2011, Modi and Mabert, 2007; Zhou and Benton, 2007) by focusing on information produced by a PMS and separating information into four different perspectives—customer, financial, internal processes, and innovation and learning. Finally, the study complements earlier BSR studies that focused on large firms or the buyer perspective (e.g., Zhou and Benton, 2007; Villena et al., 2011).

2. Theoretical model and hypotheses development

Supplier success is a difficult concept when investigating a BSR because supplier success is dependent on the actions of the buyer. One way to define success is to use the relational rent concept, which is an extension of the resource-based view of the firm (Dyer and Singh, 1998; Cousins et al., 2008; Leuschner et al., 2013). Dyer and Singh (1998, p. 662) described relational rent as, “a supernormal profit jointly generated in an exchange relationship that cannot be generated by either firm in isolation and can only be created through the joint idiosyncratic contributions.” Accordingly, high relational rent requires cooperation between buyer and supplier. Dyer and Singh (1998) propose that the relational rent can be based on inter-firm knowledge-sharing routines and effective governance.

The relational rent and knowledge-sharing routines can be viewed as resources of a firm. Wernerfelt (1984, p. 172) defines a firm's resource in relation to the resource-based view as, “anything which could be thought of as a strength or weakness of a given firm.” Many studies using the resource-based view as

a theoretical base have tried to measure a firm's different resources and correlate those resources with the firm's performance. Barney (2001) summarized previous work as showing that firms that build their strategies on path dependent, causally ambiguous, socially complex, and intangible assets outperform firms that build their strategies only on tangible assets.

A supply chain is a dynamic process and involves the constant flow of information, materials, and funds across multiple functional areas both within and between chain members. Knowledge and information sharing require inter-organizational communication and interaction (Dyer and Singh, 1998; Modi and Mabert, 2007). Accordingly, our empirical model is based on the findings of inter-organizational communication theorists (e.g., Paulraj et al., 2008). For instance, Modi and Mabert (2007) and Paulraj et al. (2008) (see also, He et al., 2013) propose that inter-organization communication is an important antecedent for the performance improvements of a supplier. In addition, Zhang, Van Donk, and van der Vaart (2016) showed that inter-organizational communication using ICT has a positive direct relationship with supply chain performance and the relationship is mediated by supply chain integration. Size and budget constraints restrict SMEs from the adoption of technology and the development of new skills; hence alliances are a necessary means for them to be able to compete (Gunasekaran and Ngai, 2003). Overall, communication requires information sharing between buyer and supplier, and such information sharing has two fundamental components; providing and receiving information. This could be seen as a two-way communication model instead of one-way model (see Grunig and Hunt, 1984). As a rule, BSR communication is at its most effective only when information is both provided and received by both supplier and buyer sides.

The purpose of a PMS is to produce information to support BSR communication that can then be used to support decision-making, thus PMSs facilitate the decision-making process by providing information to top management (Henri, 2006). That information can be either financial or non-financial. Financial

information reporting instances of negative variance against initial expectations can be used to focus attention and prompt corrective action (Vanderbosch, 1999). Scholars have proposed that a PMS can have several different effects on people's behavior, organizational capabilities, and performance (Franco-Santos et al., 2012). In the BSR context, a PMS can help to produce and share information between buyer and supplier, which enhances communication by improving learning and problem-solving (e.g., Cousins et al., 2008, Franco-Santos et al., 2012, Mahama, 2006). Learning and problem-solving help to innovate new products and to improve production processes, which may enhance suppliers' performance. Therefore, producing and sharing information are prerequisites for communication in a BSR.

In addition to the PMS information produced, BSR integration is an important factor in supplier performance. Leuschner et al. (2013) conducted a meta-analysis to illustrate that BSR integration can take three different forms, which relate to information, operational, and relational integration. High-level BSR integration means that the BSR is a close partnership, whereas low-level BSR integration indicates a transactional relationship (Vesalainen and Kohtamäki, 2015). The purpose of BSR integration is to choose an effective governance structure, which reduces transaction costs between partners (e.g., Dyer and Singh 1998). Therefore, BSR integration can increase communication between partners, which can increase relational rent. Overall, the collaboration in a BSR is a critical factor for supplier performance (Modi and Mabert, 2007).

Figure 1 summarizes our theoretical model. All the relationships between antecedents and outcome are positive in the model. The model incorporates supplier size as a control variable. Contingency theory holds that information requirements and information systems used depend on organizational factors such as size (Chenhall, 2003; Caglio and Ditillo, 2012; Cousins et al., 2008; Hoque, 2014). The larger suppliers have better resources to implement PMS and simultaneously their needs for information sharing are larger, thus, larger firms share more PMS information (Caglio and Ditillo, 2012).

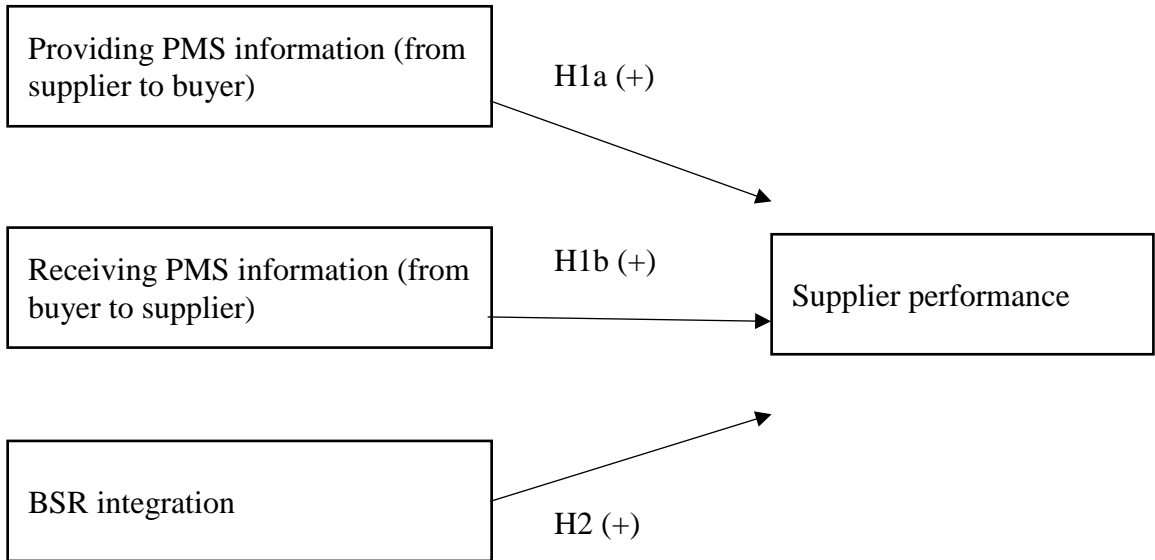


FIGURE 1. THEORETICAL MODEL. PMS INFORMATION SHARING, BSR INTEGRATION AND SUPPLIER PERFORMANCE

Information sharing and performance

Information sharing can be divided into providing and receiving information (e.g., Zhou and Benton, 2007; Kim et al., 2011). Providing information means that the supplier provides information to the buyer or the customer. Receiving information means that a buyer (or customer) produces information, which is sent to supplier; thus, the information produced can be similar, but the direction of information flow differs.

A supplier can benefit in several different ways from providing information for the buyer. The process of sending information enables BSR communication to improve the supplier’s performance (Cousins et al., 2008; Mahama, 2006). Furthermore, the buyer may force the supplier to provide information and thus it has to be produced and delivered to buyer. This kind of external impetus can help to identify required

actions that ultimately improve performance. Consequently, the common principle of “what you measure is what you get” (Kaplan and Norton, 2005, 172) will be supported (Merchant, 2007; Cousins et al., 2008) if the information has to be produced for the buyer. Finally, if a supplier is able to provide PMS information to the buyer, it signals that the supplier has some kind of PMS in use. In general, PMS information can be used among supplier staff to improve coordination and co-operation (Franco-Santos et al., 2012). These activities improve performance because they help to eliminate cost and improve response time. Sending PMS information can therefore force a supplier to focus on those performance measures that help to improve communication among the supplier’s staff as well as between supplier and buyer, which ultimately improves the supplier’s performance.

In addition to providing PMS information, receiving information from a buyer can have several positive consequences for a supplier (e.g., Kim et al., 2011; Yu et al., 2001). First, the information received on product demand helps the supplier to adjust its inventory level. Such inventory level optimization decreases the inventory costs of supplier when the supplier does not need to have extra inventory for unexpected sales (Yu et al., 2001). The information received also makes it possible to plan production schedules in a cost-effective way by incorporating economies of scale. Efficient production planning can avoid the supplier incurring unnecessary payments to staff or raw material suppliers. In addition to positive cost effects, information received helps to focus the supplier’s development activities on those products and services that can generate the greatest profit in the future. Kim et al. (2011) found that receiving information from a buyer (i.e., having inter-organizational information systems visibility in that case) was positively associated with the supplier’s expectations of relationship continuity and joint

profit performance¹. Overall, receiving information from the buyer is crucial for the supplier and its operational development.

In summary, knowledge transfer and information sharing are beneficial for the supplier in the BSR (e.g., Modi and Mabert, 2007; Franco-Santos et al., 2012) although it encompasses several different risks for suppliers (Trkman and Desouza, 2012). Accordingly, our first set of hypotheses are:

Hypothesis 1a. Providing PMS information (from supplier to buyer) is positively associated with supplier performance.

Hypothesis 1b. Receiving PMS information (from buyer to supplier) is positively associated with supplier performance.

Generally, a PMS produces both financial and non-financial information from a range of perspectives. Those perspectives can relate to customers, financial, internal business processes, or innovation and learning, which correspond to the original balanced scorecard perspectives (Kaplan and Norton, 2005). A number of studies have investigated how forms of information affect firm performance (e.g., Hoque, 2014; Ittner et al., 2003; van der Stede et al., 2006). Ittner et al. (2003) found that those firms with a broad set of non-financial measures generated the highest stock returns and van der Stede et al. (2006) showed that firms recorded better performance if their PMS includes both subjective and objective non-financial measures. The results from both of those last two studies indicate that the use of financial measures alone do not explain the variance in firm performance. One reason might be that financial measures are lagging performance indicators, whereas non-financial measures are leading indicators

¹ However, Zhou and Benton (2007) found that information received from a customer had a negative association with the delivery performance of the firm. Zhou and Benton (2007) explain their unexpected result by surmising that when the customer shares information with a manufacturer, the customers' delivery requirements might change more often, which makes it more difficult to meet delivery requirements. Zhou and Benton (2007) do not measure the overall performance of the supplier and thus their findings should be interpreted cautiously.

(Bento et al., 2013; Okongwu et al., 2015). It appears that the use of non-financial measures has a greater effect on firm performance.

Furthermore, a firm's financial information (such as profitability, liquidity, or solvency ratios) is often publicly available which means that a supplier or buyer can get it if necessary without sharing information. In contrast to financial information, non-financial information (such as innovation or process measures) is not publicly available, which means that it can provide a competitive advantage for the information holder. Nevertheless, information sharing is beneficial for the supplier in the BSR context as mentioned above. Therefore, our next hypothesis is:

Hypothesis 1c. The associations stated in Hypotheses 1a and 1b vary between PMS perspectives.

BSR integration and performance

Fabbe-Costes and Jahre (2008) analyzed 152 articles studying the link between supply chain integration and performance and concluded that the supply chain integration framework includes three overall dimensions: layers, scopes, and degree in addition to performance and its link with integration. Four layers of integration were used in these articles: 1) integration of flows (physical, information, and financial), 2) integration of processes and activities, 3) integration of technologies and systems, and 4) integration of actors (structure and organizations).

Bititci et al. (2003), in turn, proposed that collaboration between suppliers and buyers is characterized by joint planning, coordination, and process integration. Collaboration is a process in which organizations exchange information, alter activities, share resources, and enhance one another's capacity for mutual benefits and to achieve a common purpose by sharing risks, responsibilities, and rewards. Researchers with few exceptions explicitly or implicitly take the starting proposition that the greater the

degree of supply chain integration (SCI) the better (Fabbe-Costes and Jahre, 2008, p.140). Vickery et al. (2003, p.533), in turn, provide evidence that the direct relationship of SCI to financial performance is non-significant.

However, there are also studies that have shown that the relationship between BSR integration and performance is not linear. Villena et al. (2011) showed an inverted curvilinear relationship between BSR integration (i.e., social capital in their terms) and performance. Villena et al. (2011) found that some BSR integration is good for performance but too much BSR integration reduces performance owing to the diminution of objectivity and increase in opportunistic behavior. Hence, based on the previous research we suggest the following hypothesis:

Hypothesis 2. There is a positive association between BSR integration and supplier performance.

3. Empirical data and the survey instrument

Data gathering

The data were gathered by an online survey in spring 2016 among manufacturing firms in the Southern Ostrobothnia region of Finland. A cover note and a link to the survey was sent by e-mail to 440 executives. Initially we received 23 responses and then added a further 10 responses by telephoning 100 executives directly. Then, we sent another e-mail to 305 executives and obtained a further 22 responses. The data were gathered from firms of all sizes (for different research reasons), but in this study, we concentrate on small firms alone. Accordingly, we applied the criteria used by the European Commission to denote a small firm to the 55 firm responses received: Respondent firms were to employ fewer than

50 staff and have an annual turnover or balance sheet total below EUR 10 million. Consequently, 47 manufacturing firms make up in our final sample.

Survey instrument

PMS information sharing

We used 20 items to measure the sharing of PMS information. All the items reflect the traditional four dimensions of the balanced scorecard developed by Kaplan and Norton (2005). The balanced scorecard offers senior managers a fast but comprehensive view of the business (Kaplan and Norton 2005, 172) and is a response to the criticism that financial accounting measures like return on investment and earnings per share can convey misleading signals for continuous improvement and innovation. Managers should not have to choose between financial and operational measures. We applied Henri's (2006) instrument with a 7-point Likert scale anchored with *not at all* (1) and *to a very great extent* (7). We used the following 20 items (Financial, 6 items; Customer, 6 items; Internal business processes, 4 items; and Innovation and learning, 4 items) to measure both the provision of information to and the receipt of information from the buyer to reflect information sharing incorporating those two directions (e.g., Caglio and Ditillo, 2012). However, information sharing relating to patents (one item from the innovation and learning set) had a low correlation with the other items and was therefore omitted from the final scale. This means that our instrument has 38 items (two times 19) for PMS information sharing in total. The Cronbach's alpha for providing information was .93 and for receiving information .95. These indicate the instrument is reliable in terms of measuring PMS information sharing.

BSR integration

Vesalainen and Kohtamäki (2015) researched the typology of BSRs and examine how a PMS can be designed for a collaborative network. The study uses measurement items relating to relational capital,

relationship structures, relationship-specific investments, and relationship performance improvement developed in earlier studies.

We measured BSR integration with a 9-item scale based on Vesalainen and Kohtamäki (2015) in terms of having a feeling of shared destiny and shared goals, and types of structural bonds existing in BSR. The Cronbach's alpha for BSR integration was .85, indicating the instrument is reliable in terms of measuring BSR integration.

Firm size

Following prior studies, we adopted the number of employees as a measure of firm size (e.g., van der Stede et al., 2006; Chenhall, 2003). We used a natural logarithm (ln) of the firm size owing to the non-normality of the size in the analysis.

Supplier performance

We measured firm performance with an instrument from Chapman and Kihn (2009) that is itself an adaption of one originally developed by Govindarajan and Fisher (1990) and Chenhall and Langfield-Smith (1998). The instrument of Chapman and Kihn (2009) includes nine items and we adopt the same format. Respondents were asked to rate their firm's performance relative to its competitors over the previous three years (Artz, 2012). A 7-point Likert scale anchored with *unsatisfactory* (1) and *excellent* (7) was used. The Cronbach's alpha was .91, indicating the instrument is reliable in terms of measuring firm performance.

4. Empirical results

First, factor analysis was used to analyze the structure of the performance scale. The Kaiser-Meyer-Olkin measure (.77) showed that factor analysis was appropriate for this data. There were nine items measuring firm performance. Factor analytic results indicated the existence of two factors with eigenvalues greater than 1.0. These accounted for 75 % of the variance of these nine items. Varimax rotation was used to determine the variables within each factor. Table 1 shows the communalities for each variable and the factor loadings for these factors after rotation.

TABLE 1. FACTOR ANALYSIS FOR THE FIRM PERFORMANCE

Variable	Communality	Factor 1	Factor 2
Return on investment	.88	.93	
Profit	.90	.93	
Cash flow from operations	.89	.89	
Development of new products	.79		.89
Sales volume	.83		.79
Market share	.73		.82
Market developments	.74		.69
Personnel developments	.61		.55
Political-public affairs	.40		.49

The first factor was named *financial performance* and the Cronbach's alpha for the scale was .95. The second factor was named *non-financial performance* and had a Cronbach's alpha of .88. The two factors thus have high reliability ratios. As a comparison, Chapman and Kihn (2009) have three factors: 1) market performance (development of new products, sales volume, market share and market

development), which explains about 44.42 % of the variance, 2) financial performance (return on investment, profit, and cash flow from operations) explaining 19.12 % of the variance, and 3) social responsibility (personnel developments and political-public affairs) explaining 11.14 % of the variance.

To support regression analysis, variance inflation factor values were checked to see that there was no problem with multicollinearity. The normality of scales was tested using the Kolmogorov-Smirnov and Shapiro-Wilk tests, which showed that all the variables in our model were normally distributed. Homoscedasticity and the normality of residuals were examined. Common method variance (CMV) can bias the findings of empirical analyses when data for both the predictor and criterion variable are obtained from the same person in the same measurement context using the same item context and similar item characteristics (Podsakoff et al., 2003). We tested for possible common method bias using Harman's single factor test following Kaiser's criterion for retention of factors and examining the unrotated factor solution as recommended by Podsakoff et al. (2003). As a result, several factors were identified, and the first factor did not account for the majority of the variance. Hence, CMV does not appear to be present.

We tested the hypotheses using standard linear regression analysis. In the first model, the dependent variable is financial performance and in the second model, non-financial performance. The independent variables in the model are BSR integration, providing PMS information, receiving PMS information, and firm size. As can be seen from Table 2, neither BSR integration, nor providing or receiving PMS information, nor firm size explained the variance in financial performance. However, in Model 2, independent variables explain 22 percent of the variance in non-financial performance. The only significant variable in the model is BSR integration, thus, providing or receiving PMS information has no effect on non-financial performance. Hypothesis 2 is supported (with non-financial performance) and Hypotheses 1a and 1b are rejected.

TABLE 2. THE LINEAR REGRESSION ANALYSIS OF FIRM PERFORMANCE

Model 1: Financial performance		Model 2: Non-financial performance
Independent variables		
BSR integration	β .03	β .44**
Providing PMS information	β .16	β -.28
Receiving PMS information	β -.23	β .36
Firm size	β .15	β .20
Model fit statistics		
Adjusted R ²	-.06	.22
F-statistics	.416	4.10**

* p<.05. ** p<.01. *** p<.001 Standardized coefficients reported.

We used linear regression analysis to examine the effect of each perspective of information: customer, internal processes, innovation, and financial perspective. This was done separately for providing PMS information and receiving PMS information. Table 3 presents the results of the regression analysis. In Models 1 and 2, the independent variables include the different aspects of providing PMS information and in Models 3 and 4 the different aspects of receiving PMS information. Models 1 and 3 explain the variance in financial performance and Models 2 and 4 that in non-financial performance.

**TABLE 3. REGRESSION ANALYSIS FOR FINANCIAL AND NON-FINANCIAL PERFORMANCE;
DIFFERENT ASPECTS OF PMS INFORMATION SHARING**

Model 1: Financial performance		Model 2: Non-financial performance
Independent variables		
BSR integration	β -.02	β .35*
Providing PMS financial information	β .21	β .07
Providing PMS customer information	β -.20	β -.29
Providing PMS information on internal processes	β -.12	β -.12
Providing PMS information on innovation	β .10	β .46*
Firm size	β .15	β .08
Model fit statistics		
Adjusted R ²	-.10	.22
F-statistics	.372	3.02*
Model 3: Financial performance		Model 4: Non-financial performance
Independent variables		
BSR integration	β -.04	β .33*
Receiving PMS financial information	β .25	β .13
Receiving PMS customer information	β -.30	β -.05

Receiving PMS information on internal processes	β -.19	β -.26
Receiving PMS information on innovation	β .21	β .51*
Firm size	β .18	β .11
Model fit statistics		
Adjusted R ²	-.11	.26
F-statistics	.387	3.24*

* p<.05. ** p<.01. *** p<.001 Standardized coefficients reported.

Models 1 and 3 did not explain the variance in financial performance. However, Models 2 and 4 have statistical value in explaining the variance in non-financial performance. What is most interesting, the perspective of PMS information on innovation (both providing and receiving) are the most important variables in the model. Both have more value in explaining the variance in non-financial performance than BSR integration. Nevertheless, BSR integration also has statistical value in the models.

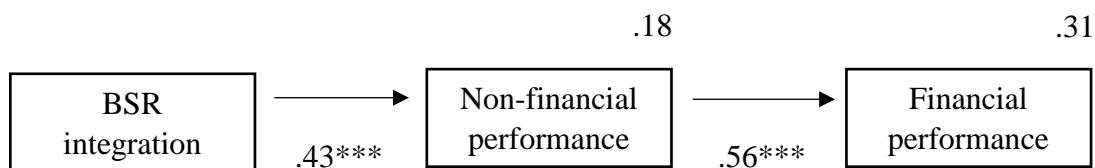
The finding indicates that providing information about firm's own innovations, or receiving information about a buyer's innovations, affect a firm's non-financial performance. Information sharing on innovations is an important factor in explaining a firm's performance. Hypothesis 1c is supported: the associations, as stated in Hypotheses 1a and 1b, vary between PMS perspectives.

The empirical findings suggest that BSR integration affects the non-financial performance of a firm, but not its financial performance. We conducted an additional analysis to test if there was an indirect effect of BSR integration on financial performance through non-financial performance using path analysis. Path analysis is an extension of multiple regression models and facilitates testing several dependent variables and chains of influence (Steiner, 2005). Byrne (2010) suggests different fit indices to evaluate path model

fit. For path model fit, the acceptable model was operationalized as χ^2 /degrees of freedom (df) ratios (CMIN/DF) less than 3.0, Comparative Fit Index (CFI) values greater than .90, Normal Fit Index (NFI) values greater than 0.95 (above 0.90 is accepted) and Root Mean Square Error of Approximation (RMSEA) values of less than .08. However, Kenny, Kaniskan, and McCoach (2015) argue that RMSEA should not be used with small samples, because there is a greater sampling error for small degrees of freedom and small sample size, which produces artificially large RMSEA values. Hence, as suggested for small sample sizes and a low df (1), we used the fit indices of χ^2 /degrees of freedom (df) ratios (CMIN/DF), CFI, and NFI.

Figure 2 presents the results of the path analysis with standardized regression weights; the model fit is good (CMIN/DF=1.941, $p=.164$; CFI=.97; NFI=.94), and the results also verify a significant indirect effect (.43, standardized indirect effect.24) of BSR integration on financial performance. The whole model explains 31 % of the variance in financial performance and 18 percent of the variance in non-financial performance.

FIGURE 2. THE RESULTS OF THE PATH ANALYSIS



5. Conclusions

This study investigates how PMS information and BSR integration are associated with firm performance in small firms. It seems that BSR integration plays a central role in the performance of small

manufacturing firms. It has a significant effect on a firm's non-financial performance and an indirect effect on financial performance. This could relate to the types of supplier performance measures: operational measures and communication measures. Supplier communication performance measures are complementary to operational measures, encouraging a climate of interaction and contact between buyer and supplier in order to open channels of communication (Cousins et al. 2008). It should be also noted that BSR measures are largely non-financial (see Vesalainen and Kohtamäki 2015). Hence, it is unsurprising that only non-financial indicators are significant. However, BSR integration has an indirect effect on financial performance.

Information sharing, both receiving and providing, has an effect on a firm's non-financial performance only in respect of information related to innovations. Other perspectives on information did not have an effect on firm performance. This suggests that sharing information about innovations in BSRs can trigger a performance improvement for a small firm. This is in line with previous research on the knowledge management process and innovation demonstrating a link between those concepts (Teixeira and Oliveira, 2018). In regard to innovations, information sharing and knowledge management seem to be central factors. In other respects, the result support the conclusion of Kembro and Näslund (2014) that information sharing in supply chains has no overall effect on performance.

It is very interesting that not only receiving information from a buyer but also providing information to that buyer is important to a supplier's performance,. The results of the study imply that two-way communication (both providing and receiving information) in a BSR influences the firm's performance. This suggests that the ideas of two-way communication could be used in the context of a BSR. Two-way communication is embedded in the theories of public relations, where communication has been divided into two general modes, one-way and two-way (Yi-Fan Su et al., 2017; Grunig, 1984; Grunig and Hunt, 1984). Grunig and Hunt (1984) proposed four models of public relations, where two dimensions—

asymmetrical and symmetrical—to one- and two-way communication. Asymmetrical communication can be seen as persuasion and symmetrical communication as compromising communication with mutual benefits. In BSRs, it is a challenge to have practices reflecting symmetrical communication if the other party has more power. Our research did not examine the asymmetrical and symmetrical communication dimensions. However, the results of the study imply that two-way communication (both providing and receiving information) in a BSR has an effect on the firm's performance. From the point of view of an SME, it could be challenging to create a symmetrical communication and power relationship with buyer. However, innovativeness on the part of an SME can bolster the performance of both parties, and make the partnership more equitable than it might otherwise be. Accordingly, an innovative SME can improve its own position in the supply chain.

Zhu et al. (2014) referenced the relational view and knowledge-based view of the firm to argue that one of the mediating factors through which \affects firm performance is inter-organizational learning. According to Dutta (2012) in line with organizational learning approach, an inter-organizational relationship has the greatest chance of success if it offers valuable knowledge to both partners and if both partners can continually learn from the experience. Organizational learning is an approach used to acquire, share, and use information and knowledge to support actors across inter-organizational networks and fosters a dynamic self-correcting system which drives continuous improvement (Argyris 1977). Inter-organizational knowledge sharing and learning constitute one of the main avenues followed to improve performance along supply chains.

Network ties between organizations allow for learning between partners. An essential factor is how firms are able to transform this learning and knowledge intake to improve their own performance outcomes. The relational rent referenced in the RBV perspective can be generated by combining valuable, scarce, and complementary resources and capabilities with key supply chain partners. According to Zhu et al.

(2017) successfully generating such relational rent requires knowledge exchange and learning between firms. The process of generating relational rents also requires a firm to create the conditions that allow the buyer and supplier to contribute to and mutually develop the relationship. Cousins et al. (2008) argued that socialization practices, both formal and informal, can contribute to that process. By strengthening social ties with the buyer, the small firm and its partner share experiential knowledge that can be distributed, especially in informal situations where partners trust each other.

It is important to notice that small firms should provide information about their innovations, even though this requires trust and risk-taking: Doing so requires small firms to develop their knowledge-sharing strategy. Fatemeh and Nemati-Anaraki (2014) argue that an organization's achievement depends on its knowledge-sharing strategy and identify five major points: first, information technology can enable both explicit knowledge and tacit knowledge sharing; second, human interaction is the simplest approach to sharing knowledge; third, knowledge management strategies may be adapted to fit with organizational culture; fourth, motivation (such as rewards) can persuade people to share knowledge; and fifth, inter-organizational trust is an important factor enabling knowledge-sharing.

This study contributes to earlier collaboration studies on BSR (e.g., Caglio and Ditillo, 2012; Mahama, 2006; Modi and Mabert 2007). As a contribution to Caglio and Ditillo (2012), Mahama (2006) and Modi and Mabert (2007), this study shows explicitly what kind of information (i.e., that relating to the customer, internal processes, financial aspects, and learning/growth) has an association with the performance of supplier. Caglio and Ditillo (2012) did not use supplier performance as an independent variable in focusing on antecedents that explain information exchange in a BSR. On the other hand, earlier studies (e.g., Mahama, 2006) focus on supplier performance from the buyer perspective and thus neglect the supplier's overall or financial performance.

A second contribution relates to the division of information sharing into providing and receiving information (e.g., Mahama, 2006; Modi and Mabert, 2007). The study illustrates that in addition to receiving information from a buyer, providing information is also influences the performance of suppliers; a finding that is in line with the inter-organizational learning perspective. When both partners can continually learn from experience such inter-organizational learning mediates SCI and affects a firm's performance.

A third contribution relates to the context of SMEs. Although supply chains and their integration and sharing of information have been intensively studied over the past few decades, research has paid limited attention to the role of SMEs in supply chains. In particular the impact of information sharing on the performance of SMEs has received little research attention, especially from the supplier's point of view.

This study has some managerial implications for SMEs too. First, informal controls, structures, and activities encourage intensity in communication and dialogue with key supply chain partners. Second, managers should facilitate integration efforts, such as information sharing and collaborative product design and development to support supply chain partners' non-financial performance in particular. Better non-financial performance, in turn, creates a basis for better financial performance over time. To enhance the results of information sharing, it is important that managers address four main questions: 1) what to share, 2) who to share it with, 3) how to share, and 4) when to share (Lofti et al., 2013). In this study we measure only supplier-side performance. This was our main focus, but could be viewed as a limitation of the study. Caglio and Ditillo (2012), and also Vesalainen and Kohtamäki (2015) have pointed out that there are always two parties to a BSR and two dimensions, and information sharing and its effects on performance are not unidimensional.

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