

## Collaborative Networks and Firm Performance: Moderating Role of Information System Integration

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### Abstract

*The objective of this study is to empirically test not only the direct effects of collaborative networks and integrated information systems (IS) on firms' performance, but also the moderating role of IS integration along the value chain in the relationship between collaborative networks and firms' performance. The six hypotheses are tested with data on 1561 firms representing the perspective of Australian SMEs. The hierarchical multiple regression analysis is employed to examine the direct effects and the moderating relationships proposed. Results show that integrated IS is a critical driver of both innovation and financial performance, while merely having a collaborative network does not lead to improved financial performance. Furthermore, a moderating effect of IS integration in the relationship between collaborative networks and innovation performance is found. For practical application, these findings offer informed advice to managers on how to innovate and survive in the challenging economic climate.*

### Keywords

Collaborative network; information system integration; firm performance; innovation;

### INTRODUCTION

The use of information communication technology (ICT) in this information age has revolutionised the way business is transacted in the global market place. Much debate about the impact of adoption of ICT on firm performance has been widely discussed in recent research (Mithas *et al.* 2012). Recently, the benefits and prospects of information systems (IS) in general and e-business in particular are a popular topic in innovation literature (Carlo *et al.* 2011; Wei and Wang 2011). Many scholars argue that technology can be matched so quickly that it is rarely a source of competitive advantage, while some empirical studies have found that ICT investments seldom associate with improved performance (Brynjolfsson 1993; Carr 2003). However, advances in IS which facilitate information sharing are a critical enabler in bringing efficiency in value chain management (Bendoly *et al.* 2012; Quinn and Strategy 2013). Thus, ICT is enabling the creation of effective and efficient IS (Melão 2009; Shareghi and Faieza 2011). An information system is considered to be the set of interacting artefacts that perform one or more functions involving the handling of data and information including data collection, creation, editing, processing and storage to support decision-making, coordination and control (Laudon and Laudon 2004). The cornerstone of information system is ICT tools in the form of the Internet, mobile electronic devices and related software programs. Thus, IS integration can be described as the degree to which a firm integrates its ICT-based systems to share information with business partners and clients and make transactions along the value chain (Francalanci and Morabito 2008).

Another important consideration of focus in the literature is the need for IS integration with business partners to improve inter-organisational cooperation. Integrated IS with business partners is expected to enhance firm performance and act as a source for identifying tangible and intangible values from operations. Specifically, collaborative partnerships focused on information sharing technology were found to positively affect relational outcomes in terms of smooth value chain process, sales volume, market share and profit (Cheng 2011). While IS integration may be a powerful strategic tool in providing value chain connectivity, there remain many unresolved queries about the practices surrounding them (Vieru and Trudel 2013). Precisely, there is a large volume of literature on the relationship between collaboration and firm performance. These studies, however, have not explicitly examined the moderating role of integrated IS with suppliers and customers in Australian SMEs in order to assess the impact of collaboration on both innovation performance and financial performance.

This study seeks to investigate how the use of integrated IS and collaborative networks impacts a SME's innovation performance and firm performance in Australia. Hence the paper contributes to bridging the research literature with empirical evidence. Specifically, three concepts – collaborative networks, integrated IS, and firm performance – will be studied in an attempt to address the following questions: do collaborative networks and integrated IS contribute to successful innovation and better financial performance in Australian SMEs. Our fundamental research question is through what mechanism is integrated IS established and facilitated in deepening our understanding of IS integration and the firm's innovation as well as financial performance? The relationships analysed in this paper can be considered critical to innovation development. Indeed, it is generally recognized that progress in this field requires in-depth study and analysis in order to better understand the true usefulness of the collaborative networks and information systems.

## LITERATURE AND HYPOTHESES

This section starts with a description of the collaborative network context. The relationship between collaborative networks and firm performance literature is reviewed next, followed by literature on IS integration. Finally, the moderating effect of integrated IS on the relationship between collaborative networks and firm performance is reviewed. From the literature, hypotheses are developed throughout this section and then inductively inferred into the development of our conceptual research model at the end of this section.

### Collaborative network and firm performance

A collaborative network is a vital driver to succeeding in the competitive battle for market share and a necessity for sustainable development in a globalised world as utilising a linear model or chain link model of (closed) innovation (Gadrey *et al.* 1995) will only constantly miss new markets and opportunities and not fully exploit its resources utilisation (Sajib and Agarwal 2013). Traditional ways of doing business have proved to be limiting and obsolete amidst rising globalised markets and players that are quite competitive. For firms to keep afloat amidst cutthroat competition, they have to adopt innovative ways of collaborative networking which open up new avenues (Chen and Yang 2012). This will enable firms to meet the increasing demand for innovation from customers and business partners. This urgent need for integrating external sources has made many firms shift from a closed innovation model to an open innovation model (Antikainen *et al.* 2010). Open innovation through joint efforts of business partners or even competitors facilitates the use of external ideas and knowledge combined with internal R&D to attain more sustainable innovation.

A collaborative network is multifaceted. It is a dynamic networked system that is built upon the concept of strategic alliance, a group of networked organizations adhering to a base long-term cooperation agreement while also adopting common operating principles and infrastructure (Herstad *et al.* 2014). Sveiby and Simons (2002), however, argue that a collaborative network is a critical determinant that controls the effectiveness of knowledge building. Numerous studies have shown that an early and intensive collaboration with partners leads to shorter innovation processes, minimised innovation expenses and greater financial results (Chen *et al.* 2014; Choi *et al.* 2010). Becker and Dietz (2004) have found empirical evidence that collaboration with various partners on research and development (R&D) increases the probability of attaining product innovation. Moreover, firms engaged in a collaborative network can acquire corresponding resources and competencies through the network.

Extant literature has intuitively analysed the connection between collaborative networks and firm performance (Sajib and Agarwal 2013; Tsai 2009). Blomqvist and Levy (2006) discovered that the higher the extent of collaboration between firms is, the better the improvements they achieve on quality, reduction in cost, delivery time and suppleness. Research also confirms that firms more deeply incorporated with customers and suppliers present better performance (Gupta *et al.* 2004). Powell and Koput (2006) revealed that close relationships with suppliers and firms' profits are positively related, although they did not find support for this connection when considering close relationships with customers. According to Montoro-Sanchez *et al.* (2011), knowledge spill overs from engaging in inter-organisational R&D collaboration have a positive impact on the increasing innovation potential in firms. Based on these discussions, two hypotheses can be formulated:

Hypothesis 1: there is a positive relationship between collaborative networks and innovation performance in SMEs.

Hypothesis 2: there is a positive relationship between collaborative networks and financial performance in SMEs.

### Integrated IS and firm performance

Activities like responding to the needs of the customer, replenishment and management of stock can be greatly improved if there is an efficient sharing of information mechanism among the partners in the value chain (Dyer and Singh 1998). Information sharing practices can increase the coordination among value chain partners thereby improving performance (Lee *et al.* 2000). This is why many researchers have considered the integration of IS as of primary importance within the literature on ICT applied to organisations (Lin *et al.* 2006). For

instance, Nachira *et al.* (2007) revealed that improved business results can be gained through a greater level of e-integration, where they measured the degree of e-integration by the use of IS integration. IS literature has identified various roles and requirements for IS in business innovation. For example, it has been discovered that IS organising vision can provide stimuli that induce invention and experimentation apart from giving legitimacy to innovation as a good organisational practice (Swanson and Ramiller 2004). A similar conclusion was drawn by Gloet and Terziovski (2004), who suggested that a capacity for continuous innovation is created by the presence of an integrated IS in the supply chain. Consequently, it is logical to propose that the use of IS for the management of the entire value chain will bring better firm results. The following hypotheses incorporate these expectations.

Hypothesis 3: there is a positive relationship between integrated IS and innovation performance in SMEs.

Hypothesis 4: there is a positive relationship between integrated IS and financial performance in SMEs.

### Collaborative networks and integrated IS with firm performance

Past studies have already shown us the necessity to share information in a collaborative network (Han *et al.* 2006). We can take the example of Singh and Power (2009), who claim that the effectiveness of group work can be improved through sharing of information as it assists in constructing trust. Lack of coordination can be one of the impediments of inadequate information sharing, which may lead to unsuccessful collaborations (Fawcett *et al.* 2008). However, certain challenges may be encountered on the path to achieving an effective process of sharing knowledge, primarily the differences in culture and geographical position (Pan and Leidner 2003). Centralisation of information through the use of ICT tools is changing the way information is shared. ICT was rated by CEOs as the principal tool for strategic purposes in a survey by the London School of Economics (Sanders and Premus 2005). However, it was conceded by many of the CEOs that it was not exactly the technology *per se* that provided the advantage in competition but rather the superiority in sharing of information. Chang and Wong (2010) claim that the emergence of integrated IS has made the biggest impact on the way information exchange is carried out between buyers and sellers. Web technologies, which are termed here as e-business technologies, are now put into use by integrated IS and have a particularly important impact on managerial practices as they can operate with each other and can transfer data between organisations through their open standard setting (Dalkir 2013).

The fact that routine interactions are made more easy, fast and precise through the use of integrated IS which enhances the communication between the firm and its clients and suppliers is recognised by the literature (Bitner *et al.* 2008). In this way, the e-procurement process of an e-commerce system can serve as a source of value creation and has become one of the key drivers of integrated systems, and strategic networks can be established throughout the value chain. Frohlich and Olhager (2012) observed that a positive effect on both financial and operational performance can be created if e-integration is extended to customers and suppliers. Saraf *et al.* (2013) examined the moderating effect of IS integration on supplier chain and firm performance. The results gave the suggestion that the IS of a firm should be integrated with its partners, which served as an antecedent for collaborative relationships with partners and had a positive effect on firm performance. These theoretical concepts lead us to propose the following two hypotheses:

Hypothesis 5: the extent of integrated IS moderates the relationship between collaborative networks and innovation performance.

Hypothesis 6: the extent of integrated IS moderates the relationship between collaborative networks and firm performance.

### Research Model

As mentioned in the previous section, the present study focuses not only on analyzing the direct effects of collaborative networks and integrated IS on firms' performance, but also on the moderating role of IS integration in the relationship between collaborative networks and firm performance associated with innovation breadth and financial results. To respond to these challenges, the whole network of relationships between collaborative networks, integrated IS and firm performance is conceptually assessed as three key constructs (Figure 1).

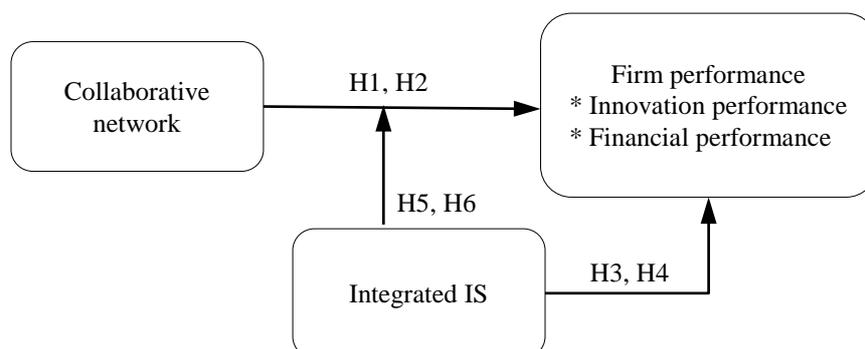


Figure 1. Conceptual model

## METHODOLOGY

### Sample Survey

The dataset used in this study comes from the Business Longitudinal Survey (BLS) 2008-2009 for Australian SMEs, which is the main statistical instrument of Australia developed for monitoring a wide range of business characteristics and behaviours, and links these to performance over time. Although there are limitations in the use of questionnaire-based research, the benefits arising from cost savings, convenience, anonymity, and reduced interview bias seem to outweigh the limitations.

Since business activities of SMEs are directly addressed, BLS can be considered as the firms' survey data which is subject oriented where firms represent the units of analysis. The survey is conducted using a harmonised questionnaire and definitions that are commonly agreed upon with the Oslo Manual provided methodology (OECD 2005). A variety of topics such as export, innovation, business plans, various employment structures, different financial structures, training and business networks which affect the development and performance of businesses are included in the questions. The given sample represents the SME population of Australia as random sampling processes were stratified on the basis of firm size and industry for the sampling frame. 3075 firms in various industries with the exceptions of electricity, gas and water supply, finance and insurance, government administration and defence, education, health and community services, libraries, museums, and parks and gardens are contained in the database. The years 2008–2009 are covered in the BLS with only firms which have less than 200 employees.

Two sampling constraints were enforced to examine the issues raised in the previous section. First, firms without sales data recorded on Business Activity Statements (BAS) were eliminated. The BAS is a form submitted to the Australian Taxation Office to report their taxation obligations. In addition, we chose only firms that participated in the complete survey. The sample used in this analysis contained 1561 SMEs.

### Measures

A careful and comprehensive review of the literature provides the basis for the addition of measurement items. Appendix A shows the constructs that were operationalised as metrics of measurement. The degree of integration which the IS of a firm has with its customers and suppliers is used to measure integrated IS (Chapman and Kihn 2009; Gorla *et al.* 2010). Joint research and development, joint buying, joint manufacturing, integrated supply chain, joint marketing or distribution and other cooperative arrangements are the six types of collaborative arrangements from which the collaborative network was derived (Australian Government 2011). The number of types of cooperative arrangement or partnership indicates the strength of exchange and co-creation of knowledge. These multiple indicators of collaboration are therefore an aggregate of the level of collaboration with different types of partners (OECD 2005). Finally, measures of firm performance which are perceptual or self-reported are used to measure firm performance in terms of both financial and innovation performance. Innovation performance was derived from four types of innovation introduced including new or significantly improved goods or services, operational processes, managerial processes as well as marketing methods (Laursen and Salter 2006). For accounting for most aspects of SME performance, an overall composite index inclusive of the four variables of financial performance was used (Gronum *et al.* 2012).

### Reliability and Validity

Special care was taken to ensure that the study is reliable and valid. In order to find how internally consistent the measures were, a reliability test was conducted. In Table 1, Cronbach Alpha values of innovation and firm performance have values of more than 0.7, as recommended by Hair *et al.* (1998), while values above 0.6 were found for collaborative network and integrated information system. However, values between the ranges of 0.6 to below 0.7 are considered moderate to acceptable for research (Hair *et al.* 1998). Thus this indicates that the variables were internally consistent and the scales are deemed reliable for further analyses. A confidence interval of  $\pm 2$  standard errors around estimates for correlation between factors was calculated, and then it was determined if 1.0 was included in the interval. In the test that we conducted, discriminant validity was displayed, as 1.0 was not contained by any confidence intervals (Anderson and Gerbing 1988).

Table 1. Mean Standard Deviation (SD) and Correlation Between Constructs

Variables	Alpha	Mean	SD	1	2	3	4	5	6	7
1 Size	n.a.	1.84	0.93	1						
2 Expenditure on IT	n.a.	1.58	1.09	0.221**	1					
3 Size of competitors	n.a.	2.35	0.65	-0.117**	-0.010	1				
4 Collaborative network	0.64	0.31	0.78	0.069**	0.122**	-0.013	1			
5 Integrated IS	0.62	1.42	1.11	0.155**	0.299**	0.042	0.139**	1		
6 Innovation performance	0.70	0.92	1.74	0.100**	0.296**	0.035	0.225**	0.328**	1	
7 Financial performance	0.80	1.83	0.68	0.091**	0.338**	0.029	0.060*	0.177**	0.246**	1

Notes: \*p<0.05, \*\*p<0.01

## ANALYSIS AND FINDINGS

The inferential statistical technique used to test these hypotheses was hierarchical multiple regression analysis (Menard 2002). This analysis was considered appropriate given the variables' nature and the hypotheses put forth. In addition, the given method could also check if the relation between firm performance and collaborative capabilities could be affected by the interaction of integrated IS.

A three-step analysis was performed following the procedure outlined by Jaccard and Turrisi (2003). In the first step, we included the control variables (firm size, expenditure of IT, size of competitors) for each regression model. In the second step of each regression, the independent variables (collaborative network and integrated IS) were included. The interaction term was introduced in the third step. We first centred the scales of the independent variables at the mean and subsequently created the interaction terms. This technique yields conditional coefficient estimates that help to clarify the results, which reflect the effects of a variable when other variables remain at their mean levels (Irwin and McClelland 2001). To check for multi-collinearity, the variance inflation factors (VIFs) were examined. The highest VIF was 1.18, thus far below the cut-off value of 10 that indicates no problematic multi-collinearity. Moreover, the residual normality and homogeneity of variance were assessed by conducted tests. No observations of significant violations of the given assumptions were made.

Regression results are summarised in Table 2. Model 1 regressed firm performance on the control variables (firm size, expenditure of IT, size of competitors). Only IT expenditure has significant and positive effects on both innovation performance and financial performance.

Model 2 showed that the relationships between collaborative network and firm performance were positive and statistically significant when considering firm performance related to innovation, while the same relationship was not statistically significant for financial performance. Thus, we find partial support for Hypotheses 1 and 2. Hence, the mere presence of a collaborative network may not lead to improved performance. The relationships between integrated IS and (innovation and financial) performance were confirmed. Thus, support for Hypotheses 3 and 4 were provided.

Model 3 show that the only positive interaction effect of integrated IS was between collaborative network and innovation performance. To further test the significance of the interaction,  $R^2$  change between the full model (with interaction terms) and the partial model (without the interaction terms) was compared. The result is reported in the lower rows of Table 2. Based on this, the partial model was rejected in favour of the full model for innovation performance (Greene 2003). Through this analysis, Hypothesis 5 is supported, whereas support for Hypothesis 6 is not provided.

Table 2. Model Summary

Variable	Coefficients and significance					
	Innovation performance			Financial performance		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
<b><i>Control variables</i></b>						
Size	0.043 (1.6)	0.012 (0.46)	0.014 (0.54)	0.019 (0.73)	0.012 (0.46)	0.012 (0.46)
Expenditure on IT	<b>0.277<sup>a</sup></b> (10.27)	<b>0.204<sup>a</sup></b> (7.63)	<b>0.208<sup>a</sup></b> (7.82)	<b>0.323<sup>a</sup></b> (12.13)	<b>0.307<sup>a</sup></b> (11.12)	<b>0.306<sup>a</sup></b> (11.10)
Size of competitors	0.045 (1.68)	0.033 (1.30)	0.036 (1.44)	0.04 (1.51)	0.036 (1.39)	0.036 (1.38)
<b><i>Independent variables</i></b>						
Collaborative network (COL)	–	<b>0.171<sup>a</sup></b> (6.73)	<b>0.132<sup>a</sup></b> (4.87)	–	0.023 (0.88)	0.026 (0.93)
Integrated information system (IIS)	–	<b>0.226<sup>a</sup></b> (8.55)	<b>0.226<sup>a</sup></b> (8.61)	–	<b>0.058<sup>b</sup></b> (2.13)	<b>0.058<sup>b</sup></b> (2.13)
<b><i>Interaction terms</i></b>						
COL × IIS	–	–	<b>0.107<sup>a</sup></b> (3.97)	–	–	-0.008 (-0.29)
<b><i>Model results</i></b>						
R <sup>2</sup>	0.085	0.169	0.178	0.109	0.113	0.113
Adjusted R <sup>2</sup>	0.083	0.165	0.175	0.107	0.109	0.109
ΔR <sup>2</sup>	–	<b>0.083<sup>a</sup></b>	<b>0.010<sup>a</sup></b>	–	0.004	0
ΔF	–	<b>65.953<sup>a</sup></b>	<b>15.785<sup>a</sup></b>	–	2.879	0.084

Notes: t-values are presented in brackets.

<sup>a</sup> denotes significance at  $p \leq 0.01$ ; <sup>b</sup> denotes significance at  $p \leq 0.05$ ;

Model 1 (step 1 include control variables only)

Model 2 (step 2 include control variables and independent variables)

Model 3 (step 3 include control variables, independent variables and interaction term)

## DISCUSSIONS

The primary objective of this study is to investigate the effects of collaborative network and integrated IS on firm performance as measured by innovation breadth and financial results. In contrast to previous work, this study examines the moderating role of integrated IS. In brief, the inferential statistical analyses confirm that collaborative network is positively related to innovation performance, while this relationship is not supported with regard to financial performance (Table 3). The findings of this study are consistent with those of the previous studies. For example, no relationships of significance along the financial performance were discovered when cooperation items were used in the models for testing (Droge *et al.* 2004; Powell and Koput 2006). Similarly, Droge *et al.* (2004) stated that the degree of collaboration, in terms of marketing and logistic processes, did not significantly affect organisational performance. An alternative explanation is that there might be a contingency factor at play that was not modelled in our study. For example the effects of environmental uncertainty on the market are not included in this study, even though Slater and Narver (1994) found no moderating effects of market turbulence, competitive intensity, and technological turbulence on return on asset (ROA), sales growth and new product success. Unfortunately, because we only included size of competition as one of the control variables in our study, we have little basis to conclude one way or the other on this intriguing speculation. The estimation results for the control variables are additionally listed in Table 2. Not surprisingly, the Expenditure on IT has stimulating, highly significant effects on the probability of developing innovations and financial performance.

Table 3. Hypotheses test results

Hypotheses	Results
H1: there is a positive relationship between collaborative networks and innovation performance in SMEs.	Supported
H2: there is a positive relationship between collaborative networks and financial performance in SMEs.	Not supported
H3: there is a positive relationship between integrated IS and innovation performance in SMEs.	Supported
H4: there is a positive relationship between integrated IS and financial performance in SMEs.	Supported
H5: the extent of integrated IS moderates the relationship between collaborative networks and innovation performance.	Supported
H6: the extent of integrated IS moderates the relationship between collaborative networks and firm performance.	Not supported

This study finds that there are significant relationships between integrated IS and both innovation and financial performance. These findings can be explained through existing research. For instance, Becker and Dietz (2004) argue that the probability of achieving product innovation is increased with the integration of IS with different partners. It was also emphasised by Azadegan and Ashenbaum (2009) that both e-procurement and e-commerce are necessary to sustain a firm's performance.

Lastly, the results of this study suggest that the manner in which integration of IS is used in innovation development contexts is critical to the depth of influence a collaboration network has on the innovation performance of Australian SMEs. Thus, it is possible to affirm that the integration of IS with business partners boost the effect of collaboration network on innovation performance. However, we found that integrated IS for managing the value chain does not reinforce the relationship between collaboration networks and financial performance. In the context of the current study, it is logical to think that collaboration is linked to more creative processes of innovation, such as idea generation, brainstorming and opportunity identification, rather than generating revenue and profits.

## CONCLUSIONS AND LIMITATIONS

The ICT value in general and particularly e-business has been greatly debated in recent years. The fact that technology can seldom furnish superiority to a particular firm since it is available to everyone including competitors has been concluded. This follows that a relative advantage can only be provided by technology only when some other critical resource is leveraged by it. This debate has been clarified by distinguishing between ICT resources and capabilities. However, this integrated IS notion has not been used by the innovation literature.

Another critical and discussed issue is the need for integration of IS with business partners, since otherwise operational inefficiencies may arise, having negative effects on firms (Amit and Zott 2001). Although the relation between organisational performance and integrating IS has been researched, the impact that a collaborative network has on both innovation and financial performance has not been thoroughly assessed by investigating IS integration's moderating network.

The gaps in previous research are filled using the present study through an empirical investigation. The analyses include collaborative networks and integrated IS and how they affect innovation and financial performance, as well as the moderating role of integrated IS in the relationship between collaborative networks and firms' performance. Several contributions are offered by this research: (1) it shows that the innovation performance is enhanced by collaborative networks and integrated IS; (2) it confirms simply that a collaborative network does not directly contributes to a firm's financial performance; (3) it demonstrates that integrating IS moderates the impact of collaborative networks on innovation performance; (4) it encounters that IS integration does not contribute to the relationship between collaborative networks and financial performance.

For management, this study has important implications. It was found that collaborative networks and integrated IS are key drivers of innovation performance. Thus, firms should invest in ICTs in order to create IS integration capabilities. Furthermore, collaborative engagements like joint R&D should be particularly attended to. In addition, the results show that better financial performance cannot be received from simply having a collaborative network. However, this should not be taken as an indication of the lack of importance of a collaborative network. This is because the effect of IS integration on moderating the relation between collaborative networks and innovation was found. A stronger relationship between collaborative networks and innovation performance will be displayed by firms with a higher degree of e-integration than those with a lower degree of the same. Hence, having suppliers and customers integrated with the IS reinforces the effect the collaborative network has on innovative performance. Additionally, the relation between collaborative networks

and financial performance is not moderated by integration of IS, quite contrary to our expectations and the literature directions.

Thus we see that most SMEs are yet to achieve effective value chain integration with their suppliers and customers, thus, firms achieving integrated IS could have a competitive advantage over their competitors. Overall, the need for awareness among executives and management of the necessity to create a collaborative network, as well as IS integration with suppliers and customers, has been highlighted in this study. They also need to realise that by not doing it when others are already doing the same, they are putting their firms at a competitive disadvantage.

There are a few limitations to the findings of the study which future research will hopefully address. Firstly, since Australian SMEs have been used for the study, the findings may not be applicable to other countries as other OECD member countries may not have similar technological and economic development as in Australia. However, a sampling frame from different countries may be used so that a more international perspective can be given on the subject. Secondly, since the financial performances are measured using the Likert-scale responses that managers and business owners provided, they are subjective in nature. Thus, studies in the future could measure financial performance by using objective performance data.

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## APPENDIX A. VARIABLES AND QUESTIONNAIRE ITEMS

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### Constructs and indicators

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#### ***Collaborative networks***

Joint research and development

Joint buying

Joint manufacturing

Integrated supply chain

Joint marketing or distribution

Other cooperative arrangements

#### ***Integrated information systems***

IS integrated with suppliers' business systems

IS integrated with customers' business systems

IS integrated with own systems

#### ***Firm performance (innovation performance)***

New or significantly improved goods

New or significantly improved services

New or significantly improved operational processes – Methods of manufacturing or producing goods or services

New or significantly improved operational processes – Supporting activities for business operations

New or significantly improved operational processes – Other

New or significantly improved managerial processes – Knowledge management processes

New or significantly improved managerial processes – Business practices for organising work procedures

New or significantly improved managerial processes – Methods of organising work responsibilities and decision

New or significantly improved managerial processes – Other

New or significantly improved marketing methods – Changes to the design or packaging of a good or service

New or significantly improved marketing methods – New media or techniques for product promotion

New or significantly improved marketing methods – Sales or distribution methods

New or significantly improved marketing methods – New methods of pricing goods or services

New or significantly improved marketing methods – Other

#### ***Firm performance (financial performance)***

Sales of products or services growth

Range of products or services growth

Profit growth

Productivity growth

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