

-RESEARCH ARTICLE-

THE INFLUENCE OF SUPPLY CHAIN MANAGEMENT ON THE PERFORMANCE OF SMALL TO MEDIUM ENTERPRISES IN SOUTHERN GAUTENG

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-Abstract-

Supply chain management is becoming more complex for small and medium enterprises (SMEs) and the need to improve performance seems to be significantly necessary. For SMEs to be efficient and effective towards minimising disruptions within the supply chain, ensure availability of resources and improve just-in-time delivery, information sharing coupled with supply chain collaboration and responsiveness are essential strategies to enhancing business performance. Therefore, the current study regards supply chain collaboration, responsiveness and information sharing as major factors influencing not only SMEs performance, but also allowing SMEs to better coordinate their business activities both within and outside the business environment. In this study, a quantitative research methodology was applied. Relational governance theory (RGT) provided structure to a clear understanding of information sharing among SMEs and customers, highlighting that SMEs aiming to improve their performance, should adopt the style of collaborating with the right suppliers and continuously communicating with the members of the supply chain. Confirmatory factor analysis (CFA) and structural equation modelling (SEM) results support the empirical findings suggesting that the model fits the study. The reliability and validity of the constructs (composite reliability) and the average variance

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extracted sought the empirical findings that correlate the need for SMEs to employ information sharing, supply chain responsiveness and supply chain collaboration as a determinant influence on SMEs performance.

Key Words: Supply chain responsiveness, Supply chain collaboration, Information sharing, SME performance, Small and medium enterprises, Relational governance theory

JEL Classification: L1, M15

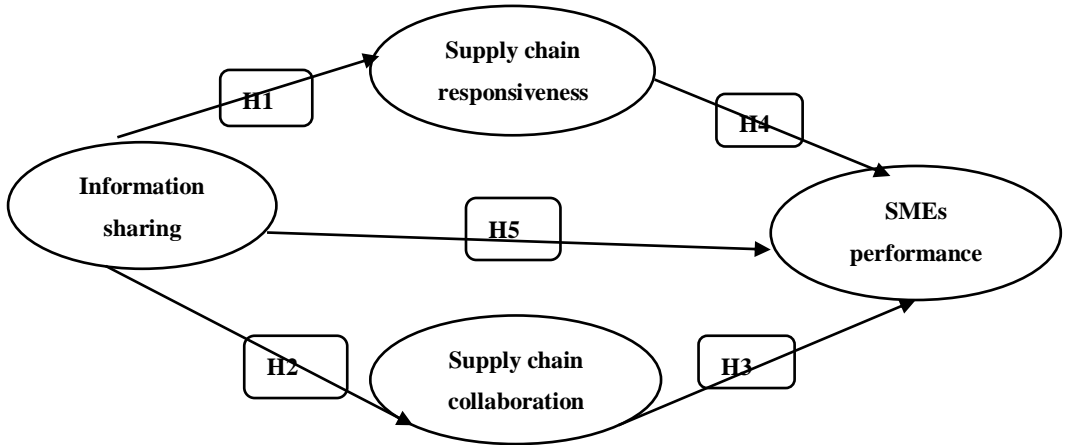
1. INTRODUCTION

Supply chains for small and medium enterprises (SMEs) are becoming more complex and the need to improve performance seems to be significantly necessary (Skipworth, Godsell, Wong, Saghiri & Julien, 2015; Turner, Aitken & Bozarth 2018). Information sharing within SMEs collaborative relationships is an essential criterion for enhancing performance (Rao, Guo & Chen, 2015). The major challenge confronting SMEs is the misperception that sharing information may lead to competitive disadvantage (Peschken, Shukla, Lennon & Rate, 2016). As a result, many SMEs who strive to improve information sharing capabilities are slow in their capability to respond to market changes. This may also be attributed to inefficient supply chain collaboration (Omar, Jayaraman & Dahlan, 2016). The degree of information shared can generate performance opportunities for SMEs and create a means for SMEs to work collaboratively to eliminate inefficiencies in information shared (Costantino, Gravio, Shaban & Tronci, 2014). This may further lead to more opportunities for SMEs. For example, SMEs can take advantage of the information to adjust existing performance levels (Cao & Zhang, 2011). Therefore, there is a need for this article to present an investigative model to evaluate the influence of information sharing, supply chain responsiveness and supply chain collaboration on SMEs performance in the southern Gauteng region.

Although SMEs, with their entrepreneurial skills, have a significant advantage in their ability to develop rapidly, failure to enhance information sharing capability may become problematic as SMEs may lag behind in terms of being able to adequately respond to market changes in the right time and place (Maghsoudi & Pazirandeh, 2016). Information sharing can provide useful insights into market conditions and trends, thereby creating market opportunities for SMEs to gain competitive advantage and improve performance (Maghsoudi & Pazirandeh, 2016). In addition, there are not many empirical studies having supply chain responsiveness and supply chain collaboration as causal effect between SMEs information sharing and SMEs performance within the southern Gauteng region.

The conceptual framework in Figure 1 shows the possible influence of the research variables proposed for this article.

Figure 1: Research Model: Own Source



2. LITERATURE REVIEW

2.1. Relational governance theory (RGT)

Some researchers such as Cannella, Framinan, Bruccoleri, Barbosa-Povoa and Relvas, (2015); Kembro and Selviaridis, (2015) argue that organisations should highlight working closely and jointly with the members directly connected to the chain in order to obtain adequate information sharing within the organisation supply chain. The RGT can assist the SMEs in terms of maintaining an integrated relationship between the partners involved in the supply chain by ensuring collaboration and management of the relationship amongst parties (Gunasekaran, Lai, & Cheng, 2008). This collaboration among the members of the chain will maintain a long-term relationship as long as each partner observes that their goals are obtained together by developing the relationship and not by ending it (Pilerot & Limberg, 2011). RGT is based on expectation, rather than opportunistic performance and it can direct inter-personal and inter-firm relationships to a joint collaborative information exchange (Kembro & Selviaridis, 2015). RGT helps create an understanding of why supply chain partners must engage in information sharing by emphasising the benefit of increased cooperation (Panahifar, Byrne, Salam & Heavey, 2018.), compared to cases where parties do not share information. RGT is also useful to determine what information to share, with

whom, when and how information should be shared (Kembro, Selviaridis & Naslund, 2014).

2.2. Information sharing, responsiveness and collaboration

With the need for supply chain visibility, accurate and viable information sharing has become the strategic means for organisations collaboration within the supply chain to combat the presence of bullwhip effect and uncertainty found in supply chains (Song, Yu, Ganguly & Turson, 2016; Adams, Richey, Autry, Morgan & Gabler, 2014). Having real-time and accurate information, enables an organisation to manage responsiveness and collaboration effectively, thereby, enhancing faster cash flow for smooth business operation (Rao, Guo & Chen, 2015). According to Kembro *et al.*, (2014), supply chain aims at providing customers with the right product, at the right time and in the right place by utilising point-of-sales information and flexible strategy to respond to customers' changing demands. As such, collaboration and responsiveness across organisations has been strengthened over time (Fawcett *et al.*, 2007). Adequate sharing of significant information between collaborating organisations is the backbone of effective and efficiency responsiveness (Afshan, Chatterjee & Chhetri, 2018). According to Chae, Koh and Prybutok. (2014), SMEs supply chain is characterised by the effective exchange of responsive and valid information, which is widely regarded as resourceful in achieving quality collaboration throughout the chain. Afshan *et al.*, (2018) further state that the greater the quality of information shared among SMEs supply chain partners, the more likely it is for the partners to coordinate the activities in a collaborative approach.

Based on the abovementioned literature, the following hypotheses are formulated:

H1: Information sharing has a significantly positive influence on responsiveness

H2: Information sharing has a significantly positive influence on collaboration

2.3. Supply chain collaboration and SMEs performance

In the current business environment, maintaining and improving an integrated long-term relationship between SMEs partners is significant (Salam, 2017). As SMEs are aiming to improve competitive advantage, inter-firm relationships are important because supply chain collaboration is considered to yield organisation-specific benefits in terms of financial performance (Prajogo & Olhager, 2012). A recent survey by Haque and Islam (2018), found that organisations that are best at collaborating with suppliers have a 40 to 65 percent advantage in the cash-to-

cash cycle time over other average organisations and the top organisations have 50 to 85 percent fewer inventories than competitors. Efficient collaboration among SMEs may lead to a better inventory reduction, faster product-to-market cycle times, as well as costs and lead time reduction (Prajogo & Olhager, 2012). Therefore, supply chain collaborative practices among SMEs are important determinants of performance enhancement. Based on this, it is hypothesised that:

H3: Supply chain collaboration has a significantly positive influence on SMEs performance.

2.4. Supply chain responsiveness and performance

For SMEs to obtain a continual undisrupted revenue and competitive advantage, the attainment of agility, robustness and resilience should be considered (Halqachmi, 2013; Moyano-Fuentes *et al.*, 2016). These key characteristics serve as tools to maximising profitability, increasing customer base, long-term profitability as well as cost-saving opportunities through improved responsive efficiency (Qrunfleh & Tarafdar, 2013). The pursuit of achieving and retaining competitive advantage depends on managerial ability to incorporate supply chain strategy; of which quick order fulfilment forms a part (Song *et al.*, 2016). According to Turner *et al.*, (2018), organisations that regard supply chain responsiveness as significant gradually improve as well as enhance efficiency within the inbound logistics and effectiveness within the outbound logistics. As such, these organisations may become more proactive in detecting market changes throughout the supply chain and thereby enhancing and maintaining long-term relationships with both suppliers and customers. Young, Yang and Roh, (2012), further argue that organisations that are responsive have a greater success in improved reliability service, improved customer service, quality improvement, cost reduction, improved organisational structure and enhance performance. Since, proactive supply chains can lead organisations to both contemporary and financial measures, SMEs can maximise the competitive advantage through improved responsiveness, which improves performance (Urban & Naidoo, 2012). Due to the above reviews, the following hypothesis is proposed.

H4: Supply chain responsiveness has a significantly positive influence on performance.

2.5. Information sharing and SMEs performance

Several researchers have empirically established the relationship between information sharing and performance. Mackelprang and Malhotra (2015) investigated that information sharing has some beneficial influence on

performance with regards to accurate inventory levels and cost reduction. Meflinda, Mahyarni, Indrayani and Wulandari, (2018) also note that accurate information sharing can result in reduced uncertainty, faster material flow, reduced inventory costs and increased customer satisfaction, thus contributing to overall performance. Accurate information sharing with customers and across the supply chain can influence positively quality product innovation and overall operational performance (Ye & Wang, 2013). According to Song and Liao, (2019), adequate information sharing is an enabler for preventing stock-outs, increasing resource productivity as well as performance. Along this reasoning, the following hypothesis is proposed.

H5: Information sharing has a significantly positive impact on SMEs performance.

3. RESEARCH DESIGN, DATA ANALYSIS AND RESULTS

The study is located within the quantitative research paradigm. This study developed a structured questionnaire with a seven-point Likert-type questions from strongly disagree to strongly agree. The study adopted a non-probability sampling approach using the convenience sampling technique, in which every element is chosen to participate in non-random ways (Rouzies, 2013:198). Convenience sampling, known as availability sampling, is a type of non-probability sampling, which relies on data collection from population members conveniently available to participate in a study. This sampling technique is appropriate for this study because it is convenient and the subjects selected are available to be tested, as every subject is invited to participate (Cooper, 2006:361). 500 questionnaires were distributed, but 323 valid questionnaires were useful for the final analysis

Out of the 323 SMEs that participated in this study, only 30 percent of respondent claims to have been in the business within 5 to 7 years. 25 percent of respondent have an annual sale of about 1 Million to less than 5 million. About 64 percent of the SMEs have fewer than 50 employees and 13 percent claims to have between 50 to 100 employees. Majority of SMEs were wholesalers which amounted to 48 percent. Manufacturing, storage or transportation SMEs were 9 percent while the agricultural, hunting, forestry or fishing were only 2 percent.

Table 1: Reliability and Validity Results

Research variables		Descriptive statistics		Cronbach's test		C.R.	AVE	Factor loading
		Mean	Std. Dev.	Item-total	α Value			
CHAININFORMA-TION RESPONSIVE-NESSHARING	IS1	5.02	1.872	0.692	0.896	0.869	0.625	0.730
	IS2	4.87	1.737	0.737				0.785
	IS3	5.06	1.794	0.765				0.814
	IS4	4.88	1.927	0.767				0.830
	IS5	4.88	1.837	0.761				0.820
CHAINSUPPLY RESPONSIVE-NESSHARING	SR1	5.27	1.597	0.571	0.823	0.824	0.500	0.637
	SR2	5.39	1.637	0.623				0.690
	SR3	5.32	1.553	0.638				0.705
	SR4	5.22	1.571	0.654				0.747
	SR5	5.23	1.624	0.598				0.695
CHAININFORMA-TION COLLABORA-TION	SC1	5.01	1.706	0.612	0.881	0.906	0.518	0.670
	SC2	4.90	1.703	0.676				0.725
	SC3	4.81	1.703	0.661				0.708
	SC4	4.95	1.685	0.675				0.727
	SC5	5.00	1.688	0.717				0.765
	SC6	5.05	1.655	0.639				0.676
	SC7	4.98	1.628	0.692				0.756
SMEs PERFOR-MANCE	SP1	5.18	1.691	0.643	0.839	0.850	0.503	0.675
	SP2	5.11	1.563	0.649				0.732
	SP3	5.01	1.575	0.656				0.723
	SP4	4.65	1.649	0.663				0.712
	SP5	4.98	1.695	0.602				0.736
	SP6	5.18	1.691	0.643				0.675

AVE: Average variance extracted; CR: Composite reliability; * Scores: 1=Strongly Disagree; 2=Disagree; 3=Slightly Disagree; 4=Neutral; 5=Slightly Agree; 6= Agree; 7=Strongly agree. **Note:** ^a significance level $p<0.05$; ^b significance level $p<0.01$; ^c significance level $p<0.001$ ***Measurement CFA model fits criteria:** CMIN/DF= 1.651; NFI=0.906, TLI=0.950, CFI=0.960, IFI=0.961, RFI=0.900; RMSEA=0.034

Table 1 shows that information sharing Cronbach alpha is 0.896, supply chain responsiveness Cronbach alpha is 0.823 while supply chain collaboration Cronbach alpha is 0.882 and SMEs performance is 0.840. Each variables' Cronbach alpha varies from 0.882 to 0.840, which means that the results meet the acceptable threshold of 0.7 as recommended by (Hair, Anderson, Tatham & Black, 2006). In addition, the item to total value results range from 0.571 to 0.767. The Cronbach alpha results validate the reliability of the measurement instrument used in this article. The composite reliability values range from 0.824 to 0.906 and are considered acceptable. This indicates that internal reliability for all the variables exists. The AVE estimate reflects the overall amount of variance in the indicators, which is accounted for by the latent variables. Therefore, Table 1 confirms a good result ranging from 0.500 to 0.625. All AVE values show good representation of latent construct for the measuring items.

3.1. Discriminant Validity

In order to check if discriminant validity is present, the correlation coefficients among the research constructs should be less than 1.0 as recommended by Malhotra, (2010). Table 2 indicates that the inter-correlation values for all paired latent variables are less than 1.00 therefore confirming the existence of discriminant validity.

Table 2: Correlations coefficients

Correlations and discriminant validity				
Research variables	IS	SR	SC	SP
Information sharing	1.000			
Supply chain responsiveness	.489	1.000		
Supply chain collaboration	.513	.615	1.000	
SMEs performance	.436	.496	.548	1.000

* Scores: 1=Strongly Disagree; 2=Disagree; 3=Slightly Disagree; 4=Neutral; 5=Slightly Agree; 6= Agree; 7=Strongly agree. **Note:** ^asignificance level $p < 0.05$; ^b significance level $p < 0.01$; ^c significance level $p < 0.001$

3.2. Confirmatory Factor Analysis

A chi-square test was used to observe the general fit of the model as recommended by Herbst, (2014:87). For this article, the chi-square value over degree of freedom below 3 was achieved, which is an indication that it meets the acceptable model fit (Chinomona, 2011). For example, value for chi-square is 1.651, The NFI value is (0.906), TLI value is (0.950), IFI value is (0.961), CFI

value is (0.960), TLI value is (0.950) and RFI is (0.900), respectively. All the CFA criteria are greater than 0.9, therefore, this confirms acceptable model fit. McDaniel and Gates (2013), state that the RMSEA value must fall below 0.08, indicating a good model fit. The RMSEA value is 0.034, which is an acceptable threshold. Since the acceptable value of confirmatory factor analysis measurement model fit is secured, the study proceeds to the next stages of examining SEM model fit and testing of the hypotheses.

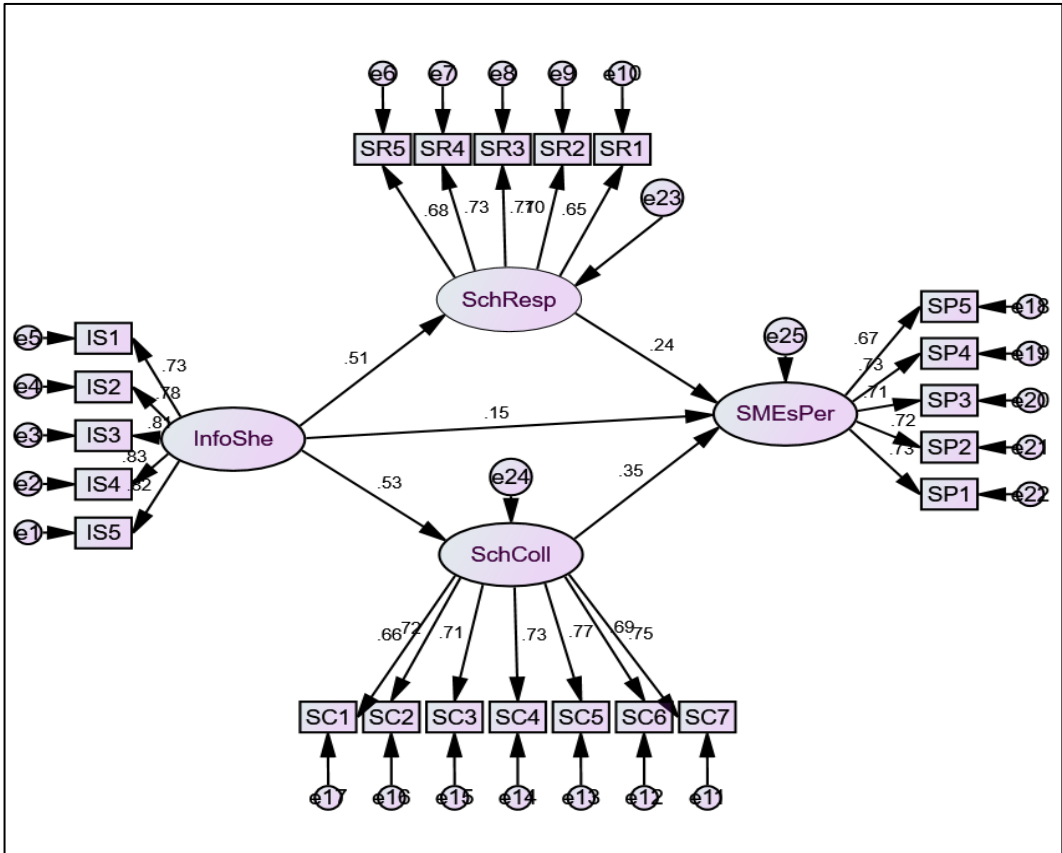
3.3. Structural Equation Model Testing

Table 3 represents the structural equation model fit results. The results show the acceptable goodness-of-fit of the model as recommended by Nunnally, (1978:212).

Table 3: Structural equation model fit results

SEM indicator	Acceptance level	Default model value	Decision
Chi-Square	< 3.00	1.899	Accepted level
CFI	> 0.900	0.945	Accepted level
RFI	> 0.900	0.900	Accepted level
IFI	> 0.900	0.946	Accepted level
TLI	> 0.900	0.932	Accepted level
NFI	> 0.900	0.900	Accepted level
RMSEA	< 0.08	0.040	Accepted level

Figure 3: Path analysis



AVE: Average Variance Extracted; CR: Composite reliability; * Scores: 1=Strongly Disagree; 2=Disagree; 3=Slightly Disagree; 4=Neutral; 5=Slightly Agree; 6= Agree; 7=Strongly agree. **Note: Measurement SEM model fits criteria:** CMIN/DF= 1.899; NFI=0.900, TLI=0.932, CFI=0.945, IFI=0.946, RFI=0.900; RMSEA=0.040

The next step examines the causal relationships that exist among latent variables by path analysis. According to Flick (2014:463), SEM emphasised that a latent variable is directly or indirectly influenced by other latent variables within a model, which can result in estimating results that portray the possibility of the latent variables being related. For this study, the estimated results elicited through hypothesis testing are presented in Figure 3 and Table 4. The literature asserts that $p < 0.05$, $p < 0.01$ and $p < 0.001$ serve as indicators of relationship significance and positive factor loadings indicate strong relationships among the latent variables (Flick, 2014:465).

Table 4: Hypotheses results

Construct measured	Path coefficient	S.E.	C.R.	P	Label
H1: Sch_Rep <--- Info_She	.516	.050	7.473	***	Accepted
H2: Sch_Coll <--- Info_She	.537	.052	8.360	***	Accepted
H3: SME_Per <--- Sch_Coll	.353	.075	3.195	.001	Accepted
H4: SME_Per <--- Sch_Rep	.235	.068	4.740	***	Accepted
H5: SME_Per <--- Info_She	.146	.060	1.827	.068	Accepted

4. DISCUSSION OF EMPIRICAL FINDINGS

Hypothesis 1, which states that information sharing has a significantly positive influence on supply chain responsiveness, is strongly supported (Path=0.52, $P < 0.000$). Therefore, **H1** confirms that SMEs with real-time information sharing initiatives can gain more efficient supply chain responsiveness throughout the supply chain. SMEs supply chains are benefited by their ability to exchange information effectively to aid quick responses to customer’s changing demands. Accurate information sharing may improve SMEs chances of being more proactive in detecting market changes, re-structuring of processes to convene innovative market needs as well as adopting new product development ahead of their competitors. Therefore, the findings of **H1** strongly indicate the presence of intermediate measure of relationships between information sharing and supply chain responsiveness. Having a high path coefficient implies that SMEs business performance and growth highly depend on their ability to respond to market demand accurately at the right time, right place and in the right quantity and quality. The relationship between information sharing and supply chain responsiveness is also consistent with the findings of Chinomona and Poe, (2013:9) and Qrunfleh and Tarafdar, (2013:547) on supply chain responsiveness. These studies claim that information sharing has a significant positive influence on supply chain responsiveness.

Hypothesis 2 further proves that the levels of quality information shared among SMEs are more likely to create an effective collaborative relationship within the supply chain ($P=0.54$, $P < 0.000$). With this, SMEs can manage inventory levels whilst being flexible in their operational lead-time. SMEs operational flexibility may lead to overcoming the presence of bullwhip effect and market uncertainties caused by lack of accurate information. The accuracy and quality of information

shared can help SMEs to collaborate successfully with partners and suppliers in a win-win position. As a result, SMEs will achieve and retain high levels of competitive advantage (Chinomona & Pooe, 2013:9; Kang & Moon, 2015:6). The path coefficient also indicates that information flow is the stronghold of efficient collaborative relationship. Therefore, information sharing and collaboration are essential business strategies that SMEs should embrace. **H2** is significant and supported.

Hypothesis 3 with significance level of (Path=0.35, $P < 0.001$), confirms that the ability of SMEs to implement a collaborating relationship outside organisational boundaries will likely result in faster product-to-market cycle times, costs and lead time reduction. SMEs supply chains are benefited by their ability to improve competitive advantages and inter-firm relationships are important in enhancing SMEs towards organisation-specific benefits in terms of financial performance (Kim, 2009:339). With this, SMEs are able to maintain and improve integrated long-term relationships among supply chain partners. Hence, **H3** is significant and supported.

Hypothesis 4 with ($P=0.24$, $P < 0.000$) empirically confirms that SMEs with a responsive supply chain capability have a greater chance of achieving success. This is true because global markets require speed to compete effectively with rivals. SMEs may further have to improve on reliability service, customer service and product quality in a quick and responsive manner to achieve business performance. The findings also authenticate that supply chain responsiveness may enable SMEs to gradually improve efficiency and effectiveness within the supply chain. SMEs supply chains are benefited by their ability to obtain a continual uninterrupted revenue and competitive advantage with the attainment of agility, robustness and resilience. As a result, SMEs can gain both contemporary and financial measures by maximising their competitive advantage through improved responsiveness, which improves performance. The results of the findings are consistent with Youn *et al.*, (2012), who state that responsive SMEs have a greater success with improved reliability service, improved customer service, quality improvement, cost reduction and organisational performance. Therefore, **H4** is significant and supported.

Hypothesis 5 examines the direct impact of information sharing on SMEs performance. The result (Path=0.15, $P < 0.068$), demonstrates that information sharing and SMEs performance has a weak relationship, but it is supported. The weak relationship may indicate that information sharing does not necessary enhance SMEs performance if the information shared is not useful and not

beneficial to the success of the organisation. As such, it might be difficult for SMEs to survive if the information exchange within the supply chain is ineffective (Creswell & Creswell, 2018). Therefore, SMEs should enhance the usefulness of information gained through a collaborative relationship with suppliers and customers, which may result in responsiveness and higher levels of business performance.

5. CONCLUSION AND MANAGERIAL IMPLICATION

From the initial stage of this study, the researcher acknowledged that evaluating the findings will by no means be accomplished without its limitations. To start with, one of these study limitations revolves around the fact that the study was restrained only within Emfuleni Local Municipality SMEs. Further studies can consider basing the study within South African SME sector in general. A relatively small sample size of 500 SMEs was employed and it limited the extent at which the information can be generalised. It was also a bit difficult to gather information from the selected SMEs because of the fear that financial information that is shared may reach the tax authorities as fulfilling tax obligations for some SMEs might not have been assured. Using a closed-end structured questionnaire can also be considered as a limitation. This is because SMEs are limited to the answer the question presented to them. Opinions on how the business can be developed through information sharing, supply chain responsiveness and collaboration cannot be generalised. Some SMEs were also reluctant in completing the questionnaire especially those questions that has to do with 'return on asses' and 'annual sales. The positions of the respondents and the steps in collecting the data required for the study argue against outcomes of bias and methods variances. Future research can therefore consider the means of utilizing a multi-matched pair by collecting the data not only from the SMEs but also from the members of their supply chain in other to allow a cross-check of the data collected.

Adequate information sharing contributes to improved visibility that leads to effective coordination. A collaborative relationship built on information sharing is essential to superior performance as it assists SMEs to reach a long-term relationship with potential partners. Collaboration can also lead SMEs towards gaining long-term process planning and complete integrated processes such as, truckload utilization, manufacturing scheduling and warehouse management. In the other hand, responsiveness has contributed benefits such as faster cycle times, increasing sales and reducing distribution operation. If SMEs can understand the relationship that exist between information sharing, supply chain responsiveness

and supply chain collaboration, it will necessitate the need for them to adopt these constructs. Therefore, the general lesson from this study is that SMEs should acknowledge information sharing as the number one critical step when aiming at improved inventory visibility, quick responds time, and business performance.

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