

THE FACTORS INFLUENCING SUPPLY CHAIN DISRUPTIONS ON SUPPLY CHAIN PERFORMANCE IN SMALL AND MEDIUM ENTERPRISES

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ABSTRACT

In recent years, supply chain has become more complex due to globalization, outsourcing, single sourcing, and the focus on removing slack from supply chains. While these strategies have improved performance, they also made supply chains more prone to disruptions. A major disruption in the supply chain can disturb or even “shut down” a company and have critical consequences on profitability. Small and medium enterprises (SMEs) however didn't fully implement supply chain management (SCM) and this will lead to inefficiency of disruption management. The research focused on SMEs to determine whether factors of disruption affect its supply chain activities. The factors enlisted are shortage of supply (Larrison, 2008), equipment failure (Kliendorfer and Saad, 2005) and lack of buying power (Asfaha, 2008). Questionnaires were distributed to collect respondents' answers. The data collected were analyzed quantitatively. Equipment failure was found to have strong impact to the supply chain performance than shortage of supply and buying power based on strong relationship between it and performance of supply chain. Buying power has the weakest relationship with the performance of supply chain, concluding that it contributes less in the performance. In a nutshell, SMEs can build a stronger supply chain resilience and protection to its network by understanding the cause and effect of the disruptions in their supply chain.

KEYWORDS: *Performance, small and medium enterprises, supply chain disruption*

I. INTRODUCTION

Globalization has exposed many supply chains to complex environments and physically distant events that – due to increasing interconnectedness – have far reaching, even global ramifications (Stalder, 2006). Multinational companies especially faced this challenge as they own extensive supply chain network. This complex nature of the supply chain exposed all the industries to high levels of uncertainty

and disruptions. Small and Medium Enterprises (SME), however, face the challenge differently from the larger companies. Arend and Wisner (2005) stated that both of SMEs and Large Enterprises (LE) implemented supply chain management (SCM) differently as the implementation is negatively correlated with SME performance. SMEs don't implement SCM as deeply as LEs. Larger enterprises have the resources and technical budgets to implement e-business and e-supply strategies, but SMEs are continued to be challenged by limited resources. While LEs can handle disruptions systematically, SMEs lack of the capabilities to do so. Due to financial restrain, it is paramount for SMEs to have effective supply chain. Hence, it is fundamental to examine the factors that cause the disruption in supply chain.

The main objectives of this paper are:

- i. to determine the effect of shortage of supply on performance of supply chain in small and medium enterprises.
- ii. to identify the effect of equipment failure on performance of supply chain in small and medium enterprises.
- iii. to examine the effect of lack of buying power on performance of supply chain in small and medium enterprises.

The remainder of this paper is followed by literature review and hypotheses development. The next section deals with data analysis. Finally, it is wrapped with conclusion and recommendation for further research.

II. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Supply Chain Disruptions

Disruptions are defined as major breakdowns in the production or distribution nodes that comprise a supply chain (Handfield et al., 2011). As supply chain become more efficient, it's also become more vulnerable to different disruptions. Recent globalization and the increasing length of the supply chain have exposed each supply chain to more risk factors. The impact of disruption propagates faster through the network because of lower buffer stocks and single sourcing / supplier based reduction (Behdani et al., 2012). According to Craighead et al.(2007), present research has not only confirmed the costly nature of supply chain disruptions but has also contributed relevant insights on such related issues as supply chain risks, vulnerability, resilience and continuity.

Shortage of Supply

Larrison (2008) defines material shortage as a lack of material at any point in the factory supply chain that causes a disturbance in the planned order scheduling. She also added that this factor can be caused by both internal and external factor. The availability of raw materials is critical to the ability of suppliers to deliver on time. With increasing volume demands and the rigid coupling of lean manufacturing, almost every raw material shortage distributes as significant delays throughout the supply chain. Shortages can occur for many reasons, including manufacturing and quality problems, delays, and discontinuations (Association of State and Territorial Health Officials, 2012). A supply disruption that disturbs delivery of finished products to customers may reduce sales revenue in short- term and result in long-term reduction n market share (Gurnani, Mehrotra and Ray, 2011).

H1: Supply shortage has significance on the performance of supply chain in Small and Medium Enterprises (SME).

Equipment Failure

SMEs play important role in state's economy but the execution have many problems that consequently impact the operations. There are a lot of SMEs' weaknesses including restricted financial, lack of strategic planning and skills, tactical inefficiency, and poor management (Ab Rahman and Wasilan et al., 2011). According to Kliendorfer and Saad (2005), the contingencies happened in operational includes equipment malfunctions and systemic failures. Baglee (2008) stated that SMEs typically adapt a run-to-failure maintenance strategy, as this largely needs limited knowledge on why and how the equipment failed. Besides that, senior management within SMEs rarely views maintenance as a strategic issue that will interpret to a significant contribution to the company profit margin.

H2: Equipment failure has significance on the performance of supply chain in Small and Medium Enterprises (SME).

Lack of Buying Power

According to Dodd and Asfaha (2009), buyer powers come from various factors, including company's size and lack of competition in a particular market. The lack of buying power complicates SME's to influence suppliers by offering large volumes of business. This impacts the price of materials purchased and their level of priority with the supplier if other disruptions occur – for example, natural

disaster (Chapman, 2010). The lack of buying power scored 46% of the problems of developing SMEs (Stefanovic, Milosevic and Miletic, 2009). Chapman and also Matovu and Okello-Obura (2011) explain that the lack of economies of scale in purchase due to limited storage space makes it difficult for SMEs to acquire in smaller volume from large suppliers, where quantities, homogenous standards and regular supply are the main concern for these suppliers.

H3: Buying power has significance on the performance of supply chain in Small and Medium Enterprises (SME).



Figure 1: Research Model of Factors of Supply Chain Disruptions on Supply Chain Performance in Small and Medium Enterprises

III. METHODOLOGY

The study, which was determining factors that influence supply chain disruption in small and medium enterprises (SMEs), used quantitative methods to collect and analyze the data. The research concentrated on SMEs in Malaysia as the subject to research method chosen. The survey was distributed to 100 respondents from Small and Medium Enterprises (SME) in various sectors. Researcher decided to choose SMEs of various sectors such as manufacturing, restaurants, retails, services and constructions mainly from Malacca to distribute the questionnaire and test the hypotheses.

Throughout the data analysis, Statistical Packages for the Social Science (SPSS) Software version 20.0 is used to quantitatively analyze all the data collected from the questionnaires being distributed. Researcher ran descriptive analysis, simple linear regression, correlation and reliability test.

Six sectors from SMEs were determined which are manufacturing sector, restaurant sector, service sector, construction sector, construction sector and retail sector. The highest number of respondents came from manufacturing sector.

IV. DATA ANALYSIS AND FINDINGS

Sectors of Responding Organization

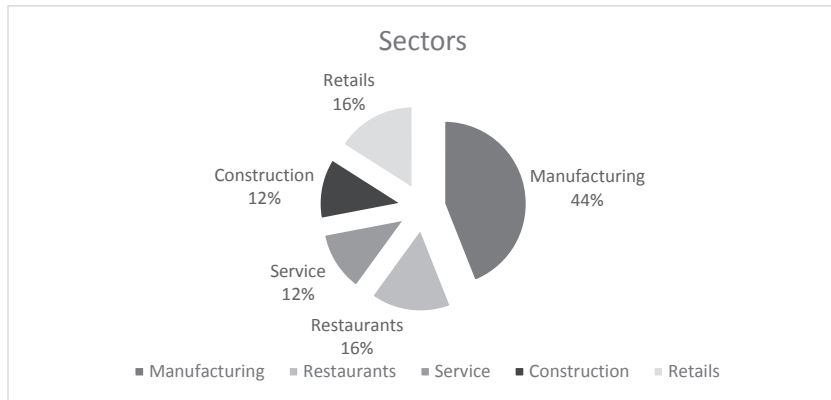


Figure 2: Sector-wise distribution of the respondents

Six sectors from Small and Medium Enterprises (SMEs) were determined which are manufacturing sector, restaurant sector, service sector, construction sector, construction sector and retail sector. There was 44% of respondents from manufacturing sector participated the survey for this research. Restaurants and retails sectors both scored 16% while service and construction sector scored 12% out of 100 companies respectively.

Reliability Test

The reliability was measured using Cronbach’s Alpha- a measure of internal consistency across a set of questions, that is, how closely related a set of items are as a group (Saunders et.al., 2012). Saunders et.al. also stated that Cronbach’s Alpha consists of an alpha coefficient ranging from 0 to 1 with values 0.6 or above suggest that the questions in scale are measuring the same thing and is significant.

Table 1: Reliability Test

Variables	Cronbach alpha
Shortage of Supply	.660
Equipment Failure	.836
Lack of Buying Power	.786

Testing of Hypotheses

Multiple regressions is used to analyze the effect of each independent variable towards the dependent variable. The results were used to test each of the hypotheses proposed.

Hypothesis 1

The performance of supply chain in SME is significantly affected by the shortage of supply, seeing that when the disruption occurs, the companies lose their customers.

Table2: Coefficientsa for Supply Shortage

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.010	.276		.035	.972
	Supply Shortage	.969	.099	.702	9.771	.000

R²: .493

a. Dependent Variable: Performance

The table shows that Supply Shortage scored (Beta= 0.702) and (p= 0.000). The p-value is less than 0.001, which shows the significance of the independent variable towards the dependent variable. Hence, the hypothesis is accepted.

Hypothesis 2

Equipment failure is shown to significantly impact the performance of supply chain in SME.

Table 3: Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.259	.189		-1.369	.174
	Equipment	1.072	.068	.848	15.807	.000

R²: .718

a. Dependent Variable: Performance

The score of R square is 0.718, showing 71.8% of equipment failure factor contribution towards performance of supply chain. This explained that this IV affect DV strongly as it's close to 100% contribution. It is stated in table above that the Beta for equipment failure is 0.848 while the p-value is 0.000. As it is less than 0.001, the IV is significant where (p<0.05). Thus the hypothesis is accepted.

Hypothesis 3

The variable 'Lack of Buying Power' mildly affects the performance of supply chain in SME.

Table 4: coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.803	.430		4.190	.000
	Power	.291	.147	.197	1.988	.050

R²: .039

a. Dependent Variable: Performance

The R square for independent variable, buying power impact towards dependent variable, performance of supply chain is 0.039. This shows that buying power factor only associate 3.9% to performance, bearing weak contribution as it is far from 100% contribution. As table shows, the coefficient for buying power is (Beta= 0.197) and ($p= 0.050$). It proved that there was significant relationship between buying power and performance of supply chain as the P value was recorded at 0.050, where $p < 0.05$. Therefore, hypothesis 3 is accepted. This shows that even though the association of buying power and performance was lack, the IV still affect the DV.

V. CONCLUSION

Numerous studies show the negative impact of supply chain disruptions to the companies regardless of the sizes. It deals with the sales performance and supply chain. The amount of uncertainties available put many companies restless. Small and medium enterprises (SMEs) however remained largely unaware of the advantage of implementing efficient supply chain management (SCM) in their operations (Retailing360, 2009). This research theoretically fits the need found within the SMEs.

The three variables discussed in this research which are supply shortages, equipment failure and buying power are one of many factors that would affect supply chain performance. Each can be defined regarding its implication in assisting SMEs supply chain. Analyses were carried out to fulfill these three IV to determine the significance of the variables and how much they associated with the DV. The data suggested that the three IVs that were studied had a statistically significant influence on performance of supply chain. The objectives are successfully achieved when all the hypotheses are accepted.

Insights gained through this research will provide useful information to SMEs regarding supply chain disruption.

Future Recommendations

The following recommendations for further research can be made based on the findings from this research study: (a) this survey was limited to SMEs in Malacca. Perhaps increasing the number of respondents and distribute it fairly throughout Malaysia to get more reliable and valid data. (b) Only three factors of supply chain disruptions were selected for this research. Broadening the factors and scope of studies would provide additional information on the disruptions that might be missed out from general supply chain disruptions factors. (d) It would be of great interest to further this research using qualitative method. This way the researcher has more way to gather data, discover the reasons of disruptions and interview on the problems of SMEs supply chain. (e) Suggest solutions such as implementing common system used by large enterprises to each of the disruptions. This will contribute more to the SMEs and help them achieve effective and efficient supply chain.

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