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Influence of Supply Chain Risk Avoidance Strategies on Performance of Food and Beverage Manufacturing Firms in Kenya

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Abstract: *The food and beverage industry has a special role in expanding economic opportunity because it is universal to human life and health. In this context, adopting proactive strategies is needed for dealing with supply chain risks and vulnerabilities for securing supply chain systems to be responsive and effective. This study focused on finding out the influence of supply chain risk avoidance strategies on supply chain performance of food and beverage manufacturing firms in Kenya. The target population was all food and beverage manufacturing firms in Kenya. The accessible population was 187 food and manufacturing firms drawn from a KAM directory using a census survey method. A five-point Likert scale questionnaire was administered to senior-level managers with the knowledge of supply-chain and logistics functions. Both descriptive and inferential analysis was done using SPSS 17 and structural equation modelling (SEM) R-Lavaan 0.5-20 to find out the influence of supply chain risk avoidance strategies on supply chain performance of food and beverage manufacturing firms in Kenya.*

Keywords*: Avoidance strategy, SC resilience, SC vulnerability*

I. Introduction

Historically, the growth in manufacturing has been a key element in the successful transformation of most economies that have seen sustained rises in their per capita incomes (World Bank, 2014[1]). In most of Africa, performance in manufacturing has been particularly poor over the last decades. In Kenya, which ranks 17th from the top, manufacturing accounts for 10.6 % of the GDP, which is low compared to most middle income countries, yet it is the most manufacturing-intensive economy in eastern Africa. According to Republic of Kenya (2014[2]), the manufacturing sector in Kenya is a potential major source of growth. The role of the manufacturing sector in Vision 2030 is to create employment and wealth and transform Kenya into a middle-income country. The government's goal is for manufacturing to account for 20% of GDP by 2030, nearly twice today's level, at 10.6% (RoK, 2014[2]).

The Kenyan food-processing sector remains the largest component of the manufacturing industry (Kenya Association Manufacturers KAM, 2015[3]). This sector is the most important and largest comprising of over 187 businesses, encompassing everything from small family organisations to large multinational companies (KAM, 2015). Kenya National Bureau of Statistics (KNBS) report that in 2014, the sector generated over a third (33.4 %) of the total manufacturing production, and provided 33.5 % of jobs in the manufacturing sector. According to KAM (2015[3]) the Kenya Food and Beverage sector encompasses a range of sub-sectors: alcoholic beverages and spirits, cocoa, chocolate and sugar confectionaries, dairy products, juices, water and carbonated soft drinks meat and meat products, vegetable oils.

The food and beverage industry has a special role in expanding economic opportunity because it is universal to human life and health (Roth *et al*., 2008[4]). The food and beverage manufacturing industries account for approximately 50% of manufacturing production turnover which is about 2.8% of GDP (KAM, 2015[3]). Despite this huge influence, the food and beverage supply chain is increasingly in the spotlight for safety concerns, recalls and disruptions. Public interest on these issues has also grown following increasing consumer concerns. Supply chain risks are resulting in increased variations in capacity constraints, increased costs of operations or from breakdowns, quality problems, delays in delivery or even natural disasters at the supplier end (Blackhurst, Scheibe, & Johnson, 2008[5]; Vaaland and Heide 2007[5]).

II. Literature Review

2.1Introduction

Supply chain risk management (SCRM) is becoming an integral part of risk management in most organisations (Tomlin, 2006[6]; Ghagde, Dani, & Kalawsky, 2013[7]). A supply chain consists of all parties involved, directly or indirectly in fulfilling a customer request. The supply chain includes not only the manufacturer and suppliers, but also transporters, warehouses, retailers, and even customers themselves (Chopra, Meiindl & Kalra, 2007[8]).

Supply chain risk management is assumed to either proactively mitigate or reactively respond to risks (Tomlin, 2006[6]; Ghagde, Dani, & Kalawsky, 2013[9]). The conceptualisation of supply chain risk management incorporates supply chain resilience and supply chain vulnerability (Sorensen, 2005[10]). According to Ponomarov & Holcomb (2009[11]) supply chain resilience is an important part of SCRM. Supply chain resilience means the capability of companies to anticipate, identify, react and learn from incidents (Craighead, Blackhurst, Rungtusanatham, & Handfield, 2007[12]; Sheffi, 2006[13]). Christopher (2005[14]) stated that resilient processes are agile and are able to change quickly

2.2 Supply chain performance measurements

Supply chain performance measurement is the process of qualifying the efficiency and effectiveness of the supply chain (Wong & Wong, 2008[15]). Supply chain performance measurement includes multiple dimensions including financial and non-financial metrics describing costs, capacity, lead times and service levels (Bigliardi & Bottani, 2014[16]). SCM could be measured at various management or operation levels. Strategic level measures influence top management decisions and also very often reflects investigation of broad based policies and level of adherence to organisational goals (Chopra *et al*., 2007[8]. The main metrics of a firm's operation performance are based (1) cost; (2) quality; (3) flexibility; and (4) delivery. Recent studies on supply chain management have suggested that these priorities can be categorised into two fundamental dimensions: efficiency and responsiveness (Chopra *et al*., 2007[8]).

2.3 Supply Chain Risk Avoidance Strategies

Risk avoidance is the most effective risk management strategy in that by avoiding an activity, any chance of loss is eliminated (Khan & Burnes, 2007[17]; Tuncel & Alpan, 2010[18]). Avoidance strategies are classified as Type 1 and Type 2 (Manuj & Mentzer, 2008[19]). Type 1 avoidance strategy is used when the risks associated with operating in a given product or geographical market, or working with particular suppliers or customers, is considered unacceptable. Manuj and Mentzer (2008[19]) suggested that avoidance takes the form of exiting through divestment of specialized assets, delay of entry into a market or market segment, or participating only in low uncertainty markets. This type of strategy is aimed at reducing chances of risk occurrence to zero by ensuring that the risk does not exist (Manuj & Mentzer, 2008[19]). In avoiding risks, managers are aware of trade-offs associated with the options and choose to avoid or drop some of these risks (Ghadge *et al.*, 2013[9]). Avoidance strategy could be preempting adverse events (Manuj & Mentzer, 2008[19]).

Manuj and Mentzer (2008 [19]) posit that in avoidance strategy Type 2, reducing the frequency and probability of a risk event is of concern. This usually arises when managers have no option but to venture into high uncertainty demand or supply markets. For example avoidance strategy for quality issues consists of site audit and approval, and product audit and approval. According to Christopher and Holweg (2011[20]) supply chains operating in all types of environments attempt to avoid risks within the constraints of acceptable returns such as revenue and profit targets. If a supply chain has an option to not enter environment but still meet targets, then it is more likely to adopt a Type 1 avoidance strategy. However, if a supply chain has no choice but to enter an environment to achieve its targets, then it is more likely to adopt a Type 2 avoidance strategy (Manuj & Mentzer, 2008[19]). All types of supply chains adopt avoidance strategies to varying degrees, driven by the availability or non-availability of options. We therefore hypothesise thus;

Hypothesis: Supply chain risk avoidance strategies have positive influence on performance of food and beverage manufacturing firms (Fig.1).

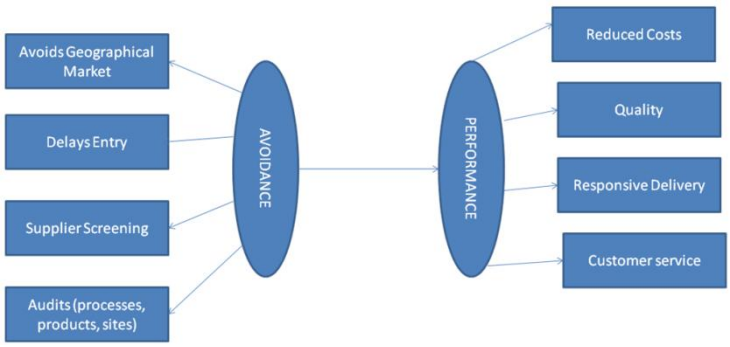

FIGURE 1: Conceptual framework

III. Research Methodology

3.1. Data Collection Instrument

The study administered a questionnaire to obtain primary data –the unit of analysis was the individual firm and the population was all 187 KAM membership food and beverage manufacturing firms in Kenya. Target

respondents were senior-level managers with the knowledge of supply-chain and logistics functions and direct involvement in strategic and operational decision-making. Such respondents were chosen as key organizational informants due to their set of skills, business responsibilities and SC expertise.

3.2 Sample and Sampling technique

This research collected data form I87 firms using the census survey technique. A census survey is the procedure of getting information from each member of the population (Saunders *et al.,* 2009[21]). Census survey is the appropriate data collection design for a small heterogeneous population. Since the sample frame for the study was small and heterogeneous, census survey was adopted. According to Saunders, *et al.,* 2009[21]) the larger the sample size for a small population, the more accurate the results are likely to be and hence the choice of the census technique in this study.

3.3 Data Collection

This study used questionnaire with both closed questions to collect information. The decision to use a questionnaire approach to data collection was consistent with the exploratory aspects of the research question, and the complexity of the issues involved (Wieland & Wallenbug, 2012[22]; Xiao-Feng Shao, 2013[23]). The study sought to find out the influence of supply chain risk avoidance strategies on supply chain performance in food and beverage manufacturing firms. Since the study was concerned mainly with variables that could not be directly observed, questionnaires were used. A five-point Likert scale was used to measure practitioners' perceptions of the extent to which different types of resources and activities achieve supply chain risk management. The end points were labelled 'Strongly disagree' (1) to 'Strongly agree' (5). The mid-point (3) was labelled 'Neutral'. Avoidance strategies include delaying entry to certain markets, avoiding some suppliers and participating in low uncertainty markets. The items were generated by reviewing relevant research literature in supply chain risk management.

IV. Data Analysis, Results And Discussions

4.1 Pilot Study

A total of 19 firms responded during the pilot survey. After recording all the completed responses, the data was downloaded into SPSS 17 software for further analysis. At the preliminary stage the survey responses were examined for errors and missing data. Surveys completed in their entirety accounted for 100% of all collected. Cronbach's Coefficient Alpha value 0.7 was the minimum acceptable for reliability measure (Nunnally, 1978[24]). This determined how the questionnaire items correlate among themselves. The pilot test results were used to improve the research questionnaire.

4.2 Descriptive Statistics

4.2.1. Response Rate

Out of the administered 187 questionnaires, 165 were returned fully completed. This represents a significant 87.3 percent response rate. The majority of the respondents were male (57.6 per cent) compared to 42.4 percent female. This shows that the gender parity food and beverage manufacturing firms in Kenya is narrow.

4.2.2 Types of F&B Firms

The breakdown of the main test survey respondents by industry is presented in TABLE 1. Results indicate that the majority of the main test survey participants were from Juices, water and carbonated soft drink (34.5 percent). The dairy sub sector and confectionaries contributed 23.6 percent and 21.2 percent of participants respectively. Participants from the vegetable oil accounted for an additional 8.6 percent. The rest (7.9 percent) were from the meat and meat products.

Table 1: Types of businesses

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Alcoholic beverages and spirits	7	4.2	4.2	4.2
	Cocoa, chocolate and sugar confectionaries	35	21.2	21.2	25.4
	Dairy products	39	23.6	23.6	49
	Juices, water and carbonated soft drinks	57	34.5	34.5	83.5
	Meat and meat products	13	7.9	7.9	91.4
	Vegetable oils.	9	8.6	8.6	100
	Total	165	100.0	100.0	

4.2.3: Influence of Supply Chain Avoidance Strategies on Performance

The analysis TABLE 2 shows that SC avoidance strategies influence performance. The indicator of avoiding certain geographical markets deemed risky had a mean score of 3.50 as 33% of the respondents strongly agreed and 21% agreed with the practice. Twenty one percent (21%) of the respondents however disagreed while 7% strongly disagreed with the SC practice. The study also revealed that avoiding some supplier to minimize risk does influence performance of F&B manufacturing firms. The indicator had a mean score of 3.45. Twenty five percent (25%) of the respondents strongly agreed and 30% agreed with the same. Ten percent (10%) strongly disagreed while 16% disagreed with the fact. Then the respondents were asked to indicate whether delaying getting into some markets to avoid risks influenced SC performance, 29% of the respondents strongly agreed, and 30% agreed while 19% of the respondents disagreed with 6% strongly disagreeing with the strategy.

The respondents were asked whether auditing the firm processes and those of their suppliers contributed to SC performance. With mean of 3.50, 29% of the respondents strongly agreed with 23% agreeing. However, 19% of the respondents disagreed with 6% strongly disagreeing with the strategy. The use of information technology to reduce risks had the highest mean score of 3.86. Forty four percent (44%) strongly agreed as 24% agreed that the strategy had influence on performance. Sixteen percent (16%) of the respondents disagreed while 6% strongly disagreed with the practice.

TABLE 2: Avoidance strategies influence sc performance

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Mean**	**SD**
A1Avoids geographical markets deemed risky	7	21	18	21	33	3.50	1.333
A2 Avoids some suppliers in order to minimize supply chain risks	10	16	19	30	25	3.45	1.285
A3 Delays getting into certain markets until the uncertainty is reduced	6	19	16	30	29	3.58	1.125
A4 Audits both our processes and supplier processes to minimize quality risks	6	19	23	23	29	3.50	1.257
A5 Information technology is used to reduce supply chain risks	6	16	10	24	44	3.86	1.287

4.2.4: SC Performance

Respondents were asked whether their firms' supply chain operations achieved the lowest possible costs. Thirty seven percent (54%) of the respondents agreed while 17% disagreed. On whether the firms had the ability to reduce time between order and delivery, 53% of the respondents agreed while 23% disagreed. The study also revealed that SC strategies influenced the ability of the firms to meet quoted qualities and quantities consistently. Nineteen percent (19%) strongly agreed, 33% agreed while 16 % disagreed and 7% strongly disagreed. It was also established that SC performance measured up to customer service levels. Twenty eight percent (28%) strongly agreed, 33% agreed but 16% disagreed as 6% strongly disagreed as shown in TABLE 3.

TABLE 3: SC Performance

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Mean**	**SD**
SCP1 The ability to achieve the lowest possible cost of logistics through efficient operations and/or scale economies	2	15	20	33	21	3.51	1.281
SCP2 The ability to reduce the time between order receipt and customer delivery to as close to zero as possible	5	18	24	34	19	3.45	1.134
SCP3 The ability to meet quoted or anticipated quality and quantities on a consistent basis	7	19	19	36	19	3.41	1.199
SCP4 The extent to which perceived supply chain performance matches customer expectations	6	16	18	33	28	3.62	1.201

4.3 Hypothesis Testing

4.3.1: Confirmatory Factor Analysis Model Estimation

The weighted least squares mean and variance adjusted (WLSMV) estimator was used to estimate all models (TABLE 4). WLSMV is robust estimation technique useful when data are coarsely categorized or follow non-normal distributions (Sass, Schmitt, & Marsh, 2014[25]). The robust techniques apply rescaling corrections or use alternative calculation procedures to other estimation methods to overcome shortcomings.

TABLE 4: CFA results

AS =~						
AS1	0.749	0.045	16.834	0.000	0.749	0.749
AS2	0.822	0.033	25.073	0.000	0.822	0.822
AS3	0.764	0.036	21.026	0.000	0.764	0.764
AS4	0.798	0.035	22.732	0.000	0.798	0.798
AS5	0.891	0.025	35.048	0.000	0.891	0.891
SCP =~						
SCP1	0.408	0.084	4.865	0.000	0.804	0.804
SCP2	0.435	0.089	4.877	0.000	0.858	0.858
SCP3	0.452	0.091	4.956	0.000	0.890	0.890
SCP4	0.472	0.094	4.998	0.000	0.930	0.930

4.3.2: Model Evaluation Criteria: Goodness of Fit

The model fitting process in SEM involves determining the goodness-of fit between the hypothesized model and the sample data (Sass, *et al.,* 2014[25]). Goodness of fit shows how well the specified model reproduces the observed covariance matrix among the indicator items. Chi-square and p-value-- the higher the probability level (p value) associated with chi square, the better the fit. SRMR (standardized RMR, root mean square residual). SRMR < = .05 means good fit. The smaller the SRMR, the better the model fit. SRMR = 0 indicates perfect fit. A value less than .08 is considered good fit. The GFI should by equal to or greater than .90 to indicate good fit. A value of 1 indicates a perfect fit. CFI (comparative fix index), close to 1 indicates a very good fit, > 0.9 or close to 0.95 indicates good fit, by convention, CFI should be equal to or greater than .90 to accept the model. CFI is independent of sample size (Rhemtulla, *et al.,* 2012[26]).

NNFI close to 1 indicates a good fit. TLI greater than or equal to 0.9 indicates acceptable model fit. By convention, NNFI values below .90 indicate a need to re-specify the model. TLI less than 0.9 can usually be improved substantially. RMSEA (root mean square error of approximation), there is good model fit if RMSEA less than or equal to .05. There is adequate fit if RMSEA is less than or equal to .08. The developed model has been proven to meet all the requirements and the results.

Supply chain risk avoidance strategies have positive influence on performance of food and beverage manufacturing firms in Kenya.

Supply chain risk avoidance strategies have standardized loading of 1.768 and Z value of 7.812 on performance as illustrated in TABLE 4. The relation is positive and significant at 1% level as the p-value associated with the critical ratio is less than 0.01. Therefore, Supply chain risk avoidance strategies have positive influence on performance of food and beverage manufacturing firms in Kenya.

TABLE 4: Hypothesis Testing Results

CHISQ	DF	PVALUE	CFI	TLI	RMSEA	NNFI	GFI	WRMR
312.253	366.000	0.981	1.000	1.002	0.000	1.002	0.992	0.773

LHS OP RHS	EST	SE	Z	PVALUE	CI.LOWER	CI.UPPER
SCP ~ AS	1.768	0.226	7.812	0	1.324	2.212

We conclude that supply chain risk avoidance strategies have positive influence on performance of food and beverage manufacturing firms in Kenya ($\beta = 1.77$, p-value < 0.0001, $R^2 = 0.758$)

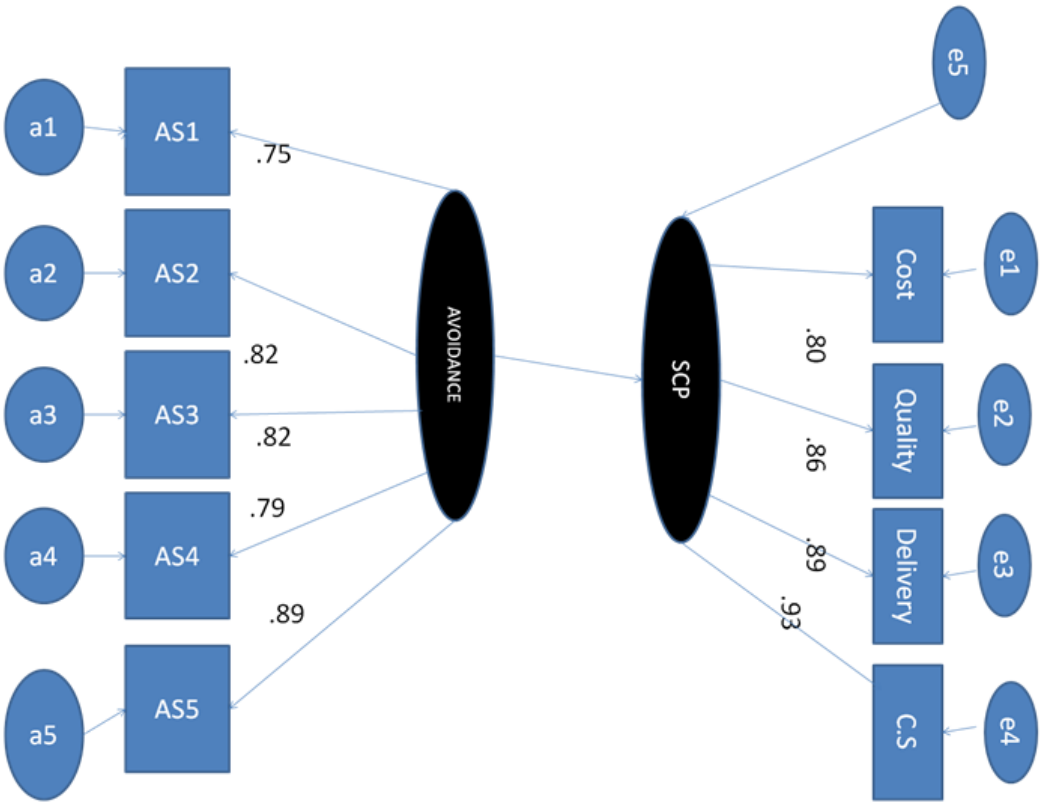

FIGURE 2: Model Path Diagram

V. Conclusion

The results show that supply chain risk avoidance strategies significantly influence performance. The implication of the study is that SC risks are inherent, but combining the right capabilities with effective avoidance strategy, firms may have successful SC. Avoidance takes the form of avoiding uncertain regions, countries or markets**,** delaying entry to volatile markets**,** screening suppliers to avoid supply related risks, exiting potentially risky ventures or markets, or participating only in low uncertainty markets. This study offers rigorous empirical test of the influence of the strategies on non financial performance criteria, which is rarely attended to. The study contributes to the growing literature on SCRM. As with any research, the results of this study are subject to some limitations that need to be taken into account when interpreting those results. Due to confidentiality issues, the data on SC performance may be subjective. In addition, the study investigated the relationships in the Kenyan context. Therefore, the results may not be readily transferable to other countries. However, further research is needed to validate and expand the model using financial performance measures.

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