AN EMPIRICAL ASSESSMENT OF SUPPLY CHAIN EFFECTIVENESS USING EXPLORATORY FACTOR ANALYSIS (EFA) APPROACH:

THE CASE OF SELECTED BEVERAGE FIRMS IN GHANA

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Abstract

There has been little contribution to academic debate and knowledge in terms of what constitutes supply chain (SC) effectiveness. This study therefore assessed supply chain effectiveness using selected beverage firms in Accra, Ghana. A quantitative research technique was primarily employed in this study. Participants were senior employees in the selected beverage firms. The simple random sampling procedure was used to draw 214 respondents from the population. Exploratory Factor Analysis (EFA) was the main statistical tool of data analysis and presentation. Results reveal that SC effectiveness is defined by two constructs. The first construct is SC strategy and this accounts for the highest variance (53.7%) in SC effectiveness. This construct is made up of variables relating to the general approach and strategy to supply chain management. The second construct is SC outcomes, and this accounts for 20.1% of the total variation in SC effectiveness. This construct is made up of variables relating to the end-results of SC management in an organization. For beverage firms to maximise SC effectiveness therefore, they need to focus on implementing the best SC strategy that will yield expected SC outcomes.

Keywords: Supply chain, supply chain management, supply chain effectiveness, supply chain strategy, supply chain outcome, beverage firms

Introduction

As contended by Janvier-James (2012), the supply chain literature is fast expanding owing to increasing attention being given to the subject of supply chain by researchers. This situation is logically as a result of the utmost relevance of supply chain to organisational performance. Supply chain management (SCM) has therefore become one of the main management functions on which the performance and growth of businesses rest. But what might be the primary goal of supply chain management?

The goal of supply chain management is to form and manage a well-coordinated network of suppliers, manufacturers, warehouses and stores that serves as a medium of distributing goods and services (Wong and Wong, 2007). Since a business makes its revenues and profit from the production and sales of goods, it is logical to say that supply chain management is basically aimed at organisational growth. Yet the effectiveness of supply chain management on organisational growth is contingent on one condition (Olugu and Wong, 2009; Rajagopal and Sulaiman, 2009), and this condition has to do with how effective the entire supply chain management process is.

In the subject's literature, supply chain effectiveness (i.e. effective supply chain) is a major recognised concept. An effective supply chain is recognised as one that addresses an organisation's pre-determined purpose of SCM (Groznik and Maslaric, 2010). In this context, the organisation's purpose of SCM at the implementation stage might vary from one organisation to another, but the primary purpose of a SCM is common to all firms (Olugu and Wong, 2009), that is to keep goods and services in a well-coordinated network of suppliers, manufacturers, stores and customers as a basis of attaining short and long-term corporate performance (Rajagopal and Sulaiman, 2009; Olugu and Wong, 2009). From a personal viewpoint, an effective supply chain is one in which all challenges and risks of supply chain are duly controlled and minimised. This assertion is supported by Olugu and Wong (2009), who contend that risks and challenges must be sufficiently minimised to achieve SC success. Simply, an effective supply chain is therefore the one that generates outcomes that: (1) satisfy the SC success criteria of management in the face of controlled SC challenges and risks (Ab Talib and Hamid, 2014); and (2) promote organisational performance in the short term, and organisational growth in the long term (Lambert, 2008; Kristofik et al., 2012). It could consequently be said that supply chain effectiveness is a measure of supply chain success and its effect on organisational performance and growth.

It is worth mentioning that SCM literature acknowledges what an effective supply chain management is but fails to provide empirical evidence on it. Several studies (e.g. Attaran, 2012; Ab Talib and Hamid, 2014; Anyanful and Nartey, 2015) have produced models on what supply chain success and its critical determinants are. Some studies (e.g. Attaran, 2012; Marwah, Thakar and Gupta, 2014) also provide empirical evidence on the general effect of supply chain on organisational performance and growth. Yet the literature, on a limited scale, touches on supply chain effectiveness. This situation reflects a major gap in the literature because supply chain cannot impact the organisation significantly without being effective. For firms to make the best of SCM, practitioners need to understand SC effectiveness, its underlying variables and its relationship to organisational performance. This evidence in the literature is lacking in a Ghanaian context.

This study therefore seeks to assess supply chain effectiveness among selected beverage companies in Ghana. Key players in the beverage sector are chosen for this study owing to the fact there are some real-life challenges that the selected firms need to resolve using recommended strategies of SC effectiveness in this study.

Objective of the Study

This paper assesses the dimensions of supply chain effectiveness using Exploratory Factor Analysis (EFA). Thus this paper identifies what constitutes SC effectiveness in the selected beverage firms in Ghana.

Significance of the Study

It is hoped that this study will generate a model that supply chain practitioners in the beverage sector can use to achieve and maximise supply chain effectiveness. The study is also expected to provide evidence on how to make the best of supply chain management in beverage firms in terms of factors to consider in managing supply chains.

Academic debate on the subject of SC effectiveness is incomplete, especially in a Ghanaian context. This study shall contribute to this debate and expand the subject's literature. Consequently, students and future researchers who would want to conduct related studies can use this study as a reference work.

Literature Review

In the literature, definitions of supply chain have a bearing with theory and practice. While some definitions (such as that of Janvier-James, 2012) are tailored from a theoretical perspective, other definitions (e.g. that of Olugu & Wong, 2009) are developed to address practices of SC in all sectors.

Janvier-James (2012, p. 194) defined supply chain by quoting Beamon (1998) as "a structured manufacturing process wherein raw materials are transformed into finished goods, then delivered to end customers". Again in Janvier-James' paper, (2012, p. 194) supply chain is defined by Bridgefield Group (2006) as "a connected set of resources and processes that starts with the raw materials sourcing and expands through the delivery of finished goods to the end consumer". The study of Olugu & Wong (2009) contains one of the most detailed definitions of supply chain. Thus supply chain is a combined system that is made up of planning, sourcing, making and development of processes with its constituent parts to include material suppliers, production facilities, distribution centres and customers connected together through the feed-forward-flow of materials as well as feedback flow of information.

Supply chain management (SCM) is a set of approaches utilised to efficiently integrate suppliers, manufacturers, warehouses and stores so as to produce and distribute products and services to the customers in the right quantities, at the right locations, at the right time, minimising the system wide cost while satisfying the service level requirements (Wong & Wong, 2007, p. 362). Furthermore, supply chain management is viewed as a business process that seeks to ensure efficient and effective flow of products, materials services, information from the supplier through to the customer (Ab Talib & Hamid, 2014). In view of these definitions and the understanding offered by them, supply chain management provides a framework of strategies for integrating suppliers, manufacturers, warehouses and stores so as to produce and distribute products and services to the customers.

The primary goal of supply chain is made evident from these definitions and conceptions. According to Wong & Wong (2007), the goal of supply chain management is to form and manage a well-coordinated network of suppliers, manufacturers, warehouses and stores that serves as a medium of distributing goods and services. Since a business (e.g. Accra Brewery Limited, Guinness Ghana Brewery Limited, Coca Cola Company, etc.) makes its revenues and profit from the production and sales of goods, it is logical to say that supply chain management is basically aimed at organisational growth. But it is worth saying that the contribution of supply chain to firm performance and growth is

dependent on SC success and effectiveness. Later in this review, SC success and effectiveness are explained. Yet the impact of supply chain management on organisational performance is contingent on one condition (Olugu & Wong, 2009; Rajagopal & Sulaiman, 2009), and this condition has to do with the effectiveness of the entire supply chain management process.

Some models underpin the concept and practice of supply chain from the perspective of SC effectiveness. In the next section, the theoretical review is geared towards relating the subject matter of this study to appropriate models.

Related Model

Firstly, SC effectiveness and how it emanates from the SC process or practice are underpinned by the model of Li et al. (2006). This model has four (4) major components, which are: (1) Level of information sharing, (2) Quality of information sharing, (3) Customer relationships, (4) Strategic supplier partnerships. The model is developed based on the argument that these four components form the basis of effective coordination in supply chain. The scope of the model is interwoven with The Model of Integrated Information Systems and Business Processes (Lambert, 2008). This model assumes that, supply chain entails some key stages of activities:

Stage 1: Supply of raw materials to the firm from external suppliers
Stage 2: Manufacturing, which is made possible by materials supplied by external suppliers
Stage 3: Distribution of finished goods to retail points
Stage 4: Retail, which is the destination for accessing produced goods by the customer
Stage 5: Customer consumption

The Model of Integrated Information Systems and Business Processes recognise flow of information as the medium in which the five stages are accomplished (Li et al., 2006; Lambert, 2008). Yet the most critical recognition of practitioners in this model is the fact that activities are initiated and implemented at each stage within the specified time periods (Lambert, 2008). Moreover, the model recognises the reversible flow of information; thus from suppliers to the organisation and from the organisation to suppliers.

With respect to this current study, the five stages defined by The Model of Integrated Information Systems and Business Processes and the four components of Li et al.'s (2006) model form the basis of SC effectiveness. This is assertion is made in view of the idea that SC can only impact the organisation when its standard stages and activities are initiated and implemented in accordance with the five stages outlined above (Mallik, 2010; Marwah et al., 2014). Since the model of Li et al. (2006) incorporates some other measures of supply chain success such as risk control, it is worth saying that The Model of Integrated Information Systems and Business Processes, and the model Li et al.' (2006) provide a framework of activities, for that matter variables, for measuring SC effectiveness in this study.

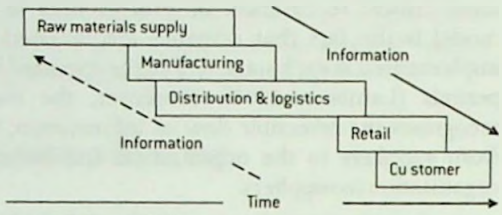
The Nature of Supply Chain

The nature of supply chain embraces standard activities and practices. However, researchers have used their unique ways of explaining these standard activities and practices based on the sector on which their studies are based and the variables of interest (Mensah et al., 2014). With respect to the variables associated with the present study, the nature of supply chain is better explained from the perspective of The Model of Integrated Information Systems and Business Processes which is prominently enshrined in the literature.

As shown in Figure 1, supply chain involves the first stage of supply of raw material from external

suppliers. Though the manufacturing process constitutes the second stage of SC, Okino & Cattini (2011) contend that this stage cannot exist without access to raw materials from suppliers. They added that activities in supply chain are systematic, with one stage leading to the next stage. The third stage of supply chain is distribution of finished goods and management of logistics (Lambert, 2008). In the beverage sector, this stage involves distribution of finished products to major depots across the country.

Figure 1: A Conceptualisation of the Nature of Supply Chain



Source: Lambert (2008)

From depots, finished goods get to retail centres, from where customers access them. The stage in which finished goods are sent to retail centres is the last but one stage of supply chain (Olugu & Wong, 2009). The final stage of supply chain is the stage where customers access finished goods from retailers for consumption (Okino & Cattini, 2011). It is argued by Lambert (2008) that the nature of supply chain is not defined by just the five stages. Rather, it involves how information flows along and across all stages in a cyclical fashion. This is to say that supply chain involves the integration of suppliers to the organisation and the organisation to customers.

With respect to a theoretical framework of Rajagopal & Sulaiman (2009) and The Model of Integrated Information Systems and Business Processes which defines the complete nature of supply chain, activities and stage of supply chain are initiated and implemented within suitable time periods. Thus raw materials must come to the organisation within a specified time and finished goods must go to customers at a specified time. As to when finished goods get to customers is dependent on when raw materials arrive, while sale of finished goods can influence how soon raw materials are accessed from suppliers in the supply chain (Lambert, 2008; Thakkar et al., 2008). To this end, the technical and time demands of the nature of supply chain determine SC success and effectiveness. Invariably, the network of teams, suppliers and customers in a supply chain must be timely coordinated to engender expected sales and revenues, as well as continuity in supply chain. In the next section, SC effectiveness is discussed to throw light on this assertion.

Supply Chain Effectiveness

The bulk of the SCM literature is made up of what constitutes the role, impact and challenge of supply chain (Attaran, 2012) and what drives supply chain success across various sectors (Attaran, 2012; Anyanful & Nartey, 2015), though the manufacturing and construction sectors are the most commonly covered. To some extent also, the literature recognises what supply chain effectiveness (Borgström, 2012) is, but this dimension of the literature is often evidently discussed in the context of SC success and organisational growth objectives. Based on the argument of some researchers such as Kuei & Madu (2001) and Kurien & Qureshi (2011), there seem to be some level of contradiction in what the literature identifies as SC effectiveness relative to SC success. To understand what SC effectiveness is, there is the need to know what constitutes organisational effectiveness.

Organisational effectiveness is defined as a standard of how well an organisation is meeting the demands of the various departments and teams that are concerned with its activities (Pfeffer & Salancik 2003, p. 11). They added that organisational effectiveness, ideally, is a construct "for doing the right things" or having validity of outcome. The question is "what happens when the right things are done" in the organisation? According to Borgstrom (2012), doing the right things in all departments and teams leads to the realisation of organisational growth objectives. From this assertion, one can easily conceptualise what SC effectiveness is.

The SCM literature recognises what an effective supply chain or effective SCM is. An effective supply chain is recognised as one that addresses an organisation's pre-determined purpose of supply chain (Borgström, 2012; Groznik & Maslaric, 2010). In this regard, the organisation's purpose of SCM at the implementation stage might vary from one organisation to another, but the primary purpose of an SCM is common to all firms (Olugu & Wong, 2009); thus to keep goods and services in a well-coordinated network of suppliers, manufacturers, stores and customers as a basis of attaining short and long-term corporate performance (Rajagopal & Sulaiman, 2009; Olugu & Wong, 2009). Based on this understanding, an effective supply chain is the one in which all challenges and risks of supply chain are duly controlled and minimised to realise the firm's supply chain objectives. This assertion is supported by Olugu & Wong (2009), who contend that risks and challenges must be sufficiently minimised to achieve SC effectiveness. Simply, an effective supply chain is therefore the one that generates outcomes that meet two criteria: (1) satisfy the SC success criteria of management in the face of controlled SC challenges and risks (Ab Talib & Hamid, 2014); and (2) promote organisational performance in the short term, and organisational growth in the long term (Rajagopal & Sulaiman, 2009; Olugu & Wong, 2009). It could consequently be said that supply chain effectiveness is a measure of supply chain success and its effect on organisational performance and growth.

It is logical to say that SC effectiveness is not the same as SC success, at least based on the two criteria to be fulfilled in the organisation to engender SC effectiveness. The acceptable definition of SC effectiveness incorporates SC success. Invariably, SC success is part of SC effectiveness. On the basis of this assertion, Borgström (2012) argue that not all successful supply chain processes lead to supply chain effectiveness. As a reminder, SC success is achieved when all the quality criteria of a SC process are met Beamon (1998). However, the fact that the quality or success criteria are met is different from SC making a desired impact on the entire organisation. To this end, SC effectiveness is a measure of SC success and the significant positive effect (in the form of augmented growth or performance) made by SC success on the organisation (Borgström, 2012; Kuei & Madu, 2001). It is therefore evident that SC effectiveness is the primary expectation of management but not SC success, though SC success forms the basis of SC effectiveness. In view of this argument, organisations need to rather focus on how to achieve SC effectiveness (Borgström, 2012). In the next section, the empirical literature on SC effectiveness is reviewed.

Empirical Review

The SC empirical literature is quite elaborate, especially in terms of the effect of supply chain on business performance and the critical success factors of supply chain. Some studies (e.g. Borgström, 2012) have also been focused on an examination of supply chain effectiveness.

The first related research of interest is the study of Borgström (2012). In his study, SC efficiency and effectiveness were conceptualised as two terms relevant to supply chain management. The researcher used the resource dependence perspective's definitions and recent development and usage of efficiency and effectiveness from the literature. The analytical framework was in three steps: Dualism, duality and beyond. First, efficiency and effectiveness are described as two independent constructs (i.e. as a dualism). Thereafter efficiency and effectiveness were described as two interrelated constructs; thus as a duality. Finally, he analysed the constructs beyond the duality applied to a supply chain context. His resulting framework shows that efficiency and effectiveness cannot be seen as independent in a supply chain context with focus on processes. The evaluation is neither of a relation nor of an organization but of an organization of relationships. In the analysis of efficiency and effectiveness the main difficulties are time, boundaries, and interdependencies.

The study of Borgström (2012) underpins this study and is relevant to this study on the basis of how it

provides an understanding of the measurement of SC effectiveness. In this respect, his framework identifies SC Effectiveness as a measure (from the perspective of the evaluator) an external standard of how well an organisation is meeting the demands of the SC team or group and other teams and stakeholders that are concerned with its activities. This conceptual idea has a bearing with the definition of SC Effectiveness by Groznik & Maslaric (2010). They define SC effectiveness as a SC process that addresses an organisation's pre-determined purpose of SCM. In essence, the framework of Borgström (2012) provides ideas for measuring SC effectiveness once the roles of SC in the chosen organisations are known.

A second related study of interest is the study of Groznik & Maslaric (2010). In their study, they analyse practitioners' experience that relates to their understanding of "SC Effectiveness". These researchers found in their study that effective supply chain management (i.e. SC Effectiveness) requires a high degree of coordination and information sharing between partners in the supply chain. In this respect, Olugu & Wong (2009) reveals that the primary purpose of an SC is to keep goods and services in a well-coordinated network of suppliers, manufacturers, stores and customers as a basis of attaining short and long-term corporate performance. It is therefore worth saying that the finding of Groznik & Maslaric (2010) is corroborated by the conceptualisation of SC Effectiveness by Olugu & Wong (2009). So like the study of Borgström (2012), their study provides an understanding of what metrics go into the measurement and recooking of supply chain effectiveness.

It is worth saying that the studies of Borgström (2012) and Groznik & Maslaric (2010) have been conducted as qualitative researches whose findings are limited to theoretical deductions and opinions of experienced practitioners. Thus their study provides no verifiable quantitative evidence of what SC Effectiveness and its dimensions are. Some studies (e.g. Kuei & Madu, 2001; Marwah et al., 2014; etc.) therefore provide some extent of remedy to this weakness. The problem is that most of these researchers did not work on SC Effectiveness; rather they used "SC Success" as an indicator of this construct.

Kuei & Madu (2001) conducted a quantitative study in which the determinants of SC effectiveness are examined. In their study, they argued that SC success is an indicator of SC effectiveness; hence they rather focused on determinants of SC success as a basis of knowing determinants of SC effectiveness. They used a population of electronic firms in Taiwan. In their study, they formed a framework of factors that influence success in supply chain management within electronic organisations. In their framework, the factors found to drive SC effectiveness are organisation integration (teamwork), top management leadership/commitment, supplier participation, competitive benchmarking and learning. They concluded that a SC process that is successful or leads to success is effective. Invariably, SC success translates into SC effectiveness.

It can be seen that the reviewed studies such as the study of Borgström (2012), Groznik & Maslaric (2010) and Kuei & Madu (2001) have made some contributions to academic debate. However, the subject's empirical literature comes with several gaps. These gaps are discussed in the next section.

Gaps in the literature

As posited by Janvier-James (2012) and acknowledged earlier, SC success and SC effectiveness cannot be the same, though they may be related. But many researchers (Groznik & Maslaric, 2010; Borgström, 2012; Marwah et al., 2014) have used SC success in place of SC effectiveness. This contradiction and conflict is a major gap in the literature. A remedy of this gap is very critical because some recent studies such as Marwah et al. (2014) have been conducted based on the study of Groznik & Maslaric (2010) with the misconception that SC Success is an indicator of SC effectiveness, or the two constructs can be used interchangeably.

Moreover, most of SC effectiveness studies (e.g. Groznik & Maslaric, 2010; Borgström, 2012) have been conducted as qualitative researches. However, the frameworks produced by these studies, precisely the study of Borgström, (2012), reveals SC effectiveness as a construct. A construct is a variable that cannot be measured directly but can be measured using several observable or manifest variables (Suhr, 1999). Though constructs can be

conceptualised in qualitative studies as done in some studies (e.g. Groznik & Maslaric, 2010; Borgström, 2012), Suhr (1999) argues that quantitative research methods are the best means of confirming them in practice. Nonetheless, the literature does not show any identifiable evidence on a confirmation of SC effectiveness.

Generally, academic debate on the subject of SC effectiveness is incomplete. This argument is made in view of the fact that researchers have not given much attention to it relative to other subjects. As a result, the scope of the literature does not address SC problems in individual sectors and firms such as the ones on which this study is based. A large proportion of studies focus on SC success, which in a personal opinion, is likely to become over-researched soon. While the studies of Borgström (2012), Groznik & Maslaric (2010) and possibly a few other researchers provide a weak base of academic debate on the subject, more studies are required on it.

The above-mentioned gaps boil down to a lack of a model of SC effectiveness, at least at a general level. Since every organisation has its unique Dynamic Capability, SC would contribute a different dimension of effectiveness in each firm (Borgström, 2012). Consequently, individual firms need a model that can be tapped in enhancing and maximising SC effectiveness. The fact is that this model does not exist in the context of the selected firms on which this study is based, or there is no identifiable model of SC effectiveness that can be used to address the SC problems of these firms.

The above gaps in the literature provide several implications for this study. These implications call for the need for the subject's literature gaps to be addressed, as previously recommended by Groznik & Maslaric (2010).

Conceptual Framework

An understanding of the nature of SC in an organisation or a group of organisations is fundamental to identifying ways of improving SC effectiveness (Borgstrom, 2012). This is another way of saying that one cannot find a remedy to a problem when the problems are not known. Hence, this study captures a detailed assessment of the nature of SC in the selected beverage firms.

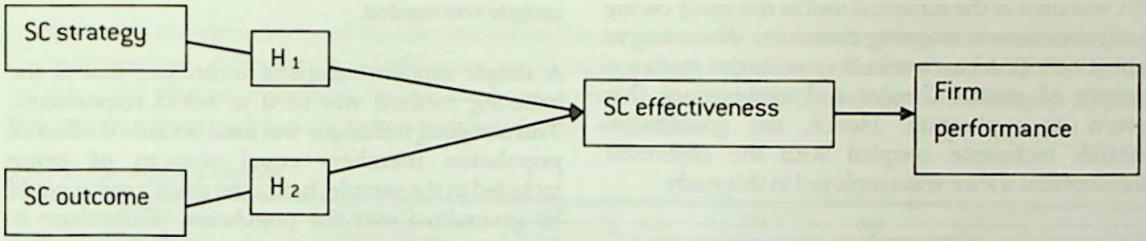


Figure 2: A Conceptualisation of the Dimensions of SC Effectiveness

Source: Researcher's Own Construct

In exploring the practical nature of a construct, one is able to explore its dimensions (Suhr, 1999). Similarly, understanding the nature of a construct is detailed in its assessment using Factor Analysis (Suhr, 1999; Ringner, 2008). On the basis of these facts, this study captures an examination of SC effectiveness as a construct using Factor Analysis, precisely Exploratory Factor Analysis. In this assessment, the dimensions of SC effectiveness are identified, but the link between SC effectiveness and a firm's performance, as identified in the framework, is left to future research. As seen in the diagram, each dimension of SC effectiveness impacts SC effectiveness.

Upon knowing the extent to which SC effectiveness relates to firm performance, strategies can then be suggested for maximising SC effectiveness in the

selected firms. The researcher would however want to leave a comparison of the SC Effectiveness and SC Success constructs, as identified in the previous section, for future research work. The conceptual framework of this study is shown in Figure 2.

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Hypotheses

Based on the conceptual framework represented by Figure 2, findings are expected to support the following hypotheses:

H1: Supply chain strategy (SC Strategy) is a significant dimension of SC effectiveness in the selected beverage firms

H2: Supply chain outcome (SC Outcome) is a significant dimension of SC effectiveness in the selected beverage firms

Methodology

In this research, the primary goal is to use Exploratory Factor Analysis to identify the dimensions (i.e. constituents) of SC effectiveness. EFA was used as the statistical tool in this study owing to its robustness in assessing constructs. According to Suhr (1999), EFA best works in quantitative studies as a result of statistical rules and assumptions that govern its application. Hence, the quantitative research technique coupled with the objectivist philosophical stance was employed in this study.

The population of the study is employees in the SC, marketing, sales, production and operations departments at the head office of ABL, GGBL, CCGL and SBC Beverages Ghana Limited. These companies were used in this study in view of the fact that they had a strong SC management structure that formed a basis of measuring SC effectiveness and its dimensions. The target population constituted senior employees who had worked in their respective firms for at least 2 years. Participants were expected to have worked in the companies for at least 2 years to ensure that they responded based on ample work experience. The population of such employees in the chosen firms was 407. Since data could not be collected on all these members of the population, a sample was needed.

A simple random sampling technique, that is the balloting method was used to select respondents. This sampling technique was used because it offers all population members equal chances of being included in the sample; hence the study's result could be generalised over the population (Kichenham & Pfleeger, 2002). The simple random sampling technique was used to draw a sample size of 214 respondents. This sample size was chosen based on the argument that a sample size which is at least 50% of the study population for large samples is adequate for a quantitative study (Creswell, 2003; Kichenham & Pfleeger, 2002), where a large sample is not less than 30 participants (Creswell, 2003). Since the number 214 is more than 50% of the population size, the study's sample size is considered representative.

Primary data was used in this study to measure SC effectiveness and consequently its dimensions (i.e. SC

strategy and SC outcome). A structured questionnaire was used to collect primary data, with a five-point likert scale used to assess the SC effectiveness constructs. Items of SC Effectiveness were derived based on the theoretical framework represented by Figure 1 and the SC effectiveness framework of Borgström (2012). Hence questions asked to measure SC effectiveness in the questionnaire were based on these frameworks. This was done to ensure that data collected was valid.

A number of steps were taken to ensure that the instrument for collecting data was valid and reliable. Firstly, the questionnaire was submitted to some research experts for assessment and validation. Moreover, items of the questionnaire were chosen based on the objective of the study and were based on standard constructs used in related studies. The questionnaire was also associated with comprehensive guidelines that enabled respondents to complete it appropriately. These and many other measures taken formed the basis of the validity and reliability of the questionnaire used.

A Chronbach's alpha value of 0.802 was realised for the SC effectiveness construct. According to Drost (2011), a construct with a Chronbach alpha value of 0.7 or more is sufficiently reliable. In essence, the instrument used to measure SC effectiveness and its dimensions was adequately reliable.

Questionnaires were administered by hand delivery. This method was used because a majority of respondents preferred it to e-mail delivery of questionnaires. Moreover, respondents were more willing to respond to printed copies of questionnaire. In data collection, 209 questionnaires were successfully completed out of 214 distributed, representing a response rate of 98%.

SPSS Version 21 was used to analyse data as a result of its robustness for quantitative data analysis and in terms of EFA. Exploratory Factors Analysis was used to assess the dimensions of SC effectiveness. This statistical tool was used for several reasons. Firstly and as argued by Suhr (1999) and Ringner (2008), this stool is an efficient tool in reducing the dimension of SC effectiveness and putting its manifest variables into the hypothesised constructs (i.e. dimensions). Moreover, this statistical tool was used because its application satisfied basic requirements such as normality of data. Yet the application of EFA satisfied other basic statistical requirements such as the need for significant correlation between most pairs of manifest variables. In the next section, primary statistical requirements satisfied are identified.

Findings

In this section, the dimensions of SC effectiveness in the context of the selected beverage firms are identified. These dimensions, contextually called factors, are identified using Exploratory Factor Analysis (EFA). Before unfolding the primary evidences, there is the need to test the data applied for validity in the context of EFA. This is done using a series of diagnostic tests which start with Table 1.

Table 1: Correlation Matrix

	X1	X2	X3	X4	X5	X6	X7	X8	X9
X1	1.000	.911	.393	.131	.868	.637	.542	.276	.866
X2	.911	1.000	.232	-.033	.850	.557	.494	.326	.702
X3	.393	.232	1.000	.714	.442	.619	.213	-.040	.302
X4	.131	-.033	.714	1.000	.164	.442	.213	-.201	.265
X5	.868	.850	.442	.164	1.000	.676	.471	.381	.735
X6	.637	.557	.619	.442	.676	1.000	.659	-.009	.568
X7	.542	.494	.213	.213	.471	.659	1.000	.050	.564
X8	.276	.326	-.040	-.201	.381	-.009	.050	1.000	.425
X9	.866	.702	.302	.265	.735	.568	.564	.425	1.000

Source: Researcher's SPSS Output

In Table 1, we expect at least most of the correlations between variables to be high to ensure that the EFA is sufficiently valid and strong. It can be seen that most of the correlations are positively high as expected. This means that a pair of most of the variables would generate a positive effect. Generally, the correlations point to a valid EFA, and variable clusters with high correlation coefficients belong to the same factor. Table 2 further diagnoses the appropriateness of the study's sample in the context of EFA

Table 2: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.556
Bartlett's Test of Sphericity	Approx. Chi-Square	1913.061
	DF	36
	Sig.	.000

Source: Researcher's SPSS Output

Table 2 contains the KMO and Bartlett's tests. These tests verify the appropriateness of the sample in the context of EFA. Consequently these tests further ascertain the validity of the EFA. The general rule of thumb is that the KMO Measure of Sampling Adequacy takes on a value closer to 1 while Bartlett's Test of Sphericity is significant at a chosen level of significance, which is 5% in this study. From the table, the KMO measure, which is 0.556, is quite close to 1. Moreover, the Bartlett's test is very much significant at the chosen level of significance ($p < .05$). Hence, the EFA is associated with an appropriate sample size, and this buttresses the validity found in the correlation matrix table, Table 1.

Table 3: Anti-image Correlations

Variable	X1	X2	X3	X4	X5	X6	X7	X8	X9
Anti-image correlations	0.290	0.270	0.242	0.252	0.273	0.252	0.151	0.149	0.250

Source: Researcher's SPSS Output

Table 4: Communalities

Variable	X1	X2	X3	X4	X5	X6	X7	X8	X9
Extraction	.905	.842	.754	.787	.852	.785	.671	.665	.780

Source: Researcher's SPSS Output

A final verification of the validity of the EFA is done using Table 3, which contains the anti-image correlations. These correlations must be as close to zero as possible to ensure that the EFA is sufficiently valid. Usually, values at 0.30 or less suggest a very valid and strong EFA (Suhr, 1999). In Table 3, most of the anti-image correlations fall in this range. Hence, the EFA could be viewed as the one which is strong and valid.

With respect to the first three tables, results of the diagnostic tests confirm that the dimensions of SC effectiveness identified in the context of EFA are valid.

In Table 4, variables which form part of a dimension or factor are extracted or identified. This table shows values called communalities or extraction, and they measure the extent to which a variable is part of a dimension of SC effectiveness. These values are equivalent to R Square values in linear regression analysis. Thus higher values indicate that the corresponding variable relates strongly with a dimension. In the table, each variable is part of a dimension; thus none is removed. This is because none of them has an extraction value less than 0.50, which is generally the minimum value a variable that forms part of a factor can assume. This evidence is supported by the validity of the EFA as seen in the

diagnostic analysis. Yet the communalities can only help to know the individual strengths of the variables but cannot reveal the dimensions or factors and their variations. The factors extracted and their variations are shown in Table 5.

Table 5: Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings*
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	4.829	53.653	53.653	4.829	53.653	53365	4.659
2	1.812	20.132	73.785	1.812	20.132	73.785	2.641
3	.886	9.842	83.627				
4	.612	6.805	90.431				
5	.394	4.372	94.804				
6	.186	2.072	96.875				
7	.164	1.824	98.699				
8	.103	1.140	99.838				
9	.015	.162	100.000				

Extraction Method: Principal axis factoring.

Table 5 shows the factors formed by the 9 variables. In the context of this table, a factor has an Eigen value not less than 1. Thus a factor cannot have an Eigen value to be less than 1. On the basis of this criterion, it is worth saying that 2 factors (dimensions) have been formed by the 9 variables. The first factor accounts for 53.7% of the total variation; the second accounts for 20.1% of the total variation. The higher the variation accounted by a factor, the more critical the factor is to SC effectiveness, or the more this factor underpins SC effectiveness. A total of 73.8% of the variation is accounted for the two factors or dimensions. Since the total variation accounted is greater than 50%, it suggests that the two factors contribute a higher part of what is SC effectiveness in the selected beverage firms. At this level however, nothing is known as to which among the 9 variables make up a dimension. Table 6 shows a classification that addresses this gap.

Table 6: Classification of Variables

Factor	Variable	Denotation
Factor 1	X1	Strategy
	X2	
	X3	
	X4	
	X5	
Factor 2	X6	Outcome
	X7	
	X8	
	X9	

Source: Researcher's Construct

In Table 6, the first five variables (i.e. X1 to X5) make up the first factor which accounts for 53.7% of the total variation. This factor is termed by the researcher "Strategy". It is so-called owing to the fact that it is made up of variables that constitute the strategic approach to SC and SC effectiveness. The second factor, "Outcome", is made up of X6, X7, X8 and X9, and accounts for 20.1% of the total variation. Please refer to Table 6 in the Appendix to identify variables represented by X1 to X9. Evidently, the Strategy factor constitutes a greater part of SC effectiveness relative to the outcome. It could also be said that the strategy factor is more critical to supply chain effectiveness among the selected beverage firms. Figure 3 shows a framework of findings.

Based on the above findings, two dimensions define SC effectiveness in the selected beverage firms. These dimensions are Strategy and Outcome. Though Strategy is seen to make the highest contribution to SC effectiveness in terms of influence, there is the need to use regression analysis to buttress this evidence and to render it more informative. In this section therefore, the relative effects of each dimension on SC effectiveness are examined.

Table 7: Correlation Between SC Effectiveness and Factors

		SC Effectiveness	Strategy	Outcome
Pearson Correlation	SC Effectiveness	1.000	.847	.623
	Strategy	.847	1.000	.670
	Outcome	.623	.670	1.000
Sig. (1-tailed)	SC Effectiveness	.	.000	.000
	Strategy	.000	.	.000
	Outcome	.000	.000	.
N	SC Effectiveness	209	209	209
	Strategy	209	209	209
	Outcome	209	209	209

Source: Researcher's SPSS Output

Table 7 shows the correlation between SC Effectiveness and each of the dimensions identified, Strategy and Outcome. It can be seen that the strongest positive correlation exists between SC Effectiveness and Strategy ($r = .847$, $p < .05$). This means that SC Effectiveness is improved as each of the dimensions is enhanced in practice in value. These significant correlations between the factors and SC Effectiveness form the basis of the regression analysis, which commences at Table 8.

Table 8: Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.847[a]	.718	.716	.54902	
2	.851[b]	.723	.721	.54480	2.034

a. Predictors: (Constant), Strategy
b. Predictors: (Constant), Strategy, Outcome
c. Dependent Variable: SC Effectiveness

Table 8 shows the model summary of the prediction of SC Effectiveness from Strategy and Outcome. In the first model, Strategy alone accounts for about 71.8% of the variation. In the second model, the two predictors account for 72.3% of the total variation. This means that Outcome alone accounts for less than 1% of the variation in the context of regression analysis. Moreover, the Durbin-Watson value is very close to 2, and this satisfies the independence-of-error assumption of a multiple linear regression analysis. Hence, regression corroborates findings of the EFA in terms of variation, but it accords a higher value to Strategy relative to Outcome. This means that Strategy has a stronger effect on SC Effectiveness in terms of regression.

Table 9: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	158.696	1	158.696	526.485	.000[b]
	Residual	62.395	207	.301		
	Total	221.091	208			
2	Regression	159.950	2	79.975	269.456	.000[c]
	Residual	61.141	206	.297		
	Total	221.091	208			

a. Dependent Variable: SC Effectiveness
b. Predictors: (Constant), Strategy
c. Predictors: (Constant), Strategy, Outcome

Table 9 shows an ANOVA test associated with the prediction of SC Effectiveness from the two factors. This test verifies if the regression analysis is a better way of expressing the relationship between SC Effectiveness and each of the factors relative to the correlation values shown in Table 8. This test is done at 5% significance level. From the table, the ANOVA test is significant for the first model, $F(1, 207) = 526.5$, $p = .000$, and second model, $F(2, 206) = 269.5$, $p = .000$. This confirms that regression analysis is a better way of expressing the relationship between SC Effectiveness and each of the factors, relative to the correlation values. This implies that the coefficients table, which is Table 10, can reliably be interpreted.

Table 10: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.333	.089		14.971	.000		
	Strategy	.753	.033	.847	22.945	.000	1.000	1.000
2	(Constant)	1.251	.097		12.903	.000		
	Strategy	.693	.044	.779	15.798	.000	.552	1.813
	Outcome	.070	.034	.101	2.055	.041	.552	1.813

a. Dependent Variable: SC Effectiveness

Table 10 shows the coefficients table of the prediction of SC Effectiveness from the four factors. In the first model, Strategy ($t = 22.95$, $p = .000$) significantly predicts SC Effectiveness at 5% significance level. In the second model, Outcome ($t = 2.05$, $p = 0.041$) significantly (but weakly) predicts SC Effectiveness. The validity of these results is seen in the fact that each of the VIF value is far less than 5, which desirably indicates a lack of multi-collinear across the two factors. Results of the regressi analysis and Exploratory Factor Analysis a conceptualized in Figure 3. The relationshi between SC effectiveness and SC strategy and SC outcome is expressed as follows:

SC effectiveness = 0.69*Strategy + 0.07*Outcome + 1.33

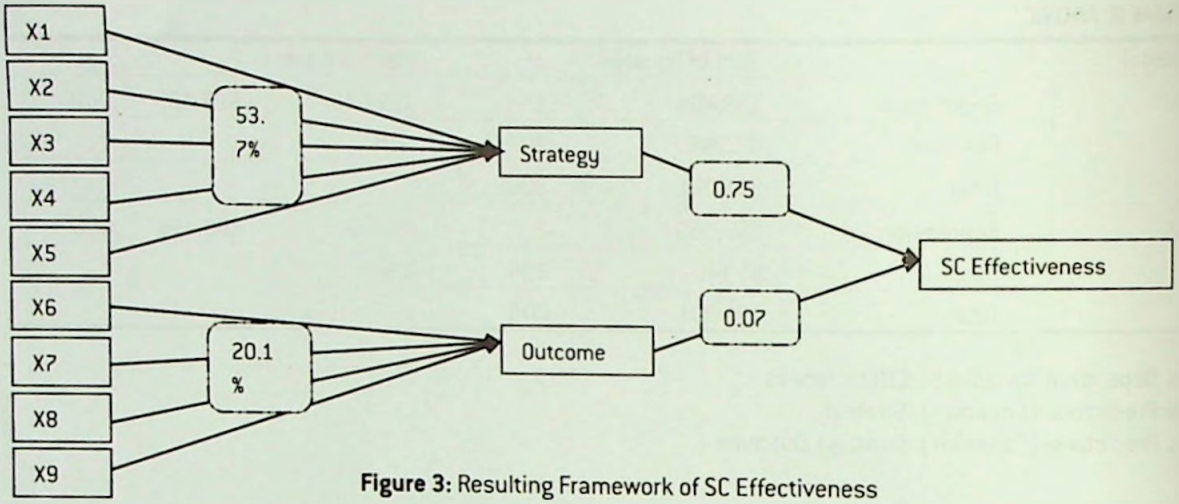

Figure 3: Resulting Framework of SC Effectiveness
Source: Researcher's Construct (Based on Findings)

Figure 3 conceptualises results of the EFA and regression analysis. It can be seen that Strategy, in terms of both EFA (53.7%) and regression (0.75), contributes a larger amount of effect on SC Effectiveness relative to Outcome. This generally indicates that SC Effectiveness is largely dependent on suitability of SC strategy, while outcome of SC depends on this strategy. Based on evidence reached in the analysis, the two hypotheses are supported by the data.

Discussion

In the analysis, SC effectiveness is found to have two dimensions, namely Strategy and Outcome. "Strategy" accounts for the highest amount of variation in SC effectiveness, with the variation accounted being 53.7%. This factor or dimension constitutes the technical aspect of SC chain management such as a good SC plan, a competent SC team or human resource, availability of appropriate material and technology, a suitable SC strategy, well-implemented communication, monitoring, control and risk management procedures, to mention but a few. The fact that this dimension accounts for the highest variation signifies that measures and activities that constitute SC strategy more highly underpin SC effectiveness relative to the end results. Though no empirical evidence corroborates this result, Groznik & Maslaric (2010) and Borgström (2012) argue that SC effectiveness is mainly based on what strategies go into supply chain management. On the basis of this argument, Groznik & Maslaric (2010) posit that a suitable and well-implemented strategy in terms of planning, implementation and risk control leads to SC effectiveness.

"Outcome" is the second dimension of SC effectiveness identified. It accounts for 20.1% of the

total variation. Some of its variables are: (1) SC leads to successful access to raw materials; (2) SC leads to successful distribution of finished goods to consumers; and (3) SC meets the criteria of success established. In their paper, Kurien & Qureshi (2011) and Borgström (2012) contend that these variables are the expected results of an effective SC management. In this context, the fact that "Outcome" accounts for the least amount of variation does not mean that it is not important. It practically implies that "Strategy" forms the bulk of what constitutes SC effectiveness, while this strategy is the basis of results of SC, which are embodied by "Outcome" in this context.

This scenario explained above which was reached through Exploratory Factor Analysis (EFA) is confirmed and buttressed at the level of regression analysis. Thus, "Strategy" accounts for the highest effect on SC effectiveness at a variation of 72.3%. "Outcome", at this level, accounts for 1% of the total variability on SC effectiveness. This evidence confirms that the bulk of SC effectiveness is captured in terms of SC strategy, or the suitability of SC strategy and how well it is implemented are fundamental to SC effectiveness. This confirmation at the level of regression reflects the validity and reliability of the evidence, as acknowledged by Suhr (1999).

An aspect of the study's finding that is strongly supported by the literature is the fact that the level of SC effectiveness among the selected beverage firms is just slightly above average; thus the level of effectiveness could be further improved and maximised. This scenario is characteristic of the subject's literature in terms of theoretical argument. Firstly, Janvier-James (2012) expressed the view that SC success and effectiveness always have room for improvement owing to the prevalence of SC challenges, risks and bottlenecks. A similar statement is made by Hines (2004). Borgström (2012) is of the view that SC effectiveness cannot assume a perfect level, unless all bottlenecks of SC management are mitigated, which is not possible in a majority of cases. It is in view of this that firms are required to always find suitable strategies of maximising SC effectiveness.

Conclusion & Recommendations

SC effectiveness is defined by two constructs or dimensions. The first construct is referred to as ""Strategy" and accounts for the highest variance (53.7%) in SC effectiveness. The second construct is termed "Outcome", and this accounts for 20.1% of the variation. Comparatively therefore, SC effectiveness is based on what strategies go into SC in terms of appropriateness and implementation. Logically, implementation of appropriate strategies could lead to the second dimension of SC effectiveness, which is desired "Outcome". This assertion is made in view of the effect of each dimension on SC effectiveness.

There is a positive correlation between SC effectiveness and Strategy ($r = .847$, $p < .05$). Moreover, Outcome makes a strong positive relation with SC Effectiveness ($r = .670$; $p < .05$). This means that SC Effectiveness is improved as each of the dimensions is enhanced in practice and in reality. Also, Strategy ($t = 22.95$, $p = .000$) significantly affects SC Effectiveness at 5% significance level, while Outcome ($t = 2.05$, $p = 0.041$) significantly predicts SC Effectiveness. The respective variations accounted for are 71.8% and 1%. The difference in the variations accounted for indicates that Strategy has a stronger effect on SC Effectiveness in terms of regression relative to Outcome. This in turn suggests that Strategy is more critical to SC effectiveness than Outcome. Of course, outcomes cannot be favourable if strategies are not appropriate and are not well implemented.

The two hypotheses of the study are therefore supported by the data. Hence, supply chain strategy is a significant dimension of SC effectiveness in the selected beverage firms. Also, supply chain outcome is a significant dimension of SC effectiveness in the selected beverage firms.

The beverage firms must therefore maximise SC outcome and consequently SC effectiveness by enhancing their SC strategy and its implementation. The firms can enhance SC strategy by using well-

skilled and trained human resource; modern and appropriate technologies; and effective communication as a basis of an effect network of stakeholders involved. There must be frequent evaluation of performance for risk control. There is the need to optimise needed resources and monitor network efficiency in terms of flow of materials and goods.

Limitations and Suggestions for Future Research

Though a random sampling process was used to select participants in this study, results can only be generalised over the four beverage companies selected. This means that findings could not reflect an industry-wide situation, or findings could not be generalised over the beverage sector in Ghana. This limitation is as a result of not being able to capture a representative sample of firms in the sector in view of time and financial resource constraints.

SC management is geared towards desired firm performance. Hence another limitation of this study is the inability of the researcher to assess the link between SC effectiveness and firm performance.

Future researchers are therefore encouraged to focus on the link between SC effectiveness and firm performance, or extend the scope of their studies to examining these relationships. There is the need for future studies to capture the entire beverage sector, more practically in terms of a representative sample of beverage firms. This would provide an opportunity for future researchers to assess SC effectiveness in the entire sector rather than the four firms captured in this study.

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Appendix

Item Number	Item	Dimension
1	Is well-planned	SC strategy
2	Has the requisite human resource	
3	Is associated with the requisite materials and technology	
4	Designed with a suitable strategy	
5	Is associated with well-implemented communication, monitoring, control and risk management procedures	
6	Leads to successful access to raw materials	SC outcome
7	Leads to successful distribution of finished goods to consumers	
8	Meets the criteria of success established	
9	Leads to the expected impact on organisation	

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