Supplier Selection and Firm Performance: Empirical Evidence from a Developing Country's Environment

Abstract

Purpose - The purpose of this paper is to examine how the various supplier selections construct impacts on firm's operational competitive capability as well as an overall performance from a developing country's environment.

Design/methodology/approach – Structural equation modeling (SEM) was used to study the relationship between supplier selection criteria, competitive operational capabilities and overall organizational performance using survey of informants.

Findings – In this work, we demonstrate that an effective supplier selection will lead to an enhanced competitive capability of the buying firm. Specifically, we show that selecting suppliers based on quality will lead to an improved quality of the buying firm, service will lead to improved delivery time and supplier strategic fit will lead to reduced cost, improved delivery time and improved flexibility of the buying firm. Furthermore, the buying firm competitive operational capabilities in terms of improved delivery time will lead overall performance from the Ghanaian business environment. The results indicates no significant different between the manufacturing and service sectors

Research limitations/implications – The results indicate the relevance and the implications of the various supplier selection criteria from a developing country's environment such as Ghana.

Practical implications – The research shows how supplier selection criteria should be structured to enhance operational competitive capabilities and overall performance of the buying firm.

Originality/value – The work illustrates and provides some insights and build on the literature in the area of supply selection strategies from a developing country's environment

Keywords: supplier, reliability, quality, cost, delivery, flexibility

1.0 Introduction

The dynamism of the business environment is putting firms under pressure to improve quality, delivery performance, and responsiveness while simultaneously reducing costs. In response, firms are increasingly exploring ways to leverage their supply chains, and in particular to systematically evaluate the role of suppliers in their activities (Kannan and Tan 2006). It is important for managers to realize the long-term impact of their sourcing strategies on the profits and the efficient functioning of the organization. At the operational level, buyers have the ability to benefit from developing close relationships with key suppliers in the form of improved quality, delivery, reduced cost, or some combination thereof. At a strategic level, a close relationship with key suppliers is expected to lead to sustainable improvements in product quality and innovation, enhanced competitiveness, and increased market share. It is however expected that all these relationships should, in turn, be reflected by improvements in financial performance (Kannan and Tan 2006).

It is important to indicate that currently, the purchasing function is considered as a crucial activity that affects the performance of any firm (Kar and Pani, 2014). Currently, the choice of suppliers has become a strategic problem for firms (Li and Zabinsky, 2011). This means selecting the right suppliers do not only bring substantial benefits to companies but also increases customer satisfaction (Lin *et al.*, 2011). The profitability of a business nowadays critically depends on their supplier's ability to reduce costs, improve quality, and develop new processes, products, and services faster than their rivals' vendors can. This dependence has made the supplier selection process one of the most important sections of any business (Liker et al, 2004). Jazemi et al, (2011), indicates that one of the most important processes in optimizing or enhancing the supply chain performance of the firm is by paying much attention to the supplier selection process. The supplier's selection decisions are primarily based on material prices, the proposed delivery times, the location of the supplier and opinion on the market, taking into account the supply costs, the quality of materials and the condition of payment (Chai et al, 2013). Fu-jiang et al, 2006, demonstrated empirically that, there exist a positive significant relationship between customer satisfaction, business performance, and supplier selection. The industrial purchasing function especially plays a considerable role in ensuring the long-term viability of a firm with its impact on business competitiveness (Cheraghi et al., 2004; Tchokogue et al., 2016)

Choosing the right suppliers, therefore, involves much more than scanning a series of price lists, choices, therefore, will depend on a wide range of issues (Ho *et al.*, 2010). Such factors include the price offered by the supplier, lead time, quality of items, the capacity of the supplier to respond flexibly to the company's requests and the supplier's geographical location (Ekici, 2013). They also include warranties, production capability, technical capability, management capability, vendor reputation, financial position, labor relations and post-sales services (Kar and Pani, 2014a). According to Monczka *et al.* (2010), the objective of supplier selection is to choose the best supplier for a particular item, one which is reliable, with fair terms, low risks and has maximum value for the client.

According to Chin-Chun Hsu, et al (2006), the theoretical basis for the supplier selection construct can be derived from transaction cost economics (TCE) theory and the resource-based view (RBV) of the firm. The underlying premise of transaction cost economics is that firms are driven by the objective of profit maximization (Coase, 1937; Williamson, 1975, 1981, 1985). In the context of sourcing decisions, it is the relative cost of using markets as opposed to firm controlled resources that drive resource allocation decisions. Chin-Chun Hsu, et.al (2006) therefore, proposed and operationalized supplier selection in terms of three constructs, consistent with the existing theory; namely supplier quality, supplier service, and the strategic/management fit between the seller and buyer using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). However, Chin-Chun Hsu, et.al (2006) did not examine how these construct, in turn, impacts on the performance of the buying firm. While prior studies in the area of supply chain management provide a myriad of evidence on the criteria used by firms to select and assess suppliers, they provide little insight into the relationships between supplier selection and its impacts on the buying firm's operational and overall performance with exception of few (Tracey and Tan, 2001; Kannan & Tan, 2003; Kannan & Tan, 2006).

This study, therefore, attempts to fill this research gap by assessing the impact of these three constructs (supplier quality, supplier service, and strategic/management fit) on the buying firm's operational capabilities as well as overall performance in Ghana. An effective supplier selection is expected to contribute to the enhancement of the buying firm's operational capabilities in terms of reduced cost, improved quality, delivery time and enhanced flexibility as well as overall performance.

The Ghanaian business environment is interesting to the current study due to the fact that managers in Ghana are mostly faced with the issue of high production cost as a result of devalued currency over the years. The Ghanaian Cedi (GHC) has consistently been trading very low against the US dollar. This devaluation issue is making the importation of raw material for production very expensive especially in a country where almost 50% of materials needed for production are imported (Wolf, 2004). These issues, in turn, affect the cost of supplies, consistently raising the cost of production in the country.

The rest of the paper is structured into five main parts. First, we present the literature review and the research hypothesis, presenting the main research model in the conclusion part. This is followed by the research method used, presenting the sample profile and the data collection procedures. After we present the measures used for the research indicating all constructs and their indicator elements used. After, we then present the data analysis and the main findings from the work. In the final part, we present the discussions and conclusions.

2.0 Literature review and development of hypotheses

2.1 Supplier Quality and Competitive Operational Capabilities of the buying firm

Several theories have been used to study the supply chain management and the concept of supplier selection. However, the most widely used theory, is the Transaction Cost Economics (TCE) (Williamson, 1981), and that of the Resource-Based View (RBV) of the firm, hence in this exploratory work, we use the TCE theory to inform our research and provide justifications for the relationship specified in our model. TCE was originally outlined by Coase (1937) and later developed by Williamson (1975). The underlying premise of transaction cost economics is that firms are driven by the objective of profit maximization (Coase, 1937; Williamson, 1975, 1981, 1985). In the context of sourcing decisions, it is the relative cost of using markets as opposed to firm controlled resources that drive resource allocation decisions.

Early works on supplier selection criteria established that criteria like quality, warranties, price, delivery schedule, supplier's financial position, supplier's performance history, among others as the key criteria (Busch, 1962; Dickson, 1966). A section of researchers have empirically established that there have been a shift from price being the main selection criteria to

other non-price economic factors (Shipley & Prinja, 1988; Petroni & Braglia, 2000), while other studies still maintain that price continues to be a major determinant in the final choice (Vyas & Woodside, 1984). In fact, Tidwell and Sutterfield, (2012) used the Quality Function Deployment (QFD) to rapidly identify suppliers that are most capable of providing the product characteristics that met the corporate goals. Verma and Pullman (1998) point out that although managers say that quality is the most important criterion for supplier selection, their actual supplier choice is based largely on cost and delivery performance. Tracey and Tan (2001) found in their study that equal weight or level of importance is given to unit price and quality performance as supplier selection criteria.

Tracey and Tan (2001) provide evidence to support the argument that selecting suppliers based on quality performance is currently a prerequisite for a firm to continue to be in business rather than as a means of achieving competitive advantage. Kannan and Tan (2003) found that firms in Europe and the US focus on the operational performance indicators in terms of quality, delivery performance and capability of a supplier as the most important criteria for supplier selection. Chin-Chun Hsu, et.al 2006, has identified seven observed indicators of a supplier quality focus; supplier testing capability, the scope of resources, technical expertise, industry knowledge, commitment to quality, supplier's process capability, and commitment to continuous improvement in product and process.

Mohammad, (2013) stated that quality is the benchmark for firm managers to assess suppliers and for supplier selection. According to Ho et al, 2010, the extant literature from 2000 - 2008 considers quality as the most important criterion for decision makers followed by delivery, price/cost, manufacturing capability, service, and management. Koufteros et al, 2012 also noted that a firm's ability to produce quality products depends critically on the quality of its suppliers as well as how well the firm integrates their suppliers into their day- day operations and network.

Supplier quality can, therefore, be conceptualized as the capability of the supplier to test the quality of their products before sending them to the buyer, the scope of the supplier's resources as well the technical expertise. The supplier quality also involves the supplier's knowledge about the industry, level of commitment to quality in order to reduce defective products and continual improvement. We also conceptualize operational competitive performance using four constructs, reduced cost, delivery time, enhanced flexibility, and improved quality according to (Schoenherr et al., 2012; Swink et al., 2005). Based on the above

and the difficult and turbulent nature of the Ghanaian business environment, we propose the following hypothesis:

H1a: the quality of the supplier will have a positive relationship with the buying firm, in terms of cost;
H1b the quality of the supplier will have a positive relationship with the buying firm, in terms of quality;
H1c: the quality of the supplier will have a positive relationship with the buying firm, in terms of delivery time;
H1d: the quality of the supplier will have a positive relationship with the buying firm, in terms of flexibility;

2.2 Supplier Service and Competitive Operational Capabilities of the buying firm

Min (1994), stresses that the strength of supplier's commitment to on-time delivery service including follow-up services is an important consideration in supplier selection. Firms who select suppliers based on their ability to offer delivery reliability are able to offer lower prices because rework cost, work-in-progress inventory and production cost per unit are decreased. Tracey and Tan (2001) provide empirical evidence that selecting suppliers based on product quality, delivery reliability and product performance of a supplier has significant positive effect on the four dimensions of customer satisfaction employed in the study (price, quality, variety and delivery).

van der Rhee et al, 2009 indicated that managers in the quest to find suppliers, the most important attribute he looks out for are how flexible the supplier is, meaning how tolerant when it comes to manufacturing, his willingness to accept small orders, his expertise and his ability to produce a variety of product. Kumar, et al 2014 found in their study that supplier flexibility is an important attribute to the buying firm. Chaing, et al 2012 also noted that supplier flexibility is an expedient attribute that creates a healthy working environment. Rashid, (2014) established that for a supplier to remain competitive in the business environment, it is important to enhance its delivery performance since this is very important for decision makers. Mwikali et al, 2012 discovered that the essence of any firm is to make a profit. This makes the cost of materials the most important factor for supplier selection. Corporate price competitiveness is improved significantly when a supplier with an efficient and effective cost is selected (Ting et al, 2008).

Having the least of cost at the best of quality is the objective of every buyer. In such instance, the suppliers are selected based on the cost and quality offered (Gonzalez, et al 2004).

In this work, supplier service is conceptualize according to the supplier service indicators prescribed by Chin-Chun Hsu, et.al 2006: supplier ability to meet delivery due dates, the price of materials, parts and services, flexible contract terms and conditions, geographical proximity, and reserve capacity or the ability to respond to unexpected demand. In considering the above viewpoints, the issue of supplier service is likely to be of importance to firms in Ghana, especially in the delivering of services such as catering, banking, telecommunications etc where delivery time, waiting time and speed respectively are of the essence, we, therefore, propose the following hypothesis:

H1e: the supplier service will have a positive relationship with the buying firm, in terms of cost;
H1f: the supplier service will have a positive relationship with the buying firm, in terms of quality;
H1g: the supplier service will have a positive relationship with the buying firm, in terms of delivery;
H1h: the supplier service will have a positive relationship with the buying firm, in terms of flexibility;

2.3 Supplier Strategic fit and Competitive Operational Capabilities of the buying firm

Previous studies noted reputation, credibility, high-level management capability, the desire to enter business deals and good financial position of a supplier as the basis for selecting a supplier (Shahadat, 2003; Karande et al., 1999). Past business record or performance history of a supplier serves as an important supplier selection criterion as it indicates the supplier's ability to meet contractual agreements (Sarkar & Mohapatra, 2006; Watt, Kavis & Willey, 2010). The Supply chain management literature postulates that sometimes, the interaction between the buying firm and a supplier affects its purchasing behavior in terms of supplier selection criteria more than price. Kannan and Tan (2003) found that honesty and integrity of a supplier has a positive correlation with performance. Ho et al. (2010), Aguezzoul (2012), and Kotula et al. (2015) identified that quality, delivery, price, manufacturing capability, services, management, technology, research development, finance, flexibility, reputation, safety environment, relationship, and risk as some of the key factors in the supplier selection decision. The aim of

any supplier selection strategy is a general belief that selecting the right supplier will support the manufacturer to meet their customers' needs (Ndubisi et al., 2005; De Araujo et al., 2015). Buyers collaborate with suppliers to ensure that input materials meet standards and quality requirements in order to produce quality products (Chen and Paulraj, 2004; Li et al., 2005; Robinson and Malhotra, 2005; Vickery et al., 2003; Kaynak and Hartley, 2008; Ou et al. 2010).

In this work, supplier strategic or management fit is conceptualized according to Chin-Chun Hsu, et.al 2006, in terms of the extent to which the supplier is open to site evaluations, supplier references and reputation, the supplier's financial stability and staying power, honest and frequent communications between buyer and supplier, the cultural match between the firms, past and current relationships with the supplier, the strategic importance of the supplier, and the supplier's willingness to share confidential information. In a developing country such as Ghana, where most of the inputs used in production and delivery of services are imported organizations are more likely to choose suppliers based on the mutual benefits such as reputation and flexibility to enable them enjoy flexible payment terms, payment periods and be able to, if possible, negotiate prices based on the strength of the currency prevailing at the time of delivery in order to be competitive. Based on these arguments, we propose the following hypothesis:

H1i: selecting suppliers based on strategic fitness will have a positive relationship with the buying firms' operational competitive capabilities in terms of cost;
H1j: selecting suppliers based on strategic fitness will have a positive relationship with the buying firms' operational competitive capabilities in terms of quality;
H1k: selecting suppliers based on strategic fitness will have a positive relationship with the buying firms' operational competitive capabilities in terms of delivery;
H1l: selecting suppliers based on strategic fitness will have a positive relationship with the buying firms' operational competitive capabilities in terms of flexibility;

2.4 Operational Competitive Capabilities and Firm Performance

According to Heizer et al, (2008), operational competitive performance refers to the ability of an organization to cut down its management costs, reduce processing time, lead-time, improve efficiency by reducing waste, and distribution capacity. Kaynak (2003), indicated that a high operational performance firm is able to enhance the quality firms' products/services that

increase customer satisfaction (Ou et al., 2010), revenue and profit for companies (Yeung, 2008; Kaynak, 2003; Kaynak and Hartley, 2008). Operational competitive advantage can have a direct, positive impact on organizational performance. Research findings suggest that if firms place priority on the right criteria for selecting suppliers, they would not only achieve a substantial improvement in short-term performance but they would also enhance sales, return on asset and market share. This competitive advantage is therefore expected to contribute to the economic performance of the firm (Rosenzweig & Easton, 2010). Mokadem, (2017), in trying to classify the supplier selection criteria of lean or agile manufacturing strategies, indicated that organizations pursuing lean strategies will emphasize factors that improve their efficiency when selecting their suppliers, while organizations pursuing agile strategies will assert factors that improve their ability to respond to customer unique requirements when selecting their suppliers. Thus, consistent with the manufacturing strategy literature, we propose that:

H2a: the buying firms' operational competitive capabilities in terms of cost will have a positive relationship with its overall performance;

H2b: the buying firm's operational competitive capabilities in terms of quality will have a positive relationship with overall performance;

H2c: the buying firm's operational competitive capabilities in terms of delivery will have a positive relationship with overall performance;

H2d: the buying firm's operational competitive capabilities in terms of flexibility will have a positive relationship with overall performance;

Figure 1 summarizes the hypotheses of this study in a conceptual model. The hypothesized relationships between the constructs are all indicated as positive (+).

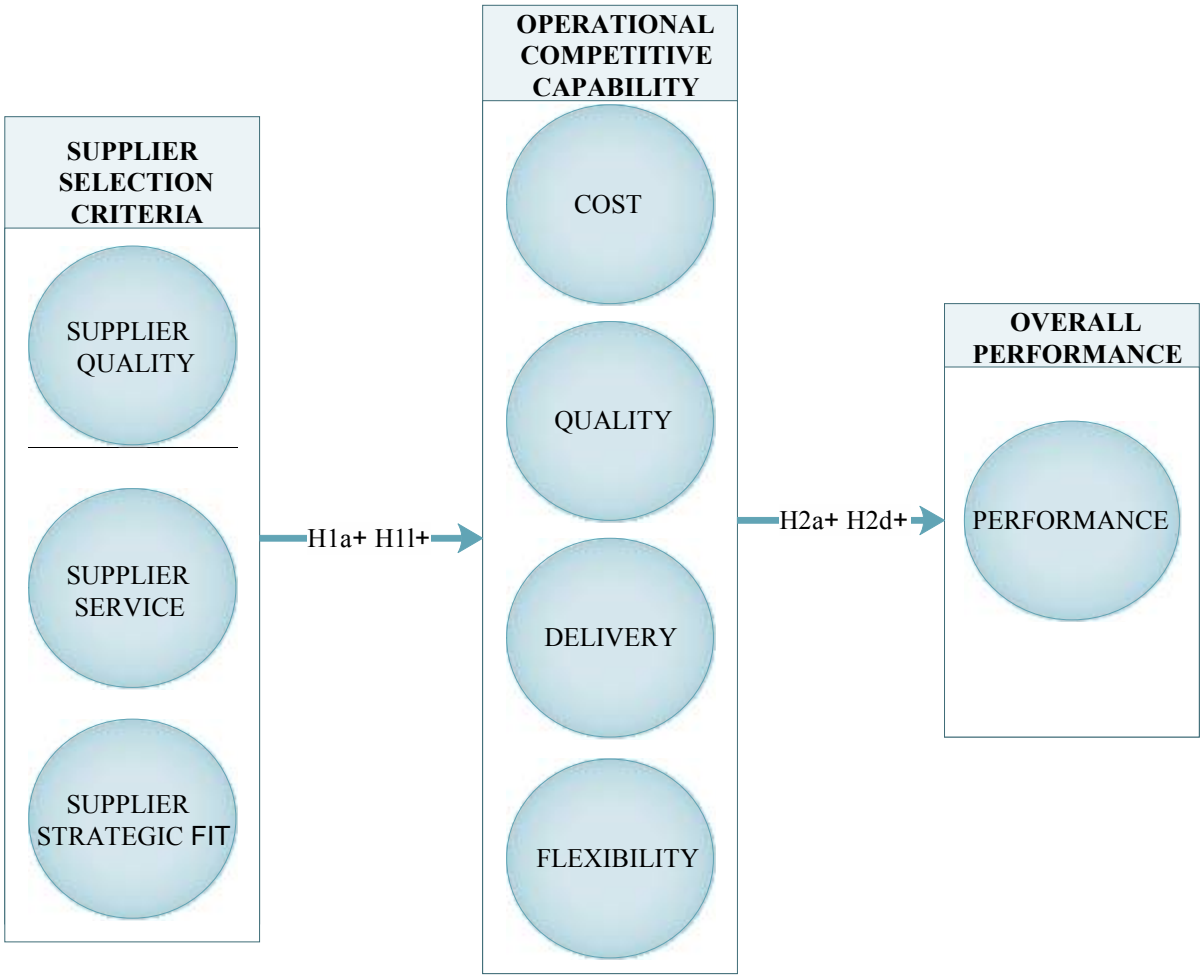


Figure 1: Proposed Research Model

3.0 Research Method

Structural equation modeling (SEM) was used to study the relationship between supplier selection, competitive operational capabilities, and overall organizational performance. Structural equation modeling is a multivariate analytical approach used to simultaneously test and estimate complex causal relationships among variables, even when the relationships are hypothetical, or not directly observable (Williams, Vandenberg, & Edwards, 2009). The study

used eight constructs and 34 indicators/manifest variables which were adapted from (Chin-Chun Hsu, et.al 2006; Karande, 1999 and Shahadat, 2003; Schoenherr et al., 2012; Qi et al., 2011 & Swink et al., 2005). The constructs are Supplier Quality, Supplier Service, supplier Strategic Fit, Cost, and Quality, Delivery, Flexibility and Overall performance. All items were measured on Likert-type scales ranging from 1-5. These together form the structural and the measurement models.

3.1 Sample Profile and Data collection procedure

In this research, we used a survey of "informant" (Van Weele & Van Raaij, 2014; Goo, Huang, & Hart, 2008), individuals, who are considered to be knowledgeable about the purchasing function and are also higher in the organizations' hierarchy to be conversant with strategic management issues within their organizations. A questionnaire made up of previously used validated measures of the different constructs was used as the means of data collection. The sample population consisted of executives from companies in Accra and Tema, the capital city of Ghana where most of the companies are based. A database containing addresses of the various companies were obtained from the Association of Ghana Industries (AGI). The survey questionnaires were distributed to research assistants and graduate students pursuing specializations in project, supply chain, and operations management in one of the top management universities in Ghana[1]. These assistants and graduate students distributed the questionnaires to the executives in the identified companies who were best qualified to answer the questions. This, therefore, ensured that the respondents were knowledgeable and competent to answer the questions posed. The data collection took place over a six-month period. In all, 510 surveys were distributed and a total of 401 were returned resulting in a response rate of 78.6%. This high level of response rates provides assurance of the absence of systematic bias from the informants (Klein et al., 2007). However, only 358 responses, out of the responses received were usable due to issues with incompleteness and non-responses.

[1] A schematic description of the data collection process has been presented using the flow chart in Appendix I

3.2 Industry type descriptive statistics

The respondents that participated in the survey came from different and diverse industries and sectors. They represented the banking (15.1%), education (10.6%), hospitality (10.9%), mining (5.6%), etc. In the analysis section, we have classified the various respondents into two broad areas, service, and manufacturing sectors. The service sector represented 259 respondents, while the manufacturing sector represented 99, corresponding to 72.3% and 23.7% respectively. The full list has been presented in appendix II.

3.3 Measures

In this work, items used in the questionnaire were adapted from previously validated from the literature. Supplier selection criteria refer to the key measures managers consider in the choice of suppliers. The measures adopted from Chin-Chun Hsu, et.al 2006; Karande et al. 1999; Shahadat, 2003), were: supplier quality, supplier service, and strategic/management fit. Supplier quality was measured using seven observed indicators: supplier testing capability, the scope of resources, technical expertise, industry knowledge, commitment to quality, supplier's process capability, and commitment to continuous improvement in product and process. Besides, the supplier service construct was also defined to consist of seven indicators namely; supplier ability to meet delivery due dates, the price of materials, parts, and services, flexible contract terms and conditions, geographical proximity, and reserve capacity or the ability to respond to unexpected demand. The strategic/management fit between buyer and supplier measured using; the extent to which the supplier is open to site evaluation, supplier preferences and reputation, the supplier's financial stability and staying power, honest and frequent communications between buyer and supplier, the cultural match between the firms, past and current relationships with the supplier, the strategic importance of the supplier, and the supplier's willingness to share confidential information (Chin-Chun Hsu, et.al 2006).

For organizations to survive in the long term, it is important that strategies are put in place to achieve a superior performance by reducing cost; delivery time; flexibility and quality compared to its competitors (Schoenherr et al., 2012). The measures for these construct were from the works of Swink et al., (2005) and Schoenherr et al. (2012). The company's overall performances were measured compared with their competitors using, return on investment, market share, the growth rate in sales, and overall profitability. These are among the most widely

used business performance measures in supply chain research (Qi et al., 2011). The full questionnaire was first pre-tested using professionals in the industry as well as academics for readability, coherence, clarity and consistency. Minor changes were made to the questions based on the feedback received.

4.0 Data Analysis and Results

To implement the PLS-SEM, we had to estimate the minimum sample size for the study (Faul, Erdfelder, Buchner & Lang, 2009). This was done using the G power to estimate the statistical power. Cohen (1998) and Hair et al (2014) indicated that a power of 0.80, median f^2 = 0.15 and that the construct overall organization performance has four predictors (two arrows – see Figure 1). Thus, for the PLS, the construct overall organization performance decides the minimum sample to be used. The calculated minimum sample for the study should be 129 cases, but in order to achieve a more consistent model, we used the entire data. We, therefore, used the 358 valid datasets as the sample for this study. The data from this was analyzed using SmartPLS 3.0 for the measurement and the structural models as well as the multi-group analysis. PLS-SEM was chosen due to its ability to predict, minimal restrictions on measurement scales, sample size, and residual distributions (Chin, Marcolin, and Newsted, 2003; Fornell and Bookstein, 1982). PLS is a variance–based SEM approach which has been found to be appropriate for exploratory research (Hair et al. 2014).

4.1 Analytical Technique – The Structural Equation Modeling (SEM)

Structural equation modeling (SEM) is statistical methods for modeling causal networks of effects simultaneously, rather than in a piecemeal manner. SEM offers extensive, scalable, and flexible causal-modeling capabilities (Lowry & Gaskin, 2014). SEM can model multiple independent variables (IV) and multiple dependent variables (DV), chains of causal effects and indirect effects, and the latent constructs that variables are meant to measure. Latent constructs are constructs that cannot be measured directly, but that can be estimated through proxies (Lowry & Gaskin, 2014).

There are two forms of SEM, one is covariance based and represents constructs through factors (CB-SEM); the other is least squares based or components based and represent constructs

through components (PLS). PLS has an advantage over CB-SEM techniques for preliminary theory building, while CB-SEM has advantages over PLS in terms of model validation. PLS incorporates several statistical techniques that are not part of CB-SEM—such as principal components analysis, multiple regression, multivariate analysis of variance, redundancy analysis, and canonical correlation (Chin, Marcolin, & Newsted , 2003)—without inflating the -statistic, as would happen if each analysis were conducted separately from the others.

Before using the PLS-SEM analysis, it is important to establish which indicators are formative and which are reflective (Diamantopoulos & Winklhofer, 2001; Jarvis, MacKenzie, & Podsakoff, 2003). This is important because the tests to establish the factorial validity for reflective indicators are quite different from the approach used to validate formative indicators. This is done to avoid both types I and type II errors (Petter, Straub, &Rai, 2007). In this study, we modeled the indicators of the constructs as reflective because the various items were interchangeable.

Following the procedure outlined by Gefen and Straub, 2005, we first established convergent validity for the items and the reflective constructs by checking factor loading and the Average Variance Extracted respectively. The relationship of each variable to the underlying construct is expressed by the factor loading. Since factor loadings can be interpreted like standardized regression coefficients, one could also say that the variable that has a correlation of 0.70 with Factor is highly correlated with the construct. This would be considered a strong association for a factor analysis in most research fields. The Convergent Validities of the constructs used in the model are obtained by the observations of the Average Variance Extracted - (AVEs). Using the Fornell and Larcker (Henseler et al., 2009) criteria, that is, the values of the AVEs should be greater than 0.50 (AVE > 0.50). The AVE is the portion of the data, that is explained by each one of the constructs or LV, respective to their groups of variables or how much, on average, the variables correlate positively with their respective constructs. Therefore, when the AVEs are greater than 0.50 we can say that the model converges with a satisfactory result (Fornell & Larcker, 1981).

Discriminant validity, of SEM, indicates how the constructs are independent of one another in the model (Hair et al., 2014). To determine discriminant validity, two techniques are possible, cross-loadings or Fornell and Larcker (1981) criteria. Using the Cross Loadings, it is

expected that indicators will load higher factorial loads on their respective constructs than on others (Chin, 1998) and the criteria of Fornell and Larcker (1981), which compares the square roots of the AVE values of each construct with the correlations between the constructs. The square roots of the AVEs should be greater than the correlations between the other constructs.

Reliability refers to the degree to which a scale yields consistent and stable measures over time (Straub, 1989) and applies only to reflective indicators. PLS computes a composite reliability (CR) score similar to Cronbach's alpha (CA) in that they are both measures of internal consistency as part of its integrated model analysis. The traditional indicator Cronbach's Alpha (CA), is based on the variables inter-correlations. CR is the most fitting to PLS, as it prioritizes the variables according to their reliabilities, while the CA is very sensitive to the number of variables in each construct. In the two cases, the CA, as well as the CR, is used to evaluate if the sample is free of biases. CA values above 0.60 and 0.70 are considered fitting in exploratory studies and CR values of 0.70 and 0.90 are considered satisfactory (Hair et al., 2014).

Once the full model had been tested, it is important to assess the predictive power of the model, meaning, how well the model explains variance in the DVs, as demonstrated by the path coefficients and R^2s in the model. Chin (1998) indicates that to demonstrate a meaningful predictive power of a PLS model, one needs to show high R^2 values, substantial and significant structural paths. To be "substantial," standardized paths need to be close to 0.20, to indicate that the model has meaningful predictive power (Chin, 1998). The R^2 values evaluate the portion of the variance of the endogenous variables, which is explained by the structural model. It indicates the quality of the adjusted model. For the area of the social and behavioral sciences, Cohen (1988) suggests that $R^2 = 2\%$ as classified as having a small effect, $R^2 = 13\%$ as a medium effect and $R^2 = 26\%$ as having a large effect.

Finally, since SEM deals with correlations and linear regressions, it is important to evaluate if these relations are significant ($p \leq 0.05$). In order to test the significance of the cited relations, we use the Bootstrapping module, which draws a large number of subsamples from the original data and estimates models for each subsample. It is used to determine standard errors of coefficient estimates to assess the coefficient's (β - *values)* statistical significance (*p-values)* without relying on distributional assumptions (Hair et al., 2014).

4.2 Reliability & Validity Analyses

To proceed, we, therefore, examined the validity and reliabilities of our items and constructs. Table 1 shows the results of these analyses. To establish convergent validity, we considered the outer loadings of the items as well as the Average Variance Extracted (AVE) for items and constructs respectively. The factor loadings of items as shown in figure 1 displays an acceptable convergent validity as all items had significant loadings above 0.7 on their associated constructs (Fornell and Larcker, 1981). We established the convergent validity of our constructs using the Average Variance Extracted (AVE). As can be seen, all the values displayed in table 1 for all constructs were larger than the recommended threshold value of 0.5 (Fornell and Larcker, 1981). We established discriminant validity in order to indicate that our constructs are unique and capture phenomena not represented by other constructs in the model. Here we used the (Fornell and Larcker, 1981), which compares the square root of the AVE values with latent variable correlations. Specifically, the square root of each constructs AVE should exceed the squared correlations with other constructs. We establish that the square root of all AVEs was greater than the correlations with other constructs (Chin, 1998, Fornell and Larcker, 1981), as shown in Table 2 exhibiting discriminant validity. We also ensured our constructs had high internal consistency by calculating their Composite Reliabilities (CR) and Cronbach Alpha (CA) values. The Cronbach Alpha were all above the recommended threshold of 0.7 apart from that of strategic fit and supplier service which were 0.677 and 0.697 respectively, approximately 0.7 (Hair et al 2014). Interestingly, the most reliable measure which is the composite reliability values were all above the recommended level of 0.7 (Nunnally and Bernstein 1994), as displayed in Table 1.

Table 1: AVE, Composite Reliability Cronbach Alpha, and R-Square Measures

CONSTRUCTS	AVE	Composite Reliability	R Square	Cronbachs Alpha
BUYER COST	0.7237	0.9289	0.084	0.904
BUYER DELIVERY	0.6475	0.8798	0.2257	0.8189
BUYER FLEXIBILITY	0.6654	0.8882	0.0844	0.8371
BUYER PERF	0.7239	0.9291	0.2444	0.905
BUYER QUALITY	0.6189	0.8664	0.1593	0.7946
STRATEGIC FIT	0.5052	0.8022	-	0.6773
SUPPLIER QUALITY	0.6199	0.8651	-	0.7868
SUPPLIER SERVICE	0.5199	0.8113	-	0.6979

Table 2: Discriminant validity-Fornell-Larcker Criterion

CONSTRUCTS	BUYER COST	BUYER DELIVERY	BUYER FLEXIBILITY	BUYER PERF	BUYER QUALITY	STRATEGIC FIT	SUPPLIER QUALITY	SUPPLIER SERVICE
BUYER COST	**0.851**							
BUYER DELIVERY	0.414	**0.805**						
BUYER FLEXIBILITY	0.509	0.397	**0.816**					
BUYER PERF	0.379	0.435	0.317	**0.851**				
BUYER QUALITY	0.464	0.605	0.464	0.358	**0.787**			
STRATEGIC FIT	0.258	0.428	0.281	0.274	0.304	**0.711**		
SUPPLIER QUALITY	0.163	0.356	0.205	0.089	0.374	0.533	**0.787**	
SUPPLIER SERVICE	0.234	0.332	0.106	0.174	0.216	0.456	0.311	**0.721**

**The bold numbers on the diagonal are the square root of the AVEs.*

The interpretation of tables 1 and 2 indicates the satisfaction of all the quality criteria since the psychometric properties of the data seem appropriate, hence our data was deemed adequate for further analysis.

4.3 Results

The results of both the measurement and the structural models have been presented in figure 2, and tables 3 and 4. The bootstrapping procedure using resamples of 5000 was used to determine the significance of the path coefficients in this model. We begin the analysis of the structural model by evaluating the Pearson's coefficients (R^2). This R^2 value indicates the portion of the variance of the endogenous variables which is explained by the structural model. It also indicates the quality of the adjusted model. According to Cohen (1988), an R^2 = 2% is classified as having a small effect, R^2 = 13% is classified as having a medium effect, and R^2 = 26% can be

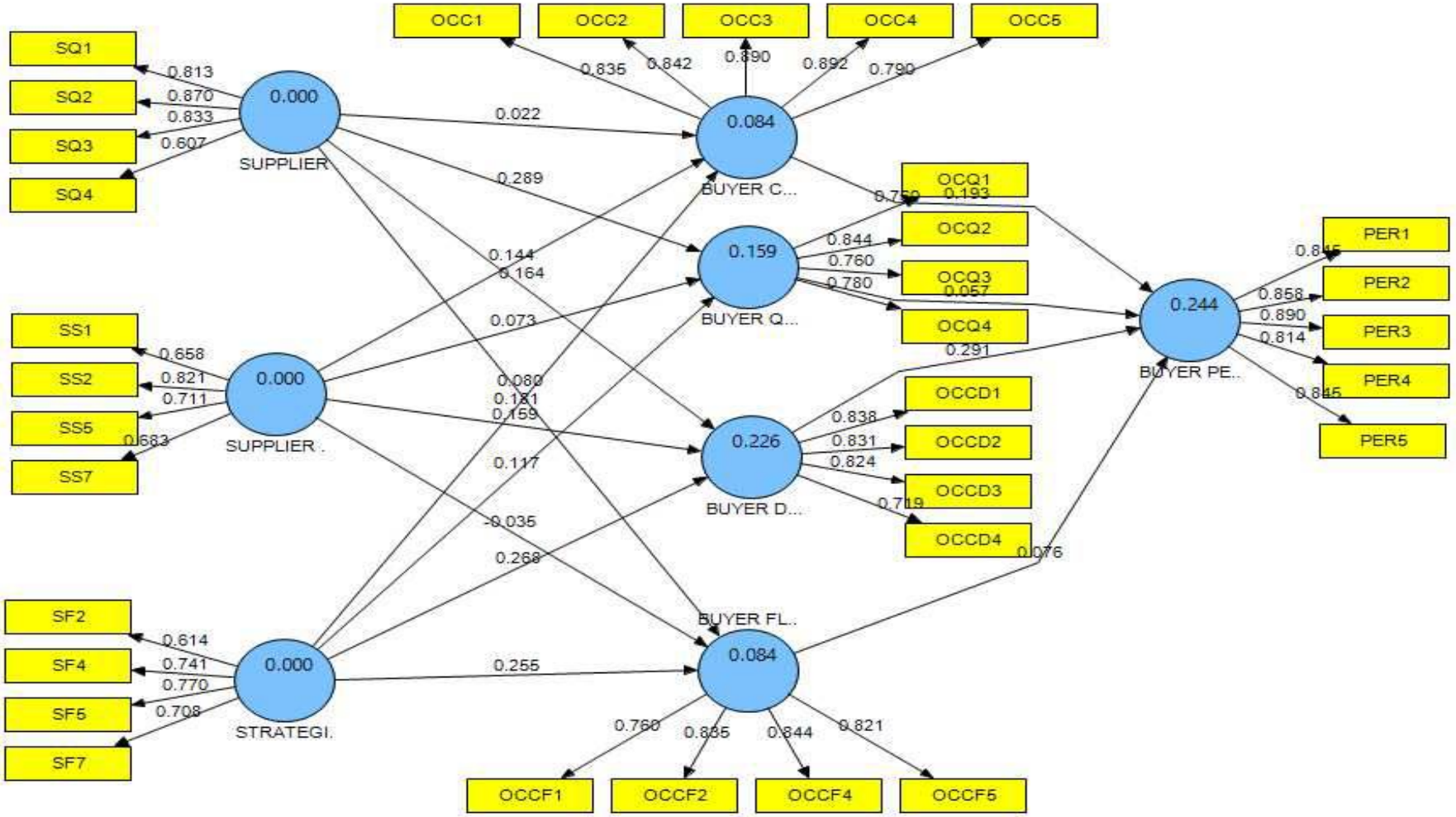
classified as having a large effect. Thus, the results in figure 2 indicates that the research model explained 8.4%, 15.93%, 22.57%, 8.44% and 24.44% of the variance in buyer's operational cost, quality, delivery, flexibility, overall performance of the buying firm respectively, indicating a small effect in two of the constructs and medium in the other three constructs.

In table 3, we present the results of the bootstrap. The first column present the various relationships presented in our model, which we refer to as our hypothesized relationships, in the second column the path estimates or coefficients (Beta (β) values), the third is present the sample mean and the last column contains the probability values (*p*-values). In the table, the *p*-values determine the statistical significance of the β- values (Hair et al., 2014).

The results indicate that the quality of the supplier has no significant impact on the buying firm operational competitive performance in terms of cost (β = 0.216, p = 0.749), delivery (β = 0.1639, p = 0.1086) and flexibility (β = 0.0800, p = 0.3947). However, the quality of the supplier, has a significant impact on the buying firm in terms of quality with (β = 0.2888, p = 0.0154), rejecting H1a, H1c, and H1d, however supporting H1b.

The results also indicate that whilst supplier service has a significant relationship with the delivery performance of the buying firm (β = 0.1590, p = 0.0629), however, it seems to have no significant impact on the buying firm's operational competitive capability in terms of cost (β = 0.1442, p = 0.1582), flexibility (β = -0.0352, p = 0.6237), and quality ((β = 0.0.0728, p = 0.3610) supporting H1g and rejecting H1e, H1f and H1h. Strategic/Management fitness of the supplier seems to have significant positive impact on the buying firm, in terms reduced cost (β = 0.1881, p = 0.0979), delivery (β = 0.2677, p = 0.0057), flexibility (β = 0.2548, p = 0.0262) but no impact on quality of the buying firm (β = 0.1171, p = 0.2944), supporting H1i, H1k and H1l, but not H1j. The results further indicates that whilst the buying firm's competitive operational capabilities in terms of reduced cost (β = 0.1934, p = 0.0424), and delivery ((β = 0.2906, p = 0.0141) has a significant positive relationship with its overall performance, however, operational competitive performance in terms of flexibility (β = 0.0763, p = 0.4173), and quality (β = 0.0570, p = 0.4684) has no positive relationship with its overall performance, providing supporting H2a, H2c, but rejecting H2b and H2d.

Figure 2: Results of the measurement and the structural models[2]



[2] See Appendix III for Key to figure 2, indicating the various constructs and the details of items used in the model

Table 3: Bootstrapping results for test of path significance

Constructs	Original Sampl	Sample Mean	Standard Deviation	Standard Error	T Statistics	p-values
BUYER COST -> BUYER PERF	0.1934	0.1914	0.0950	0.0950	2.0364	0.0424
BUYER DELIVERY -> BUYER PERF	0.2906	0.3128	0.1178	0.1178	2.4672	0.0141
BUYER FLEXIBILITY -> BUYER PERF	0.0763	0.1216	0.0939	0.0939	0.8121	0.4173
BUYER QUALITY -> BUYER PERF	0.0570	0.1024	0.0786	0.0786	0.7258	0.4684
STRATEGIC FIT -> BUYER COST	0.1811	0.1960	0.1091	0.1091	1.6597	0.0979
STRATEGIC FIT -> BUYER DELIVERY	0.2677	0.2891	0.0963	0.0963	2.7799	0.0057
STRATEGIC FIT -> BUYER FLEXIBILITY	0.2548	0.2612	0.1141	0.1141	2.2327	0.0262
STRATEGIC FIT -> BUYER QUALITY	0.1171	0.1549	0.1115	0.1115	1.0500	0.2944
SUPPLIER QUALITY -> BUYER COST	0.0216	0.0961	0.0692	0.0692	0.3124	0.7549
SUPPLIER QUALITY -> BUYER DELIVERY	0.1639	0.1661	0.1019	0.1019	1.6087	0.1086
SUPPLIER QUALITY -> BUYER FLEXIBILITY	0.0800	0.1268	0.0939	0.0939	0.8521	0.3947
SUPPLIER QUALITY -> BUYER QUALITY	0.2888	0.2962	0.1186	0.1186	2.4344	0.0154
SUPPLIER SERVICE -> BUYER COST	0.1442	0.1754	0.1020	0.1020	1.4140	0.1582
SUPPLIER SERVICE -> BUYER DELIVERY	0.1590	0.1723	0.0852	0.0852	1.8660	0.0629
SUPPLIER SERVICE -> BUYER FLEXIBILITY	-0.0352	-0.1036	0.0717	0.0717	0.491	0.6237
SUPPLIER SERVICE -> BUYER QUALITY	0.0728	0.1114	0.0796	0.0796	0.9147	0.3610

Table 4: Summary of Hypotheses Testing Results

Hypothesis	Exogenous variable	Path	Endogenous variable	Path Estimate	P- value	Supported?
H1a	Supplier Quality	→	Buyer Cost	0.0216	0.755	No
H1b	Supplier Quality	→	Buyer Quality	0.2888**	0.015	Yes
H1c	Supplier Quality	→	Buyer Delivery	0.1639	0.109	No
H1d	Supplier Quality	→	Buyer Flexibility	0.08	0.395	No
H1e	Supplier Service	→	Buyer Cost	0.1442	0.158	No
H1f	Supplier Service	→	Buyer Quality	0.0728	0.361	No
H1g	Supplier Service	→	Buyer Delivery	0.159*	0.063	Yes
H1h	Supplier Service	→	Buyer Flexibility	-0.0352	0.624	No
H1i	Supplier strategic Fit	→	Buyer Cost	0.1811*	0.098	Yes
H1j	Supplier strategic Fit	→	Buyer Quality	0.1171	0.294	No
H1k	Supplier strategic Fit	→	Buyer Delivery	0.2677***	0.006	Yes
H1l	Supplier strategic Fit	→	Buyer Flexibility	0.2548**	0.026	Yes
H2a	Buyer Cost	→	Buyer overall Performance	0.1934**	0.042	Yes
H2b	Buyer Quality	→	Buyer overall Performance	0.057	0.468	No
H2c	Buyer Delivery	→	Buyer overall Performance	0.2906**	0.014	Yes
H2d	Buyer Flexibility	→	Buyer overall Performance	0.0763	0.417	No

*$p < 0.1$; **$p < 0.05$; ***$p < 0.001$

4.4 Moderation Analysis - Multi-Group Analysis

We wanted to know whether model parameters differ significantly between the services and manufacturing sectors. In order to test whether the difference of the group specific PLS path model estimation was significant, we performed PLS multi-group analysis – PLS MGA. The starting point of this analysis is the Henseler Multi-group analysis (Henseler (2007). It was proposed that the relationship between the supplier selection and operational competitive and overall performances will be different between the service and the manufacturing industries/sectors. We, therefore, selected certain path coefficient in the structural model for the multi-group analysis. The original sample was divided into two groups representing the service industry and the manufacturing industry for group 1 and group 2 respectively.

A bootstrapping procedure using 5000 samples for each group of data was analyzed for the two industries/sectors. For any selected relationship in the structural model, we compare the group specific bootstrapping results and their corresponding probabilities (*p*- values). A *p* - value of less than or equal to 5% implies statistically significant group differences in the estimated path model. Surprisingly, in Table 5, it can be seen that all the *p* values were greater than 5% meaning that there were no significant group differences in the path estimates, indicating that in Ghana, the relationship between supply selection and operational competitive performance, does not differ between the service sector and the manufacturing sectors.

Table 5: Multi-Group Analysis Results

CONSTRUCTS	Group 1 and 2 Difference - Coefficient	p-Value Group Difference
BUYER COST -> BUYER PERF	0.352	0.949
BUYER DELIVERY -> BUYER PERF	0.148	0.738
BUYER FLEXIBILITY -> BUYER PERF	0.195	0.228
BUYER QUALITY -> BUYER PERF	0.119	0.691
STRATEGIC FIT -> BUYER COST	0.207	0.257
STRATEGIC FIT -> BUYER DELIVERY	0.036	0.436
STRATEGIC FIT -> BUYER FLEXIBILITY	0.012	0.499
STRATEGIC FIT -> BUYER QUALITY	0.077	0.405
SUPPLIER QUALITY -> BUYER COST	0.093	0.596
SUPPLIER QUALITY -> BUYER DELIVERY	0.171	0.793
SUPPLIER QUALITY -> BUYER FLEXIBILITY	0.128	0.380
SUPPLIER QUALITY -> BUYER QUALITY	0.007	0.556
SUPPLIER SERVICE -> BUYER COST	0.223	0.220
SUPPLIER SERVICE -> BUYER DELIVERY	0.198	0.829
SUPPLIER SERVICE -> BUYER FLEXIBILITY	0.081	0.607
SUPPLIER SERVICE -> BUYER QUALITY	0.161	0.271

5.0 Discussion and Conclusion

From the summary of the results in table 4, we found support for the hypothesis concerning supplier quality and the buying firm's competitive operational capabilities in terms of the quality supporting the findings of Busch, 1962 and Dickson, 1966. We also found support for supplier service and the improved performance in terms of delivery time of the buying firm, also consistent with the work of Min (1994). The results finally indicate that when there is a strategic fit between the supplier and that of the buyer, it enhances the buying firm in terms of reduced cost, better delivery performance, and improved flexibility, also supporting the findings of Sarkar & Mohapatra, 2006; Watt, Kavis & Willey, 2010.

The underlying premise of transaction cost economics is that firms are driven by the objective of profit maximization (Coase, 1937; Williamson, 1975, 1981, 1985). We used the Transaction Cost Economics theory as the main theory in this study because it provides a framework for examining the supplier choice criteria by Ghanaian firms and how it impacts on operational competitive capabilities as well as overall performance (Coase, 1937; Williamson, 1975, 1981, 1985). This is an indication that firms in Ghana, in their quest to achieve operational capabilities should source from suppliers with good track record of quality, service and common strategic/management fit. This is very important especially for buyers from a developing country such as Ghana, where most of the inputs used in production and delivery of services are imported, coupled with very unstable currency, high taxes, and unreliable power for productions and service delivery, firms should source from suppliers with high-quality standards, good services in terms of lower prices, flexible contracts, reputations etc in the selection of their suppliers in order to be competitive as indicated by Tracey and Tan, 2001.

The results from the study also fit into the conclusion established by Chin-Chun Hsu, et.al (2006) to the effect that in an era characterized by increasing quality, delivery, innovation and cost pressures, management needs more than ever to get it right when managing supply processes. The findings indicate that it is imperative that buyers select the right suppliers to meet their needs. Chin-Chun Hsu, et.al (2006) maintains that supplier selection criteria revolve around the need to assess a supplier's quality and service capabilities as well as their strategic and managerial alignment with the buyer. While these can be defined and measured in different ways, it is important to recognize that they represent what buyers' need to critically evaluate

when making purchase decisions. Our study provides additional confirmation to this assertion by Chin-Chun Hsu, et.al (2006) and in the process provides purchasing managers and professionals with guidelines for analyzing supplier selection decisions, and also shows that the underlying dimensions of supplier selection are the need to ensure supplier quality, supplier service, and supplier strategic and management fit. The results indicate no significant difference between the services and the manufacturing sectors.

We have also shown that firms competitive operational capabilities developed in terms of reduced cost and delivery are likely to contribute to firm performance in the form of return on investments, increased market share and sales growth, but quality as a competitive priority seems to have no impact on overall firm's performance.

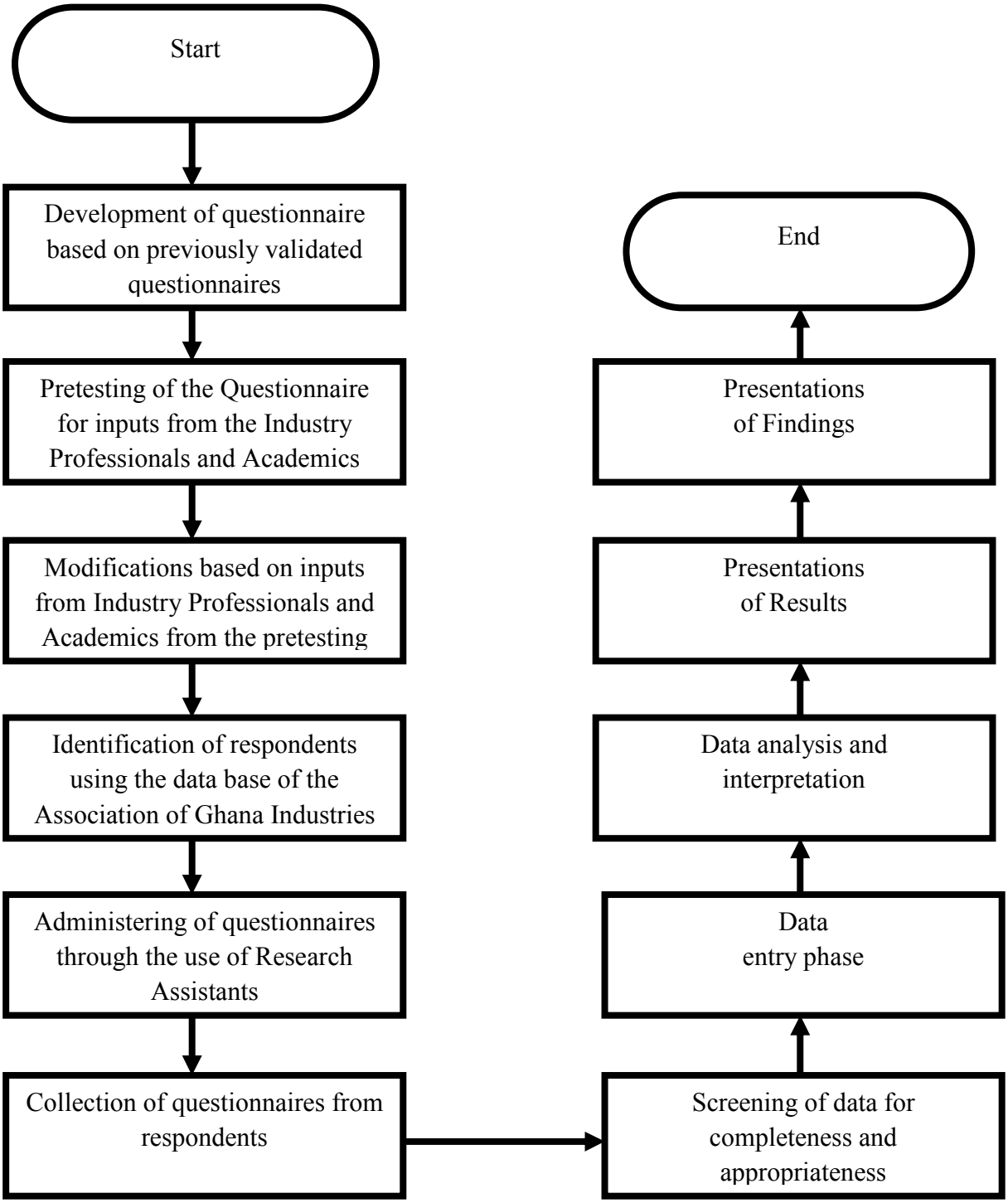
The result has implications for suppliers and buyers. For suppliers, the results indicated the importance of supplier quality, supplier service and strategic fit in the purchasing decisions of buyers. It is, therefore, important for suppliers to open up to site evaluation by buyers, understand buyer's references, build reputations/financial stability, and be honest to buyers and try to build a good relationship with buyers. For buyers it is also important to build relationships with buyers since building a good relationship is likely to reduce their delivery cost, delivery time and improved flexibility. This study contributes to the literature on supply chain management by using the PLS-SEM to understand how the supplier selection criteria from the TCE theory and how it impacts on the operational competitive capabilities of the buying firm using data from Sub-Saharan African. We also provide new findings from a different environment that has not been studied extensively, contributing to theory development.

It is important for future research to assess the relationships between other supplier selection constructs and how it can impact on the overall supply chain performance as well as the satisfaction of customers and overall performance.

The main limitations of the PLS-SEM, according to (Marcoulides et al, (2009); Fornell and Bookstein, (1982), is the relaxation of the normality assumption of the data set, the use of it mostly for exploratory research works, and the lack of model fit indices.

6.0 Appendices

Appendix I: A schematic description of the process from data collection through to findings



Appendix II: Industry type descriptive statistics

Industry/Sectors		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	aviation services	5	1.4	1.4	1.4
	banking	54	15.1	15.1	16.5
	building materials	15	4.2	4.2	20.7
	chemicals	3	.8	.8	21.5
	education	38	10.6	10.6	32.1
	energy	15	4.2	4.2	36.3
	health	14	3.9	3.9	40.2
	hospitality services	39	10.9	10.9	51.1
	households equipments	5	1.4	1.4	52.5
	insurance	20	5.6	5.6	58.1
	legal services	21	5.9	5.9	64.0
	media and publications	6	1.7	1.7	65.6
	metal	1	.3	.3	65.9
	mining	20	5.6	5.6	71.5
	office equipments	8	2.2	2.2	73.7
	oil and gas	1	.3	.3	74.0
	printing services	14	3.9	3.9	77.9
	production	26	7.3	7.3	85.2
	public services	20	5.6	5.6	90.8
	shipping services	12	3.4	3.4	94.1
	stationery	1	.3	.3	94.4
	telecommunications	6	1.7	1.7	96.1
	textiles	4	1.1	1.1	97.2
	transportation	7	2.0	2.0	99.2
	waste management services	3	.8	.8	100.0
	Total	**358**	**100.0**	**100.0**	

Appendix III: Key to Figure 2: The constructs and indicator elements used in the model

CONSTRUCTS	INDICATOR ELEMENTS	
	ID	ITEMS
SUPPLIER QUALITY	SQ1	Supplier testing capability
	SQ2	Scope of supplier resources
	SQ3	Supplier technical expertise
	SQ4	Supplier industry knowledge
SUPPLIER SERVICE	SS1	Supplier ability to meet delivery due dates
	SS2	Prices of supplier materials compared to the competition
	SS6	Supplier reserve capacity
	SS7	Supplier ability to respond to unexpected demand
SUPLIER STRATEGIC FIT	SF2	Supplier preferences and reputation
	SF4	Supplier honesty and degree of frequent communications
	SF5	Supplier cultural match
	SF7	Supplier willingness to share confidential information
BUYER COST	OCC1	Buyer reduction in unit cost of labour
	OCC2	Buyer reduction in unit cost of material
	OCC3	Buyer reduction in overhead cost
	OCC4	Buyer reduction in average inventory
	OCC5	Buyer reduction on overall cost
BUYER QUALITY	OCQ1	Buyer reduction in defective rates
	OCQ2	Buyer improved reliability in products or services
	OCQ3	Vendor quality of the buyer
	OCQ4	Implementation of quality management systems
BUYER DELIVERY	OCCD1	Improved delivery reliability
	OCCD2	Improved delivery speed
	OCCD3	On time delivery
	OCCD4	Improved after sales service
BUYER FLEXIBILITY	OCCF1	Buyers ability to change product mix
	OCCE2	Buyers ability to offer unique products
	OCCF4	Buyers reduction in product development cycle
	OCCF5	Buyers reduction in change over or set up times
BUYER PERFORMANCE	PER1	Buyer return on investment
	PER2	Buyer overall market share
	PER3	Buyer growth rate in sales
	PER4	Buyer attractiveness
	PER5	Buyer overall profitability

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