THE EFFECT OF SUPPLIER PERFORMANCE EVALUATION ON SUPPLY CHAIN OPERATIONAL PERFORMANCE: THE CASE OF ETHIO TELECOM

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DECLARATION

I, the undersigned, hereby declare that this thesis entitled as "**THE EFFECT OF SUPPLIER PERFORMANCE EVALUATION ON SUPPLY CHAIN OPERATIONAL PERFORMANCE: THE CASE OF ETHIO TELECOM**" is my original work and has not been presented or submitted for the award of any degree or diploma in Addis Ababa University or any other university. All sources of materials used in the thesis have been well acknowledged.

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Place of Submission: School of Commerce, AAU

Addis Ababa, Ethiopia

STATEMENT OF CERTIFICATION

This is to certify that this thesis entitled "**THE EFFECT OF SUPPLIER PERFORMANCE EVALUATION ON SUPPLY CHAIN OPERATIONAL PERFORMANCE: THE CASE OF ETHIO TELECOM"** submitted in partial fulfilment of the requirements for the award of the degree of Master of Art in "**Logistic and Supply Chain Management"** to the Graduate Program of College of Commerce, Addis Ababa University by Mr. **Abegaz Sahilu Neway** (ID. No GSE/5742/10) is an authentic work carried by his own effort under our guidance. The matter embodied in this thesis work has not been submitted earlier for the award of any degree or diploma to the best of our knowledge and belief.

Name of the Supervisor

Fesseha Afework (Asst. Professor)

Signature and date: _____

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List of Abbreviation and Acronyms

AHP	Analytical Hierarchical Process
ANP	Analytic Network Process
AVE	Average Variance Extracted
CMV	Common Method Variance
CR	Composite Reliability
DEA	Data Envelopment Analysis
EFA	Exploratory Factor Analysis
ETA	Ethiopian Telecommunications Authority
ETC	Ethiopian Telecommunications Corporation
GTP	Growth Transformation Plan
HTMT	Hetrotrait-Monotrait
NN	Neural Network
PLS-SEM	Partial Least Square Structural Equation Modeling
SEM	Structural Equation Modeling
SC	Supply Chain
SCM	Supply Chain Management
SCOP	Supply Chain Operational Performance
SCOR	Supply Chain Operational Reference
SLA	Service Level Agreement
SPE	Supplier Performance Evaluation
SPMI	Supplier Performance Monitoring and Improvement
SPSS	Statistical Package for Social Science
SSCM	Sustainable Supply Chain Management
VIF	Variance Inflation Factor
VC	Voucher Card

Abstract

Supply chain management is an increasingly important organizational concern, and proper management of supplier relationships constitutes one essential element of supply chain success. Facing increasingly competitive contests, many organizations view supplier performance as an important contributor to their competitive advantage. The purpose of the research is to examine the effect of supplier performance evaluation on supply chain operational performance of ethio telecom. The dimensions of supplier performance evaluation are supplier quality performance, delivery performance, cost performance, innovation performance and sustainability performance whereas the dimensions of supply chain operational performance are supply chain reliability, responsiveness, flexibility, cost and asset management. The study employed inferential quantitative approach to examine the magnitude, direction and significance of the relationship between supplier performance dimensions and supply chain operational performance dimensions using Partial Least Square Structural Equation Modelling (PLS-SEM) to test the proposed hypotheses. The primary data was collected using a survey instrument adapted from literature and modified to align with the research objectives which is found to be reliable and valid. 94 questionnaires were distributed and 85 valid responses were analyzed using smartpls 3 and SPSS version 26. The result of the study depicts supplier quality, and innovation performance evaluation has a significant effect on the effectiveness dimension of supply chain operational performance (i.e. supply chain reliability, responsiveness and flexibility) whereas delivery has a significant positive effect on supply chain responsiveness and flexibility but sustainability has an only significant positive effect on supply chain reliability. The study found no significant relationship with the cost dimension of supplier performance evaluation and supply chain operational performance dimensions. The study contributes to fill the gap outlined in literature and its managerial implication will help ethio telecom to improve its supply chain operational performance. Based on the findings of the study recommendation is given to work on the significant factors to improve the supply chain operational performance of ethio telecom.

Keywords: supplier performance evaluation, supply chain operational performance, supply chain efficiency supply and chain effectiveness

CHAPTER ONE

INTRODUCTION

Chapter one of the study contains the background of the study, the background of the company, statement of the problem, research hypotheses, objectives, significance, scope and organization of the study.

1.1 Background of the Study

Many companies currently acknowledge the importance of supply chain management activities in influencing overall performance (Humphreys, *et al.,* 2011). Supply chain management has become an important organizational concern, and proper management of supplier relationships make up one essential element of supply chain success (Sánchez-Rodríguez, Hemsworth & Martínez-Lorente, 2005).

Facing increasingly competitive contests, many organizations view supplier performance as an important contributor to their competitive advantage (Humphreys, *et al.*, 2011). To sustain as a winner in a competitive market, the capabilities and responsiveness of the firm's supply base must be equal to, or better than, those practised by the buying firm's competitors (Krause & Ellram, 1997).

Progressive organizations must create alliances with their supply chain partners in general and suppliers in particular so that the organizations can outperform their competitors and sustain in turbulent markets (Cormican & Cunningham, 2007). A proactive customer firm will not only evaluate suppliers but will actively facilitate the improvement process (Krause & Ellram, 1997).

Supplier evaluation is an important information input for supplier development. Supplier evaluation, or grading, may thus be a part of a supplier development effort and should be a prerequisite to more extensive supplier development activities (Krause & Ellram,1997).

The case study conducted by Cormican & Cunningham (2007) reported that the development and implementation of supplier rating tool resulted in a 290 percent reduction in the number of suppliers from 23,225 to 8,024 and a 260 percent reduction in inventory value held from $15.24 million to just around $5.86 million. This study furthermore concludes that reducing the number and improving the quality of suppliers resulted in increased quality, reduced lead time and a reduction in the number of errors and defects. Thus, best-performing suppliers are more closely integrated and can add their knowledge and experience to development initiatives. Potential problems can be anticipated in advance then process changes and modifications can be made earlier resulting in integration of supply chain actors. This integration allows synchronization amongst supply chain actors and seamless flows of materials and information. Seamless flow of information over the supply chain will reduces the bullwhip effect and gives several operational advantages such as reducing supply chain costs, lead time and risks (Palma, 2020).

1.2 Background of the company

Emperor Menelik II introduced the telecommunications service in Ethiopia in 1894 when the telephone line was constructed from Harar to the capital city. The interurban network was expanded connecting many important centers in the Empire. This marked the beginning of long-distance communication with the help of operators at intermediate stations serving as verbal human repeaters between the distant calling parties (ethio telecom, 2018).

The telecommunication sector has undergone several structural changes over the years in the different regimes since its establishment. Under the current regime, Federal Democratic Republic of Ethiopia, the telecommunications sector was restructured and two separate independent entities namely the Ethiopian Telecommunications Authority (ETA) and the Ethiopian Telecommunications Corporation (ETC) were established.

As an extension of the 2005/06-2009/10 five-year plan the Ethiopian government decided to focus on the improvement of telecommunication service, considering it as a key lever in the overall development and wellbeing of the Nation. Ethio telecom was restructured and retain its current name on November, 2010. (Ethio telecom, 2018).

According to Ethio telecom (2012) the company adopted seven steps strategic sourcing procedure in-line with its policy guideline for sourcing strategy (i.e Global sourcing, Partnership, Green Sourcing and Supply Chain, Strategic Alliance, Vendor Financing, Multiple Contract Awarding, Standardization and Out-sourcing). According to Ethio telecom (2013) suppliers are categorized to prioritize supplier relation management activities such as; business review, supplier audit, performance evaluation. The base of the supplier categorization is related to Kraljic portfolio analysis matrix.

According to Ethio telecom (2013) suppliers are categorized into five categories (i.e. strategic, privileged, preferred, conditional and potential). Suppliers are evaluated based on delivery, quality, responsiveness and cost with the below designated weight.

Supplier/partner score = (0.3 x Delivery Rating Score + 0.3 x Quality Rating Score + 0.15 x Responsiveness Rating Score + 0.25 x Price Rating Score)

Even though ethio telecom has a formal procedure for monitoring and evaluation of supplier performance, the practice and its effect on supplier development, partnership and supply chain operational performance is not well studied. Some studies suggest that there is potential a problem in this area (Delamo, 2016; Muluadam, 2014).

1.3 Statement of the Problem

Ethio telecom is the only telecom operator in Ethiopia. However, on 13th of June 2019 the Ethiopian house of people's representatives pass a communication service proclamation (proclamation 1148/2019) intending to restructure the telecommunications market and introduce competition in the provision of telecommunications service to enhance the economic and social development of the Country. Accordingly, the Ethiopian government is taking crucial steps in the process of liberalizing the state-owned monopoly to gain foreign currency and increase the sector's competitiveness (Bekele, 2019).

According to Dey, *et al*. (2015) evaluating supplier performance and monitoring suppliers all over the contractual period is very important and crucial to ensure supply chain operational performance objectives. This study further suggests client organization should measure their suppliers' performance dynamically and monitor their improvement. According to Fırat, *et al.* (2017) suppliers are most important actors in the supply chain and supplier performance evaluation has become a tool by which competitive advantage could be leveraged in today's goods and service-producing industries.

Studies have indicated that supply chain operational performance issues such as failure to deliver on time and quality can be solved by having a proper supplier evaluation because of the positive relationship between the two (Omanga, 2017). Companies will be benefited if they have more insights about their suppliers' performance, better decisions can be made concerning which suppliers are meeting their requirements, need improvement and have the potential to do so, and which suppliers should be disengaged (Gordon, 2008). One tool used to manage suppliers is supplier evaluation (Prahinski & Fan, 2007).

Muluadam, (2014) indicated that ethio telecom has unsatisfactory internal supply chain operational performance. A study conducted by Delamo (2016) also reported that ethio telecom's supplier relationship is poorly managed. Waiting to face intense completion ahead, ethio telecom is expected to enhance its supply chain operational performance to stay competitive and retain its customers in the face of the liberalized market.

According to ethio telecom annual report, the major challenges the company identified in the budget year of 2018/19 are repetitive fiber cut, commercial power interruption and telecom fraud. The report further indicated that partnership development and supplier's performance improvement, especially in the areas of critical/strategic purchase categories such as service level agreement (SLA), for fraud detection and management system, generator spare part purchase and tool and spare parts purchase for fiber optics maintenance, have critical importance for the company's success (Ethio telecom, 2019). Conducting supplier performance evaluation will help to optimize supply base in strategic purchases to a manageable size and best-performing suppliers could be easily integrated with the company's operation thereby improving the supply chain operational performance (Cormican & Cunningham, 2007).

According to ethio telecom corporate commercial sourcing manager, ethio telecom did not conduct supplier performance evaluation proactively to build approved list of suppliers for most critical purchases which increases the sourcing lead time (mainly searching and selecting). The manager also indicated that poor performing suppliers that should have been suspended (i.e. suppliers' who score below 50% on performance evaluation), or denied new purchase order or contract (i.e. suppliers' who score below 65% on performance evaluation) as per the sourcing procedure may end up getting new contract or purchase order for the reason that performance evaluation of these suppliers is not conducted.

The manger also pointed out that ethio telecom witnessed poor performing suppliers that have delivered poor quality of Voucher Card (VC) and delayed delivery of VC that flared up the shortage and resulted in hoarding & overpricing of VC. This situation ultimately caused customer dissatisfaction and loss of revenue. The manager further elaborated that lack of responsiveness and agility from local promotional item suppliers has affected the company sales target, customer satisfaction and overage and shortage of inventory.

According to ethio telecom director of supply strategy and relation management, ethio telecom conducts suppliers' performance evaluation. However, the evaluation parameters are generic with a weighted rating of quality, price, delivery and responsiveness. The director further noted that it is difficult to measure major facades of performance of suppliers with the evaluation parameters, especially for service providers. This situation has resulted in a failure to disengage poor performing suppliers and inability to shape and re-shape suppliers to improve their performance.

The director stressed that good system of supplier performance evaluation and continuous assessment of supplier performance will result in delivery of goods and services with the right quantity, right quality, to the right place, at the right time, with the right price. This will further result in increased revenue, increased customer loyalty and satisfaction, reduced leakage of revenue, create a good working environment for employees, and improvement in overall the company's performance and competitiveness.

Even though there are many studies in the area of supplier development and supply base reduction and those studies imply supplier performance evaluation is a critical part of supplier development and supply base reduction; enough emphasis is not given in the area of supplier performance evaluation and its effect on the overall supply chain operational performance. However, to the

knowledge of the researcher, no studies have been conducted to study the effect of supplier performance evaluation on supply chain operational performance.

This study tries to fill the outlined research gap by showing the effect of supplier performance evaluation on supply chain operational performance of ethio telecom from the perspective of reliability, responsiveness, flexibility, cost and asset management.

1.4 Research Question

The research questions that this research address are:

What is the effect of evaluation of suppliers' quality performance on supply chain operational performance?

What is the effect of evaluation of suppliers' delivery performance on supply chain operational performance?

What is the effect of evaluation of suppliers' cost performance on supply chain operational performance?

What is the effect of evaluation of suppliers' innovation performance on supply chain operational performance?

What is the effect of evaluation of suppliers' sustainability performance on supply chain operational performance?

1.5 Research Hypotheses

The research tests the below null hypotheses in line with the research objective:

H_o1: Evaluation of Supplier quality performance has no significant relationship with supply chain operational performance (supply chain reliability (a), responsiveness (b), flexibility (c) cost (d) and asset management (e))

H_o2: Evaluation of Supplier delivery performance has no significant relationship with supply chain operational performance (supply chain reliability (a), responsiveness (b), flexibility (c) cost (d) and asset management (e))

H_o3: Evaluation of Supplier cost performance has no significant relationship with supply chain operational performance (supply chain reliability (a), responsiveness (b), flexibility (c) cost (d) and asset management (e))

H_o4: Evaluation of Supplier innovation performance has no significant relationship with supply chain operational performance (supply chain reliability (a), responsiveness (b), flexibility (c) cost (d) and asset management (e))

H_o5: Evaluation of Supplier sustainability performance has no significant relationship with supply chain operational performance (supply chain reliability (a), responsiveness (b), flexibility (c) cost (d) and asset management (e))

1.6 Research Objectives

The general objective of the research is to examine the effect of supplier performance evaluation on supply chain operational performance.

However, the specific research objectives are:

1. To examine the effect of evaluation of supplier Quality performance on Supply chain operational performance.
2. To examine the effect of evaluation of supplier delivery performance on Supply chain operational performance.
3. To examine the effect of evaluation of supplier cost performance on Supply chain operational performance.

4. To examine the effect of evaluation of supplier innovation performance on Supply chain operational performance.
5. To examine the effect of evaluation of supplier sustainability performance on Supply chain operational performance.

1.7 Significance of the Study

The study provided empirically tested evidence for the academic community concerning the relationship between supplier performance evaluation and supply chain operational performance and contribute to the accumulation of knowledge and used as a future reference for researchers interested in the subject area. The study will also help policymakers by broadening their insight into the nature and significance of the relationship between supplier performance evaluation and supply chain operational performance in the dynamic telecom industry. The study's managerial implication will help ethio telecom to achieve a higher level of supply chain operational performance by focusing on key levers in supplier evaluation thereby driving suppliers to higher performance.

1.8 Scope of the Study

The scope of the study is limited to the effect of evaluation of supplier performance on supply chain operational performance from the buyer's perspective. The supplier performance evaluation is bounded from the perspective of delivery, quality, cost, innovation and sustainability. The supply chain operational performance is bounded from the prospect of flexibility, responsiveness, reliability, asset management, and price. The study focuses on local and international suppliers' performance evaluation in ethio telecom but it is bounded on corporate supply chain division.

1.9 Definition of Terms

Supplier performance evaluation is a process of evaluating a supplier based on a specified evaluation parameter and continuously monitoring this supplier's operational performance. As a result, companies reduce overall cost and probability of taking risk due to unexpected low performance of supplier (Gordon, 2008).

Supplier performance improvement is defined as upgrading existing suppliers' performance and capabilities with the intension of developing the supplier to meet the changing competitive requirements (Hahn, *et al.*, 1990 as cited by Lin, Taso & Lin, 2013).

Supplier development is a process of allowing suppliers to produce goods and services the buyer wants to quality standards, in the quantities required and to the right delivery schedule and place (Gitau, 2013).

Supply chain performance is defined as the ability of the supply chain to deliver the right product to the correct location at the appropriate time at the lowest cost of logistics (Zhang & Okoroafo, 2015 as cited by Leończuk, 2016).

The supply chain operational performance is defined as an outcome of effective, and efficient of flow of goods, service and information to and from the organization (Christopher, 2011)

1.10 Organization of the Study

This study is organized into five chapters. The first chapter shows the general background of the study, statement of the research problem, objective, research question and hypotheses, significance and scope of the study, and definition of terms. The second chapter deals with a review of the literature. The third chapter depicts the research methodology that is employed in the study. Chapter four presents data analysis and findings. Finally, conclusions and possible recommendation is given in the last chapter which is chapter five.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter deals with the review of related literature. It consists review of the theoretical and empirical literature, the conceptual framework of the study as well as hypotheses development.

2.1 Theoretical Literature Review

2.1.1. Theoretical Framework

2.1.1.1 Transaction Cost Theory

According to Williamson (1979) Transaction cost economics is considered a foundational theory that illuminates the understanding of firms' motives and behavior concerning entering and governing inter-organizational arrangements. As a result, it has been very significant in supply chain management literature addressing such themes as strategic sourcing and outsourcing decisions (for instance, Arnold, 2000; Dekkers, 2011; McIvor, 2009; Williamson, 2008); market entry strategy (for example, Anderson and Gatignon, 1986; Brouthers, *et al.,* 2003; Madhok, 1997); buyer-supplier relationships in general (e.g. Carr & Pearson, 1999; Heide & Stump, 1995). Transaction cost economics assumes that organisations in their attempt to improve efficiency not only focus on production costs but also include transaction cost in their evaluation as representing 'the cost of running a relationship' (Frazier, *et al.,* 1988). These costs to 'contact, contract, and control' (Halldorsson, *et al.,* 2007) include both ex-ante transaction cost (searching, evaluation and negotiation) as well as ex-post control cost (measuring, monitoring and enforcing). Within the context of transaction cost economics, decisions are not only influenced by Coase's (1937) postulation of transaction cost but also, among other factors, determined by the frequency of

transactions, uncertainty about future transactions and asset specificity; thus, transaction cost economics adds a behavioral perspective to the concept of the transaction cost.

2.1.1.2 Agency Theory

During the last four decades, agency theory has been broadly used across a variety of disciplines, but little work has been carried out concerning how agency theory might be used to explain the interaction between organizations within the Supply Chain (SC). Agency theory is relevant for the circumstances where one party (the principal) delegates the other party (the agent) to control and make a decision on certain tasks (Fayezi, O'Loughlin & Zutshi, 2012). Agency theory focuses on determining the most efficient contract governing the principal-agent relationship (Fayezi, O'Loughlin & Zutshi, 2012).

2.1.1.3 Network Theory

According to Thorelli (1986) Network theory defines a network as two or more organisations (‘nodes’) that are connected through relationships (‘links’) established through interactions, even though his writing lands from a strategic perspective. Such interactions encompass exchange processes, consisting of transactions, social exchange and information exchange in addition to adaption processes, where parties mutually influence and adapt to each other technically, logistically and administratively (Johanson & Mattsson, 1987). This means supply chains are not only simple linear systems that exchange goods, money, and information but complex adaptive systems (Choi, *et al.*, 2001; Surana, *et al.*, 2005). In terms of complex systems, interactions are viewed as dynamic concerning collaboration, inter-organizational integration and decentralization of decision making (Dekkers & Bennett, 2010). The existence of two different views on network

theory (i.e. strategic and dynamic) dictates that its application to supply chain have to consider which one is appropriate to the phenomena under study.

2.1.1.4 Collaborative networks

Collaborative networks are defined as ‘a distinct mode of organization in which member organizations work together in fairness, commitment and faith. These distinct organizations exchanging information, share activities and resources through improving each other’s capacity for mutual benefit with a common objective by sharing risks, responsibilities and rewards' (Bititci, *et al.,* 2004). Examples of collaborative networks include virtual enterprises, (dynamic) virtual organizations, extended enterprises, virtual laboratory, industry clusters, and so on (Bititci, *et al.,* 2004; Camarinha-Matos & Afsarmanesh, 2005). However, there is not much agreement on which entity might or might not be classified as collaborative networks, such as supply chains. For example, Bititci, *et al.* (2004) state that supply chains are a form of collaborative networks, whereas Camarinha-Matos & Afsarmanesh (2005) identify as an example of collaborative networks ‘advanced and highly integrated supply chains’. Notwithstanding these subtle differences about the inclusion of supply chains in classifications for collaborative networks, the referrals imply that conceptualizations derived from collaborative networks may apply to supply chains (Dekkers, *et al*., 2019)

2.1.1.5 Social exchange Theory

Social exchange theory assumes that interactions between organizations or groups and individuals in organizations are motivated by the rewards. These interactions are expected to generate relative to the allocation of resources to achieve outcomes (Griffith, *et al.,* 2006; Wu, *et al.,* 2014), albeit that it could be framed within the conceptualization of transaction cost economics (Nyaga, *et al.,*

2010). However, social exchange theory explicates that returns and allocation of resources are not purely limited to economic aspects, but also include social aspects, such as autonomy, power and reciprocity. When making decisions, companies evaluate expected intermediate and long-term outcomes of different alternatives and choose the one that promises the best overall trade-off between rewards and allocation of resources. The accumulation of such results determines the satisfaction with each relationship, or its 'social capital', which can vary over time. However, the standards that individual entities use to evaluate the allocation of resources (including monetary) and rewards (such as status and monetary rewards) may vary across the temporal dimension (West & Turner, 2013).

Table 2. 1: Synthesis of Key theoretical concepts: Adapted from Dekkers, et al. (2019).

No	Theories	Key theoretical concepts
1	Transaction cost economics	Bounded rationality, Potential for opportunism, Asset specificity, Ex-ante/ex-post transaction cost minimization, and Alternative modes of governance
2	Agency theory	Principal-agent relationship, Competing goals (conflicts of interest), Information asymmetry, Moral hazard, Agency cost, Adverse selection, Information as commodity, Behavior/outcome based contracts
3	Network theory	Relationships ensure access to resources and activities, Interdependency, Centrality, Focus on developing long-term trust-based relationships, Information and knowledge sharing
4	Social exchange theory	Rewards and costs drive relationship decisions, Social capital, Power differentiation, Evaluation standards vary, Development of relationships, The Positive relationship ensures stability and beneficial outcomes
5	Collaborative networks	Collaborative advantage based on a unified approach to value creation ('win-win-win'), Central coordination mechanism (information and communication technology as an enabler), Network as an organism with adjustable structure and phase transitions

According to Dekkers, *et al*. (2019) the transition zones of the theoretical paradigms are depicted under the below table shows that social exchange theory incorporates one or more aspect of key theoretical concepts in the other paradigms, providing it more explanatory power.

Table 2. 2: Transition Zones for theoretical constructs: Adapted from Dekkers, et al. (2019).

	Agency theory	**Network theory**	**Collaborative networks**	**Social exchange theory**
Transaction cost economics	• Social exchange relationships • Transaction costs part of agency costs	• Structural embeddedness Opportunism • Social-economic exchange relationships	• Dynamic applications of game theory	• Trust and specific asset investments
Agency theory		• Social-economic exchange relationships		• Social-economic exchange relationships • Trust and power
Network theory			• Mutual exchange relationships • Dynamic applications of game theory	• Structural embeddedness • Social-economic exchange relationships
Collaborative networks				• Common and private benefits

The Social exchange theory assumption of reward as a driver of interaction between organizations or groups and individuals in organizations explains the basis of the buyer-supplier relationship in concerning supplier performance evaluation. For instance, supplier evaluation result may dictate the continuation of the existing long term contract, order allocation, an award of similar contract or termination of an existing contract.

Furthermore, the non-economic reward aspect of the social exchange theory could explain the importance of supplier performance improvement drivers (as a result of supplier evaluation) such

as supplier certification which is non-economic but will develop the suppliers' technical competency and credential. Thus supplier certification for good performance could provide a competitive edge for the supplier.

Thus, the current study is grounded on the social exchange theory to explain the specific phenomenon of the supply chain concerning supplier performance evaluation and supply chain operational performance.

2.1.1.6 Importance of Supply Chain

Supply Chain Management (SCM) is the management of the relationships and flows between the 'string' of operations and processes that yield value in the form of products and services to the customers of the customer (Slak & Brandon-Jones, 2018). Supply chain management is also the design and management of flows of products, information, and funds throughout the network of all actors involved in producing and delivering a finished product to the final customer (Sanders & Wood, 2014). The above explanation implies that supply chain is an important strategic function in the current highly dynamic business environment.

In some industries, supply chain costs sum-up to 75% of the total operating budget and therefore efficient supply chain management can have an enormous impact on companies' profit (Laudon & Laudon, 2014). Because the supply chain process spans the whole company, it probably provides the best overview of the company and its value chain (Cordon, Hald & Seifert, 2013). Hence, Supply chain management is the vital business function that coordinates Supply chain, a network of all the activities involved in delivering a finished product or service to the customer (Sanders & Reid, 2013).

Improving total supply chain output performance is one of the main objectives of supply chain management which is referred to as supply chain effectiveness (i.e., sales and service level) and efficiency (supply chain costs) (Ivanov, Tsipoulanidis & Schönberger, 2017). To achieve these objectives close collaborations amongst supply chain actors is important. Many collaboration efforts are undertaken along the supply chain where the major advantages are: cost reduction, increased revenue, fewer delays, faster movement of goods, fewer rush orders, fewer stock-outs, and better inventory management (Turban, *et al.,* 2017). Close collaboration among supply chain actors can better align them and thus improve the value of the network's combined activities and can produce a major improvement in supply chain operational performance (Hugos, 2018; Gattorna & Jones, 1998).

Sarkar & Mohapatra (2006) reported that the development of a partnership with suppliers is widely recognized today as a powerful tool for supply chain improvement. To build an effective partnership, it is necessary to have a small supply base and an effort to reduce the supply base to a manageable level is of paramount importance. Despite its tremendous importance, models of supply base reduction are rare. The study further concludes that supplier sorting methods, used for pre-selection of suppliers and sometimes considered as methods for supply base reduction, have limitations ranging from (1) requirement of an exhaustive historical data/information (case-based reasoning), (2) failure to predefine the number of elements in a cluster (cluster analysis) and (3) failure to pinpoint suppliers who are both greatly capable as well as high performers (data envelopment analysis). The study also highlights two important dimensions of suppliers—performance and capability. Performance of a supplier signifies the short-term result of achieving supply chain objectives while supplier capability shows long-term effects. Many of the performance and capability elements are inaccurate in nature. Having a few suppliers makes it

easier to build stable and repetitive delivery schedules and eliminate paperwork (Sanders & Reid, 2015)

To perform well, firms need competent suppliers who have the ability and willingness to invest time and resources (Rossi, 2017). The big supplier gives the benefits of the economy of scale, while the other supplier absorbs the uncertainty of the first supplier and also gives a sense of competition (Vrat, 2014). When suppliers provide their customers with products and services that address their customers' needs, improve their customers' operational efficiency, and help them with their bottom line, they automatically become a strategic business partners with those customers (Bonk & Graham, 2012). With suppliers striving to be recognized and thus improving performance to do so, both their internal costs and the customer's costs of poor supplier performance can decrease (Gordon, 2008). Hence, supplier performance improvement is required if an organization is to maintain competitiveness (Westcott, 2012).

2.1.1.7 Supplier performance evaluation methods

Categorical method. In this method, once the list of attributes to use in the evaluation process is established, the suppliers' performance on each attribute is assessed in categorical terms such as "good/positive", "fair/neutral", and "poor/negative". The supplier receiving the most "good/positive" rating is considered best. This method is easy to use, cheap and requires minimum data. However, it is largely an intuitive process, heavily dependent on personal judgment of the evaluator, and all criteria are assumed to have equal importance (Timmerman, 1986; Willis & Huston, 1990).

Linear weighted average method. This method allocates weight to each criterion base on relative importance. The evaluator then rates the performance of suppliers for each criterion. The supplier performance ratings for the criterion is multiplied by the allocated weights to calculate a weighted

score. These weighted scores are then added up to obtain the total weighted score for each supplier. The best is one with the highest weighted score. Although this method no longer treats the criteria as having equal importance, the subjectivity of the decision-makers in assigning weights remains an issue (Timmerman, 1986).

Cost-ratio method. This method is developed based on the belief that part-cost is not the total price of purchasing parts. The total cost related to quality, delivery, and service is calculated and expressed as a proportion of the total price. The best supplier is the one who can provide the lowest cost. This method is more precise compare to the other aforementioned methods. However, it requires a comprehensive cost-accounting system to identify the precise cost data (Timmerman, 1986; Dobler, *et al.*, 1990).

Vendor profile analysis. This is a modified weighted average method to reduce the uncertainty involved in the assignment of the ratings. A Monte Carlo simulation technique is used to replace the rating based solely on an intuitive judgment. The use of Monte Carlo simulation has two advantages over the weighted average technique. It simplifies the decision maker's input to the evaluation process and provides an output that has considerably more information for the decision-maker (Thompson, 1990; Soukup, 1987).

Vendor rating with AHP. One of the major difficulties of the basic linear weighting model was the assigning of the weights to the attributes. These weights were assigned purely based on personal judgment and intuition of the decision-maker. To overcome this difficulty, researchers proposed the use of the Analytical Hierarchical Process (AHP). AHP provides a systematic way for determining the weights of the attributes by a series of pairwise comparisons of all attributes. This method eliminates the need to provide point estimates for criteria weights in the basic linear weighting model. Once weights of the attributes are determined by AHP they are used to construct

a vendor evaluation system. The pair-wise comparisons of the criteria require the decision maker's knowledge of the company, its operations, and internal structure. Even so, the bias of the decision-maker towards particular criteria can influence the result of the decision. Besides, for situations with a large number of decision factors and alternatives, the task of conducting all necessary pair-wise comparisons is quite demanding. One of the main difficulties with the AHP approach is that the interdependencies among decision factors are ignored (Sarkis & Talluri, 2002; Kahraman, *et al*., 2003; Gencer & Gurpinar, 2007).

Dimensional analysis. The evaluation process undergoes with a series of one-on-one comparisons and can only make comparisons with two suppliers at a time. The dimensional analysis ratio can be greater than one, equal to one, or less than one. One restraint of this evaluation method is that the dimensional analysis ratio of one will make the decision-maker to be indifferent about which supplier is chosen. Another major difficulty is that the process becomes very time consuming if there are a large number of suppliers that must be evaluated (Willis, *et al.,* 1993; Youssef, *et al*., 1996).

Data envelopment analysis. The efficiency of each supplier is computed as the ratio of the weighted sum of its output (the performance of the supplier) to the weighted sum of its input (the cost of using the supplier). Data Envelopment Analysis (DEA) method assistants in classifying suppliers into two categories: the efficient suppliers and inefficient suppliers (Weber & Desai, 1996; Liu, *et al.,* 2000; Ramanathan, 2007).

Cluster analysis. This method uses a classification algorithm to group several suppliers into clusters based on a set of numerical attribute scores. The differences between suppliers within a cluster are minimal, while the differences between suppliers from different clusters are maximal (Holt, 1998).

Taguchi loss function method. The original method was limited to just four decision criteria for evaluation of the suppliers. To overcome this limitation, the Taguchi loss method was expanded to include all the risks and benefits of outsourcing to a third party. The performance of the suppliers concerning these benefit and risk categories are measured as a quality loss by using Taguchi loss functions. The supplier with the lowest combined loss score is the best to perform the outsourcing function. The advantage of this model is the ability to quantitatively measure the suppliers' performance and transfer it into a common language, quality loss, which is easy to understand by the decision-makers. The disadvantage is that the weights of the risk and benefit categories are assigned subjectively when calculating the total loss score for each supplier (Pi & Low, 2006; Ordoobadi, 2009).

Supplier performance evaluation methods in the literature Periodic evaluation of supplier quality is carried out to ensure the meeting of relevant quality standards for all incoming items (Jain, Tiwari & Chan, 2004). The supply exchange could be subject to opportunistic behavior where market-based control mechanisms are not in place. An accurate rating system can restore competitive pressure within the pool of suppliers by monitoring and comparing the supplier's improvement over time (Toni & Nassimbeni, 2000). Although each of the several approaches of performance evaluation methods appeared in literature offers advantages under specific conditions, none provide a general methodology for combining multiple criteria or attributes into a single measure of supplier performance (Li, Fun & Hung, 1997). Timmerman (1986) ranked different supplier characteristics as ''good'', ''satisfactory'', ''neutral'' and ''unsatisfactory'' by using the simplest rating model, the 'categorical method'. Humphreys, Mak & McIvor (1998) emphasized the problems with this approach; for example, the attributes are given equal weightings, which is not the case in practice. Besides, the process is primitive and does not have

the same accuracy as that provided by a more quantitative approach. In the AHP method, the relative positions of suppliers for given criteria are determined using pair-wise comparison. The performance measures used for the various criteria must apply standardized units which are the main disadvantage of this approach. In the cost ratio method, standardized cost analysis is first applied and cost ratios for supplier performance evaluation criteria are used to calculate a net adjusted cost for each vendor (Humphreys, Mak & McIvor, 1998). This method is not widely used in most industries and requires a comprehensive cost-accounting system and used dimensional analysis methods in their research. Dimensional analysis methods combine several criteria of different dimensions and relative importance into a single dimensionless entity. Dimensional analysis methods are less subjective. (Li, Fun & Hung, 1997; Humphreys, Mak & McIvor, 1998). Schmitz & Platts (2004) studied four major vehicle manufacturers using questionnaires. By applying questionnaires, they ranked their suppliers according to their logistics performance. Talluri & Narasimhan (2004) used the questionnaire technique to evaluate suppliers according to quality, price, delivery and price discount performance. They used DEA to assess the results. One of the most important advantages of this method is that it does not require criteria weightings.

Aksoy & Öztürk (2011) proposed in their study a novel supplier selection and performance evaluation approach based on a Neural Network (NN) for supplier selection and performance evaluation in JIT production environments where suppliers are represented as an input vector in terms of quality, JIT delivery performance, location and price, and they are presented to the NN to successfully select the appropriate suppliers. This study also suggested if required, more criteria in the proposed approach can be considered by the user. In the supplier performance evaluation system, suppliers are evaluated according to their quality performance, which includes six sub-criteria. The study further depicts that the NN based supplier evaluation system classifies suppliers

into three groups as Class A, B and C suppliers where the corresponding action will be to continue to work with class A group of suppliers, class B suppliers have some defects and need to improve and stop working with class C suppliers.

2.1.1.8 Supplier categorization and performance evaluation method in ethio telecom

According to Ethio telecom (2013) suppliers are categorized into 5 categories based on the spend volume, level of the business impact of the goods and service they provide and whether they have a contract or not. These categories are stated below

1. **Strategic suppliers/Partner**: Suppliers that have a contract with ethio telecom, with high spend and high impact
2. **Privileged suppliers/Partner**: Suppliers that have a contract with ethio telecom, with low spend and high impact
3. **Preferred suppliers/Partner**: Suppliers that have a contract with ethio telecom, with high spend and low impact
4. **Conditional suppliers/Partner**: Suppliers that have a contract with ethio telecom, with low spend and low impact
5. **Potential suppliers/Partner:** have no contract

The procedure further stipulates supplier's performance is evaluated for the reasons such as to assess if there are repeated inconsistencies on delivery and/or quality of contract and reward/recognize best-performing suppliers. The procedure also dictates that supplier performance evaluation shall be conducted based on the below designated parameters and weight

Main Criteria	Quality	Delivery	Price	Responsiveness
Weight	30 %	30 %	25 %	15 %

Table 2. 3: weight and parameters of supplier rating: (Adapted from ethio telecom 2012, P 58)

Quality Rating = 100-((number of units rejected) / (total number of units received during the period) x100

Delivery Rating = ((units/services delivered as per schedule) / (total units/service scheduled for delivery during the period) x 100

Responsiveness is rated 0-100 based on the following criteria:

i) Flexibility to accommodate changes

ii) Reduction of order lead time compared with earlier

   a. Orders of similar product

   b. Service quality and prompt communication

   c. General attitude to different situation

   d. Ability to address and resolve complaints on time

Price is rated 0-100 based on the below criteria:

i) The Number of times price is reduced in last fiscal year

ii) Innovative methods or value engineering techniques deployed for cost reduction

iii) Investments on the latest technology for achieving economies of scale and optimize the delivery costs

The procedure also depicts supplier evaluation score will be computed as below

Supplier/partner score = (0.3 x Delivery Rating Score + 0.3 x Quality Rating Score + 0.15 x Responsiveness Rating Score + 0.25 x Price Rating Score)

2.2 Empirical Review

2.2.1 Supplier performance evaluation

Although past performance is not an absolute predictor of future performance, it can give valuable insight into the supplier's operational capability (Sollish & Semanik, 2007). The purpose of performance evaluation is to allow both the supplier and customer to react quickly to unfavorable trends affecting product quality, product availability, and mutual profitability (Bossert, 2004). These performance expectations will be the backbone of your supplier performance management process and the basis for decision making about suppliers (Gordon, 2008). Ittner *et al*. (1999) reported that performance gains from supplier partnership practices are mainly dependent on the use of non-price selection criterion, frequent discussion and interactions with suppliers and supplier certification for good performance.

The buyer will often closely monitor and measure the performance of the supplier, but will also provide suggestions about performance improvement that come from the supplier (Svend & Oliver, 2019). Observations of consistent performance on the part of the product or service of a firm will create reliability in the future level of expected performance (Oliver, 2014). If the supplier evaluation can be done appropriately, the positive effect of right decision making yields the right intervention throughout the whole supply chain (Kahraman & Oztaysi, 2014). However, directing the supplier to improve performance requires cooperation between the supplier and the buyer (Christensen, Betz & Stein, 2013).

A study conducted by Dey, *et al.* (2015) on UK based carpet manufacturing using an integrated analytical framework reported that monitoring suppliers' performance all through the contractual period is significant for ensuring overall supply chain operational performance. The study also proposes both key drivers (risk management, organizational practices, environmental and social practices) and lagging factors for supplier evaluation that shows a systematic method for identifying those factors with the involvement of relevant stakeholders and process modeling. The study further reveals that enhanced supplier performance results in a positive impact on operational and business performance of client organization.

Nair, Jayaram, & Das (2015) reported that combination careful choice of supplier selection criteria and monitoring supplier performance result in improved purchasing performance of cost, quality, delivery, flexibility and innovation. This study also concludes that purchasing's participation in strategic planning influences purchasing performance directly as well as through the mediating effects of supplier selection criteria and supplier performance evaluation.

Görener, *et al.* (2017) reported that a major factor for of smooth, well-tended airlines industry supply chain is designing a sound and reliable Supplier Performance Evaluation (SPE) methodology where several tangible and intangible evaluation criteria are incorporated that reflect the multifaceted character of the decision problem. The suppliers, which are one of the most important players/actors in the supply chain, have a significant effect on the performances of their customer firms. Hence, supplier performance evaluation is a competitive tool in the course of rendering goods and service for customers (Fırat, *et al.*, 2017). A survey study on 345 textile firms reveals that buying firms' trust is positively related to supplier performance improvement. Moreover, it is a mediating factor across supplier development dimensions and supplier performance improvement. This study also underlines that large-scale manufacturing buying firms

need to trust their suppliers when involved in supplier development practices in the textile industry. Additionally, buying firms' trust positively, significantly, and partially mediates between supplier development dimensions and supplier performance improvement in the textile industry of Pakistan (Rajput, Gulzar & Shafi, 2019). Rewards for supplier performance improvement can be considered market-based incentives and these rewards are intended to encourage suppliers to increase their performance level (Manzoor, Khan & Adeel, 2019). If supplier capability could be enhanced, it was reasonable to conclude that quality would improve, too, with both parties "winning more." Instead of taking the conventional approach of finding fault with the suppliers and forcing them to take corrective actions (Ramaswamy & Ozcan, 2014). A survey conducted on 214 manufacturing revealed that improvement in supplier performance and buyer supplier-relationship is crucial to predict the improvement in buyer's competitive advantage (Dalvi & Kant, 2018).

Briggs (1994) stated that joint involvement, culture, supply chain management, forward integration, quality, trust, and communication are the key ingredients of a supplier partnership, apart from optimum cost. Petroni & Braglia (2000) evaluated the comparative performance of suppliers that have multiple processes, outputs and inputs, based on capabilities relating to management, production facilities, technology, quality, price and delivery compliance. Giannakis *et al.* (2019), argue that existing models for measuring sustainability performance dimensions of suppliers' evaluation are limited in a way that they either evaluate the environmental and social performance separately. These methods do not consider the inter-relationships amongst the metrics across the three dimensions of sustainability (i.e. social, environmental and economic), or utilize metrics that are difficult to find and evaluate precisely. Their study also develops sustainability performance measurement framework for supplier evaluation and selection, using the Analytic

Network Process (ANP) method and proposes additional metrics and weighting sustainability metrics that are widely used across several industries.

According to Terpend & Ashenbaum (2012) in their empirical study concluded that the supplier's trust in the buyer has a positive relationship to all five supplier performance dimensions namely delivery, quality, cost, innovation and flexibility. Similarly, Maestrini, *et al.* (2018) in their empirical study of the impact of supplier performance measurement system on supplier performance they indicated that supplier performance dimensions are supplier quality, delivery, innovation, sustainability and cost. Accordingly, this study adopted these five dimensions of supplier performance evaluation (quality, delivery, innovation, sustainability and cost).

2.2.3 Supply Chain Operational Performance

According to Huan, Sheoran, & Wang (2004) argues that supply chain management can be categorized into three categories (i.e. operational, design, and strategic). While many models have been proposed in literature to address operational and design issues (mainly analytical and numerical), formal models for strategic planning are scarce. This study also depicts that Supply Chain Operations Reference (SCOR) model, developed by the Supply Chain Council, is a strategic planning tool which enables Managers and Executives Directors to simplify the complexity of supply chain management. This study further revealed that the SCOR model is cultivated in industrial practices and is positioned to become an industrial standard that assists the realization of next-generation supply chain management.

A literature review study conducted by Saleheen, Habib & Hanafi (2018) on supply chain performance measurement model reveals that supply chain management is considered as an extended enterprise connecting business across different locations and facilitating allies to drive competitive advantage in the era of globalization. This study further reveals that substantial

research has been undertaken along with literature on supply chain performance management from cost and non-cost standpoint, strategic, functional or emphasis on operational aspects. Additionally, this study depicted that in order to gratify customer orders rapidly and efficiently than competitors, the supply chain needs to warrant continuous upgrading of its processes and competitive strategies and to apprehend how supply chain contests. It is imperative to realize the overall performance of the supply chain. However, many companies fail to acquire effective performance measurement tools and techniques to attain integrated supply chain management (SCM).

Cross-sectional survey research conducted on 50 industries by Kahan, *et al*. (2018) reported that Supply Chain has evolved through different phases over time and contemporary vision is extended to the supply chains of both buyers and suppliers. The study further depicted that there is a modern classification of supply chain in terms of a modern horizontally integrated system and a vertically integrated system. In a vertically integrated system, all of the supply chain-related activities are performed under one roof whereas, in independent supply chain, activities are performed by partners. In a horizontal supply chain, there is a focus on collaboration to reduce the supply chain related risks.

According to Maulina & Natakusumah (2020) in their study of determinants of Supply Chain Operational Performance (SCOP), it is measured with dimensions of reliability, responsiveness, agility and cost. Similarly, Huan, Sheoran & Wang (2004) in their review and analysis of the supply chain operational reference model (SCOR) indicated that SCOR metrics criteria that construct the overall supply chain efficiency are delivery reliability, responsiveness and flexibility, cost and asset management. Accordingly, this study adopted these five dimensions to measure supply chain operational performance in line with the SCOR model.

2.3 Hypothesis development

2.3.1 Supplier performance Evaluation (from a quality, cost, delivery aspect) and supply chain operational performance

Briede-Kukko (2019) reported that development and implementation of standardized supplier performance evaluation process will enable organizations to evaluate the existing suppliers. Furthermore, the study indicates that supplier performance evaluation allows organizations to measure at which level the existing suppliers fulfill their performance criteria. Thus, if some of the suppliers are not able to fulfill their performance, corrective actions can be taken to gauge supplier performance improvement. This can improve performance in the organization, decrease operational costs related to claims, delays, stock-outs, and ensure other improvements. According to Lima & Carpinetti (2016) evaluating suppliers and fostering their continuous improvement has become an important factor for supply chain (SC) performance management. This study also illuminates that the performance of an organization in its SC depends on the performance of its suppliers. Consequently, integrating the evaluation of a supplier in the evaluation of the supply chain operational performance is desirable. According to Mogikoyo, Magutu & Dolo (2017) in their study set out to establish the relationship between supplier evaluation attributes and supply chain operational performance on commercial state corporation in Kenya revealed that considering financial dependency, turnover and profitability levels when evaluating their suppliers is equally important as financial health. The study additionally implies that the supplier evaluation attributes explain 55.6 % of the performances of the firm's supply chain. This study further concludes that commercial state corporations pay a lot of attention to the suppliers' financial health and autonomy, the supplier's physical security and the supplier's supply chain experience.

According to Yang (2010) evaluating and improving suppliers' performance is important when building long-term supply chain competitiveness. Typically, buyers assess their suppliers at least once annually. Suppliers must enhance their performance, according to evaluation results, to improve supply chain competitiveness. Although numerous studies have examined supplier performance evaluation, few have developed models for improving supplier performance based on the evaluation results. This study further proposes a novel and comprehensive framework that illustrates the linkages between evaluating supplier performance and planning improvements. The four major components of the proposed framework are: building an evaluation model, evaluating supplier performance in a buyer's viewpoint, evaluating supplier performance in the supplier's viewpoint and planning improvement tasks. The study further concludes that the tested model on light-emitting diode (LED) manufacturer in Taiwan revealed that supplier performance evaluation has a positive impact on supplier performance improvement.

Kampan (2010) states that the company must understand the current performance of each supplier. This study depicts that the supplier performance evaluation is a critical process for any firms to implement and without knowing the working performance of each supplier, the company will manage with no direction. This study further concludes that supplier's performance in the perspectives of quality, delivery and service surely impact the overall performance of the suppliers. According to Famiyeh & Kwarteng (2018) in their empirical study of supplier selection and firm performance demonstrate that an effective supplier selection method will lead to an enhanced competitive capability of the buying firm. Specifically, 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 result in reduced cost, shorter delivery time and improved flexibility of

the buying firm. The study further indicates that there is no significant difference between the manufacturing and service sectors.

According to the above explanation, the below hypotheses are formulated

H1: Evaluation of Suppliers quality performance has a positive impact on supply chain operational performance (supply chain reliability (a), responsiveness (b), flexibility (c) cost (d) and asset management (e))

H2: Evaluation of Suppliers delivery performance has a positive impact on supply chain operational performance (supply chain reliability (a), responsiveness (b), flexibility (c) cost (d) and asset management (e))

H3: Evaluation of Suppliers cost performance has a positive impact on supply chain operational performance (supply chain reliability (a), responsiveness (b), flexibility (c) cost (d) and asset management (e))

2.3.2 Supplier performance Evaluation (from innovativeness and sustainability aspect) and supply chain operational performance

According to Parkash & Kaushik (2011) continuously improving the performance of suppliers, a critical component of overall supply and demand chain management, Supplier Performance Monitoring and Improvement (SPMI) is a business practice that is used to assess, analyze and improve the performance of a supplier's in an effort to cut costs, reduce risks, and drive sustainable improvement. This can help companies have better awareness into supplier deliverables and offer benefits to uncover and remove hidden cost drivers from poor quality, increase competitive advantage by shortening order cycle times, a refund for non-conforming material and supplies, gain insight on how to take advantage of their supply base, and align practices between their way of doing and their suppliers. According to Handfield, *et al.* (2015) in their study of 151 UK

manufacturing firms concludes that supplier performance improvement resulted from dynamic capability development, will directly improve supply chain operational performance.

According to Rasi, Abbasi & Hatami (2019) in their empirical study of the effect of supplier innovation and environmental uncertainty on supply chain agility, they have found that supplier innovation has an impact on supply chain agility through the mediation effect of information sharing and strategic resource. Similarly, Duhaylongsod & De Giovanni (2019) in their empirical study of the impact of innovation strategies on the relationship between supplier integration and operational performance, they have concluded that the adoption of an incremental product innovation strategy improves the relationship between internal and external (Operational Performance) OP and leads to more effective (Supplier Integration) SI. Singhry's (2015) framework investigated the mediating role of innovation capability on the relationship between supply chain technology and supply chain collaboration on firm performance. The study's results conclude that innovation capability influences the direct relationship between supply chain technology and collaboration on supply chain operational performance.

Ramezankhani, Torabi & Vahidi (2018) argue that adaptive strategy for supply chain disruptions saved many businesses from insolvency and going out of business and adopting sustainability and resilience concepts at an operational level has recently become a necessity for business supply chains to sustain in the tough, ever-changing, competitive market environment. They have also pointed out that it is now inevitable to look beyond the economic aspects and include the sustainability and resilience factors in the study of supply chain operational performance. A study conducted on a Pakistan manufacturing company to exemplify the applicability and usefulness of the suppliers' sustainability performance evaluation on decision framework identifies three main dimensions of sustainability criteria (i.e. economic, environmental and social). The study also

further identifies amongst the three sustainability dimensions three criteria, namely: 'Cleaner Information Disclosure' (13.75%), 'Technology Implementation' (11.51%) and 'Quality' (10.87%), respectively, are the topmost ranked criteria. (Khan, *et al.*, 2018).

Wolf (2014) argues in his analysis of three competing models of the potential stakeholder, Sustainable Supply chain management (SSCM) and the corporate sustainability performance relationship that are grounded on Resource Dependency theory manifest that stakeholder pressure and SSCM both contribute to an organization's sustainability performance.

Therefore, from the above explanation, the below hypotheses are formulated

H4: Evaluation of Suppliers Innovation performance has a positive impact on supply chain operational performance (supply chain reliability (a), responsiveness (b), flexibility (c) cost (d) and asset management (e))

H5: Evaluation of Suppliers Sustainability performance has a positive impact on supply chain operational performance (supply chain reliability (a), responsiveness (b), flexibility (c) cost (d) and asset management (e))

Conceptual Framework: the below conceptual framework is developed to be studied

Independent variable **Dependent variable**

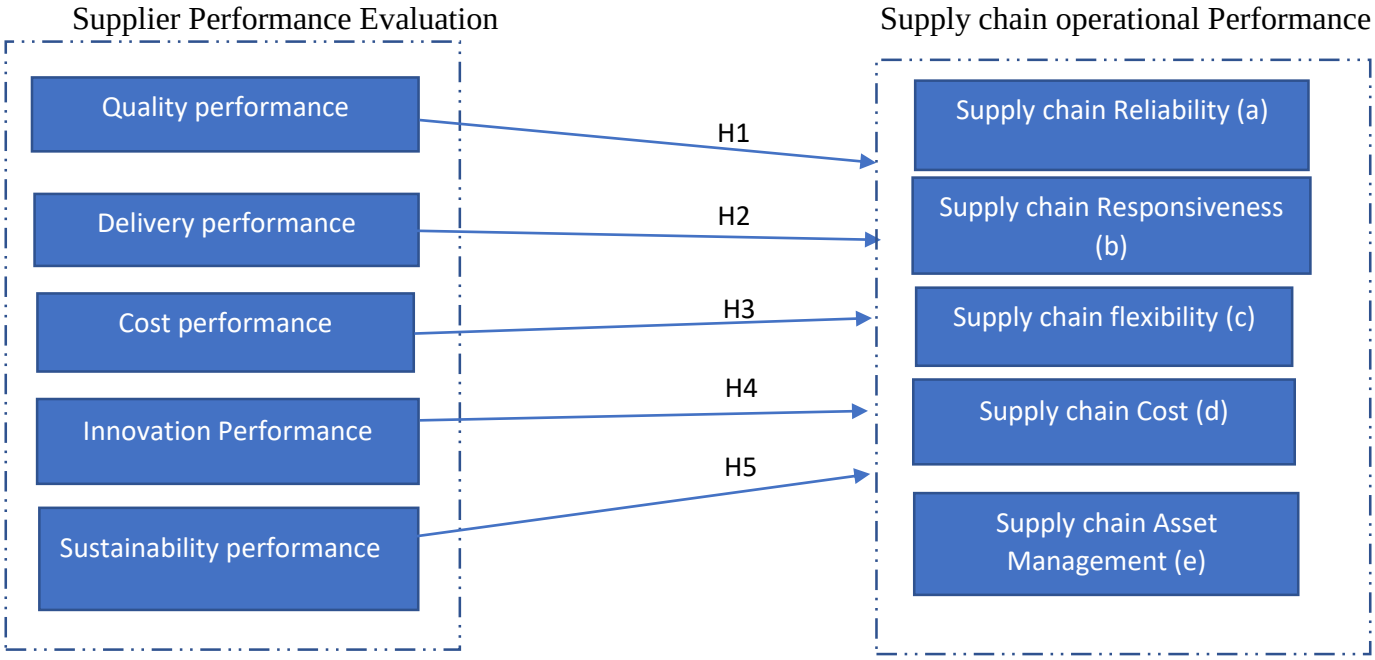


Figure 1: Proposed relationship of the conceptual framework: (Adapted and Modified from Maestrini, *et al.*, 2018; Huan, Sheoran, & Wang, 2004)

CHAPTER THREE

METHODOLOGY

This chapter elaborates the methodology of the study. It explains the subject nature and type of the study, source and type of data used in the study, sampling technique and data collection procedure and method of data analysis.

3.1 Description of the Study Area

The study area is confined to the corporate supply chain division, particularly on sourcing and supplier strategy and relationship management department, which is responsible for major and critical supply chain activities and is located at ethio telecom head office at Addis Ababa.

3.2 Research Approach

The study employed a quantitative research approach particularly inferential quantitative research approach. According to Kothari (2004) the main purpose of inferential approach to research is to create a data base where inference of the characteristics or relationships of the population is made off. This usually means survey research where a sample of the population, that are representative of the population, is studied (questioned or observed) to investigate its characteristics, and it is then inferred (conclude) that the population has the similar characteristics.

3.3 Research Design

An explanatory research design is employed on this research to examine the effect of supplier performance evaluation on supply chain operational performance. A structured questionnaire is used to gather the required primary data.

3.4 Population and Sample

The total population number in the corporate supply chain division that has direct contact with suppliers is 123 (i.e. from Sourcing department 78, from Supplier Strategy and relation department

44 and the chief supply chain officer). Since the population has homogenous character regarding supplier performance evaluation and its effect on supply chain operational performance, simple random sampling is used. The number of the sample is calculated based on sample size determination formula developed by Yamane (1967).

$$n = \frac{\mathrm{N}}{1 + \mathrm{Ne2}}$$

Where N=population size, n=sample size, e=the error of sampling

$N=123/1+123(.05)^2 = 94$

3.5 Data Sources and Types

Primary and Secondary data is used in this study. Structured questioner and preliminary interview is used to collect data from the primary source. Data from a secondary source is collected from reviewing different articles from journals, books, web sites, white papers and researches conducted on the subject matter.

3.6 Data Collection Procedures

To achieve the research objective, data is collected from a primary source through questioner to randomly selected respondents and preliminary interview with the key informant that was administered personally. First the questioner was pilot tested with 10 managers and supervisors. Reliability test was conducted before full data collection and the pilot test was found to be reliable. Finally, full data collection was conducted by distributing 94 questioners and 86 questioners was returned but one of them was incomplete. Data from secondary source was collected through a review of the reputable source of literature.

3.7 Method of Data analysis

The collected primary data was analyzed using Partial Least Square Structural Equation Modeling (PLS-SEM) using smartpls 3 and SPSS version 26 software. According to Wong (2013) PLS-SEM

is more appropriate for small size sample, predictive accuracy is paramount and correct model specification is not ensured.

3.8 Reliability and Validity of Measurement Item

According to Hair, *et al.* (2017) structural equation model comprises two models i.e. measurement (outer) model and structural (inner) model. The reliability and validity of the measurement model was assessed using Cronbach's alpha, and reflective indicator loading. According to Hulland (1999) reflective indicator loading >0.5 is a good measurement of the latent construct. Cronbach's alpha evaluates the reliability of the items in terms of uni-dimensionality of a set of scale items and $\alpha > 0.7$ is considered a good measure of reliability (Nunnally, 1978). The internal consistency of the measurement model was assessed using Dhillon-Goldstein Rho (or also known as the Composite Reliability (CR), ρ); which measures the reliability of indicators where values are between 0 and 1. CR > 0.7 shows adequate internal consistency (Gefen, Straub & Boudreau, 2000). The convergent validity of the item is measured using Average Variance Extracted (AVE) comparable to the portion of the variance explained in factor analysis (values between 0 and 1) AVE >0.5 is a good measure of convergent validity (Bagozzi & Yi, 1998; Fornell & Larcker, 1981). The discriminant validity measures the subjective independence of every indicator on its latent variable. Accordingly, the cross-loading criterion measures the discriminant validity. Subjective independence can help reduce the presence of multicollinearity amongst the latent variables denoting that the average variance extracted (AVE) of a latent variable should be higher than the squared correlation between the latent variables and all other variables (Chin, 2010; Fornell & Larcker, 1981).

3.9 Ethical consideration

The primary source of data for the study was a questionnaire from the Supply chain division staff of ethio telecom. The respondents were assured that the information they provide is kept confidential and used exclusively for academic purpose only. Besides, respondents were informed not to include any identity detail and personal reference in the questionnaire. This has minimized the respondents' biasedness. Besides, the different secondary source of data such as; research studies, articles, and textbooks was used as a reference in the study and exhaustively cited consistently with Harvard style of referencing. Furthermore, the whole process of the research was conducted within acceptable professional ethics.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

This chapter deals with the data analysis result and presentation as well as discussion of the findings with the related literature.

4.1 Introduction

In this chapter, the data collected through questioner was analyzed and discussed. The data collected was found to be valid, reliable and important to explain the effect of supplier performance evaluation on supply chain operation performance of ethio telecom. A total of 94 questionnaires were distributed and 86 was returned. One of responses was found to be incomplete and was disregarded from the analysis. Consequently, the total response rate was 90.41 %, which is significant for the statistical analysis. The questioners were developed using 5-point Likert scale and 10 constructs were used.

Minimum Sample requirement

According to Thompson, Barclay & Higgins (1995) as a rule of thumb the minimum sample size for PLS-SEM should be larger of the following (the 10 times rule): a) 10 times the larger number of formative indicators or b) 10 time the maximum number of arrow head (structural path) directed at particular construct in the structural model. With regard to the above explanation, the maximum number of arrow head pointing towards at a particular construct in this study is five which dictates the minimum sample size should be 50. According to Cohen (1992) when the maximum number of independent variables in the measurement and structural models is six (the same as this study), one would need 48 observations to achieve a statistical power of 80% for assuming minimum $R2$ values of 0.25 (with a 5% probability of error). Accordingly, a sample of 85 observation deemed

sufficient to apply PLS-SEM. Furthermore, according to Hair, *et al.* (2017) PLS-SEM is well suited for smaller sample size and non-normal distribution which are the characteristics of this study.

Table 4. 1: Demographic characteristics of Respondent

NO	Respondent profile	Choice	Frequency	Percent	Cumulative percent
1	Gender	Male	47	55.29%	55.29%
		Female	38	44.71%	100.00%
		Total	85	100%	
2	Level of Education	Diploma	0	0%	0%
		Degree	65	76.47%	76.47%
		Masters	20	23.53%	100.00%
		PHD	0	0%	100.00%
		Total	85	100.00%	
3	Position in the organization	Professional	24	28.24%	28.24%
		Specialist	34	40.00%	68.24%
		Supervisor	17	20.00%	88.24%
		Manager	8	9.41%	97.65%
		Director	2	2.35%	100.00%
		Total	85	100.00%	
4	Experience in ethio telecom	Below 5 Years	3	3.53%	3.53%
		6-10 Years	28	32.94%	36.47%
		11-15 Years	16	18.82%	55.29%
		16-20 Years	31	36.47%	91.76%
		Above 21 years	7	8.24%	100.00%
		Total	85	100.00%	
5	Experience in Supply Chain Division	Below 1 Year	0	0	0%
		2-3 Years	5	5.88%	5.88%
		4-5 years	36	42.35%	48.24%
		Above 5 year	44	51.76%	100.00%
		Total	85	100.00%	

The finding in above table shows that 44.71% of the respondents were female and 55.29 % of the respondents were male. Even if there are more male respondents than female, there is no significant

difference between them. The respondents were requested to indicate their level of education and the result shows that 76.47% of the respondents hold first degree and 23.53 % of the respondents hold graduate degree (Masters). Since the total respondents have first degree and above, it is a clear indication that the respondents can easily understand the question and give valid response. Concerning respondents' position in the company 28.24 % of the respondents hold the position of professionals, 40% of the respondents were in specialist position, 20 % of the respondents were in supervisory position, 9. 41 % of the respondents hold managerial position and 2.35 % of the respondents hold in a director position. The analysis shows that the study is inclusive of all positions. Respondents' composition concerning their experience in ethio telecom shows that 3.53% of the respondents have below 5 years' experience, 32.94 % of respondents have 6-10 years of experience, 18.82 % of respondents have 11-15 years of experience, 36.47% of the respondents have 16-20 years of experience and 8.24% of respondents have above 20 years of experience. Totally, 96.47% of the respondents have more than 5 years of experience. This shows that the respondents have adequate knowledge about their organization.

Concerning respondents' domain experience 5.88% of the respondents have 2-3 years of experience, 42.35% of the respondents have 4-5 years of experience, 51.76% of respondents have above 5 years of experience. Totally, 94.12% have more than 4 years of domain experience in Supply Chain Division which indicates that the respondents have adequate experience and exposure to give valid response regarding the questionnaire.

4.2 Measurement Model Assessment

4.2.1 Assessment of Validity and Reliability

The Measurement model is analyzed using smart PLS 3 software. Measurement model has been assessed and examined. Accordingly, Cronbach alpha, composite reliability, factor loading, and average extracted variance are found to be above the required threshold level stated in literature. In Fig. 2 and Table 4.2 depicts the results of the measurement model.

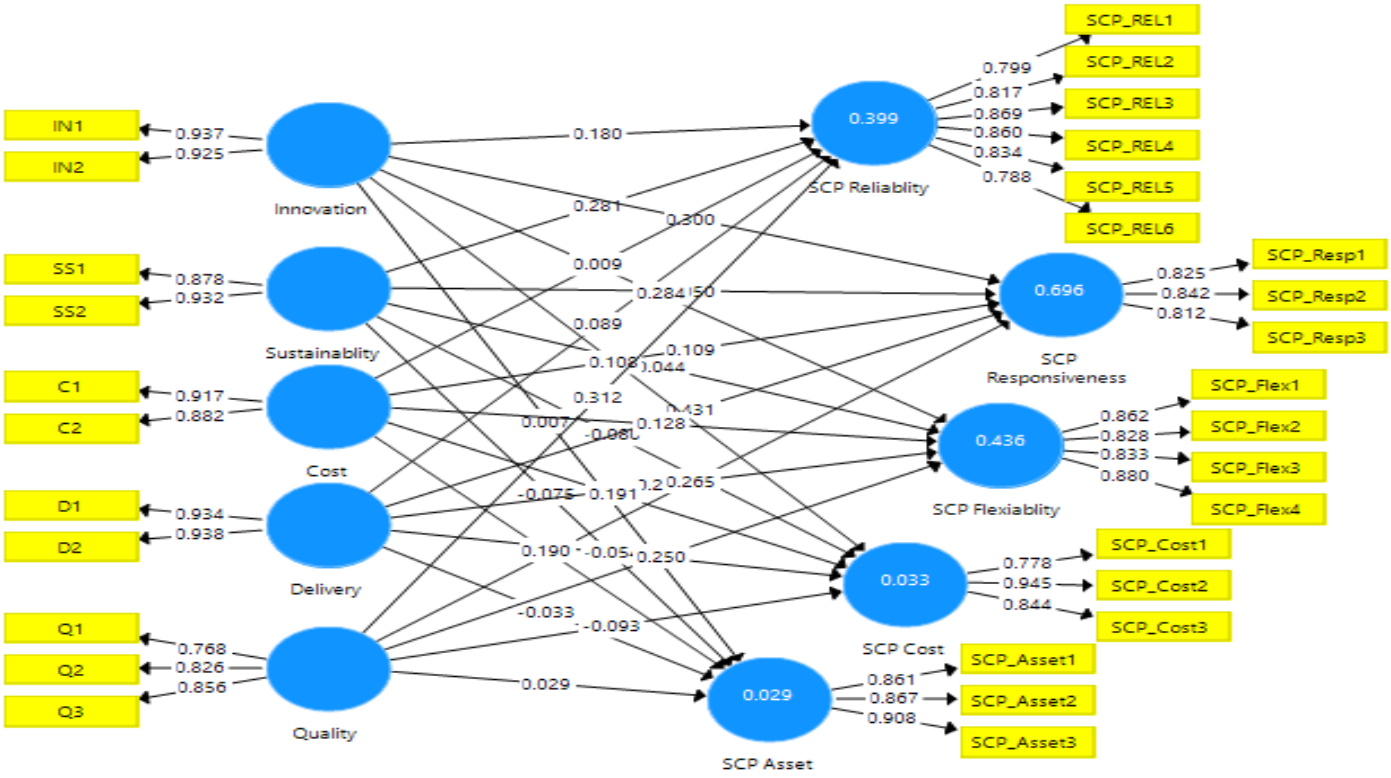


Figure 2: Pictorial representation of the measurement model

Source: Respondents' response analyzed using Smartpls-3

Fig 2 shows the pictorial representation of the measurement model after running the PLS algorithm at this stage of the analysis shows the indicator loadings each latent construct and R^2 before bootstrapping procedure (hypothesis testing) is conducted. The detail result of the validity and reliability analysis is depicted in table 4.2.

Table 4. 2: Convergent Validity, Internal Consistency, Average Variance Extracted (AVE) and Composite Reliability

Construct	Indicator	Loading[a]	Cronbach's Alpha[b]	rho_A	Composite Reliability (CR)[c]	Average Variance Extracted (AVE)[d]
Cost	C1	0.918	0.791	0.796	0.905	0.827
	C2	0.900				
Delivery	D1	0.942	0.871	0.871	0.939	0.885
	D2	0.940				
Innovation	IN1	0.944	0.868	0.871	0.938	0.883
	IN2	0.935				
Quality	Q1	0.860	0.816	0.818	0.891	0.732
	Q2	0.822				
	Q3	0.884				
Sustainability	SS1	0.861	0.766	0.83	0.893	0.806
	SS2	0.933				
SCP Asset	SCP_Asset1	0.848	0.855	0.868	0.911	0.774
	SCP_Asset2	0.893				
	SCP_Asset3	0.898				
SCP Cost	SCP_Cost1	0.851	0.827	0.911	0.891	0.733
	SCP_Cost2	0.909				
	SCP_Cost3	0.805				
SCP Flexibility	SCP_Flex1	0.873	0.887	0.898	0.921	0.746
	SCP_Flex2	0.830				
	SCP_Flex3	0.858				
	SCP_Flex4	0.893				
SCP Reliability	SCP_REL1	0.787	0.913	0.919	0.932	0.697
	SCP_REL2	0.812				
	SCP_REL3	0.875				
	SCP_REL4	0.859				
	SCP_REL5	0.864				
	SCP_REL6	0.806				
SCP Responsiveness	SCP_Resp1	0.823	0.776	0.777	0.870	0.690
	SCP_Resp2	0.848				
	SCP_Resp3	0.821				

a. All items loading > 0.5 indicates indicator reliability (Hulland, 1999)
b. Cronbach's alpha > 0.7 indicates indicator Reliability (Nunnally, 1978)
c. Composite reliability (CR)>0.7 indicates the existence of internal consistency (Gefen, et al., 2000)
d. Average Variance Extracted (AVE)>0.5 indicates Convergent Reliability (Bagozziand Yi,1988; Fornel & Larcker, 1981)

Source: Respondents' response analyzed using Smartpls-3

Table 4.2 shows factor loading, Cronbach alpha, composite reliability values and values of average variance extracted. The results of factor loading shows only item no 4 of SCP cost is below 0.5. Consequently, this item is excluded from the results. According to Heorge & Yallery (2007) indicator reliability is suitable if Cronbach's alpha value is more than 0.7. The result this study shows that the Cronbach's alpha value (all except three construct) is above from 0.8 which is considered excellent. Furthermore, composite reliability equal to 0.7 or more and AVE value equal or more than 0.5 are considered to be excellent. In this study the values of AVE and composite reliability is above the required threshold.

4.2.2 Assessment of Discriminant validity.

Discriminant validity measures the distinctiveness of a construct. Discriminant validity is demonstrated when the shared variance within a construct (AVE) exceeds the shared variance between the constructs The discriminant validity of the construct is assessed based on three parameters (i.e. Fornell and Larcker criteria, items cross loading and the Hetrotrait-Monotrait (HTMT) criterion (Hair, Howard & Nitzl, 2020). All the result in table 4.3, 4.4 and 4.5 shows the contracts used in the study have good discriminant validity.

Table 4. 3 Discriminant Validity (Fornell and Larcker Criterion)

Source: Respondents' response analyzed using Smartpls-3

	Cost	Delivery	Innovation	Quality	Sustainability	SCP Asset	SCP Cost	SCP Flexibility	SCP Reliability	SCP Responsiveness
Cost	**0.909**									
Delivery	0.451	**0.941**								
Innovation	0.159	0.142	**0.940**							
Quality	0.332	0.475	0.547	**0.856**						
Sustainability	0.385	0.157	0.274	0.288	**0.898**					
SCP Asset	0.152	0.031	0.090	0.105	0.056	**0.880**				
SCP Cost	0.132	-0.025	0.035	-0.077	0.061	0.722	**0.856**			
SCP Flexibility	0.346	0.419	0.486	0.553	0.294	0.304	0.269	**0.864**		
SCP Reliability	0.326	0.353	0.476	0.559	0.464	0.159	-0.012	0.539	**0.835**	
SCP Responsiveness	0.438	0.629	0.528	0.692	0.335	0.079	-0.022	0.677	0.555	**0.831**

The diagonals are the square root of the AVE of the latent variables and indicates the highest of any column or row which is an indication of good discriminate validity.

Table 4. 4: Indicator Items Cross Loading

	Cost	Delivery	Innovation	Quality	Sustainability	SCP Asset	SCP Cost	SCP Flexibility	SCP Reliability	SCP Responsiveness
C1	**0.918**	0.432	0.170	0.311	0.416	0.082	0.089	0.306	0.362	0.429
C2	**0.900**	0.386	0.116	0.292	0.278	0.200	0.154	0.325	0.224	0.364
D1	0.374	**0.942**	0.137	0.505	0.127	0.015	-0.060	0.382	0.327	0.615
D2	0.476	**0.940**	0.131	0.387	0.168	0.044	0.014	0.407	0.338	0.568
IN1	0.162	0.150	**0.944**	0.558	0.319	0.029	-0.026	0.428	0.535	0.502
IN2	0.136	0.116	**0.935**	0.468	0.192	0.145	0.096	0.488	0.353	0.490
Q1	0.265	0.368	0.504	**0.860**	0.196	0.154	0.011	0.538	0.433	0.559
Q2	0.267	0.429	0.439	**0.822**	0.204	-0.019	-0.174	0.421	0.415	0.646
Q3	0.318	0.422	0.462	**0.884**	0.334	0.129	-0.037	0.460	0.581	0.573
SS1	0.255	0.058	0.206	0.248	**0.861**	0.076	0.035	0.210	0.364	0.206
SS2	0.414	0.201	0.277	0.269	**0.933**	0.032	0.070	0.305	0.458	0.371
SCP_Asset1	0.127	0.078	0.075	0.101	0.044	**0.848**	0.603	0.278	0.098	0.101
SCP_Asset2	0.136	-0.006	0.071	0.096	0.084	**0.893**	0.682	0.240	0.192	0.057
SCP_Asset3	0.137	0.022	0.091	0.082	0.017	**0.898**	0.617	0.289	0.122	0.059
SCP_Cost1	0.135	0.046	0.026	-0.042	0.154	0.623	**0.851**	0.352	0.055	0.070
SCP_Cost2	0.101	-0.041	0.079	-0.103	0.001	0.605	**0.909**	0.148	-0.044	-0.076
SCP_Cost3	0.109	-0.095	-0.074	-0.026	-0.006	0.682	**0.805**	0.220	-0.050	-0.047
SCP_Flex1	0.334	0.395	0.510	0.545	0.279	0.126	0.121	**0.873**	0.559	0.683
SCP_Flex2	0.249	0.349	0.320	0.397	0.204	0.296	0.207	**0.830**	0.332	0.542
SCP_Flex3	0.330	0.373	0.416	0.489	0.287	0.278	0.296	**0.858**	0.511	0.570
SCP_Flex4	0.268	0.323	0.405	0.457	0.233	0.385	0.322	**0.893**	0.422	0.520
SCP_REL1	0.283	0.230	0.462	0.456	0.346	0.054	-0.009	0.419	**0.787**	0.465
SCP_REL2	0.259	0.281	0.351	0.489	0.457	0.181	-0.036	0.444	**0.812**	0.446
SCP_REL3	0.326	0.368	0.519	0.547	0.430	0.110	-0.025	0.542	**0.875**	0.613
SCP_REL4	0.344	0.310	0.351	0.449	0.377	0.098	-0.096	0.347	**0.859**	0.387
SCP_REL5	0.169	0.226	0.368	0.423	0.379	0.210	0.123	0.488	**0.864**	0.437
SCP_REL6	0.230	0.342	0.294	0.409	0.314	0.149	-0.007	0.442	**0.806**	0.389
SCP_Resp1	0.522	0.666	0.327	0.527	0.403	-0.036	-0.017	0.535	0.471	**0.823**
SCP_Resp2	0.318	0.495	0.378	0.606	0.370	0.139	0.003	0.614	0.535	**0.848**
SCP_Resp3	0.232	0.390	0.625	0.594	0.046	0.105	-0.043	0.538	0.374	**0.821**

Source: Respondents' response analyzed using Smartpls-3

As table 4.4 depicts all indicator loadings are higher in its own construct than any other construct which shows there is good discriminant validity

Table 4. 5: Heterotrait-Monotrait (HTMT) ratio assessment for Discriminant Validity

	Cost	Delivery	Innovation	Quality	SCP Asset	SCP Cost	SCP Flexibility	SCP Reliability	SCP Responsiveness	Sustainability
Cost										
Delivery	0.543									
Innovation	0.19	0.163								
Quality	0.412	0.562	0.649							
SCP Asset	0.188	0.051	0.107	0.141						
SCP Cost	0.167	0.085	0.096	0.113	0.876					
SCP Flexibility	0.409	0.474	0.546	0.642	0.362	0.332				
SCP Reliability	0.375	0.394	0.523	0.639	0.18	0.103	0.583			
SCP Responsiveness	0.547	0.757	0.65	0.873	0.146	0.097	0.808	0.648		
Sustainability	0.473	0.176	0.326	0.361	0.075	0.099	0.343	0.542	0.408	

Source: Respondents' response analyzed using Smartpls-3

According to Hair, Howard and Nitzl (2020) researchers can apply cutoff scores such as 0.85 and 0.90 to interpret their HTMT results. The result of HTMT ratio in table 4.5 shows that all values are below 0.90 which is an indication of good discriminant validity.

4.2.3 Assessment of Common Method Bias

According to Podsakoff & Organ (1986) Harman single factor test evaluates the mono-biasness inherent in the variance proportion of distribution of items. Taking all items in EFA (Exploratory Factor Analysis), if the unrotated 1st factor is <50% on all observed indicators including the dependent variables is an indication that Common Method Variance (CMV) is not a problem for Structural Equation Modeling (SEM)

Table 4. 6: Harman single factor Test for CMV

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.038	33.461	33.461	9.453	31.510	31.510
2	4.229	14.096	47.556			
3	2.287	7.623	55.179			
4	2.065	6.883	62.062			
5	1.365	4.549	66.611			
6	1.211	4.037	70.648			
7	1.059	3.531	74.179			
8	.803	2.678	76.857			
9	.765	2.549	79.406			
10	.654	2.181	81.587			
11	.575	1.918	83.505			
12	.522	1.740	85.245			
13	.492	1.641	86.886			
14	.424	1.414	88.300			
15	.371	1.238	89.538			
16	.359	1.197	90.735			
17	.353	1.177	91.912			
18	.332	1.107	93.019			
19	.295	.983	94.001			
20	.264	.881	94.883			
21	.236	.787	95.670			
22	.224	.748	96.418			
23	.189	.631	97.049			
24	.165	.551	97.600			
25	.163	.544	98.144			
26	.154	.514	98.658			
27	.138	.460	99.118			
28	.102	.341	99.459			
29	.098	.326	99.785			
30	.065	.215	100.000			

Extraction Method: Principal Axis Factoring.

Source: Respondents' response analyzed using SPSS version 26

As indicated in table 4.6 the unrotated first factor is 31.5% which is below 50% and is an indication that CMV is not a problem in this study.

4.2.4 Assessing Normality of Data

The Normality of the latent construct was calculated based on the standardized value of the latent construct. The standardized value of the latent construct output from smart pls -3 was exported to excel file and uploaded on online skewness and kurtosis calculator on the below web site. (https://webpower.psychstat.org/models/kurtosis/). Accordingly, the result is depicted in the below table.

Table 4. 7: Result of Skewness and kurtosis calculation

Output of skewness and kurtosis calculation

```
Sample size:  85
Number of variables:  10

Univariate skewness and kurtosis
                     Skewness    SE_skew   Kurtosis   SE_kurt
Cost                -0.1535653 0.2611531 -1.2682744 0.5167563
Delivery            -0.2073065 0.2611531 -1.3345664 0.5167563
Innovation          -0.2322117 0.2611531 -1.4396306 0.5167563
Quality             -0.5226338 0.2611531 -0.7043032 0.5167563
SCP.Asset            0.5349391 0.2611531 -1.0451785 0.5167563
SCP.Cost             0.3457805 0.2611531 -1.3421857 0.5167563
SCP.Flexiablity     -0.1486868 0.2611531 -1.4072291 0.5167563
SCP.Reliablity      -0.2320747 0.2611531 -1.2748901 0.5167563
SCP.Responsiveness -0.1380133 0.2611531 -1.2959598 0.5167563
Sustainablity       -1.1024461 0.2611531  0.4289292 0.5167563

Mardia's multivariate skewness and kurtosis
                 b           z   p-value
Skewness  16.30479 230.984458 0.2922401
Kurtosis 116.33640  -1.090138 0.2756522
```

Source: Respondents' response analyzed using Smartpls-3 and online skewness and kurtosis calculator

Table 4.7 shows that supplier sustainability performance evaluation is slightly above the threshold for skewness of univariate normality that is within the range of (-1 to +1). This shows the data set did not fully meet univariate normality. Furthermore, the Mardia's multivariate skewness and Kurtosis for data set is above the threshold i.e. (within the range of (-1 to +1) for skewness and (-20 to +20) for Kurtosis). Hence, the data did not meet multivariate normality, it is justifiable to use bootstrapping procedure to test the hypotheses (Efron & Tibshirani, 1986; Davison & Hinkley, 1997).

4.2.5 Test of Multi-Colliniarity

Table 4. 8: Inner VIF (Variance Inflation Factor)

	Cost	Delivery	Innovation	Quality	Sustainability	SCP Asset	SCP Cost	SCP Flexibility	SCP Reliability	SCP Responsiveness
Cost						1.446	1.446	1.446	1.446	1.446
Delivery						1.523	1.523	1.523	1.523	1.523
Innovation						1.5	1.5	1.5	1.5	1.5
Quality						1.893	1.893	1.893	1.893	1.893
Sustainability						1.256	1.256	1.256	1.256	1.256
SCP Asset										
SCP Cost										
SCP Flexibility										
SCP Reliability										
SCP Responsiveness										

Source: Respondents' response analyzed using Smartpls-3

As the result of inner and outer VIF depicted in table 4.8 and 4.9 shows all values of inner VIF and outer VIF are below 3, which is an indication that there is no multi collinearity (Hair, Howard and Nitzl, 2020)

Table 4. 9: Outer VIF (Variance Inflation factor)

Construct	Indicator	VIF
Cost	C1	1.748
	C2	1.748
Delivery	D1	2.465
	D2	2.465
Innovation	IN1	2.423
	IN2	2.423
Quality	Q1	1.929
	Q2	1.613
	Q3	2.072
Sustainability	SS1	1.627
	SS2	1.627
SCP Asset	SCP_Asset1	1.992
	SCP_Asset2	2.165
	SCP_Asset3	2.247
SCP cost	SCP_Cost1	1.77
	SCP_Cost2	1.946
	SCP_Cost3	1.947
SCP Flexibility	SCP_Flex1	2.227
	SCP_Flex2	2.187
	SCP_Flex3	2.362
	SCP_Flex4	2.992
SCP Reliability	SCP_REL1	2.227
	SCP_REL2	2.469
	SCP_REL3	2.98
	SCP_REL4	2.843
	SCP_REL5	2.915
	SCP_REL6	2.271
SCP Responsiveness	SCP_Resp1	1.489
	SCP_Resp2	1.753
	SCP_Resp3	1.631

Source: Respondents' response analyzed using Smartpls-3

4.3 Assessment of The Structural Model

4.3.1 Hypothesis Testing

According to Hair, *et al.* (2017) PLS-SEM does not take an assumption that the data is normally distributed, which implies that parametric significance tests cannot be applied to test whether coefficients such as outer loadings, outer weights and path coefficients are significant (as used in regression analyses). Instead, PLS-SEM relies on a nonparametric bootstrap procedure to test the significance of estimated path coefficients in PLS-SEM (Efron & Tibshirani, 1986; Davison & Hinkley, 1997).

In bootstrapping, subsamples are formed with randomly selected/drawn observations from the original set of data (which is done with replacement). The subsample is then used to calculate the PLS path model. This process is iterated until a large number of random subsamples has been created, specifically about 5,000. The parameter estimates such as outer loadings, outer weights and path coefficients are estimated from the subsamples are used to calculate the standard errors for the estimates. Based on the above information, t-values are calculated to assess each estimate's significance (Hair, *et al.*, 2017).

Table 4. 10: Hypothesis testing

Hypothesis	Relation ship	Std Beta	Std Error	|t-Value|	P Values	95% CI LL	95% CI UL	Decision
H1a	Quality -> SCP Reliability	0.290	0.119	2.406	0.017**	0.090	0.484	Supported
H1b	Quality -> SCP Responsiveness	0.307	0.093	3.291	0.001***	0.152	0.459	Supported
H1c	Quality -> SCP Flexibility	0.246	0.130	1.872	0.062*	0.029	0.457	Supported
H1d	Quality -> SCP Cost	-0.154	0.202	0.903	0.367	-0.516	0.151	Not Supported
H1e	Quality -> SCP Asset	0.078	0.150	0.474	0.636	-0.177	0.319	Not Supported
H2a	Delivery -> SCP Reliability	0.134	0.097	1.330	0.184	-0.031	0.289	Not Supported
H2b	Delivery -> SCP Responsiveness	0.402	0.094	4.209	0.000****	0.240	0.550	Supported
H2c	Delivery -> SCP Flexibility	0.213	0.114	1.813	0.070*	0.019	0.396	Supported
H2d	Delivery -> SCP Cost	-0.073	0.176	0.229	0.819	-0.330	0.249	Not Supported
H2e	Delivery -> SCP Asset	-0.081	0.159	0.505	0.614	-0.342	0.182	Not Supported
H3a	Innovation -> SCP Reliability	0.211	0.108	2.004	0.046**	0.038	0.394	Supported
H3b	Innovation -> SCP Responsiveness	0.261	0.083	3.265	0.001***	0.133	0.406	Supported
H3c	Innovation -> SCP Flexibility	0.285	0.110	2.618	0.009***	0.106	0.469	Supported
H3d	Innovation -> SCP Cost	0.082	0.183	0.576	0.565	-0.196	0.407	Not Supported
H3e	Innovation -> SCP Asset	0.043	0.120	0.364	0.716	-0.155	0.242	Not Supported
H4a	Sustainability -> SCP Reliability	0.296	0.085	3.434	0.001***	0.152	0.433	Supported
H4b	Sustainability -> SCP Responsiveness	0.081	0.069	1.135	0.257	-0.036	0.193	Not Supported
H4c	Sustainability -> SCP Flexibility	0.076	0.099	0.758	0.449	-0.089	0.240	Not Supported
H4d	Sustainability -> SCP Cost	0.027	0.167	0.118	0.906	-0.256	0.295	Not Supported
H4e	Sustainability -> SCP Asset	-0.022	0.134	0.220	0.826	-0.250	0.191	Not Supported
H5a	Cost -> SCP Reliability	0.017	0.109	0.237	0.813	-0.153	0.205	Not Supported
H5b	Cost -> SCP Responsiveness	0.087	0.083	1.027	0.305	-0.051	0.221	Not Supported
H5c	Cost -> SCP Flexibility	0.099	0.116	0.841	0.401	-0.094	0.288	Not Supported
H5d	Cost-> SCP Cost	0.202	0.140	1.333	0.183	-0.044	0.417	Not Supported
H5e	Cost-> SCP Asset	0.169	0.158	1.069	0.286	-0.092	0.429	Not Supported

*(p<0.10), **(p<0.05), ***(p<0.01), **** (p<0.001)

Source: Respondents' response analyzed using Smartpls-3

The result in table 4.10 shows that the standardized path coefficients with two-tailed t-tests for the hypotheses. H1, H2, H3 and H4 are partially confirmed with different levels of significance for different supply chain operational performance dimensions while H5 is not confirmed.

4.3.2 The Effect size (f^2)

The effect size indicates the relative significant effect of each independent construct on the dependent construct. It is computed by dividing the difference between the R^2 of the full model and R^2 computed by removing each independent variable with the unexplained portion of the model ($1-R^2$) i.e. $(R^2-R^2_{excluded}) /(1-R^2)$ (Hair, *et al.*, 2017). The effect size is considered low of where, $0.02 < f^2 < 0.15$, moderate $0.15 < f^2 < 0.35$, strong $f^2 > 0.35$, but no effect is considered if $f^2 < 0.02$ (Henseler, Ringle & Sarstedt, 2012).

Table 4. 11: Effect size f^2

	SCP Responsiveness	SCP Reliability	SCP Flexibility	SCP Cost	SCP Asset
Quality	**0.138**	**0.079**	**0.053**	-0.025	0.003
Delivery	**0.305**	0.020	**0.046**	-0.002	0.004
Innovation	**0.123**	**0.057**	**0.096**	0.000	0.001
Sustainability	0.015	**0.121**	0.007	0.002	0.001
Cost	0.018	0.000	0.010	-0.049	0.021

Source: Respondents' response analyzed using Smartpls-3

As table 4.11 shows the evaluation supplier quality performance have low effect on supply chain responsiveness, reliability and flexibility being the effect on the supply chain responsiveness is the highest amongst the three. The evaluation of delivery performance of suppliers has low effect on

supply chain flexibility but has moderate effect on supply chain responsiveness which is the highest amongst all values. The supplier innovation performance has low effect on supply chain responsiveness, reliability and flexibility being the effect on the supply chain responsiveness. But the supplier sustainability performance evaluation has low effect on supply chain reliability.

4.3.3 Predictive relevance (Q^2)

The predictive relevance test developed by Stone (1974) and Geisser (1975) is an indicator of how well observed values are replicated by the model and its parameter estimates (i.e., cross-validated relevance of PLS path model). The value of Q^2 (Stone-Geisser's Q^2) value is computed using blind folding procedure (Hair, *et al*, 2017). The effect size q^2 is computed similar to f^2 where the Q^2 value of the model for each dependent variable is compared with the step –wise removal of each independent variable and computation of $Q^2_{execluded}$. Thus $q^2 = (Q^2 - Q^2_{execluded})/(1 - Q^2)$. The effect size *q*2 allows to examine independent construct contribution to an endogenous latent variable's Q^2 value. q2 is considered as a relative measure of predictive relevance where the values of 0.02, 0.15, and 0.35, respectively, shows that an exogenous construct has a small, medium, or large predictive relevance for endogenous construct under consideration (Hair, *et al*, 2017)

Table 4. 12: Predictive Relevance (q^2)

	SCP Responsiveness	SCP Reliability	SCP Flexibility	SCP Cost	SCP Asset
Quality	**0.055**	**0.037**	**0.031**	0.005	-0.003
Delivery	**0.125**	0.007	**0.029**	-0.018	-0.002
Innovation	**0.059**	**0.024**	**0.055**	-0.011	-0.004
sustainability	0.004	**0.065**	-0.006	-0.028	-0.010
cost	0.002	-0.004	0.000	0.002	0.025

Source: Respondents' response analyzed using Smartpls-3

As indicated in table 4.12 Evaluation Supplier quality, delivery, innovation and sustainability performance have low predictive relevance.

4.3.4 Coefficient of Determination Statistics

According to Hair, *et al.* (2017) PLS-SEM aims at maximizing the R^2 values of the dependent latent variable(s) in the path model. Depending on the particular model and research discipline the exact interpretation of the R^2 value may vary, but in general R^2 values of above 0.75, 0.50, or 0.25 for the endogenous construct can be explained as substantial, moderate, and weak respectively.

Table 4. 13: Co-efficient of Determination R^2

	R Square	R Square Adjusted
SCP Asset	0.033	-0.028
SCP Cost	0.046	-0.015
SCP Flexibility	0.417	0.380
SCP Reliability	0.453	0.418
SCP Responsiveness	0.666	0.645

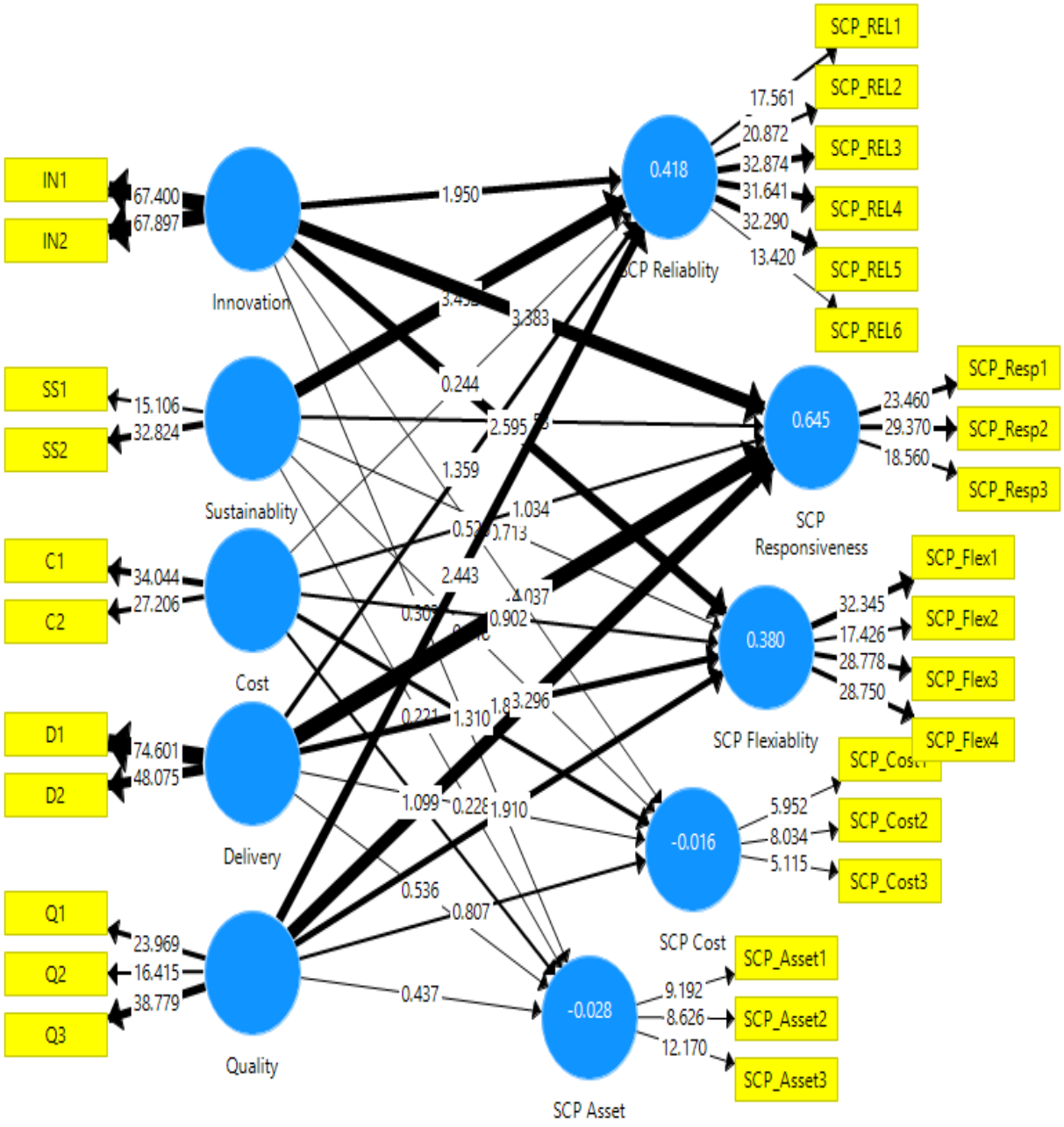
Source: Respondents' response analyzed using Smartpls-3

Table 4.13 depicts that supply chain responsiveness have moderate R^2 value whereas supply chain reliability and supply chain flexibility has close to moderate value. Supply chain cost and asset management has extremely low value.

The above table also dipicts38% of the variation in Supply chain flexibility attributes to change in the independent variable, 41.8% of variation in Supply Chain Reliability is attributed to variation in independent variables, where as 64.5 % of variation in Supply chain responsiveness is

explained by the variation in the independent variable. However, the variation in Supply chain asset and supply chain cost aspects of supply chain operational performance are not explained by the variation in the independent variables, where the R^2 values are too small.

Figure 3: Path coefficient after bootstrapping procedure



Source: Respondents' response analyzed using Smartpls-3

Figure 3 shows the relative strength of the path coefficients, where relatively stronger and significant path coefficients are represented by darker and thicker lines. Similarly, the adjusted R^2 result of the endogenous latent construct is shown.

4.4. Discussion of results

The result the study suggests that supplier performance evaluation (SPE) from the perspective of supplier quality performance has significant effect on supply chain operational performance particularly supply chain effectiveness represented by supply chain responsiveness, flexibility and reliability. The path coefficient is shown as supply chain reliability (β_{1a} = 0.29, ρ = 0.017), responsiveness (β_{1b} = 0.307, ρ = 0.001), and flexibility (β_{1c} = 0.246, ρ= 0.062) which is positive relationship. The effect size and the predictive relevance of this exogenous construct on (quality performance evaluation dimension) on supply chain reliability (f^2_{1a} = 0.138, q^2_{1a} = 0.055), responsiveness (f^2_{1b} = 0.079, q^2_{1b} = 0.037) and flexibility (f^2_{1c} = 0.053, q^2_{1c} = 0.031) is low ranging between 0.02 to 0.15.

This finding is also supported by Saunders (1994) where supplier quality performance affects firm's responsiveness, reliability through supplier auditing practice. Hu, et.al, (2015) also suggest Supplier performance evaluation activity, specifically evaluation of supplier quality performance will provide the organization and supplier the communication bridge and chance to improve quality, and at the same time improve the overall supply chain competitiveness.

The result of the study suggests that supplier sustainability performance has significant effect on supply chain reliability. The direction of the path coefficient on supply chain reliability (β_{4a} = 0.296, ρ = 0.001) is positive. The effect size and the predictive relevance for supply chain reliability is (f^2_{4b} = 0.121, q^2_{4b} = 0.065) is low. This finding is also confirmed by Freire & Alarcón (2002)

and Yuan and Woodman (2010) where supplier social sustainability performance contributes to supply chain reliability and delivery.

The result the study depicts that similar to quality performance perspective, supplier innovation performance perspective of supplier performance evaluation (SPE), has significant effect on supply chain operational performance perspective of supply chain responsiveness, flexibility and reliability. The path coefficient is shown as supply chain reliability (β_{3a} = 0.211, ρ = 0.046), responsiveness (β_{3b} = 0.261, ρ = 0.001), and flexibility (β_{3c} = 0.285, ρ= 0.009) which is positive relationship. The effect size and the predictive relevance for supply chain reliability (f^2_{3a} = 0.123, q^2_{3a} = 0.059), responsiveness (f^2_{3b} = 0.057, q^2_{3b} = 0.024) and flexibility (f^2_{3c} = 0.096, q^2_{3c} = 0.055) This finding is in agreement with the findings of Oke, Prajogo and Jayaram (2013) where supply chain partner innovativeness impact the focal firm's innovative strategy and has effect on the overall supply chain effectiveness (supply chain reliability, responsiveness and flexibility)

The fining of the study also shows that evaluation of supplier delivery performance has significant effect on supply chain responsiveness and flexibility. The direction of the path coefficients for supply chain responsiveness (β_{2b} = 0.402, ρ = 0.000), and flexibility (β_{2c} = 0.213, ρ = 0.070) is positive. The effect size and the predictive relevance for supplier delivery performance for supply chain responsiveness (f^2_{2b} = 0.305, q^2_{2b} = 0.125) and flexibility (f^2_{2c} = 0.046, q^2_{2c} = 0.029) is moderate and low respectively. This find is similar to the findings of Huhtane (2017) which states delivery tracking and delivery performance measurement of suppliers with the use of advanced IoT based solutions have impact on supply chain responsiveness and flexibility.

The findings of the study concur with the findings of Nair, Jayaram & Das (2015) which they reported that monitoring suppliers' performance from operational criteria such as quality, delivery and innovation have positive and significant effect on the company's inter supply chain operational

performance from the dimensions of supply chain reliability, flexibility and responsiveness. Similarly, the finds of the study are in alignment with the finds of Kampan (2010), which states suppliers' performance evaluation from the perspective of quality, delivery and service improves supplier performance and consequently the supply chain operational performance.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

This chapter deals with the summary of purpose, methodology and findings of the study. The conclusion drawn from the study will be discussed and the recommendation and future are of research is also presented

5.1 Summery of findings

The purpose of the research is to examine the effect of supplier performance evaluation on supply chain operational performance of ethio telecom. The study identified five constructs related to supplier performance evaluation. These dimensions of supplier performance evaluation are supplier quality performance, delivery performance, cost performance, innovation performance and sustainability performance. The study also identified five contracts related to supply chain operational performance. These dimension of supply chain operational performance are supply chain responsiveness, reliability, flexibility, cost and asset management. Even if there are different researches in the area of supplier evaluation, no research is found that address the effect of supplier evaluation on supply chain operational performance, this research intends to fill this gap. Appropriate design and methodology of research was employed to examine the effect of supplier performance evaluation on supply chain operational performance. The survey instrument was pilot tested before distribution to check the internal consistency. The full data collected was analyzed with Smartpls 3 and SPSS version 26. The measurement and structural model was assessed and the result of the analysis shows minimum threshold was meet for all relevant statistics.

The study has five main objectives that it intends to address

a) To assess the effect of supplier quality performance evaluation on the supply chain operational performance.

The result of the study depicts that supplier quality performance evaluation has significant positive effect on supply chain reliability ($\beta_{1a} = 0.29$, $\rho = 0.017$), responsiveness ($\beta_{1b} = 0.307$, $\rho = 0.001$), and flexibility ($\beta_{1c} = 0.246$, $\rho = 0.062$) dimension of supply chain operational performance. However, no significant impact is exhibited in relation to cost and asset management dimension of supply chain operational performance.

b) To assess the effect of supplier delivery performance evaluation on the supply chain operational performance.

The result of the study depicts that supplier delivery performance evaluation has significant positive effect on supply chain responsiveness ($\beta_{2b} = 0.402$, $\rho = 0.000$), and flexibility ($\beta_{2c} = 0.213$, $\rho = 0.070$) dimension of supply chain operational performance. However, no significant impact is exhibited in relation to reliability, cost and asset management dimension of supply chain operational performance.

c) To assess the effect of supplier innovation performance evaluation on the supply chain operational performance.

The result of the study shows that the evaluation of supplier innovation performance has significant positive effect on supply chain reliability ($\beta_{3a} = 0.211$, $\rho = 0.046$), responsiveness ($\beta_{3b} = 0.261$, $\rho = 0.001$) and flexibility ($\beta_{3c} = 0.285$, $\rho = 0.009$) dimension of supply chain operational performance. However, no significant impact is exhibited in relation to cost and asset management dimension of supply chain operational performance.

d) To assess the effect of supplier sustainability performance evaluation on the supply chain operational performance

The result of the study shows that the evaluation of supplier sustainability performance has significant positive effect on supply chain reliability ($\beta_{4a} = 0.296$, $\rho = 0.001$) dimension of supply chain operational performance. However, no significant impact is exhibited in relation to supply chain responsiveness, flexibility, cost and asset management dimension of supply chain operational performance.

e) To assess the effect of supplier cost performance evaluation on the supply chain operational performance

The result of the study shows the supplier cost performance evaluation has no significant impact on any of supply chain operational performance dimension (i.e. Reliability, responsiveness, flexibility, cost and asset management).

5.2 Conclusion

The research aims to examine the effect of supplier performance evaluation on the supply chain operational performance. Accordingly, the findings of the research depict that supplier quality performance evaluation has significant positive effect on supply chain reliability, responsiveness and flexibility dimension of supply chain operational performance having low effect size and predictive relevance on these dimensions.

Supplier delivery performance evaluation has significant positive effect on supply chain responsiveness and flexibility dimension of supply chain operational performance having low effect and predictive relevance on supply chain flexibility and moderate effect on supply chain responsiveness.

The evaluation of supplier innovation performance has significant positive effect on supply chain reliability, responsiveness and flexibility dimension of supply chain operational performance having low effect size and predictive relevance on supply chain reliability, responsiveness and flexibility.

The evaluation of supplier sustainability performance has significant positive effect on supply chain reliability dimension of supply chain operational performance with low effect size and predictive relevance.

Despite what literature dictates the study found no significant relationship between supplier cost performance evaluation with any of the dimensions of supply chain operational performance.

5.3 Recommendation

Based on the finds of the research on the survey data as well as the detailed review of reputable literature the below recommendations are given

Mangers should give emphases for supplier performance evaluation particularly it is recommended to take the below course of action

- Suppliers quality performance should be measured regularly and proactively so that the supply chain responsiveness, reliability and flexibility is consistently and continuously improved.
- Suppliers innovation performance should be measured regularly and proactively so that the supply chain responsiveness, reliability and flexibility is consistently and continuously improved.

- Suppliers delivery performance should be measured regularly and proactively so that the supply chain responsiveness, and flexibility is consistently and continuously improved.
- Suppliers sustainability performance should be measured regularly and proactively so that the supply chain reliability is consistently and continuously improved

5.4 Limitation of the study and areas of future research

5.4.1 Limitation of the study

The study has extended on prior researches and make theoretical and empirical contribution however it is not without its limitation one of which is the study is confined to corporate supply chain unit of ethio telecom no zonal or regional representative is included in the sample. Accordingly, due care should be taken in generalizing the findings of the research result.

5.4.2 Areas of future research

The researcher advice future researches to focus on the impact of supplier performance evaluation from dyadic perspective (buyer-supplier relationship).

The researcher further recommends future should focus on impact of supplier performance evaluation on different category of supplier such as strategic, privileged, preferred

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Annexe I

Questionnaire

ADDIS ABABA UNIVERSTY

SCHOLL OF COMMERCE

DEPARTMNET OF LOGISTICS & SUPPLY CHAIN MANAGEMENT

Dear Respondents

The following questionnaire is developed by student, Abegaz Sahilu, from Addis Ababa university school of commerce to study the effect of Supplier performance evaluation on supply chain operational performance of ethio telecom in fulfilling the requirement of Masters of Logistics and supply chain management. I kindly request your co-operation in responding the following questions for the successful completion of the study. Please do not put your name on the questionnaire. The overall purpose of this questionnaire is exclusively academic. Your response will not be used for any other purpose; it is confidential. Thank you very much for taking your time to complete this questionnaire.

Do not hesitate to contact me for any information with 09115097 95 or abegazsahilu@gmail.com.

PART I: **Demographic Information**

1. Gender: **M** ☐ **F** ☐

2. Educational level?

Diploma ☐ Degree ☐ Masters ☐ PhD ☐

If other specify_____

3. Position in the organization?

Professional ☐ Specialist ☐ Supervisor ☐ Manager ☐ Director ☐

4. Year of experience in ethio telecom?

Below 5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21 and above ☐

5. Year of experience in Supply chain division_____

Below 1 ☐ 2-3 ☐ 4-5 ☐ above 5 ☐

Part III: Independent Variables

Please indicate your level of agreement on the statements by circling the numbers in the column using the following rating scale.

Where: 1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

No	**Latent Variable and Measurement Instrument**	**Scale**				
SQPE	**Supplier Quality Performance Evaluation**					
Q 1	Our supplier performance evaluation method enable us to measure our suppliers product/service quality	1	2	3	4	5
Q 2	Our supplier performance evaluation method enable us to measure rate of rejected orders	1	2	3	4	5
Q 3	Our supplier performance evaluation method enable us to measure our suppliers product/service reliability and consistency	1	2	3	4	5
SDPE	**Supplier Delivery Performance Evaluation**					
D1	Our supplier performance evaluation method enable us to measure our suppliers on-time delivery	1	2	3	4	5

D 2	Our supplier performance evaluation method enable us to measure our suppliers accuracy of delivery	1	2	3	4	5
SIPE	**Supplier Innovativeness Performance Evaluation**					
IN 1	Our supplier performance evaluation method enable us to measure our suppliers existing product/service improvement	1	2	3	4	5
IN 2	Our supplier performance evaluation method enable us to measure our suppliers' development of new product	1	2	3	4	5
SSPE	**Supplier Sustainability Performance Evaluation**					
SS1	Our supplier performance evaluation method enable us to measure our suppliers' product and service environmental sustainability	1	2	3	4	5
SS 2	Our supplier performance evaluation method enable us to measure our suppliers' social sustainability	1	2	3	4	5
SCPE	**Supplier Cost Performance Evaluation**					
C 1	Our supplier performance evaluation method enable us to measure the competitiveness of our suppliers' cost	1	2	3	4	5
C2	Our supplier performance evaluation method enable us to measure our suppliers' real discount	1	2	3	4	5

Part II: Dependent Variable

Please indicate your level of agreement on the statements by circling the numbers in the column using the following rating scale.

Where: 1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

No	Latent Variable and Measurement Instrument	Scale				
SCOP	**Supply chain operational performance**					
SCREL	**Supply chain Reliability**					
SCP_REL 1	Our relationship with our suppliers enables us to have speedy introduction of new products.	1	2	3	4	5
SCP_REL 2	Our relationship with our suppliers enables us to deliver quality products to customers.	1	2	3	4	5
SCP_REL 3	Our relationship with our suppliers enables us respond to urgent customer request.	1	2	3	4	5
SCP_REL 4	Our relationship with our suppliers enables us to providing accurate information to members in the supply chain.	1	2	3	4	5
SCP_REL 5	Our relationship with our suppliers enables us to meeting deadlines as promised to members in the supply chain	1	2	3	4	5
SCP_REL 6	Our relationship with our suppliers enables us to providing adequate information to members in the supply chain.	1	2	3	4	5
SCRES	**Supply chain Responsiveness**					
SCP_Resp 1	Our relationship with our suppliers enables us to improve responding to customer.	1	2	3	4	5

SCP_Resp 2	Our relationship with our suppliers enables us to improve timely delivery.	1	2	3	4	5
SCP_Resp 3	Our relationship with our suppliers enables us to improve delivery of emergency orders.	1	2	3	4	5
SCFLE	**Supply chain flexibility**					
SCP_Flex 1	Our relationship with our suppliers enables us to improve adaption to product volume changes.	1	2	3	4	5
SCP_Flex 2	Our relationship with our suppliers enables us to solve unexpected problems.	1	2	3	4	5
SCP_Flex 3	Our relationship with our suppliers enables us to improve resources reallocation to support demand changes.	1	2	3	4	5
SCP_Flex 4	Our relationship with our suppliers enables us to improve speed of respond to demand changes.	1	2	3	4	5
SCC	**Supply chain cost**					
SCP_Cost 1	Our relationship with our suppliers enables us to reduce inventory cot	1	2	3	4	5
SCP_Cost 2	Our relationship with our suppliers enables us to reduce operation process to save costs.	1	2	3	4	5
SCP_Cost 3	Our relationship with our suppliers enables us to reduce waste in processes to save cost.	1	2	3	4	5
SCP_Cost 4	Our relationship with our suppliers enables us to reduce communication costs	1	2	3	4	5
SCASS	**Supply chain asset management**					

SCP_Asset 1	Our relationship with our suppliers enables us to increase our return on supply chain fixed assets	1	2	3	4	5
SCP_Asset 2	Our relationship with our suppliers enable us to increase our return on working capital	1	2	3	4	5
SCP_Asset 3	Our relationship with our suppliers enables us reduce cash-to-cash cycle time	1	2	3	4	5

Preliminary interview Questions

1. What are the challenges faced regarding supplier performance?

   ……..

   …….

2. What are the major challenges faced by ethio telecom regarding supplier evaluation and performance monitoring?

   ……..

   ……..

   …….

3. How do you think good performance evaluation system help improve supply chain operational performance?

   ……..

   …….