The Influence of Supply Chain Practices and Performance Measurement Practices towards Firm Performance

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***Abstract* – The assessment of the success of organizations throughout history has been done using performance metrics. Performance measurement quantifies effectiveness and efficiency of action using metrics. Proper selection of key performance variables allows for major consideration in improvement, problem identification, and gauging performance against plans, norms, or best practices, and so giving directions for improvement plans. The concept paper predicts that supply chain management is practical in developing economies and to improves performance of organizations in the chain. Furthermore, it hopes to help firms that embraced supply chain management to used balanced sets of measures coupled with appropriate performance measurement practices (PMP) to increase performance results. Additionally, the proposed framework will be useful in any environment as it resulted from the synthesis of past literatures and studies. This study is one of the first to identify and discuss conceptually the relationship between performance measurement practices and overall firm performance.**

Keywords *– Supply Chain Management Practices, Firm Performance, Performance Measurement, Time Based Performance*

1. Introduction

Organizational competitiveness is a precondition for the survival of any business in the globalized business environment that prevails currently in the world. The business environment has witnessed markets that have a global nature combined with a global kind of competition, with customers demanding more but willing to pay less [17]. These environmental conditions have compelled businesses into having multiple competitive performance objectives that include: quality, price, responsiveness, flexibility, and dependability, among many others [69]. Taking advantage of available resources and to be closer to their markets, many companies operating in this new environment have shifted from centralized to decentralized operations. One such strategy (i.e. supply chain management) requires firms to align conjointly with their suppliers and customers to streamline operations as well as working together to achieve levels of agility beyond individual firms [43] resulting in supply chain relationships. The significance of supply chain management in improving competitiveness in organizations has been well acknowledged by many firms after realizing that they could no longer compete, as stand-alone firms, in the current highly dynamic business environment [56], [78].

Among the key issues for supply chain partners are the opportunities to produce products in a collaborative way. In doing so, the supply chain partners have to effectively coordinate their activities and streamline their operations. In turn, this will increase their profit margins and enhance customer service [13], [29]. Despite being seen as a solution to the dynamic market environment, supply chain management comes with challenges in its practices. Many attempts aimed at capturing market advantage in the current dynamic business environment have been undertaken by organizations, consultants, practitioners and academicians [57]. The attempts include activities to properly organize supply chain management concepts and practices and to integrate these into the business processes. These organizations, consultants, practitioners and academicians have realized that supply chain management concepts and practices are not well defined and cannot be implemented easily [57]. The supply chain management concept has many challenges in its implementation that include the development of trust and collaboration among members of the chain, process alignment and integration, implementation of latest collaborative information systems and Internet related technologies for purposes of driving efficiency, performance, and quality throughout the supply chain [68].

In contrast, the assessment of the success of organizations throughout history has been implemented using performance measures [39]. [8] is of the opinion that management tasks are inherently complex and generally

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the number of states necessary to describe all possible future events and the corresponding range of decisions that can be taken is limitless. [8] further reiterates that the managements of organizations are exposed to enormous amounts of data; thus, having proper guidance of the management process selectivity becomes essential. It is at this juncture that the selection or identification of key performance variables becomes important. These variables reflect a major consideration in performance improvement involving the creation and use of performance measures, or performance indicators. The created measures or indicators in turn allow managers to know how their businesses are performing. In addition, this allows for problems in the organization to be identified. Moreover, the indicators enable the management to gauge performance against plans, norms, or best practices, hence giving essential directions for improvement.

1.1 Research gap

Based on previous research, there are several gaps that can be identified in the area of performance measurement in supply chains and in supply chain management in general. Authors including [55] and [63] claim that relationships between producers and suppliers define various intermediary forms of interaction between markets and supply chains, but no management control mechanisms have been so far developed for such relationships. Lack of research linking specific supply chain practices to supply chain performance is another area that authors (e.g. [45], [72]) see as a gap in supply chain performance measurement research. These authors claim further that only a small number of studies that have attempted to empirically link supply chain management practices (SCMP) to supply chain performance are so far in existence. In the literature reviewed, studies do not dispute the prevalence of the shortfall pointed by these authors.

According to [28], despite of measurements being a cornerstone of operational success, for many managers the process of measuring performance in supply chains proves to be a difficult and an elusive exercise, especially in metrics that can be used to measure performance in supply chains while little guidance is available on how best to use them. [52] adds to this point when they claim that performance measurement and performance metrics pertaining to supply chain management has not received adequate attention from researchers. The lack of guidance pointed out presents another gap in the studies in the area of supply chain performance measurement. [60] points out the failure of researchers and practitioners to come up with a single all-encompassing performance measurement system as the tradition of measuring performance used to be in the past. The needs of supply chains being different for each of them, has made it difficult for the realization of a single all-encompassing performance measurement system.

2. The Supply Chain and its Management

In defining a supply chain, one common aspect that is important to all supply chains is the existence of the linkage (chain) between parties involved in fulfilling the customer's request. A supply chain is defined as a set of three or more entities, with systems that are directly or indirectly involved in fulfilling a customer's request [87]. Figure 1 presents a basic supply chain configuration. The complexity of the chain increases as more participants and stakeholders are involved in fulfilling customer requests. This is imperative as one production unit may have several suppliers (who may have several suppliers of their own and several production units to supply) as well as customers (who also may have their own customers) [71].

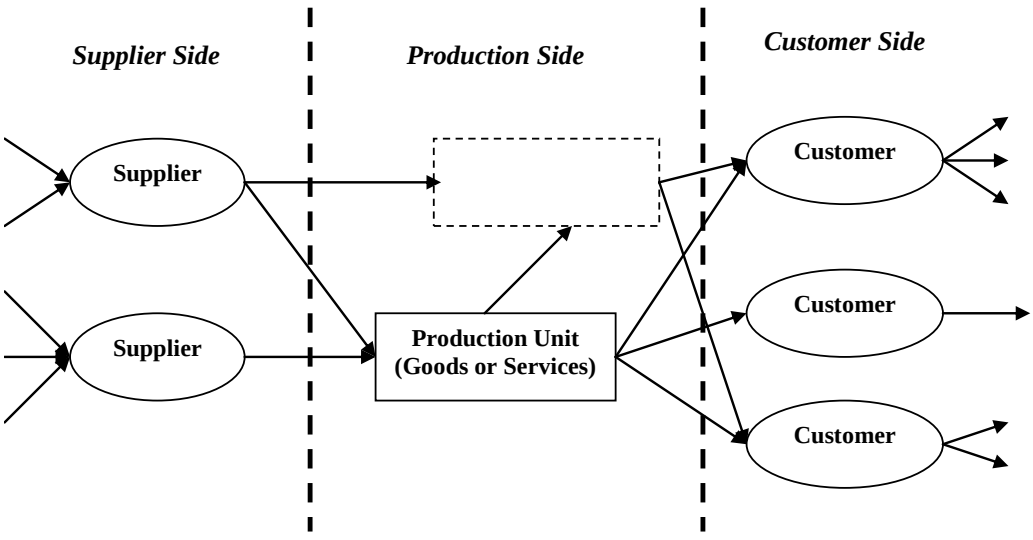


Figure 1. Basic supply chain configuration

In observing the supply chain configuration and the definition of supply chain, it can be seen that an important aspect of integrating the business processes from the consumer (who has the demand and is the source of funding), through original supplier (where the process of satisfying the customer's request begins) is included. At this juncture one has to ascertain how to manage these integrated processes and the linkages in the supply chain. This is basically an initiative that focuses on managing the entire process of raw materials being transformed into finished goods (products or services) delivered to the customer [31]. Noteworthy, supply chain management is defined as the design and management of seamless, value added processes across organizational boundaries to meet the real needs of the end customer. In this definition three core elements are explicit i.e., value creation (value addition), the integration of key business processes (across organizational boundaries), and collaboration (seamless) [70].

In defining supply chain and supply chain management, the terms can be used to describe a series of interconnected entities incorporating the satisfaction of customer demand and the management of the flow of materials, funds and information through these entities to and from the end customer respectively, not excluding after sales services and returns, or recycling. [79] claim that one of the lessons from business experience that has been communicated accurately by literature in the past decade is the fact that producers have to align with suppliers, supplier's suppliers, customers and customer's customers to streamline operations, thus, resulting into supply chains becoming the dominant vehicle for competition. The main objective of every supply chain, as [17] state, is to maximize the overall value generated. They assert that, this value is strongly correlated to the supply chain profitability, which is the total profit to be shared across all supply chain stages. The only source of revenue for any supply chain is the customer. The flows that take place in the supply chain generate costs. It is important to manage these flows appropriately, as this is the key to supply chain success, which is measured, in terms of profitability.

2.1 Supply chain management practices

The supply chain management practices (SCMP) is where development of a supply chain can be observed in any chain across time, beginning with an un- managed supply chain and improving to reach the highest level of supply chain management. It should be noted that each of the levels of evolution reflect dominant practices performed by a firm belonging to a supply chain. This makes it relevant for one to study these practices in terms of how they are measured and their impact on the well being of the firm and its chain [31]. It was earlier generalized that the activities being performed by firms in supply chains are aimed at improving the performance of the individual firms and that of the chains to which they belong. Supply chain management practices are defined as a set of activities undertaken in an organization to promote effective management of its supply chain [41], [42].

According to [42], most researchers choose to focus their investigation either on only practices related to internal supply chain, those related to the upstream or downstream side of the supply chain. Examples of researchers looking within these categories or into the few aspects of internal supply chain such as total quality management practices [61], [76], internal integration practices [9], [51], agile manufacturing practices [46], and postponement [80]. Some studies have dwelt simultaneously on SCMP in both the upstream and downstream side of supply chains. These studies include that by [41], [42], [75], and that by [24].

The inconsistence results and lack of a unifying conceptual framework covering the upstream side, the internal part, and the downstream side of the supply chain waters down the usefulness of the results of the above studies. Therefore, this conceptual paper has identified different practices to represent the constructs or variables for studying supply chain management in firms belonging to supply chains. Some of these authors with the identified practices are presented in Table 1. As seen from the table, literature portrays supply chain management from a variety of perspectives with a common goal of improving organizational performance.

Several studies reported that lower total costs, higher-order fulfillment rates, sorter-order cycle times, making dependable deliveries, and introduction of products to market quickly result from high level of information sharing [33], [44], while increased customer responsiveness and satisfaction [53], and reduced time to market [54] are being linked too strategic supplier partnership; and flexibility being reported to result from postponement [80]. Other than that, increased market share, improved return on investment, improved financial performance, as well as improved overall competitive position, among other things, were reported to result from SCMP [67]. On the other note, to achieve continuous improvement in supply chain, some metrics encouraged the practice of SCM (e.g. measures spanning several organizations), and also some SCMP encouraged improved PMP (e.g. measures have to be aligned to strategy, in SCM a common strategy is encouraged for SC members, this results into the use of common measures, improving PMP). This proposition leads to:

P1a: There is a direct positive impact of supply chain management practices (SCMP) on time based performance (TBP).

P1b: There is a direct positive impact of supply chain management practices (SCMP) on overall firm performance (OFP).

P4: There is an association between supply chain management practices (SCMP) and performance measurement practices (PMP).

Table 1. Identified Supply Chain Management Practices

Author	Identified SCMP
[21]	Supplier partnership, outsourcing, cycle time compression, continuous process flow, information technology sharing
[75]	Purchasing, quality, customer relations
[3]	Core competencies, use of EDI (and other IT technologies), postponement
[74]	Coordination of flow (material and information), postponement, mass customization
[27]	Strategic supplier partnership, number of knowledge workers, investment in IT, Use of internet and intranet, communication
[76]	Information sharing, supply chain characteristics, supply chain integration, customer service management, geographical proximity, Just in time (JIT) capabilities
[83]	Supplier management strategy, customer management strategy, supply chain management strategy
[14]	Supplier base reduction, long term relationship, communication, cross-functional teams, supplier involvement
[47]	Agreed vision and goals, information sharing, risk and award sharing, cooperation, process integration, long term relationships, agreed supply chain leadership
[42]	Strategic supplier partnership, customer relationship management, information sharing, internal lean practices, information quality, postponement
[41]	Strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing, postponement
[18]	Suppliers and customer management, information sharing, speed of communication, supply chain features
[16]	Information sharing, customer relationship, strategic supplier partnership, material flow management and corporate culture
[73]	Strategic supplier partnership, customer relationship, information sharing, information quality, postponement, agreed vision and goals, risk and reward sharing
[32]	Strategic supplier partnership, customer relationship, information sharing
[30]	Integration, information sharing, customer and delivery management, supplier management, speed of responsiveness
[34]	Strategic supplier partnership, customer relationship, information management, lean systems

3. Performance Measurement in Supply Chain

The performance measurement, measures and performance measurement systems (PMS), in general terms are presented. These apply to individual firms. It is pointed out that, supply chains supply chain management are made up of several firms working together as one entity in their bid to fulfill their customers' requirements. This working together has an implication that even supply chains need monitoring mechanisms for their performance, the same way as individual firms. Being an indispensable management tool, performance measurement provides the necessary assistance for performance improvement in pursuit of supply chain excellence [1], [77].

The basic configuration of a supply chain given in Figure 1 is an indication of how complex a supply chain can be, depending on the number of echelons in the chain and the number of facilities in each echelon. Given this complexity and the fact that it extends to issues of context, scope, whether to include many organizations, or many product lines, besides the difficulty in developing appropriate measures, subsequently, makes the process of supply chain performance measurement particularly critical [4]. An appropriate performance measurement process should include both cross-functional and up/down alignment. According to [19], what gets measured gets managed. So, the author continues that most supply chain management experts agree that collaboration calls for a drastic change in corporate culture, including the creation of an entirely new reward structure that fosters teamwork. Companies must change their measurement systems, so that performance is driven by accountability and compensation, says [19].

[4] states that strategic goals involve key elements that include the measurement of resources (generally cost), output (generally customer responsiveness) and flexibility

(how well the system reacts to uncertainty), hence a supply chain measurement system must place emphasis on three types of measures, such as, resource measures – R; output measures – O; and, flexibility measures – F (see Figure 2). The goals of each of these measures are as presented in Table 2, showing each to be different, making it necessary for a supply chain performance measurement system to measure each type, due to each one's importance to the successful performance of the whole supply chain.

Table 2. The Goals of Supply Chain Performance Measure Types

Performance Measure Type	**Goal**	**Purpose**
Resources (R)	High level of efficiency	[Maintain] efficient resource management [as it] is critical to profitability
Output (O)	High level of customer service	Without acceptable output, customers will turn to other supply chains
Flexibility (F)	Ability to respond to a changing environment	In an uncertain environment, supply chains must be able to respond to change

Source: Adopted from [4]

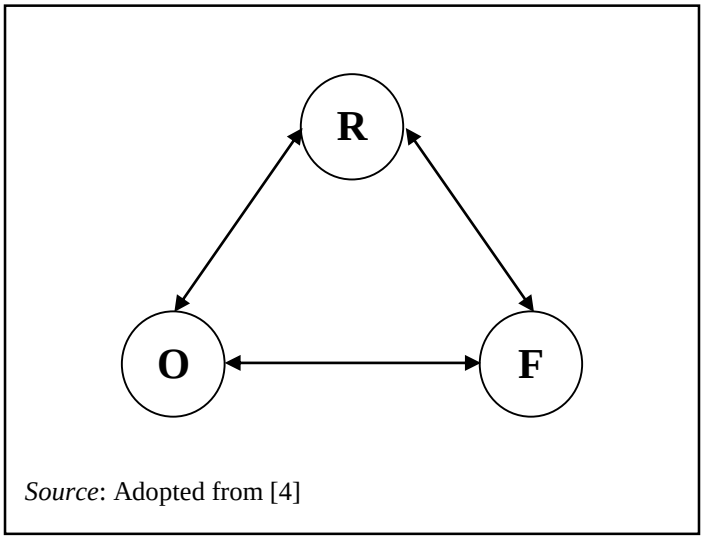


Figure 2. The Interrelationship of Measure Types in a Supply Chain Measurement System

3.1 Performance measurement practice

Performance measurement practices (PMP) include all activities undertaken in an organization to promote effective performance measurement i.e., the process of quantifying effectiveness and efficiency of action. Performance measurement practices facilitate the provision of information needed to assess the extent to which a firm in a supply chain delivers value and achieves outstanding practice in managing the firm and delivering value for customers and other stakeholders [48]. The importance of measuring performance in effective and efficient management of organizations, has been in recognition for a lengthy period of time [38]. The whole process involves the use of performance measurement systems (PMS), which are made of performance measures, or performance indicators. Thus, the selection of appropriate measure to make up an appropriate performance measurement system is vital to all organizations, as this determines the way performance is viewed in an organization.

Furthermore, in the review of literature, some essentials of performance measurement are identified [48], [65] and these are: the use of a balanced set of measures; to make sure what is measured matters to all stake holders; make sure that employees are involved in determining the measures; include both perception measures and performance indicators; use a combination of outcome and process measures; take account of the cost of measuring performance; have clear systems for translating feedback from measures into a strategy for action; and, measurement systems need to focus on continuous improvement. The study found no apparent literature that explicitly discusses these essential facts on performance measurement practices. These essentials are to be studied in the relevant organizations to understand the performance measurement practices of these organizations.

The use of a balanced set of measures is a necessity for a supply chain aiming at delivering excellence to its customers and other stakeholders. Measuring what matters to customers and other stakeholders makes another important component of performance measurement practices [65]. On the other hand, those providing the service or the ones who are physically involved in making the product, also need to be consulted to establish what really matters to them. The involvement of employees in the determination of measures encourages employees to implement the measures earnestly as they have a sense of belonging to the firm, so they take responsibility of the process of implementing the measures. Non-involvement of employees in this exercise leads to many negative consequences. According to [48], "If [employees] are not involved in determining the measures and feel they are misguided, then they are likely to respond to measures in a very different way leading to a poorer service all round" [48]. This proposition leads to:

P2a: There is a direct positive impact of performance measurement practices (PMP) on time based performance (TBP).

P2b: There is a direct positive impact of performance measurement practices (PMP) on overall firm performance (OFP).

4. Organizational Performance as a Variable

Various authors are of the belief that despite organizational performance being the most widely used dependent variable in many research works, yet it remains to be one of the most vague and loosely defined construct [36], [58], [64]. In some fields, performance as a construct has received its focus almost entirely in the financial measures, while others view it as a comparison between the value created by the organization and the value expected by its owners [81]. [62] views performance as something referring to doing work, as well as being about the results achieved. The author defines performance as the outcomes of work. In other words, it may be termed as the end result of an activity. The basis for this definition is its linkage to the organization's strategic goals, customer satisfaction and economic contribution.

Also, performance may be viewed as capacity to achieve a set of desired results. Looking at the organization as an entity, its performance can comprise of the output or results of an organization as measured against intended outputs (or goals and objectives). In one quotation [41] says organizational performance refers to how well the organization achieves its market oriented goals as well as its financial goals. If one links this to the definition of performance given in the preceding paragraph, organizational performance may be seen as the accumulated end results of all work processes and activities that take place in the organization. This may be extended to supply chains as they behave as one entity.

Performance has something to do with effectiveness (achievement of objectives) and efficiency (rates of resource usage in achieving objectives). As [25] put it, performance is a relative concept. This is the reason that makes it to be often measured against some baseline or standard. The end goal of measuring performance is to have better assert management and increased ability to provide customer value. In the recent past, a large number of methods of performance measurement systems have been reported in literature [6], [10], [11], [12], [66].

It is noted that the performance goals diverge depending on a firm's objectives. In terms of supply chain management, it can be categorized into two (sometimes more) types of performance. In this study two types will be studied i.e., time based performance (TBP) and overall firm performance (OFP). In the time-based performance, the study intends to see how firms perform in terms of time to market, cash to cash cycle time, up and down flexibility, and delivery dependability. The overall firm performance is to be studied in terms of financial performance and market performance.

4.1 The overall firm performance

Overall firm performance has been studied by many, among others, [7], [22], [47], [83], [85], and [86], using and incorporating differing elements of overall firm performance. The performance is assessed by relating it to past performance or top performance of competitors. For example, [36] studied the direct relationships and use factors that include financial as well as customer service. While [2], [15], and [82] investigate both direct and indirect relationships between practices of supply chain and overall firm performance.

Overall firm performance has been widely studied with a number of other variables such as those related to supply chain management practices, performance measurement practices and time based performance. For instance, a number of authors including [5], [20], [23], [35], and [50], conducted researches examining relationships using overall firm performance measures, and/or operational costs measures, and/or customer service measures. The commonly used measures for overall firm performance have included overall sales growth, overall market share, return on investments, return on asserts, and overall profitability.

Additionally, efficient resource management is critical to profitability, while without acceptable output, customers would turn to other supply chains. Thus, performance metrics is important as they affected strategic, tactical, and operational planning and control, as well as their role in setting objectives, evaluating performance, and determining future courses of action [26]. In other words, all those efforts lead to improving overall firm performance.

4.2 Time based performance

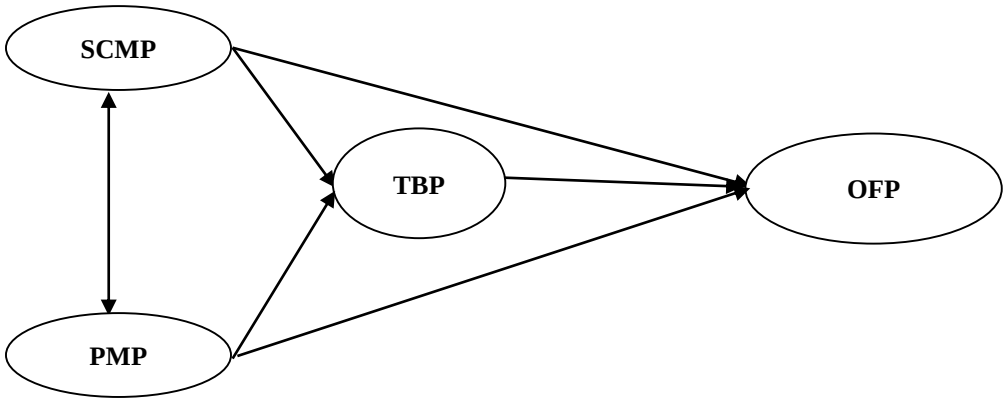
Few studies have examined time-based performance (strategies or its antecedent practices). In literature, several studies have examined parts of the time based strategies in

supply chain management practices and performance, combining both time based and overall firm performance as one variable [22], [84]. The studies that examined only part of relationships among these: [7], [22], [47], [83]. Reports on firms achieving higher productivity, increase market share, charging premium prices, reduced risks, and improved customer service are acknowledged by authors such as [40] to be among the outcomes of time based performance (TBP). This indicates the existence of a link between time based performance and overall firm performance.

Time to market is the extent to which a firm is capable of introducing new products more rapidly compared to major competitors, while delivery dependability is the extent to which a firm is capable of providing on time, the type and volume of the product required by customers [42]. Flexibility refers to making available the products / services to meet the individual demand of customers [27]. These authors state that, by evaluating flexibility firms are able to achieve rapid response in delivering individual customer requirements, as their sentiment is to regard flexibility as a metric for winning and retaining customers, as it has a positive influence on customers' decisions to place orders.

Time based performance allows firms to identify and eliminate non-value adding activities and subsequently strengthening product quality and delivery, thereby providing a foundation for sales growth [59]. Alternatively, time based performance through flexibility enhances the ability of the firm to accommodate seasonal demands, poor supplier performance, poor production performance, poor delivery performance, new products, new markets and new competitors [4], [49]. The result of this are reduced number of backorders, lost sales, number of late orders, and increased customer satisfaction. This in turn, with appropriate costs, improves on revenue as well as resource utilization.

P3: There is a direct positive impact of time based performance (TBP) on overall firm performance (OFP).



Key: SCMP – supply chain management practices; PMP – performance measurement practices; TBP – time based performance; OFP – overall firm performance.

Figure 3. Conceptual Framework

5. Discussion

The conceptual paper has been able to come up with some exploration results and findings that lead to useful conclusions. These are seen to be of significant importance to academicians and researchers, as well as practitioners in the areas of supply chain management and performance measurement. The following are some of these identified useful results, presented as contributions, as well as implication to the theory and practice.

Next, the introduction of supply chain management practices and performance measurement practices in a firm definitely touches other practices that may be in existence in the firm. Also, the introduction of these two sets of practices is bound to be coupled with an appropriate performance measurement system that matches the practices. This is poised to attract research attention in firms for the purpose of avoiding clashes and possible duplications of efforts within one firm. Thus, it is suggested that firms introducing these practices should align and prepare themselves to do such studies for smooth operations.

5.1 Theoretical Implications

The paper was able to develop and validate a measurement instrument for measuring performance measurement practices in the perspective of supply chains. After justification of its constructs, this instrument has shown suitability for the study and may be used in similar environments, for instance in industrial sectors of other developing economies around Tanzania. The instrument will advance studies in supply chain performance measurement practices.

Using related data, this paper was able to perform revalidation of the adapted instruments for measuring supply chain management practices, time based performance, and overall firm performance. Initially these instruments were used to study the variables in developed countries where the operating environment is different from the one in developing economies. The successful revalidation of these instruments lends a hand into studying the variables in developing economies, hence playing a positive role in advancing the knowledge through the studying of these variables.

The study was able to verify the mediating role of time based performance in the relationship between supply chain management practices and overall firm performance (full mediation effect), and, in the relationship between performance measurement practices and overall firm performance (partial mediation). This knowledge lends an important hand in the study and advancement of theories related to relationships between supply chain management practices, performance measurement practices, and overall firm performance. Also, it will be helpful in studying or in the search for best practices in terms of the study variables for varying business environmental conditions.

5.2 Practical Implications

The developed instrument measurement instrument for performance measurement practices construct can be used by managers practicing supply chain management in evaluating the how comprehensive their practices are, in terms of performance measurement practices. The identified best practices in terms of the study variables will enable firms to focus on their objectives by using specific practices to achieve specific goals through appropriate allocation of resources. Also, the identified best practices can be used by firms needing to start implementing supply chain management practices and performance measurement practices in the bid to improve their performances.

The confirmation of the mediation role of time based performance is important as it enables managers to know that for firms practicing supply chain management in environments such as that found in Tanzania, it is only through improvements in time based performance that better overall firm performance can be achieved as supply chain management practices has no direct impact on the overall firm performance. Similarly, managers will be able to know that the performance measurement practices have a direct and an indirect impact on overall firm performance, necessitating proper attention to practitioners when planning to excel in their firm performances.

The confirmed association between supply chain management practices and performance measurement practices will help managers needing to practice the two sets of practices to understand the need to proceed practicing these practices simultaneously rather than sequentially as their association brings a bi-directional impact on both sets of practices, as well as improving the impact on time based performance and overall firm performance.

6. Conclusion

In conclusion, this study is one of the first to identify and discuss conceptually the relationship between performance measurement practices and overall firm performance. Nevertheless, there could be limitations that exist while conducting research based on this conceptual approach. The limitations can be addressed in future research work that may focus on studying the relationships among variables used for this paper, as well as in related areas of current and past researches. Firstly, the limitation of sample size; it is suggested that works in this area should use different data sets to re-validate the model and constructs used. Moreover, future studies should strive, whenever possible, to collect large enough samples of data to allow for full analyses to be conducted within one study. This will permit the avoidance of using special techniques such as item parceling.

Furthermore, there is a great need to study other links between the concept paper suggested variables as this exploration has not been able to consider all the possible relationships that may exist among the variables. Also, not to forget to involve future studies in the area of modern technology usage and IT, as these are identified as important elements to appropriately practice supply chain management and performance measurement.

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