

Evaluating the Perceived Use of Supply Chain Management Elements in the Sudanese Medium Size Companies

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ABSTRACT:

This paper monitoring and evaluates the perceived use of supply chain management elements in the Sudanese Medium Size Companies in Khartoum state, Sudan from the employees' point of view and/or perceptions. Moreover, the paper presented the roles and reasons for adopting a supply chain, and the challenges and issues faced by the employees. This paper used descriptive statistics and theoretical analysis approaches for collecting and analyzing the data. The investigation was based on a qualitative and quantitative design using questionnaires and semi-structured interviews. The research questionnaires were distributed to four hundred twenty (420) possible respondents over seven (7) selected Sudanese Medium Size Companies (SMSC) in Khartoum State with only two hundred thirty-three (233) usable questionnaires, yielding a response rate of fifty-five percent (55%). Questionnaires focused on the ten (10) measures elements of supply chain management (SCM) namely: integration, operations, purchasing, distribution, agility, innovation, performance measurement, alignment, technology, and coordination. The results of the analysis of the variance between the ten (10) independent variables of the (SCM) and the status of the (SMSC) showed that the measures of elements were not fully implemented in the Sudanese Medium Size Companies in Khartoum state, Sudan. Thus, it is recommended that the elements be fully incorporated in the design and process of the Supply Chain Management (SCM) usage in Sudanese Medium Size Companies (SMSC) before it is provided to the employees and stakeholders.

KEY-WORDS:

Supply, Chain, System, Evaluating, Assessing, Companies, Medium, Sudan, Future, University, Information, Technology, Salah, Hassan, Malik, Information, Technology, integration, operations, purchasing, distribution, agility, innovation, performance measurement, alignment, technology, coordination.

INTRODUCTION:

Today's global supply chains are increasingly complex, making a data-driven approach to supply chain management a must. Data-driven SCM provides visibility from end to end for monitoring the flow of information, services, and goods from procurement to manufacturing and delivery to the end consumer. Data isn't the only driver of effective supply chain management; other factors such as good vendor and supplier relationships, effective cost control, securing the right logistics partners, and adopting innovative supply chain technologies make a big impact, too.

The definition and the concept of medium size enterprise firms differ from one country to another, due to the variance in the resources, economy, and environment. According to the European Commission, the medium size companies are an enterprise where the number of employees is greater than 250 employees, turnover is greater than or equal to £ 50 million and the balance sheet is greater than or equal to £ 43 million.

There are a growing number of medium-sized companies in Sudan; this may be attributed to the increasing robustness of the country's economy; the future position of the economy is strong with an ambitious investment strategy originating from the Sudan Government. The Sudanese government introduced a medium-term development program aiming at small and medium-sized companies to improve the infrastructure resources. Sudan has strengthened relations with internal and international organizations and groups related to investment, such an environment will increase investment opportunities in different scales and economic sectors (Ministry of Investment, Sudan 2006).

Sudan is a developing/under-developed country with an economy that has been performing well in recent years, despite adverse security conditions. The Sudanese government has put in place a number of economic reforms to liberalize the economy, attract direct foreign investment (FDI), boost international trade, and encourage foreign exchange (Rennack, 2005). The government also promotes privatization and state-enterprise restructuring programs.

In recent years, there has been a growing concern about business management in some Sudanese companies, particularly with respect to their lack of innovation and competitiveness in the global market (Ministry of Investment, Sudan 2006). Some of the issues related to human resources (HR), others to productivity, efficiency, and lack of creativity, total quality management approaches are promoted as being the key to resolving some of these issues (Fageer, 2006).

As stated above, there is a growing number of medium-sized companies due to the exploitation of petroleum and the arrival of peace in Sudan. Therefore, most people expect the economy to grow and competition to increase (Ministry of Investment, Sudan 2006).

Sudan is a country with vast resources, although these are mainly unrealized. However, there is now a sense of expectation and openness and a feeling that there are better things to come. Consequently, it is anticipated that plenty of opportunities for economic development will arise, ushering in an expansion of economic activities amidst growing competition within and outside the country.

1. Reasons for using supply Change Management:

- **Better collaboration:** Information flow is a prominent challenge for companies. According to Oracle, 76% of companies lack an automated flow of information across the supply chain, and half of the companies say fragmented information results in lost sales opportunities.
- **Improved quality control:** Companies that have greater control over not only their direct suppliers but also their suppliers' suppliers benefit from improved quality control.
- **Higher efficiency rate:** Having real-time data on the availability of raw materials and manufacturing delays allows companies to implement backup plans, such as sourcing materials from a backup supplier, preventing further delays.
- **Keeping up with demand:** "If consumer sales increase by 5 percentage in a given week, a retailer could end up ordering 7 percentage more products in response to the increase and a feeling that demand will continue," according to a report by VISA.
- **Shipping optimization:** Identifying the most efficient shipping methods for small parcels, large bulk orders and other shipping scenarios helps companies get orders to customers faster while minimizing costs.
- **Reduced overhead costs:** With more accurate demand predictions, companies can reduce the overhead costs associated with storing slow-moving inventory by stocking less low-velocity inventory to make room for higher-velocity, revenue-producing inventory.
- **Improved risk mitigation:** Analyzing big-picture and granular supply chain data can reveal potential risks, enabling companies to put backup plans in place to readily respond to unexpected circumstances.
- **Improved cash flow:** The importance and benefits of supply chain management systems discussed above allow companies to make smarter decisions, choose the right partners, accurately predict and respond to market and demand changes and reduce supply chain disruptions, but that's not all: they also improve the company's bottom line.

2. Challenges in using Critical Thinking:

- **Material scarcity:** Insufficient inputs have been a concern since the pandemic began, due to an abrupt rise in consumer demand like never before. Even now, retailers and suppliers alike are struggling to meet this demand in the midst of the limited availability of many parts and materials.
- **Increasing freight prices:** Contrary to initial expectations, the need for container shipping has increased considerably throughout the pandemic. With worldwide lockdown measures inciting a surge in e-commerce sales, the response has been a greater import demand for raw materials and manufactured consumer goods (a large percentage of which are moved in shipping containers).
- **Difficult demand forecasting:** Demand forecasting in the middle of a global pandemic has added a new layer of complexity to many companies' supply chain management. The onset of COVID-19 essentially shattered the forecasts for countless retailers and suppliers of consumer goods/services, leaving them without a guide as to how much inventory to stock or manufacture at any given time.
- **Port congestion:** caused by the pandemic remains one of the top challenges for the world's supply chains, seeing as port owners, carriers, and shippers are collectively still scrambling for a viable solution to this problem. Congestion occurs whenever a ship arrives at a port but cannot load (or unload) its freight because that station is already at capacity.
- **Changing consumer attitudes:** Consumer attitudes and behaviours have changed in some big ways during the pandemic, as well, like lowering the threshold for delivery times and raising the requirements for a positive customer experience.

- **Digital transformation:** When it comes to supply chain operations, digital transformation and IoT can be a mixed blessing. With that said, there are several technologies with the potential to enhance the way we approach the traditional supply chain, including artificial intelligence, drones and robots, electric vehicles, and on-demand delivery.
- **Restructuring:** There’s no doubt that restructuring is making major waves among modern retail brands. This process can take many different forms, from re-shoring to changing suppliers, to signing contracts with all new carriers. The challenge in terms of restructuring is to decide when it’s the right time for a change and how to do so as seamlessly as possible.
- **Inflation:** Although it's too soon to say for sure, there’s a strong chance 2022 will be remembered as the year of inflation. While much has been said about inflation in the United States, the reality is, that quite a few countries around the world are now dealing with the highest inflation in decades.

THE PROBLEM:

Despite the growing literature in the area of Supply Chain Management, it is not known why the usage of Supply Chain Management Elements in Sudanese Medium Size Company is still very slow. Could it be a reflection of the fewer acknowledgments for the roles and importance of the Supply Chain Management Adaptation (SCM) in the Sudanese Medium Size Company? Based on the problem raised the following hypothesis was raised: **"Performance of Supply Chain Management in the Sudanese Medium Size Company influences by the Adaptation of Supply Chain Management Elements"**.

RESEARCH MODEL:

The following research model (Figure1) was developed based on the effect of the ten independent variables of the Supply Chain Management Elements (SCME) in the Sudanese Medium Size Company (SMSC) identified in the literature in order to assist the study in answering the above question.

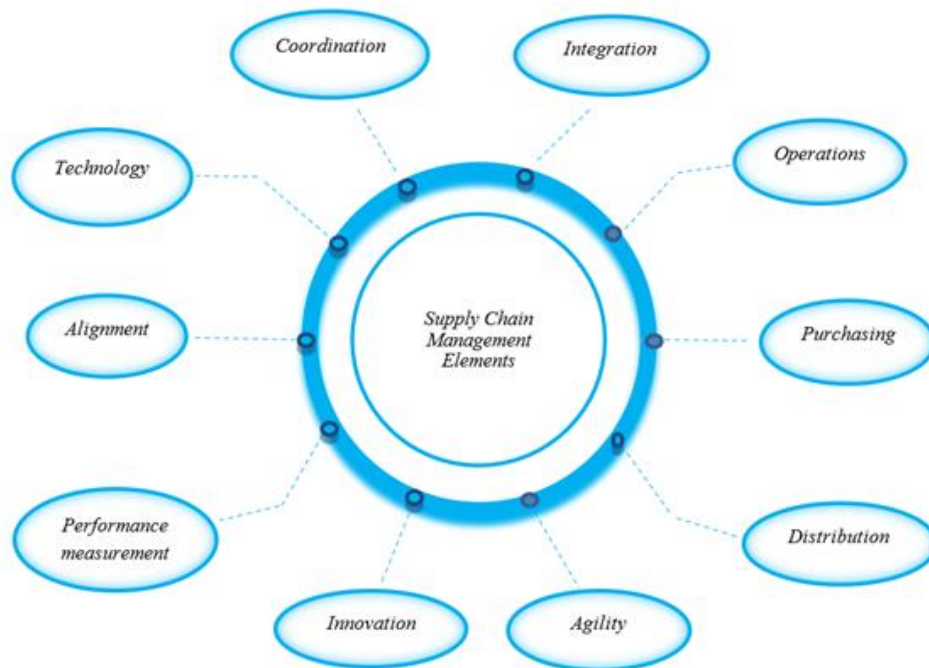


Figure: 1 SCME Research Model

LITERATURE REVIEW:

This section provides a review of the conceptual literature which will inform the frameworks of the study. The literature review for the study includes the definition of the terminologies used in the study such as Supply chain, integration, operations, purchasing, distribution, agility, innovation, performance measurement, alignment, technology, coordination, Reliability Testing, Kaiser-Meyer-Olkin Test, these themes contribute to the foundation for this study.

1.1 Supply Chain Management:

Supply chain management is the management of the flow of goods and services and includes all processes that transform raw materials into final products. It involves the active streamlining of a business's supply-side activities to maximize customer value and gain a competitive advantage in the marketplace.

1.2 Operations: Managing operations is one of the major elements of supply chain management as it leads to more efficient fulfillment processes. Getting powerful insights and real-time data can be useful in creating the path of sustained improvement in the entire value chain.

1.3 Purchasing: Effective supply chain management plays a major role in acquiring raw materials, components, and services. It determines the necessary goods that need to be purchased within your company.

1.4 Distribution: The final and most important process of the supply chain is ensuring that the product is delivered to the right customers at the right time. It manages the transport, delivery, and return of goods by deeply getting powerful insights into the operations.

1.5 Agility: It is a core element of the supply chain as it helps in determining the company's ability to quickly adapt to the changes. A strong supply chain can enable companies to combat market unpredictability and volatility.

1.6 Innovation: Supply chain management is largely useful in balancing the product flow and costs of the operations. Innovation is a key element that can lead to optimally functioning supply chains. It is imperative to plan the integration of SCM in the conceptual stages of the product's design.

1.7 Performance Measurement: One of the major elements of supply chain management is to measure the performance metrics by delving deeper into the operations. Getting powerful insights by analyzing the metrics based on the procedures is the most significant way to enable responsiveness and innovation in the organization.

1.8 Alignment: Supply chain needs should be strategically connected and aligned to the company's objective. It is a fundamental cornerstone as it leads to the transformation of entire supply chain processes. The effort to foster alignment entails a successful internal and external supply chain integration that can ensure efficient functioning in the value chain.

1.9 Technology: Implementing new-age technologies like artificial intelligence, the internet of things, and blockchain is a major element of supply chain management that can add significant value to your business.

1.10 Coordination: The supply chain strategy should be well planned and coordinated accordingly. Communication and exceptional coordination are basic elements of maintaining good relationships with the business's various stakeholders.

1.11 Integration: Every business needs strategic planning for the better functioning of operations. In a data-driven world, integrating the supply chain across the processes is an essential step to eliminating errors.

1.12 Reliability Testing: Refers to the extent to which a test measures without error. It is highly related to testing validity. Test reliability can be thought of as precision; the extent to which measurement occurs without error (John DeLuca, 2021).

1.13 Regression Analysis:

Regression analysis is a statistical tool for the investigation of relationships between variables. Usually, the investigator seeks to ascertain the causal effect of one variable upon another, the investigator assembles data on the underlying variables and employs regression to estimate the quantitative effect of the causal variables upon the variable that they influence. The investigator also assesses the "statistical significance" of the estimated relationships, that is, the degree of confidence that the true relationship is close to the estimated relationship (Sykes, A.O., 1993).

RESEARCH METHOD:

The research variables consist of one dependent variable (perceived use of Supply Chain Management Elements in Sudanese Medium Size Companies) and ten independent variables (integration, operations, purchasing, distribution, agility, innovation, performance measurement, alignment, technology, and coordination). An independent variable is the supposed reason, while the dependent variable is the supposed result. The descriptive statistics technique was used to analyze the data. The questionnaire technique of data collection will be used. Staff from seven (7) Medium Size Companies (DAL Group, Sega, Rotan Company, Capo Dairy Milk, CTC Company, DAL Agriculture Company, and Weta Company) in Khartoum state will be conducted purposively to select the participant of the questionnaire. Analysis of variance (ANOVA) will be used to answer the research question. The sampling frame population for the paper was 452 persons. Even though 420 questionnaires were distributed to the participants, only 233 questionnaires were successfully collected. Of the 233 (55.4%) questionnaires that were returned successfully only 149 (63.9%) copies were completely answered. The remaining of 84 questionnaires could not be included in the study due to incomplete data or poor responses.

RESULTS AND DISCUSSION:

There are four principal assumptions that justify the use of regression analysis for the purpose of prediction: Linearity of the relationship between dependent and independent variables; Independence of the errors (no serial correlation); Multicollinearity and Normality of the error distribution (Field, 2005).

Table1: Results of Regression Model Analysis between Independent Variables and Dependent Variables.

Variable	B	Std. Error	Beta	T	Sig.	VIF
Constant	2.37E-013	.052		.000	1.000	
Integration	.313	.054	.313	5.345	.000	1.213
Innovation	-.011	.051	-.011	.0453	.762	1.274
Purchasing	.201	.063	.201	2.766	.000	1.191
Distribution	-.104	.057	-.104	-2.147	.010	1.103
Agility	.063	.052	.063	2.207	.151	1.147
Technology	.301	.061	.301	5.736	.000	1.113
Performance measurement	.102	.060	.102	1.642	.0131	1.146
Alignment	.053	.062	.053	1.054	.243	1.303
Operations	-.211	.065	-.211	3.443	.000	1.187
Measurement	.081	.079	.081	1.191	.257	1.537

(Table 1) shows the results of multiple regression analysis between integration, operations, purchasing, distribution, agility, innovation, performance measurement, alignment, technology and coordination and perceived use of supply chain management elements in Sudanese medium size companies. The adjusted squared multiple correlation coefficient (adjusted R²) clearly explains 24.7% of the variance associated with the perceived use of supply chain management elements, (see Table 2). The F statistic is also significant (F = 7.537) (see also Table 2), which confirms that not all the variables make a significant contribution to fit into the regression model. Four independent variables, namely Integration, Purchasing, Technology, and Operation were found to be significantly associated with the perceived use of supply chain management elements in Sudanese Medium Size Companies.

As can be seen in (Table 1), the usage depends on only Integration, Purchasing, Technology, and Operation. The term 'Multicollinearity' has been coined to express the situation where the independent variables are higher associated with each other. The last column in (Table 1) shows that the highest VIF (Variance Inflation Factor) value is 1.537 which is below 5 and therefore there is no problem with Multicollinearity (Hair et al., 2006). Thus, the predictor variables can be considered to be independent of each other. In (Table 2), the p-value is less than 0.001; therefore, usage depends on at least one of the predictors. The R-squared value is 0.247, which means 24.7% of the variation in USAGE can be explained by all 10 predictors.

Table 2: ANOVA Table

Source	Sum of Squares	Df	Mean Square	F	Sig.
Regression	043.452	006	5.345	7.313	.000(a)
Residual	205.2758	239	.715		
Total	237.000	247			

R² = .247, F = 7.313

A stepwise regression model was used to identify independent variables which are predictors of the dependent variable. Stepwise regression was used to identify the predictors of the perceived use of supply chain management elements in the Sudanese medium-sized companies (Table 3), which shows the results of the regression model for integration, purchasing, technology, Operation, and the perceived use of supply chain management elements in the Sudanese medium-sized companies.

Table 3: Results of the Analysis using the Stepwise Regression Model for integration, purchasing, technology, Operation, and the perceived use of supply chain management elements in the Sudanese medium-sized companies

Table 3: Results of the Analysis using the Stepwise Regression Model

Model	B	Std. Error	Beta	T	Sig.
Constant	2.37E-013	.052		.000	1.000
Integration	.313	.054	.313	5.345	.000
Purchasing	.201	.063	.201	2.766	.000
Technology	.301	.061	.301	5.736	.000
Operation	.211	.065	.211	3.443	.000

R² = 0.247

Since the constant value of 2.371E-013 is almost zero, the regression equation is:

$$\text{Perceived Use} = .313(\text{Integration}) + .201(\text{Purchasing}) + 0.301(\text{Technology}) - 0.134(\text{Operation})$$

- For every unit increase in Integration, the USAGE is expected to increase by 0.313 units, provided an increase in Purchasing, Technology, and Operation.
- For every unit increase in Purchasing, the USAGE is expected to increase by 0.201 units, provided Integration, Technology, and Operation.
- For every unit increase in Technology, the USAGE is expected to increase by 0.301 units, provided Integration, Purchasing, and Operation.
- For every unit increase in Operation, the USAGE is expected to decrease by 0.211 units, provided Integration, Purchasing, and Technology.

The findings from this study revealed that key among the challenges associated with the perceived use of supply chain management in Sudanese medium size companies there is a lack of innovation, distribution, agility, performance, alignment, and measurement. Furthermore, integration, purchasing, technology, and operation were among the key strategies which the respondents felt should be put in place to improve the perceived use of supply chain management in Sudanese medium size companies.

CONCLUSION AND RECOMMENDATION: To sum up, these are some of the basic elements of supply chain management that give the organization a better understanding to meet customers' needs. Therefore, in a competitive data-driven world it is necessary to implement effective forecasting and distribution that can lead to sustainable organizational growth. Supply Chain Management Elements (SCME) offer very powerful instruments to bring higher performance for Sudanese Medium Size Companies (SMSC). However, as it has been stated in several studies reviewed, supply chain management must evolve to meet new demands and supply chain challenges, and supply chain managers need to plan ahead to keep everything flowing smoothly. The findings from this study should enable top management in Sudanese Medium Size Companies to implement proactive approaches to improve the perceived use of supply chain management elements in order to increase the performance of the organization and handle the certificate of satisfaction.

The Limitations of this study return to the participant of our questionnaire survey that has been conducted in only a specific Sudanese Medium Size Companies, Khartoum, Sudan, therefore the result of the study may not be generalized to all other companies, so the results may not be more accurate to all other Sudanese Medium Size Companies.

Challenges to the perceived use of supply chain management in Sudanese medium size companies include innovation, distribution, agility, performance, alignment, and measurement.

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