



Promoting Supply Chain Performance Through Load Planning among Oil Marketing Companies in Juba, South Sudan

Simon Wiyual Nin

School of Business and Economics,
Mount Kenya University.

Jackson Ndolo,

School of Business, KCA University.

Abstract

This study's main objective was to establish the relationship between load planning and supply chain performance of oil marketing companies in Juba, South Sudan. The study adopted an explanatory study design targeting all the 28 oil marketing firms in Juba, South Sudan. Questionnaires were used to collect data from 56 respondents who were purposefully selected from the supply chain management and finance functions. Descriptive and inferential statistics were used for data analysis. Linear regression analysis was also undertaken to establish the intensity of the relationship. Key findings of the study is that load planning more so rail and road planning was key to the responsiveness of the oil supply chain. Besides it reduced the operational costs of the firms leading to financial savings

Keywords; Load Planning, supply chain performance, lead time, storage, oil marketing companies,

1.0 Introduction

A supply chain is an intricate network of facilities used in logistics that transform raw materials into completed goods and then deliver those goods to final users or clients. In Oil supply chain process, the product is delivered to storage, refineries, terminals, and ultimately the point of sale at several points. From point of production to point of sale, crude oil is transported via trains, trucks, ships, and pipelines. The oil company functions like an international logistics network entailing survey, physical management, local and global shipment, application of machinery, etc. Today, many possibilities exist there for the planning of interests on all parts of supply chain functions and on constantly multiple petroleum companies. Consolidating supply chain management with other aspects of procedures considered all the purposes to be included in the administration determination (Yusuf *et al*, 2013). To satisfy client wants and increase profits, suppliers have to collaborate with the company's counterparts. Nevertheless, since there exists so many various companies engaged in supply chain activities, each with particular skills and goals, managing the numerous partnerships in a supply chain is an extremely challenging undertaking. Because repeated procedures are interdependent, handling issues and ambiguities demands immediate functioning and decisions beyond various activities, domains of functionality, and lines of authority. Lacking increased collaboration plus an adaptable supply chain structure, the change in strategy of emphasis toward broad customization, speed, and excellent support would not be accomplished.

The goal of managing the supply chain is to maximize client fulfillment by distributing suitable items to the appropriate individual at a suitable moment and retaining earnings optimization. However, the primary obstacle confronting the oil sector does not lie in the limited amount of oil reserves, but the process of utilizing those reserves for fulfillment while furnishing users with the end results at the most affordable price possible. Further levels of adaptability and dependability were required in the scheduling and management structures for the supply chain functions as well as manufacturing processes due to the unpredictability surrounding ecological issues in the oil sector. The pipes, crude oil carriers, and transportation through ships that traverse international borders make up the supply chain network in the oil business. The purpose of this road system is to move crude from the field to the facility for preparation, transitions across multiple upgrading plants, and completed goods from manufacturing containers to distributors and ultimately to consumers. Some inefficiencies in the global supply chain performance could have a devastating impact on increasing productivity while preserving profits, performance, and pleasing clients. A number of factors, including requirements, delivery, fluctuations in markets, and instabilities in politics, could contribute to unfavorable outcomes. Thus, it was determined by Shah, Li, and Ierapetritou (2011) that in order to simulate the logistics network layout dilemma successfully, the changing nature of the system had to be taken into account, and information consolidation methods to analyze a large information establishment had to be implemented.

South Sudan is a land locked country and therefore oil companies have faced increasing difficulties throughout time, including tighter rules enforced by the government, risky politics, rivalry, the emergence of new competitors,

and hostility from politicians. These difficulties have had an impact on processing as well as the development of an efficiency petroleum supply chain. Globally the oil business has faced challenges with the increasing shortage of the resource, geopolitics, inter-country conflicts as well as the drive for sustainable sources of energy. Besides the external challenges Oil marketing companies have to ensure seamless flow of oil products from the source to their customers. This calls for an efficient and effective load management system. It is under this background that the current study sought to establish the influence of load planning on supply chain performance of Oil marketing companies in Juba, South Sudan.

2.0 Literature Review

Load planning practices such as organizing distributions together with analyzing an allocation models of transportation systems were essential since they significantly reduced transportation costs by optimizing truck space and routes and helped avoid demurrages. Load planning faced an immense influence on the cost of shipments for the customer, for the shipper as it influenced the transportation period. Load planners were encountered with intricate functional attentions at the time of loading and planning exercises. For perfectly capitalizing the feasible loading interval, vehicle capability was supervised pertaining to convenient area while detailing for the seriousness in which load sections might be delivered. Benantar, Ouafi and Boukachour (2019) focused on a combined vehicle loading and routing problem taking a case of fuel logistics among oil marketing companies. The study introduced a model to solve a multi-compartment vehicle routing and loading problem with time windows. It was indicated that this complication emanates through an authentic practice emerging in the fuel delivery, in which an accurate observation can be rendered to combine the loading process in the routing challenge. Such a study established that load planning was a significant determinant of reduced lead-time on the firms focused on. Baykasoglu and Subulan (2016) focused on multi-function feasible load-planning model for multi-mode shipment systems per an effective practice. The paper presented a mixed-integer mathematical programming model for a multi-objective, multi-mode, and multi-period sustainable load-planning challenge on anticipating import/export load flows to meet transport requests on consumers including various similar cases. Different multiple objective optimization approaches were applied to guide contradictory designs concurrently under crisp and fuzzy managing situations. A real-life case study too, was accomplished to exhibit practice and advantage of the suggested mode and got initiated such that it had an outstanding outcome upon satisfaction of demands of customers.

Heggen, Braekers and Caris (2016) conducted a study on optimizing trainload planning by reviewing determination assistance for succession designers. This study aimed to provide a contribution to literature on trainload planning as well as developing a static model to introduce

several functional restrictions from the perspective of the network operator. Ultimately, the model is adapted to reflect the planning environment of a real-life case study. The revealed that train load-planning practices were essential in realization of efficiency in the supply chain. The reviewed studies have indicated points of convergence and divergence in analysis of transportation management and supply chain performance. While efforts have been made by previous studies to link transportation management practices to supply chain performance, most studies have focused on the entire set of logistics management practices such as Mwinzi (2018) and Gitahi and Ogollah (2014).

Other studies have focused on specific transportation management practices in isolation with little efforts to combine, a route, which the current study has chosen to follow. The study by Kosicek, Tesar, Darena, Malo and Motycka (2013); Feng, Zhang and Jia (2017) and Muchori (2015) purely interrogated route planning as their main independent variable. Benantar, Ouafi and Boukachour (2019); Baykasoglu and Subulan (2016) and Heggen, Braekers and Caris (2016) purely interrogated load planning as their main independent variable. On the other hand, Kovacs and Tatham (2010); Jahre (2014) and Ding, Kam, Zhang and Jie (2015) interrogated the importance of human resource management practices in logistics. This study provides a point of deviation by focusing on each of the categories in one study. Reviewed studies have been carried out in the context of developed countries and in other sectors. This presented gaps that the current study sought to fill.

3.0 Research Methodology

The study adopted an explanatory research design and targeted all 28 Oil Marketing Firms in Juba, South Sudan. According to the Africa Oil Power, South Sudan Oil and Power (SSOP) report of 2019; the number of licensed Oil Marketing Companies was 28. The firms' managers of Supply chain logistics and operations formed the unit of observation leading to a sample of 56 participants. Data was collected using a questionnaire, analyzed through use of both descriptive and inferential statistics. A pilot study of six respondents was accrued out to ascertain the research instrument reliability, content and face validities. Cronbach's Alpha (α) was used to test for reliability and

any item that had a coefficient of 0.7 and above was deemed reliable. To analyze the relationship between load planning and supply chain performance a linear regress model of the form;

$$Y = \beta_0 + \beta_1 X_1 + \varepsilon \text{ was adopted}$$

Where:

Y = Supply chain performance

X1 = Load Planning

ε is error term

β_0 represents the constant and β_1 , the regression coefficient.

4.0 Findings and Discussions

The study sought to establish how various load planning parameters affected supply chain performance of Oil Marketing companies in Juba, South Sudan. Key findings of the study on the descriptive statistics of load planning showed that effective railway and road load planning procedures were necessary for achieving supply chain efficiency. The companies also accomplished optimal costs associated with storage by investing in response-based restoration storage facility management procedures. The firms had also accepted the use of load planning methods resulting in carefully situated storage facilities that reduced their operational costs. On the relationship between load planning and supply chain performance, most of the participants indicated that adoption of load planning techniques had steadily increased their annual revenue. Through storage facility planning the firms had achieved lower transportation costs.

The study findings indicated a positive and significant relationship between load planning and supply chain performance resulting to the optimal model;

$$\text{Supply Chan Performance} = 0.48 \text{ Load planning} + \text{error term}$$

This indicates that a 0.48 change in load planning accounts for a unit change in supply chain performance of Oil Marketing firms in Juba, South Sudan.

5.0 Conclusions and Recommendations

Load planning had led to improved delivery dates, shorter waiting periods, and reduced transportation expenses leading to a responsive supply chains of oil companies' marketers in Juba, South Sudan. The study was limited to Juba, south Sudan and therefore future research should be carried in other oil marketing companies in other parts of South Sudan as well as in other sectors of the economy.

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