

EMERGING OF ARMY BULK PETROLEUM RESERVE AS A CRITICAL SUPPLY CHAIN INFRASTRUCTURE IN SRI LANKA ARMY

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Abstract - The present military logistics system would be planning in such a manner that military forces should be able to sustain the men and material for any type of war scenarios. Oil is the main energy source of all running equipment except few machines which are energized by the electricity. Therefore, oil can be identified as the main energy source for any military logistics planning and the term oil has broader understanding and petroleum represents as the main engine running energy source where it can be further sub-divided as petrol and diesel. It is obvious that the military cannot be engaged into the petroleum production but petroleum is mostly required for the Army for maintaining their battle efficiencies in terms battle tanks movement including troops carrying vehicles. Nevertheless, the military forces should have a continuous petroleum supply either from selected sources or self-sustain schemes. Army Bulk Petroleum Reserve (ABPR) is a paramount important factor for the military forces where it can be maintained as the first reserve of petrol and diesel stock when the regular supply would be cut off due to manmade or other disturbances. It is merely identified that Sri Lanka Army does not maintain such an ABPR for the consumption in uncertainties and the main objective of this research is to identify the immediate operational requirement of maintaining an Army Bulk Petroleum Reserve in Sri Lanka Army in order to fulfill the emergency fuel requirements and studying the alternative petroleum procurement strategies available for the strategic level decision making process.

Keywords- Army Bulk Petroleum Reserve, Strategic Petroleum Reserve, Critical Infrastructure, key performances indicators, Design of Oil Storage Tanks

I. INTRODUCTION

The petroleum market of Sri Lanka has been gradually increased since the colonial era and the market was shared by three major private companies. The Ceylon Petroleum Corporation (CPC) came into the market in 1963 and expanded its capacity by entering into crude oil refining industry in 1969.

The Sri Lanka Army is the biggest government organization in Sri Lanka where the organization would be in the position of maintaining of petroleum bulk storage to cater for the emergency situations at strategic level.

By having such critical environment of supply chain management, there are two major factors which Sri Lanka Army can predict on the availability of petrol and diesel. Firstly, the man made disturbance can paralyze the supply of petroleum to Army. Secondly, the natural calamities can disrupt the supply chain.

II. OBJECTIVES OF THE STUDY

Objective of this research document under the title of Emerging of Army Bulk Petroleum Reserve as a Critical Supply Chain Infrastructure in Sri Lanka Army as fol:

- a. To identify the immediate operational requirement of maintaining an Army Bulk Petroleum Reserve in Sri Lanka Army in order to fulfill the emergency fuel

requirements and studying the alternative petroleum procurement strategies available for the strategic level decision making process.

- b. To optimize the emergency petroleum requirement by maintaining an Army Bulk Petroleum Reserve for the operational consumption of Sri Lanka Army.
- d. To hold a 2nd line stock of petroleum as a buffer stock for the operational consumption requirement in the Sri Lanka Army.
- e. To discover feasibility means to hold an Army Bulk Petroleum Reserve as a backward integration policy.

III. RESEARCH QUESTIONS

- a. How does the Army Bulk Petroleum Reserve (ABPR) identify to diminish the criticalness as the infrastructure in supply chain management in military logistics in Sri Lanka Army ?
- b. What are the available alternatives to maintain the Army Bulk Petroleum Reserve (ABPR) for the Sri Lanka Army ?
- c. How could Army Bulk Petroleum Reserve (ABPR) be utilized in order to manage a petroleum reserve for provisioning of Sri Lanka Army as an immediate reserve?
- d. How could the military forces be strengthened of confirming the continues availability of sufficient petroleum stocks at any emergencies ?

IV. LITERATURE REVIEW

- a. Maintaining an Army Bulk Petroleum Reserve in order to fulfill the emergency fuel requirements and study the alternative petroleum storages as an immediate reserve for the strategic level decision making.

Role and tasks of Quartermaster Petroleum Depot of USA Army

The Quartermaster Petroleum Depot of USA Army has been established to maintain the adequate petroleum stocks in the terminals in order to meet the fuel requirement of the USA Army, the depot is facilitated by military petroleum tanks and pipeline facilities to conduct

the distribution of petroleum within the organization. The depot is also carrying out the laboratory service in order to maintain the quality of the petroleum. The role of the Quartermaster Petroleum Depot of USA Army is to maintain the Army Bulk Petroleum Reserve (ABPR) to cater the emergencies of the Army. The depot is capable of handling 500,000 barrels of petroleum as a reserve and the petroleum platoons which are attached the depot are the emergency petroleum suppliers in the Army by laying the emergency pipeline network. The depot is capable of establishing 6 petroleum pump station within 90 miles distance in an emergency. Moreover, Quartermaster Petroleum Depots are attached to each corps headquarters to minimize the logistics burden of the supplying of petroleum in the USA Army. (USA Headquarters Department of The Army, 1960)

The USA Army has identified the strategic importance of Army Bulk Petroleum Reserve (ABPR) in 1960 and the Quartermaster Petroleum Depot has been established to minimize the threat of having petroleum shortages in an emergency in the military. The depot is capable of maintaining 500,000 barrels of petroleum and one barrel has the capacity of 158.987 liters where the depot is having a reserve of 59171 metric tons. It would be sufficient to fulfill the total demand of Sri Lanka for 19 days since the Sri Lanka average consumption of petroleum is 3000 metric tons per day. However, the military force of any country is important at strategic level and it should be supplied with required petroleum stocks as a reserve. Therefore, the petroleum bulk depot can be established within the Army organization in order to cater the emergencies and offensive requirements.

Role and tasks of Australian Army Bulk Depot

The objective of establishing the Australian Army Bulk depot is to maintain the existing defence standards in terms of the Army Bulk Petroleum Reserve (ABPR). The depot has not been tasked to conduct the daily issuance of petroleum for the consumption and primarily it has been designed to store the Army Bulk Petroleum Reserve (ABPR) to cater the emergencies in the Australian Army. These oil tank capacities are higher than the regular daily issuance maintaining stocks of petroleum. In fact, the reserves are to be used only in emergencies which would be required more maintenance cost of the oil tank farm to reduce the potential corrosion, contamination and quality changes and those aspects are the challenges of Army Bulk Petroleum Reserve (ABPR) rather than producing it for

the commercial purposes. The main objective of the Army Bulk Petroleum Reserve (ABPR) is to ensure the whole of life of performances in the military in terms of the continuous petroleum supply. The duties of the Australian Army Bulk Depot are as follows: (Australian Army Department of Defence, 2011)

- a. Procurement of bulk fuel and lubricants.
- b. Provision of advice on strategic and bulk reserves.
- c. Quality assurance of petroleum.
- d. Provision of logistics and operational support
- e. Contractual management.
- f. Payment of all petroleum products.
- g. Documentation of policy related Petroleum products.

In the Australian Army, the main objective of maintaining the petroleum depot is to ensure the whole of life of performances in the military activities of the Australian Army. Therefore, the Army organization has carried out its threat analysis in terms of the logistics and a major issue of petroleum in an emergency has been answered successfully by having an Army Bulk Petroleum Reserve (ABPR) to ensure the smooth functioning of Australian Army in severe lack of supply of petroleum. Even though, Sri Lanka Army has identified its important, the development of Army Bulk Petroleum Reserve (ABPR) is not yet launched in the organization.

V. METHODOLOGY

- a. Conceptual Framework - The conceptual framework which is shown under Figure 01 has been drawn from the literature review.



Figure 01: Opportunities available for Army Bulk Petroleum Reserve
Source: Developed by author (2017)

Army Bulk Petroleum Reserve (ABPR) is the dependent variable and Dedicated Unique Portion from Strategic Petroleum Reserve, Outsourced Storage Facility and Army Owned Petroleum Storage Depot are the independent variables of this study.

In order to verify the validity of the model in terms of internal and external treatments, unit test was conducted among five respondents to amplify the validity of the result.

A. Formulation of Empirical Model

$$Y1=f(X 1i, X 2 ii, X 3 iii) err$$

Y = Vectors of Army Bulk Petroleum Reserve (ABPR).

X 1i = Vectors of Dedicated Unique Portion from Strategic Petroleum Reserve (SPR).

X 2 ii = Vectors of Outsourced the Storage Facility.

X 3 iii = Vectors of Army Owned Petroleum Storage Depot.

i = of an organization.

err = Error margin and other factors.

B. Sample Profile

The study Area of the research was the all 30 Army Officers who held the appointment of Officer Commanding of the Sri Lanka Army Service Corps Supply Squadrons and Composite Squadrons which are located under Security Force Headquarters (Jaffna), Security Force Headquarters (Wanni), Security Force Headquarters (East), Security Force Headquarters (Mulative), Security Force Headquarters (West), Security Force Headquarters (Central), Security Force Headquarters (Kilinchichi). Therefore, the data collection could be carried out among all these sub unit commanders and due to the size of the population, the whole population was considered as the sample of the research.

C. Data collection Method

The data were collected in the form of semi-structured questionnaire from the Sri Lanka Army Service Corps Supply Squadron and Composite Squadron Commanders who were involving the maintaining and issuing of

petroleum to the military vehicles in the Army. The interview was also carried out with staff officers of the Directorate of Supply and Transport of Army Headquarters to find some important data for the research. Primary data was defined as the data are collected for the research purpose by the researcher himself. The researcher collected the primary data in the form of questionnaire from the Sri Lanka Army Service Corps Officers in the capacity of sub unit commanders. The researcher also carried out interviews with army staff officers who were involving in petroleum procurement and budgeting at strategic level. The collected primary data would be analyzed by using the SPSS in the form of charts and tabulated presentations.

D. Testing of the Developed Model

When the model was being tested by the researcher, all respondents were observed that they had been experienced of cutting off regular oil supply due to the rejection of oil shipment by CPC in late 2017. Hence, the model was undergone on testing with 5 respondents who were selected randomly which helped to eliminate the outcome of inappropriate results.

E. Data Analytical Method

The researcher discussed both primary and secondary data in the analysis by using statistics formula, pie charts and tables and descriptive measures. The researcher collected the primary data in the form of questionnaire from the Sri Lanka Army Service Corps Officers in the capacity of sub unit commanders and also interviews provided some important statistical data to reach up to some important conclusions which suited to facilitation mixed method.

VI. FINDING DISCUSSION AND CONCLUSION

A. Finding

Storage Capacities of Petrol Stocks

Sri Lanka Army Service Corps Squadrons which held the petrol bulk storage capacities of the storage tanks in the Petrol stations. Independent Supply Squadron was the most resourceful organization which was having 171,850 liters capacity and it was established in Kalaniya

with decentralized fuel station around Colombo district. Apparently, 1st Supply Squadron which was located at Panagoda Army Cantonment carriers the 2nd position of having storage resources for petrol in the Army where it also provided its facility for Army and Ministry of Defence vehicle fleets in Colombo and suburbs where it was necessary. However, other SLASC squadrons also maintained the petrol storage capacities but these storage facilities lesser than the Independent Supply Squadron and 1st Supply Squadron.

Storage Capacities of Diesel Stocks

Sri Lanka Army Service Corps Squadrons which held the diesel bulk storage capacities of the storage tanks in the Petroleum stations. 1st Squadron was the most resourceful organization which was having 226936 liters capacity and it was established in Panagoda with decentralized fuel station around Colombo and suburbs. Outwardly, Independent Supply Squadron which was located at Kalaniya carriers the 2nd position of having storage resources for diesel in the Army. However, other SLASC squadrons also maintained the diesel storage facilities at an expected level all around the country to cater the diesel fuel requirement in the Sri Lanka Army.

Lead time for Petrol/Diesel

The lead time in no days of 30 SLASC organizations which were primarily tasked to maintain stocks and issue the daily requirement of petrol and diesel of army and other detailed vehicles of Ministry of Defence. It showed that except 510, 520, 530 and 550 composite squadron which were establish in Jaffna peninsula, all other squadrons records 2 days of lead time of receiving petrol stocks to their storages. Apparently, Sri Lanka Army demanded only 95 octane from the and it was not available in the CPSTL regional depots so that those stocks should be transported from the main CPSTL at Kolonnawa to all around the country which would take three days of lead time. However, CPSTL was capable of transporting diesel requirement within one day from its regional depots so that all the squadrons received diesel bulks during the period of one day.

Safety Stock of Petrol and Diesel

This area was focused on the calculation of the safety stock of petroleum as per the data gathered at the interview of

the Staff Officer 3 (Petroleum) of the Directorate of Supply and Transport. For the better command and control of Army supply and composite squadrons, they had been under commanded to 7 army units and one independent depot as per the operational area coverage of Sri Lanka Army.

Sri Lanka Army did not face any stock out situation in the year of 2017 except curtailing the demand during the fuel crisis in the month of November in 2017, therefore the service level could be considered as 98% since no stock out situations reported during the interview.

B. Discussion

The recent incident of fuel crisis occurred due to the engagement of the LIOC and CPC on oil procurement. Sri Lanka Army is the largest organization of Sri Lanka and it always needed to have assistance from the government sector rather than having a private partnership in strategical decision making. Sri Lanka Army should trust the private sector for its backward integrations but it has to plan under well framed lawful agreement. Sri Lanka Army would reach to self-sustained in ABPR with the self-governed organization which could be established under the Directorate Supply and Transport with the supervision of CPC. Sri Lanka Army should gain a self-efficient procuring system to adopt this method to have the ABPR in the Army storage premises. Petroleum and its inventory cost was comparatively higher than the ordinary warehousing. Therefore, it needed further researches to be carried out on this regard. Carrying out the payments for the petroleum stocks was another challenge which needed continuous supervision if such an organization would be established in the Sri Lanka Army. As it was produced through a statistical method the re-order level with safety stocks may give an overall idea on which the decisions on military logistics could be planned but military occurrences would always be unforeseen and it has to be treated with proper deductions on security condition of the country. The safety stock had been calculated for both petrol and diesel and it could be used for maintaining ABPR in the self-governed organization or contracted tank warehouses for the usage of Sri Lanka Army. It was found that the Re-order level of the petrol stock with the safety stock 8,102.43 liters and diesel is 153270.41 liters where the Sri Lanka Army should maintain such a stock at a time to survive at an unforeseen situation.

VII. CONCLUSION

The study was mainly focused to find some alternative means which are available to Sri Lanka Army when it would maintain an Army Bulk Petroleum Reserve as the 1st reserve of petroleum bulk stock to run the military mechanism during operations even though the CPC would not be in a position to provide required petroleum product due to the manmade or natural calamities. The Safety stock formula produced the safety stock of both petrol and diesel stocks where the Sri Lanka Army should maintain for the movements of all combat and other necessary vehicles. Therefore, three alternatives are available to the Sri Lanka Army as the model developed by the author.

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