

THE CHARACTERISTICS OF THE MILITARY SUPPLY CHAIN MANAGEMENT OF MEDICAL ITEMS. THE CASE OF ISRAEL DEFENSE FORCES

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Abstract: *The paper discusses the characteristics of the management of medical military supply chain in the state of Israel, based on a mixed research method, quantitative and qualitative. The medical military supply chain has the mission to ensure the combat effectiveness and readiness of the military in times of peace and war. The paper approaches the management the supply chain of medical equipment for military hospitals using the modern management approach based on various multiple stakeholders goals and interests, such as the accuracy of inventory management and its influence on the end-user units of the field and operational competence of the operational units, how it can be used in the supply and centres and in the unit. The researchers formulate several recommendations about various ways how to cope with urgent and operational requests and to improve the management of the medical military supply chain.*

Keywords: *supply chain management; medical; military; characteristics; Israel*

JEL Classification: *H56; H57; I18; L32*

1. Literature Review

A group of definitions of Supply Chain focuses on the main stages of a process such as Pienaar W. (2009b) defines Supply Chain as “a general description of the process integration involving organizations to transform raw materials into finished goods and to transport them to the end-user”. According to the definition given by Little (1999) a supply chain is “the combined and coordinated flows of goods from origin to final destination, also the information flows that are linked with it”. The definition of Chow and Heaver (2004) focuses on the entities which are involved in a value chain which “is the group of manufacturers, suppliers, distributors, retailers and

transportation, information and other logistics management service providers that are engaged in providing goods to consumers”. Consequently, the researcher opinion is that a supply chain is adding value to a product by transporting it from one location to another, including the possible transformation of the product, too. There are several supply chain models we have identified. First, there is the SCOM model (supply chain and operations management) (Ivanov et al., 2017), having as key components: sourcing, production, distribution and after sales. These key elements are kept aligned by the management at every planning level strategic, tactical planning level and operational and execution. The second model is the Supply Chain Operations Reference (SCOR model) which consists of the following processes: planning, acquisition, make, delivery and return (APICS, 2017). A different view is taken by the Global Supply Chain Forum model (GSCF). According to this model the supply chain consists of three essential parts: first, supply chain network structure; second, supply chain business processes; and third, supply chain management components.

The nine dimensions that make up the process performance requirements construct for any supply chain in the modern era are the following: “interoperability, collaboration, transparency, integration, flexibility, responsiveness, efficiency, making the supply chain leaner and performance measurement” (Frederico et al., 2020, p. 274).

The field of Supply Chain Management (SCM) while dealing with traditional logistics incorporates also additional business activities, like marketing, product development, customer service and the related finances, to ensure satisfactory fulfillment of customer requests. SCM “encompasses planning, integrating, and executing” all of the activities that are involved in getting materials or products to a final customer for use “to best meet the goals of a supply chain’s stakeholders” (Peltz & Robbins, 2012). SCM includes the management of finances and the flow of material and information across the entire supply chain. “SCM views the supply chain and the organizations therein as a single entity” (Zanjirani et al., 2009). The study of Supply Chain Management (SCM) has been considered as an “applied field of research” (Näslund et al., 2010).

Supply Chain Management (SCM) is “the management of a network of relationships within a firm and between interdependent organizations and business units consisting of material suppliers, purchasing, production facilities, logistics, marketing, and related systems that facilitate the forward and reverse flow of

materials, services, finances and information from the original producer to final customer with the benefits of adding value, maximizing profitability through efficiencies, and achieving customer satisfaction” (Toorajipour et al., 2021, p.503).

However, there are special characteristics of military SCM for medical items mainly because the external factors influencing military supply chain are specific, such as the fact that the soldier’s needs represent the number one factor. Soldiers who are fighting a war are dependent on continuous support to accomplish their specific war mission. The smallest failure to do so is putting their lives, their health, and their fighting mission at high risk. Combat operations have a greater degree of uncertainty for all variables impacting its effectiveness, including the fact that during war there are several major difficulties such as: the presence of many injured and traumatized soldiers and civilians in the operational military space, there are various degrees of destruction of the physical infrastructure (damaged roads, bridges, airports, the railway system, fluvial and sea ports, etc.) and of the communications infrastructure (Kovacs and Tatham, 2009). The environment in which military operations are happening under various situations (war, disaster relief) is much more uncertain regarding all the most important variables when we are comparing it with logistical operations in the civilian commercial sector. Another characteristic is about the demand for needed resources for supporting defense operations, such as war or disaster response are characterized by large, sudden, and often irregular increases, due to the higher uncertainty of military actions.

In addition, war operations and even major disasters have highly negative consequences on various infrastructure components such as physical, medical, transport and communications infrastructure, reduction, and even total loss of some public services (energy supply, water and sanitary supply, healthcare services, educational services at every level). Another major characteristic of military SCM is represented by the direct threat of physical violence in many forms for the civilian population, and military personnel, and also the presence of large numbers of military personnel and civilian population which are injured and psychologically traumatized in the operational war area or disaster area (Kovacs and Tatham, 2009). At the same time, the most important characteristics are that the military supply chains are highly complex, they deal with heterogeneous supplier capabilities, are heavily regulated and required to follow strictly multiple and fixed rules, they deal with quite diverse military customer requirements, and with long life cycles of the products they move along the supply chain. Military specialist in logistics must find and apply” innovative solutions for deploying tens of thousands of people, their equipment, and their support staff into an austere, hostile environment in a matter of

days”, “to securely sustain deployed forces, including secure transportation pipelines, communications infrastructure, and support services (food, shelter, medical, etc.)” (Zsidin et al., 2020, page 7).

2.The Research Methodology

We used a mixed research approach, “qual-quant” type. For the qualitative research, twenty-two participants responded to the open-ended questionnaire during their interviews. Two additional in-depth interviews using a specific qualitative questionnaire were conducted with high-ranking commissioned officers in the military.

The research questions were the following: How to improve the supply chain system for medical products and equipment in the Israeli military? Which are the ways to improve the management of the supply chain system for medical products and equipment in the Israeli military? Which is the relation between the efficiency of the management of the supply networks for medical products and the way medical equipment is distributed to military clinics? Which is the relation between the changes that have taken place in the supply chains for medical products and the way medical equipment is distributed to military clinics in IDF?

For the quantitative research, 100 participants representing several groups of stakeholders answered to a structured questionnaire which provided data used for the validation or rejection of the formulated hypothesis. The questionnaire consists of 17 statements, assessed based on a Likert scale from 1 to 5. Of the 17 statements included in the questionnaire, 3 statements examine the distribution of medical equipment to the clinics, 4 statements relate to actions for improving the supply chain system, 3 statements relate to the management of supply chains for medical products, and 7 statements relate to changes occurring in the supply chains for medical products. The responses to the questionnaires underwent quantitative analysis, such as statistical tests for validation of the questionnaire, Pearson correlation analysis, T test and ANOVA test.

3.Findings and Recommendations for Improving the Medical Military Supply hain in Israel

The results of the research related to the identified characteristics of the military SCM for medical items in the Israel Defense Forces (IDF) have indicated that there is a strong need for continuously improve the management of the military medical supply chain. The interviewed respondents and the questionnaire respondents have formulated a large number of recommendations. Many of them referred to the

technicalities of the new software management (SAP) system which indicate the high interest from participants to contribute to the improvement of the new system. The results show that they were using it in their daily work, became aware of the advantages of the SAP system for the medical supply chain, and found that the system is not perfect and needs several improvements, situation that is very positive since it indicated their adherence to the new system.

In addition to this, it is quite remarkable that massive changes about improving the medical supply chain itself were suggested, too. For example, it was recommended to change the type of the supply chain entirely, from a multiple (three) tier supply system to a direct model of supply chain, without the need for intermediaries, such as a central warehouse or storage units, with direct delivery of medical items from the supplier to the medical clinics. In the authors' opinion, this suggestion is very hard to implement, since the medical supply chain for the military needs to function not only in time of peace, but also in time of war or military conflicts. In such case the duration of the period between moment when the request from an army hospital for various medical items and the moment of delivery from the supplier needs to be very short to ensure that the treatment of wounded warriors and their full or partial recovery to be ready for combat is very important. This represents their mission, both in time of peace and time of war, too. This mission is reflected also by the recommendations related to align the medical supply chain, to the customers' needs which are the army clinics represented by clinic staff: doctors, nurses while the people need of medical treatment are the beneficiaries of their health services.

The researchers have formulated 8 main hypotheses and 22 sub hypotheses. The results of the research validated one main hypothesis (H1), partially validated two main hypothesis (H2 and H5) and rejected five main hypotheses (H3, H4, H6, H7 and H8). For the sub hypotheses, 5 were validated, 5 partially validated and 12 rejected.

Based on these results, we have formulated several additional recommendations such as: to develop specialized trainings for various types of activities and functions related to medical military supply chain for all individuals involved in its operations, to revise the reward system for members of the military supply chain, both military personnel and civilian personnel, and provide various incentives related to stimulate their acceptance of the changes induced by the implementations of various solutions for improvement of their activities, and also make them equitable for all those involved in the whole medical military supply chains; the introduction of independent delivery methods, where the medical units work directly with the

manufacturer of the medical supplies to manage and monitor their supplies. An important recommendation is that the Israel Defense Force (IDF) and its logistics units should increase the number of suppliers for medical items, medical equipment, and medicines. The goal is to ensure the availability of medical items and medicines at any given moment, being independent from one single supplier who might become unavailable for various reasons, and thus creating possible rupture of stocks. This recommendation is derived from the mission of the military medical supply chain that is to ensure combat readiness and maintenance of the combat capability of each soldier and of each military unit. This is because the effectiveness of supply chain management and distribution of military equipment in IDF will be influenced by improvements in relationships with suppliers, increasing the number of suppliers, and reducing the amount of inventory items.

The researcher recommends developing, integrating, and continuously analyzing their medical supply strategy. The efficient performance of medical therapy in the IDF military clinics depends on the accessibility to adequate medical supplies in army clinics, and adequate supply of medical supplies to the forces in the field and the need for them to be in a constant state of battle readiness. The military has developed a strategy and created a path to enhance its supply chain but has done little to communicate it to all leaders within the supply chain system. Each level of the supply chain is conducting business practices in a compartmentalized stage of the chain and do not understand how their areas of responsibility affect the other layers.

Therefore, the researcher recommends implementing strategic management and strategic leadership of the whole medical supply chain, managing suppliers, sharing of information and technology across the medical supply chain participants, and implement customer relationship management approach and practices.

A very important recommendation is to continue to add new technological instruments based on using specialized supply chain management software to improve the efficiency, the speed and the in-time delivery of the medical supply chain management. This is crucial to executing the mission of the medical military supply chain management that is to care for the health of military personnel and soldiers to maintain the combat readiness. Another recommendation is to continue to implement the suggestions about making the changes to the SAP system to simplify its functioning and ensure a smooth operability of the medical supply chain. The SAP system ensures the management of all medical inventory and synchronize it within the system that will allow easy access to manage the updated inventory.

The next recommendation is to intensify the training into using the new SAP system and additional systems functioning on the medical supply chain. Despite the

implementation of SAP for supply chain management to replace some of the old systems, several of the personnel faced challenges with learning how to use the new system. Another recommendation is to organize and deliver effective training of all the personnel involved to use the new and existing systems when considering the implementation of new technologies in a setting where the personnel are of different ages and with different levels of education. Appropriate training must be carried out for the professionals who will oversee the management of the medical inventory, in dispensing and managing medical drugs and medical equipment. The recommended courses are first, a management course in using the SAP system for medical inventory. The second course which is recommended is about qualification for inventory management and tracking equipment validity.

While the system was improving the management of the supply chain, it seemed likely that there remained a need to shorten the time it takes to distribute medical supplies from the suppliers to the end units. Therefore, the researcher recommends to giving a greater independence for the military clinics to manage their inventory and to be able to withdraw medical supplies directly from the suppliers would likely improve the management of medical supplies in the military clinics.

Another recommendation is to implement the lessons from the private sector in managing the medical supply chain. For example, Khorasani et al., (2020) studied which are the most important problems faced by healthcare organizations intending to apply the lean supply chain management (LSCM) and recommended some important techniques for implementing LSCM in healthcare. Healthcare organizations have operational goals to reduce costs while providing better quality healthcare services to their customers. According to Khorasani et al. (2020), the Lean Supply Chain Management method has the potential to allow for better cost management of the hospital supply chain, increased patient safety, and more effective systems for distribution of medication.

Duque-Urbe et al., (2019) have identified 12 categories of management practices, to address the deficiencies of the medical supply chains, such as high costs, negative impacts on the natural environment and high social problems. These very diverse practices are the following: the strategic management and leadership of the medical supply chain, managing suppliers, improved purchasing, warehousing and management of inventory, optimized transportation and distribution, sharing of information and technology, management of energy, water and food management, better hospital design, management of medical waste, and customer relationship

management. Bozic et al. (2022) found that the costs of a civil hospital can be reduced while maintaining the quality of medical services “ through knowledge and technology transfer, proper decision making process using simulation and modelling, implementation of lean tools, optimized inventory management, timely and accurate procurement, adequate storage space, collaboration in the hospital network, information technologies, automation of physical and information flow, proper waste segregation and management, collaboration with suppliers and outsourcing of some areas of hospital logistics” (Bozic et al., 2022, page 296).

Another recommendation is for managers of the medical supply chain to implement performance management and continuously update set key performance indicators related to the functionality, effectiveness, and efficiency of the medical supply chain. Each supply chain manager should be clear about the outputs, which should also be measurable and specific. The key performance indicators allow managers and their collaborators to measure the performance of the supply system or of the component for which they are responsible to make sure that expectations will be met accordingly. It is very important to develop an adequate system and instruments that provide the needed information to managers and all the other stakeholders. The managers of the supply chain should be trained in the nature and content of the key performance indicators and about the actions recommended to understand and act upon them.

The supply chain management should conduct proactive audits on the performance of the suppliers and about their punctuality in meeting delivery times, to provide financial independence for Special Forces units in purchasing of medical equipment needed.

4. Conclusions

The management of the medical military supply chain has several characteristics making it highly complex, The major characteristics identified are the following: its managers deal with heterogeneous supplier capabilities, work in a heavily regulated environment, are required to obey orders from their superiors, must follow strictly all the multiple and fixed rules and military procedures based on the military discipline, must deal constantly with quite diverse military customers' requirements, and also with long life cycles of the multiple and heterogeneous medical items they move along the supply chain. Their main mission is to keep the fighting capabilities of each unit of the military at every moment by providing health care to military personnel both in times of peace and war. Therefore, there is a strong need to innovate and change according to the new situation under the impact of the

digitalization process of supply process, while considering the requirements and the needs of the military and of its stakeholders. The paper lists multiple recommendations aiming to contribute to the increase of the effectiveness and the efficiency of the medical military supply chain of IDF.

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