

The Impact of Supply Chains on Health Service Projects in the Kingdom of Saudi Arabia

أثر سلاسل التوريد على مشاريع الخدمات الصحية في المملكة العربية
السعودية

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شكر وتقدير

الحمد لله الذي علم بالقلم، علم الانسان ما لم يعلم، الحمد لله المنان، الملك القدوس السلام، مدبر الليالي والايام، مصرف الشهور والاعوام، قدر الامور فأجراها على أحسن نظام ما شاء الله كان وما لم يشأ لم يكن، الحمد لله على ما أنعم به علينا من فضله الخير الكثير والعلم الوفير وأعاننا على إنجاز هذا البحث العلمي عليه نتقدم بخالص الشكر وعظيم الامتنان للأستاذ الفاضل الدكتور وليد سليمان والدكتورة فاطمة على ما قدموه لنا من علم نافع وإرشاد مستمر وعطاء متميز وعلى ما بذلوه من جهد متواصل ونصح وتوجيه من بداية مرحلة البحث حتى إتمام هذه البحث العلمي، ومهما كتبنا من عبارات وجمل فإن كلمات الشكر تظل عاجزة عن إيفاء حقهما، فجزاهما الله عنا خير الجزاء وجعل كما نتقدم بعبارات الشكر والتقدير إلى والدينا العزيزين. ذلك في موازين حسناتهما اللذين غرسا في حب العلم من الصغر، وقدما لنا كل غالي ونفيس، وكان لهما الفضل بعد الله فيما وصلنا إليه الان فلا نملك الا الدعاء لهما بطول العمر وحسن العمل وبلوغ الجنان والشكر لكل من قدم لنا نصيحة، ولكل من مد لنا يد العون، أو أسدى لنا بمعروف أكانت له إسهامه صغيرة أو كبيرة في إنجاز هذا العمل فله منا جزيل الشكر والعرفان .

الملخص

يواجه القطاع الصحي في مختلف دول العالم تحديات مختلفة مثل الارتفاع في التكاليف والمنافسة وتراجع استرداد تكاليف الخدمات؛ لذلك، تحتاج المؤسسات الصحية إلى اعتماد نظام فعال يمكنه التعامل مع هذه المطالبات وتحسين قدرتها التنافسية مع زيادة رضا العملاء، وتهدف هذه الدراسة إلى التحقيق في تأثير إدارة سلسلة التوريد على جودة الخدمات الصحية في المملكة العربية السعودية. تركز الدراسة على الحالة الحالية لإدارة سلسلة التوريد في صناعة الرعاية الصحية في المملكة العربية السعودية وتحديد مختلف جوانب إدارة سلسلة التوريد التي تؤثر على جودة الرعاية الصحية، بما في ذلك المواصفات وخدمة ما بعد البيع والمعايير وعلاقات الموردين والتسليم، كما تهدف الدراسة إلى توضيح كيف يمكن لإدارة سلسلة التوريد أن تسهم في تحسين جودة الخدمات الصحية وتخفيض التكاليف بشكل فعال، حيث تُظهر الدراسات أنه في السنوات الأخيرة قد زاد الطلب على زيادة الربحية ومعالجة ارتفاع نفقات سلسلة التوريد للشركات الصحية، ويمكن لإدارة السلسلة الصحية الفعالة تقليل النفقات والإنفاق الهدر وكذلك تعزيز رعاية المرضى والسلامة، وتوسعت أهداف إدارة سلسلة التوريد الصحي لتشمل تعزيز الرشد السريع والمرونة، والتي تعد أساسية في زمن التحديات والتقلبات في ظروف العرض والطلب، وتسعى الدراسة إلى توفير نظرة على الفوائد المحتملة لتنفيذ ممارسات إدارة سلسلة التوريد في المجال الصحي.

Abstract

The healthcare industry is facing challenges such as rising costs, competition, and declining service reimbursement. Therefore, healthcare organizations need to adopt an efficient system that can handle these demands and improve their competitiveness while increasing customer satisfaction. This study aims to investigate the impact of supply chain management (SCM) on the quality of healthcare services in Saudi Arabia. The study focuses on the current state of SCM in the healthcare industry in Saudi Arabia and identifies the various aspects of SCM that affect healthcare quality, including specifications, after-sales service, standards, supplier relationships, and delivery. The study also aims to clarify how SCM can contribute to improving the quality of healthcare services while reducing costs effectively. In recent years, demand to boost profitability and address rising supply chain expenses has increased for healthcare businesses. Effective management of the health supply chain can reduce waste and wasteful spending while also enhancing patient care and safety. The goals of healthcare supply chain management have expanded to include enhancing supply chain agility and resilience, which is essential in times of rising uncertainty and volatility in both supply and demand conditions. The study seeks to provide insights into the potential benefits of implementing SCM practices in the healthcare industry in Saudi Arabia.

Table of Contents	2
Chapter One: Introduction	3-5
Study Aim	5
Study Significance	5
Study Methodology	5
Chapter two: Literature Review	6-7
Definition of Supply Chain Management	7
Supply Chain Management in Healthcare	8-10
Supply Chain Management System in Healthcare	10-15
How Supply Chain Management Can Reduce Costs and Enhance Quality in Healthcare Sector	15-16
Achieving High-quality Supply Chain Management System in Healthcare System	16-19
Supply Chain Management in Nupco Company in Saudi Arabia	19-20
The Role of Nupco Company in Improving Supply Chain Management in Saudi Arabia	20-23
Conclusion	23-24
Reference	25-29

Chapter One: Introduction

1. Introduction

The majority of organizational processes are intricate and varied. It is vital for businesses to integrate with their primary clients and suppliers in order to achieve external integration. Both suppliers and customers must be integrated because if they aren't, the business won't be able to properly integrate with the outside world (Mathew et al., 2013).

Supply chain management, which covers all procedures that convert raw materials into finished commodities, is the management of the movement of goods and services. It entails the deliberate simplification of a company's supply-side operations in order to optimize customer value and achieve a competitive edge in the market. Suppliers make an attempt to design and operate supply chains that are as effective and cost-effective as feasible through supply chain management (SCM). Production, product development, and the information systems required to manage these activities are all covered by supply chains.

The goal of supply chain is to develop value delivery systems so that businesses can become more responsive and adaptable to the rapidly changing times. As a result, the supply chain in the modern world is more interconnected than ever (Cohen & Roussel, 2013). The capacity to plan and manage a supply chain process is one of an organization's key competences, claim (Fawcett et al., 2012). This is particularly true now because managers must always come up with fresh ways to offer solutions in the rapidly evolving global marketplace.

The management of resources and cost optimization in healthcare nowadays revolve around maintaining patient health. Several subsystems are involved in carrying out the hospital's operations. To reduce costs and maximize resources, the majority of healthcare organizations are turning their unit processes into supply chains. (Bhutta, K. S. and Huq, F, 2002).

SCM often aims to centrally coordinate or link a product's manufacturing, shipment, and distribution. Companies can save unnecessary expenses and expedite the delivery of goods to customers by optimizing the supply chain. Internal inventories, internal production, internal distribution, internal sales, and the inventories of firm vendors are all closely monitored to achieve this. (Ravkovsla, et al., 2018)

The foundation of SCM is the notion that almost all products that are sold are the result of the efforts of numerous companies that are connected by a supply chain. Despite the fact that supply chains have been around for a very long time, most businesses have only recently recognized the value they can contribute to their operations.

Customer dissatisfaction, rising healthcare costs, competition, and declining service reimbursement are just a few of the issues that health organizations face in the face of new regulations. The adoption of a system that can handle these demands, deal with ongoing technological advancements, increase the cost of health services, boost their competitiveness, and increase customer satisfaction is forced upon health organizations by all of these considerations. (Ali et al, 2012). Administrators of private hospitals are increasingly in need of supply chain management in order to develop healthcare. (Hong et al, 2012, Toba et al, 2008).

In the healthcare industry, there is a dire need for more efficient supply chain management. For instance, COVID-19 exposed severe flaws in the U.S. healthcare supply chains as hospitals were forced to manage with shortages of personal protective equipment (PPE), ventilators, and essential drugs. However, in recent years, demand to boost profitability and address rising supply chain expenses has increased for healthcare businesses. In fact, it's been said that by enhancing hospital supply chain management, hospitals may save about \$12 million yearly. The primary goals of healthcare supply chain management are to improve visibility and efficiency throughout the supply chain. In recent months, these goals have expanded to also include the strategic objective of enhancing supply chain agility and resilience, which is essential in these times of rising uncertainty and volatility in both supply and demand conditions. By managing the health supply chain properly, supply partners will be better able

to identify and address bottlenecks, possible interruptions, and other problems that may arise anywhere along the end-to-end supply chain. It can reduce waste and wasteful spending while also enhancing patient care and safety. (Malik, et al., 2022)

1.1. Study Aim

The current study intends to clarify how supply chain management affects the standard of healthcare services in Saudi Arabia's hospitals and other healthcare departments. The aims can be explained in more detail as follows:

- o To determine the current state of supply chain management in the healthcare industry in Saudi Arabia.
- o To identify the various aspects of supply chain management including: (Specifications, after-sales service, standards, supplier relationships, and delivery) that affect the aspects of healthcare quality that involves (responsiveness, safety, and trust).
- o To clarify how supply chain management contributes to improving the quality of healthcare services with reducing costs effectively.

1.2. Study Significance

The importance of the study lies in the fact that it is crucial for enterprises in the healthcare industry since it lowers costs, improves supply chain effectiveness, and, depending on how it is applied, increases the value chain's agility and resilience. For patients, it is essential because it makes sure they can get the medications and therapies they require.

1.3. Study Methodology

A literature review study that involves an extensive evaluation of the frameworks, models, and published literature, including publications, studies and researches relating to supply chain management in healthcare generally and in Saudi Arabian healthcare particularly, which is the

first step in a literature review study. based on literature reviews and consideration of the advice of experts.

Chapter (2): Literature Review

(Hong et al., 2012), A study that found significant results related to supply chain management in healthcare, which are: The drivers of healthcare supply chain management, healthcare supply chain practices, healthcare supply chain policies and strategy, and healthcare supply chain, which are defined by a model put forth by the researcher. Their study covered the strategic focus on healthcare supply chain operations and healthcare cost performance as drivers of Korean settings for healthcare supply chain management.

Dobrzykowski et al. (2010) outlined the decentralized nature of the healthcare delivery supply chain, or the absence of conventional financial and contractual structures for supply chain member cooperation. It is suggested that the partner connection serves as a coordinating mechanism that might have an impact on a hospital's resource strategy, supply chain integration during care delivery, and integrative information integration.

Bozarth et al., (2009) presented four supply chain models that are used in 209 factories across seven European countries. The models, which were developed by the researchers themselves, were used in the study. The findings indicated that factories using a basic supply chain model had higher levels of success in terms of performance, but plants with a more complicated supply chain model had a negative impact on performance.

Moreover, in Jordan, Ali et al. (2012) study investigated the extent to which TQM was applied to hospital performance in Jordanian hospitals. The study examines the public (King Abdullah University Hospital, Irbid) and private health sectors (Jordan Hospital and Medical Center, Amman). The study's conclusions demonstrated a strong correlation between hospital performance and the eight TQM principles. Similarly, in the Jordanian setting, total TQM significantly improves hospital performance. (Abu-Kharmeh, 2012) has reviewed the level of medical care offered in Jordan. Five criteria were used to evaluate the quality: empathy,

tangibility, assurance, dependability, and responsiveness. The findings showed that the quality of the medical care given to patients in Jordanian hospitals was moderate; all aspects of service quality except for responsiveness and assurance factors were high. While reliability was ranked lowest, responsiveness came in first.

2.1. Definition of Supply Chain Management

A network, system, or process that focuses on the movement of materials from one side (production) to another side (distribution) in a single direction may be referred to as supply chain management. This process also involves the movement of information that offers control mechanisms (Rakovska & Stratieva, 2018). The process is a structure that consists of many different constituent parts, such as material suppliers, production machinery, distribution activities, and consumers. These parts are connected through the 'forward movement' of materials and the feedback connected to the flow of information. The supply chain, according to Syed (2012), is a network of institutions or organizations connected through upstream and downstream links, as well as other processes and activities that result in the production of value in the form of finished goods and services. The network must deliver high-quality products that satisfy the final consumer's interests and preferences for this to be considered a success (Altarawneh, et al., 2020). In a 2015 interview, James Spann, Practice Leader of Supply Chain & Logistics at Simpler Healthcare, defined supply chain as "the management of upstream and downstream connections between suppliers and consumers to offer higher customer value at less cost to the supply chain as a whole." (Seidman, et al., 2017)

The resources required to deliver goods or services to a customer are often referred to as the supply chain. Consequently, collecting resources, managing supplies, and delivering goods and services to providers and clients are all part of healthcare supply chain management. Physical items and data about medical goods and services typically pass through a variety of different stakeholders, including producers, insurers, hospitals, providers, group purchasing groups, and various regulatory bodies, to be completed. (Seidman, et al., 2017)

2.2. Supply Chain Management in Healthcare

The medical product manufacturer, where the products are made and delivered to a distribution hub, is where the healthcare supply chain begins. Hospitals can either acquire goods directly from the manufacturer or distributor, depending on the kind of product, or through a group purchasing organization, which negotiates a deal with the manufacturer on the hospital's behalf. (Chopra, et al., 2013)

Medical supplies are subsequently delivered to the healthcare facility, where they are put into inventory for both patients and providers. The group makes sure that both patients and healthcare professionals have access to potentially life-saving equipment.

The involvement of regulatory bodies, such as the Federal Drug Administration, and healthcare payers, such as Medicare and private health insurance organizations, is another facet of healthcare supply chain management. A medical resource's suitability for consumer use and its reimbursement for use on particular patients are decided by regulatory bodies and payers.

The healthcare supply chain has many participants, including pharmacies and pharmacists in all practice settings, hospitals and health systems, developers of pharmaceutical quality standards, and health insurance companies. However, manufacturers and distributors are crucial to the healthcare supply chain. The first link in the supply chain and the source of the essential medications and medical equipment are manufacturers. From the site of production via wholesalers and, in some cases, directly to a pharmacy or hospital, manufacturers control the flow of their product. The second link in the healthcare supply chain is the distributor. Distributors carefully maintain substantial inventories in key sites across the nation after purchasing medications and medical supplies in bulk from manufacturers. (Abdulsalam, et al., 2015)

Some wholesalers focus on dealing with a particular product category, such biologics, or with particular categories of clients, like nursing homes.

Building healthcare supply chains is a labor-intensive process that begins years before a medical product is ever authorized for patient use. Creating a supply chain for medicine, for instance, entails a variety of tasks, such as negotiating contracts with different vendors, guaranteeing the availability of a manufacturer's highly skilled labor force, and maintaining the vital quality control and testing systems required to ensure patient safety. (Abdulsalam, et al., 2015)

In the context of healthcare, a supply chain is the sequential use of physical and technological resources needed to provide patients with high-quality care that is also affordable. Manufacturers, Buyers, Distributors, and Providers are the four categories into which players in the healthcare supply chain can be categorized based on their functions. As shown in figure (), the production process can be managed by a series of steps or practices as: Demand/supply management, operation, production control, inventory management, distribution management, warehouse management, and transportation management. Which are just a few of the operations that logistics is engaged with in the production process (Heidari-Fathian and Pasandideh, 2017). First, logistics manages resources, like: The management of capacity (Stretcher, Wheelchair, and Ambulance), or the management of warehouses (Devices, Drugs, and Medical equipment). While the second, logistics manages workflow, such as shipping and routing (Stretcher, Patient, Ambulance, and Wheelchair).

The prevention, diagnosis, and treatment of illnesses, as well as the mental and physical disabilities that affect people, constitute the continual maintenance of health in humans. Pharmaceutical products, medical and surgical equipment, devices, and other items needed by healthcare professionals such as nurses, doctors, and administrative staff make up the logistics in the healthcare industry (Heinbuch, E. Susan, 2005). In the healthcare industry, prompt response, accuracy, and positive results are crucial. The SCM should improve the treatment's effectiveness and efficiency. It's a difficult responsibility to keep hospital regulations and standards in place while controlling expenditures. Aligning all subsystems is a challenging

task because each subsystem operates separately. Hospitals are currently working to pinpoint trouble spots where patient care and service quality could be enhanced. Transparency in all processes should be the main objective of SCM. Information flows ought to be centralized and promptly evaluated and modified. Information exchange between the manufacturer, providers, insurance companies, distributor, and patients should be transparent and clear. (Smith, et al., 2011)

Producers, buyers, and healthcare providers are the three main actors that make up the healthcare supply chain at different points. Manufacturers of devices, capital equipment, information systems, and pharmaceutical companies are producers. Manufacturers of medical and surgical products are also producers. GPOs, wholesalers of pharmaceuticals, distributors for medical and surgical products, independent contractual distributors, and product reps from manufacturers are some of the buyers. Hospitals, hospital systems, integrated delivery networks (IDNs), and facilities in alternative sites are examples of providers. (Toba et al, 2008).

2.3. Supply Chain Management System in Healthcare



Figure (1): Supply Chain Management in Healthcare

There are many different stakeholders in the healthcare supply chain as shown in figure (1). Each one is important to the way the supply chain runs. These parties involved include:

- **Manufacturers:** The laboratories, biologists, and vaccine developers are the manufacturers. They carry out the investigation, creation, production, and supervision. These organizations produce pharmaceutical, medical, and surgical supplies and keep an eye out for shortages.
- **Distributors:** Under the guidance of logistic partners and wholesale distributors, products are sold, delivered, and monitored.
- **Providers:** Pharmacies, urgent care clinics, hospitals, assisted living homes, dialysis facilities, and long-term care institutions are examples of providers. Products are delivered to these locations by distributors so that they can recommend them to patients. They phone in prescription refill requests, submit orders to distributors, and search for inventory shortages.
- **Patients:** The folks in the neighborhood who utilize these goods or services are the patients. Due to their specific requirements, they have an impact on the demand for medicines and other goods. (Moons, et al., 2019)

Due to cost management Healthcare firms now view supply chain management as a critical factor in achieving their objectives. In order to serve customer needs in the most effective manner, supply chain management (SCM) works with many categories of flows, including flows of items, flows of information, and flows of finances among the various supply chain partners (Chopra & Meindl 2007). The majority of the research on supply chains has been on using material flows to best suit supply and requirement. Also, controlling and managing the information flows within the supply chain is crucial for a competitive organization (Liu and Kumer 2003, Omar et al. 2010). Figure (2) show the healthcare stakeholders in health sector.

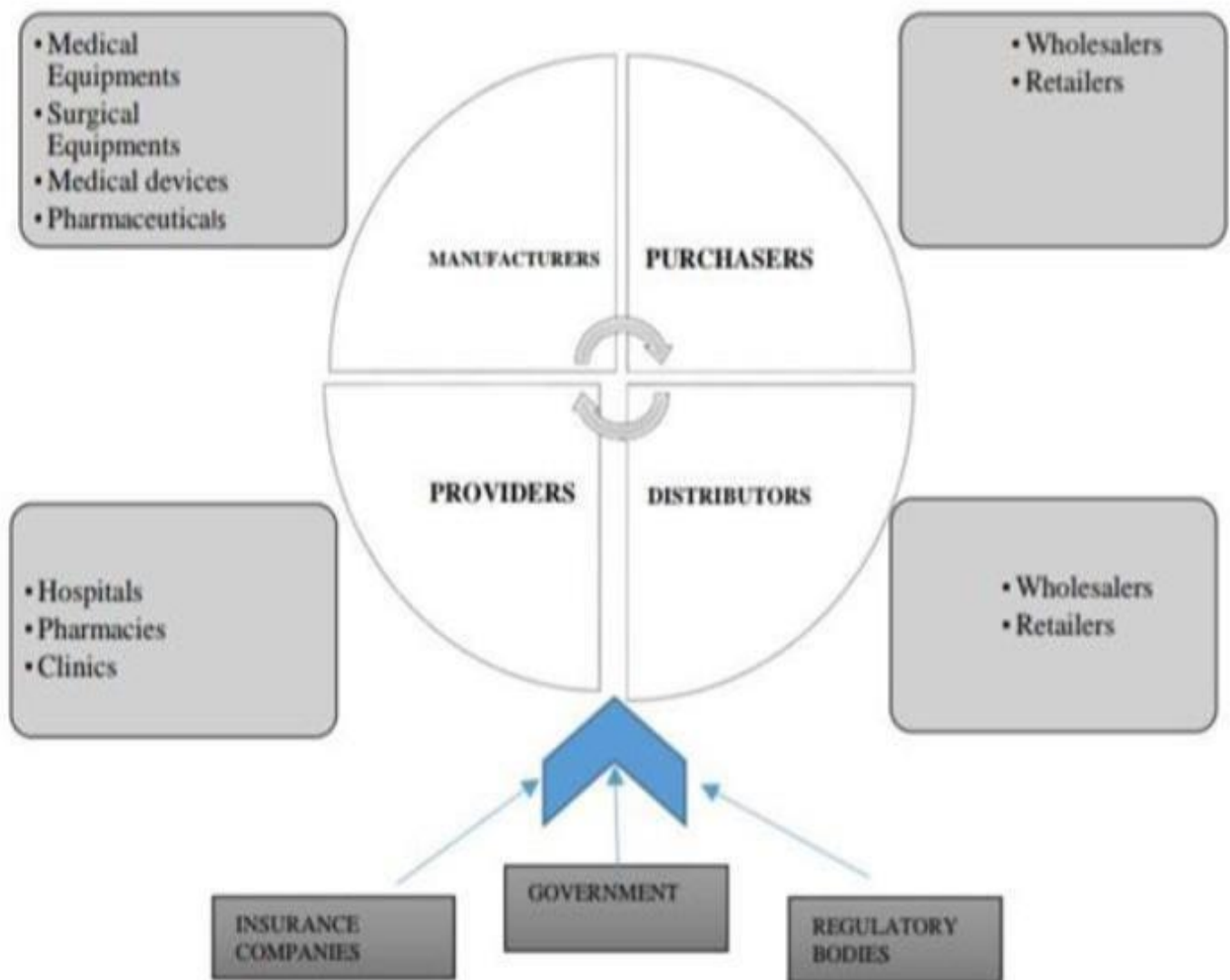
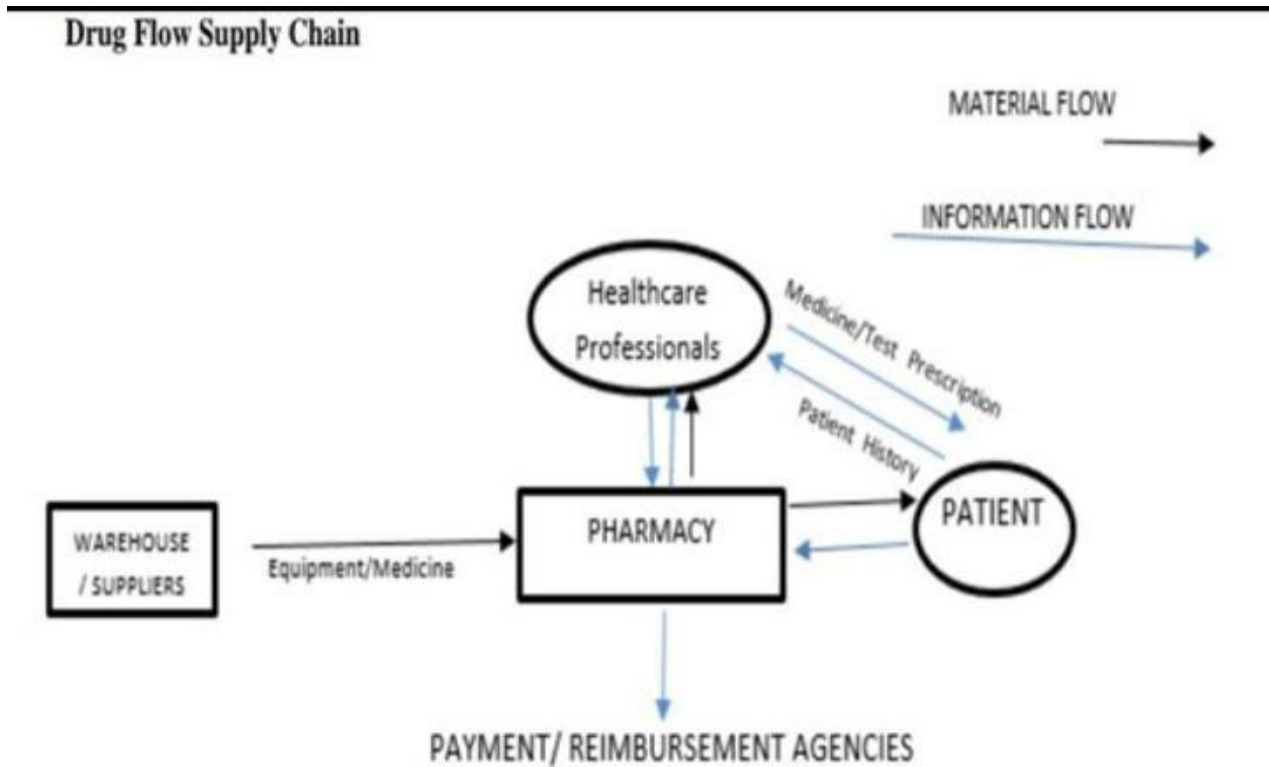


Figure (2): Healthcare Stakeholders (Arora, et al., 2018)

2.3.1. Supply Chain Management in Pharmacy

The hospital's main goal is to give patients adequate medical care. It essentially requires a sufficient supply of top-notch medications at pharmacies. For the hospital pharmacy to assure timely availability of medications at the lowest possible purchase price, supply chain

management is crucial. Different Vendors are required in the supply chain (Narasimhan, R., Talluri, S., and Mendez, D, 2001), Agreements with suppliers, the opening of bids, rounds of discussion, and the freezing of product delivery processes are all necessary since some medicines can only be carried at specific temperatures. It is challenging to foresee the precise demand for medicines. So, it is crucial to collect precise data on drug consumption in order to determine a trend. The supply chain is managed by general storekeepers in today's hospitals,

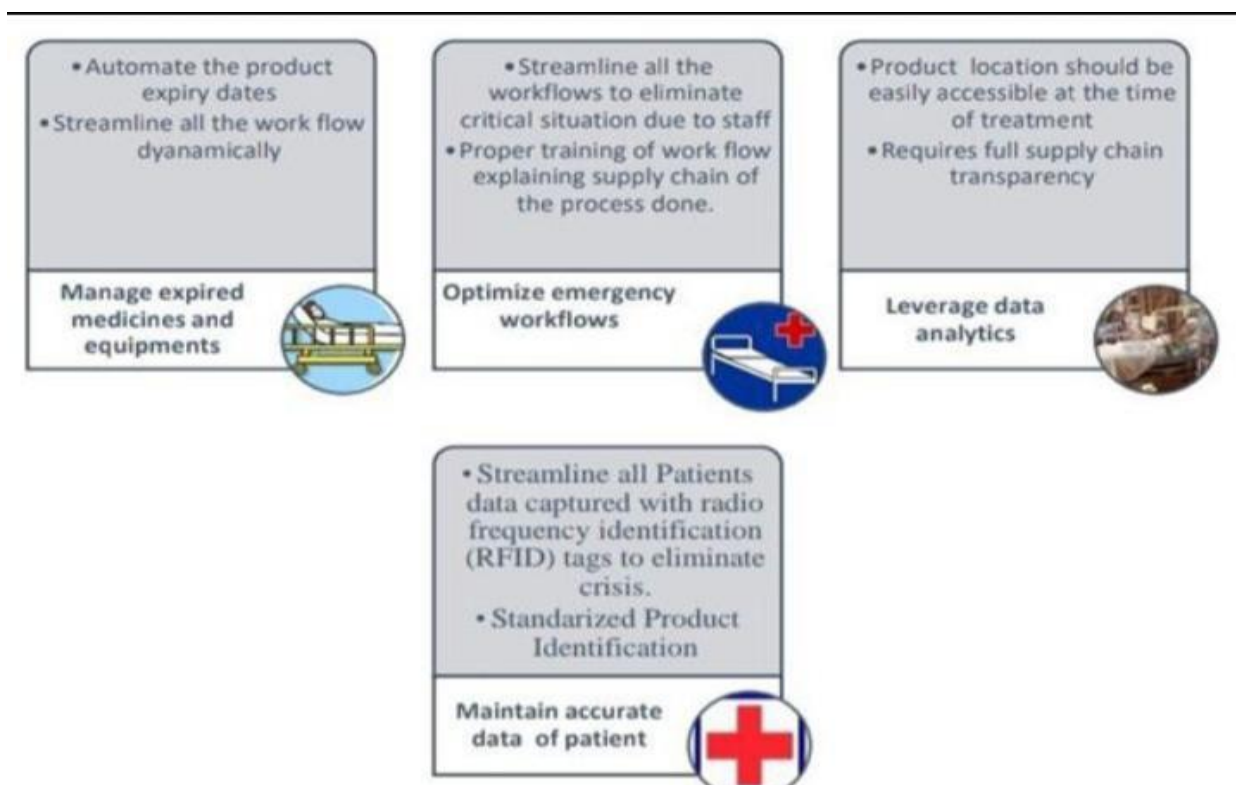


but because they are not well versed in supply chain management principles, this can occasionally result in either High Demand, Low Availability or Reverse, Low Demand but High Availability for some of the medicines, extending shelf life and increasing risk of medication expiration in pharmacy (Shah, N, 2004). Figure (3) has shown the supply chain management practices in pharmacy, particularly the drug flow supply chain management.

Figure (3): Drug flow in supply chain management (Arora, et al., 2018)

2.3.2. Supply Chain Management of Patient Safety

According to a previous study, there are 440,000 patient deaths every year alone as a result of avoidable medical mistakes and subpar safety practices. The healthcare supply chain is essential to preserving the vitality and smooth operation of business. Improved care quality and patient safety are supported by improved healthcare supply chains. Different hospitals have connected patient safety to all other operations in the right way, managing expired medications by automating product tracking and identification, then taking appropriate action



to provide staff and patients confidence in the care provided. To decrease the time it takes to find drugs, human error, and redundant processes, streamline all time-consuming supply chain procedures. The whole data sheet that a doctor records should be electronically recorded to reduce human mistake and redundancy (Acharyulu, G., 2012). To increase patient satisfaction and take into account that human life is of the utmost importance, all processes should adhere to supply chain transparency. Figure (4) explained the suggested practices that should be followed in order to enhance supply chain management of patient safety.

Figure (4): Patient safety supply chain management (Arora, et al., 2018)

2.3.3. Supply Chain Management in Blood Bank

The crucial issue in healthcare is the control of the blood supply. The hospital's objective is to manage the blood supply chain dynamically. According to a study, donor blood supply is erratic, hence the following issues need to be watched out for: places chosen for blood collecting sites, basis on the transfusion services supply that is needed, the quantity of local blood banks, How demand and supply should be balanced to achieve the goal, transporting blood as needed, Delivery systems must be connected closely in order to meet runtime requirements. For any situation, blood banks in hospitals or adjacent hospitals should be open around-the-clock (Bhutta, K. S. and Huq, F, 2002).

2.4. How Supply Chain Management Can Reduce Costs and Enhance Quality in Healthcare Sector:

- 1) An efficient supply chain may lower costs, increase productivity, and enhance patient outcomes for enterprises. Seven top practices are listed by VIE Healthcare Consulting as improving healthcare supply chains.
- 2) Replace or discard worn-out or broken equipment: To receive a discount for swapping the worn-out equipment, get in touch with the product's maker. Obsolete devices can be recycled or sold to distributors of medical parts.
- 3) Analyzing data to find inefficiencies: Real-time data analysis helps replace unnecessary scheduling, minimizes paperwork, and demonstrates how efficiently resources are being used. By locating patients who are most at risk for developing subsequent health issues, it also reduces readmissions.
- 4) Reduce the number of equipment vendors: While it is uncommon for a healthcare provider to buy all of its equipment and supplies from a single source, by reducing the number of suppliers it works with, it can streamline maintenance and repair, reduce paperwork and record-keeping, and save money on training expenses. (Miller, et al., 2020)

- 5) Bring together the department heads to discuss the difficulties they face jointly: While working together on a daily basis, departments within a healthcare service may have opposing or incompatible aims. Supply chain operations integration fosters shared perspectives across all divisions and enables prompt problem-solving.
- 6) Renting is preferable to buying rarely used equipment like MRI machines, CT scanners, and other pricey diagnostic and treatment devices because doing so frees up precious resources and may not be financially viable. When compared to purchasing, renting such equipment is far less expensive and frequently covers the cost of machine installation and maintenance.
- 7) Once a vendor secures a consistent contract with a healthcare service, they frequently grow complacent and may even raise prices without warning. This calls for an annual review of vendor prices. The healthcare provider can compare costs with rivals, request bulk discounts and other savings, and resolve delivery delays or other potential issues with an annual assessment.
- 8) Internal inventory audit: The audit will list the number and types of devices present as well as the maker, model, serial number, location, and state of each device.
- 9) Replace or discard worn-out or broken equipment: To receive a discount for swapping the worn-out equipment, get in touch with the product's maker. Obsolete devices can be recycled or sold to distributors of medical parts. (Miller, et al., 2020)

2.5. Achieving High-quality Supply Chain Management System in Healthcare System:

The impact of supply chain management on the quality of healthcare relates to administrative and medical service quality. Quality can be assessed from a medical professional's point of view, from the patient who will be receiving the services, or from an administrative one, which is the topic of this study. From an administrative standpoint, the quality of healthcare services must largely make use of the resources already in place and the capacity to recruit new ones in order to meet the demands of outstanding service, which offers the appropriate service at the right time at an affordable price. The provision of high-quality healthcare at an affordable

price and resource optimization should never come at the expense of a quality performance, which calls for effectiveness during the planning and execution phases, professional and personal competence, and finally, an internally structured philosophy to deal with outside parties (Ayers. 2010). (Omar et al., 2010), added that supply chain management (SCM) encompasses the control of product, information, and financial flow from the point of origin of suppliers through manufacturing and assembly, right up to the delivery of the finished product to customers. In order to meet consumer needs, supply chain partners must manage the flows of goods, information, and funds. This is known as supply chain management (SCM). (Chopra and Meindl 2007).

More precisely, the growth of public relations with the health industry as a whole is necessary for the quest for new resources. The hazy and convoluted administrative organizations are blatant examples of this demand for human relationships. The health system is generally ambiguous and complex, necessitating a great deal of work to promote administrative quality. This highlights the significant value of supply chain management and how it helps to guarantee the caliber of medical care.

To guarantee that patients receive high-quality care, it is essential to optimize the healthcare supply chain. Despite having stringent regulatory standards, the healthcare supply chain still has room for improvement. Use the advice below to improve supply chain efficiency:

1. Streamline the Supplier Base

The healthcare supply chain can be easily optimized by managing the vendors. Supplier consolidation may be straightforward if:

2. Establish mutually beneficial relationships with your providers.

Initiate retendering to enhance supplier competition, increase market understanding, and potentially create open contracts.

Conduct monthly, quarterly, and yearly performance reviews.

3. Performer Center

Establish a hierarchy of valuable supply chain metrics that are outcome-based. Analysis of the trade-offs between important performance indicators should be possible using these performance measurements (KPIs).

A KPI model that focuses on the quality, service, expenses, and income of your complete supply chain is also an option. Target each link in the organization's supply chain and record performance information in real time.

4. Put standardization into action

Healthcare corporations frequently expand by buying other businesses. This circumstance may cause all the various systems and processes to interact with one another.

Use a framework like the Supply Chain Operations Reference (SCOR) model to standardize the processes for the financial and physical components. You may then apply and enforce standards throughout the entire supply chain by doing this.

5. Increasing visibility

You should be able to accurately monitor inventory and determine where products are located at any given point in your supply chain. Collect all of your data in one place to accomplish this. Data from manufacturing facilities, distributors, suppliers, goods, modes, customers, and other sources are included in this process.

After that, you will need to completely upgrade your data analysis skills via software platforms, artificial intelligence (AI), or outside services. (Office of Inspector General of the Department of Health and Human Services US, 2020)

6. Calculating Expenses

A better understanding of costs, particularly their magnitude and source, would be advantageous to many companies. Begin by compiling information on your costs for goods

and services. You can benchmark, evaluate, and search for patterns in the data using common categories.

You can identify where you have opportunity to cut costs by analyzing the invoice. You can spot unusual patterns and put new waste-reduction techniques into place. (US Department of Health and Human Services, 2020)

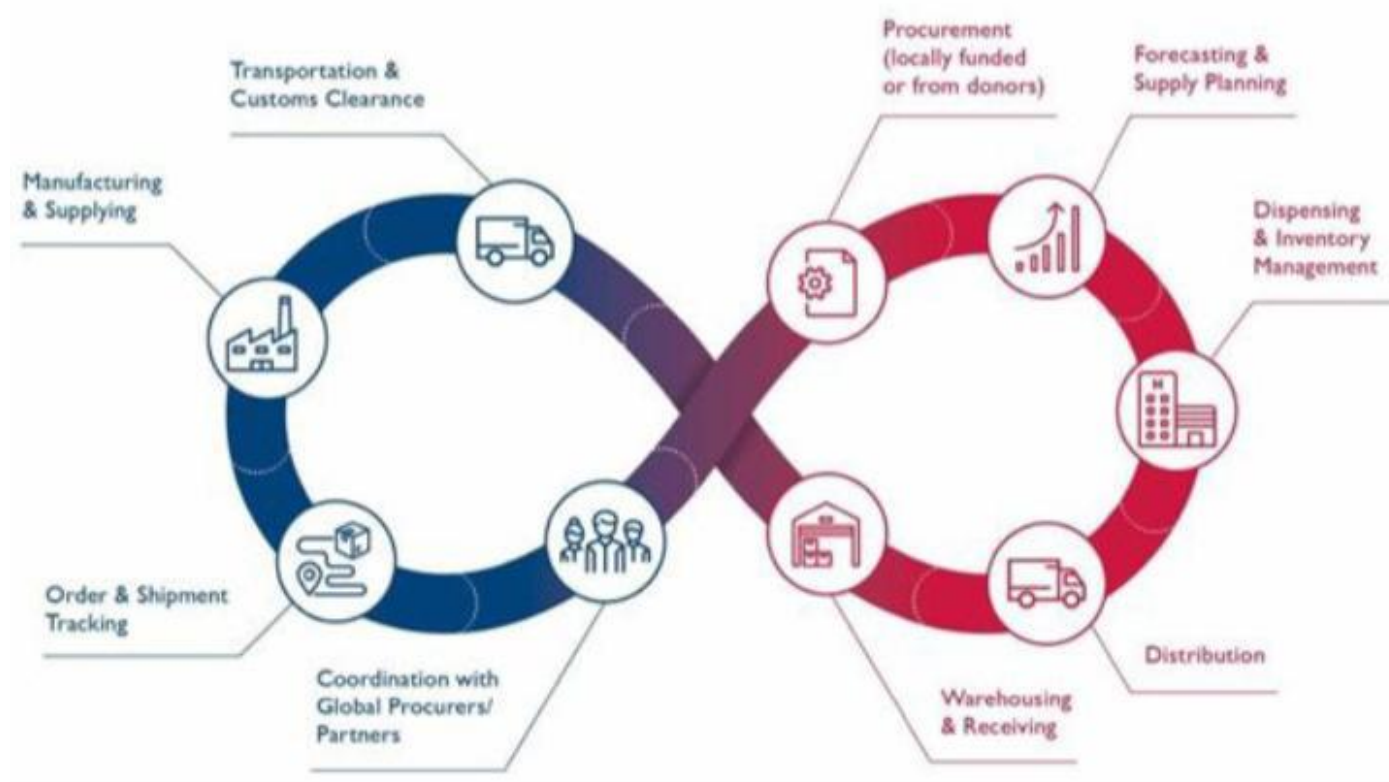


Figure (5): Supply Chain Management System

2.6. Supply Chain Management in Nupco Company in Saudi Arabia

The largest value-driven and centralized pharmaceutical, medical equipment, and supply procurement, re-exporting, warehousing, and distribution company in the Kingdom of Saudi Arabia is called Nupco. Nupco, which was established in 2009 and is wholly owned by the Public Investment Fund, intends to improve the quality of care provided by all public hospitals and healthcare facilities in the Kingdom.

Nupco equips healthcare organizations to provide everyone with excellent, cost-effective treatment thanks to its deep insights and robust worldwide network.

With the power of included technology and connection, Nupco Company, along with its member hospitals and suppliers, is progressing toward supporting a new business model and a new approach to healthcare. (Supply chain challenges in the Global Healthcare Sector.)

Nupco provides its clients with high-quality services through its targeted and astute approach to enhancing healthcare facilities at the governmental level. It helps them provide the greatest healthcare services by giving the demands of the patients top priority. For the benefit of the entire Saudi population, Nupco increases its appropriate market share in the healthcare sector. The Saudi Arabian medical supply chain has been reevaluated and strengthened primarily according to two significant players. The National Unified Procurement Corporation (NUPCO) is in charge of supply chain management and the acquisition of medical goods and equipment, whereas the Saudi Food and Drug Authority (SFDA) regulates and monitors foods, medicines, and diagnostic tools. There are now more and better pharmaceuticals available, and self-sufficiency has improved as a result of the companies' strategic focus on strengthening the medical supply chain through competition and open, thorough operations and processes. Given the extensive requirements of the

COVID-19 pandemic, these developments were very beneficial. (NUPCO Company Website)

2.7. The Role of Nupco Company in Improving Supply Chain Management in Saudi Arabia

In order to build national supply chains both domestically and externally, NUPCO has played a significant role in developing and establishing local and international collaborations. The importance of suppliers with established ties to the Saudi healthcare business is partly diminished as the corporation awards contracts more and more primarily on the strength of supporting data. This shift in dynamics may make some businesses feel excluded, but the level playing field it has created and the speed with which a company's product is distributed throughout Saudi Arabia's healthcare system after winning a tender should encourage competition in the domestic market and strengthen the supply chains of a sector whose continued growth is crucial to the Kingdom's achievement of its Vision 2030 goals. (NUPCO Company Website)

Blue Yonder and the National Corporation for the Unified Procurement of Pharmaceuticals, Devices, and Medical Supplies (NUPCO), a Saudi Arabian healthcare supply chain organization, have successfully integrated a number of digital supply chain solutions.

NUPCO is the top supplier of medical procurement, storage, and distribution services for drugs, devices, and medical supplies to 400 hospitals in the Kingdom and is wholly owned by Saudi Arabia's Public Investment Fund (PIF).

NUPCO is working with its hospitals and suppliers to develop toward supporting a new business model and new approach to healthcare, all through the power of integrated technology and connectivity, in order to realize its goals related to Vision 2030. . (Alotaibi, 2021) Nupco supports the health industry in a significant way by:

1. Utilizing technology to boost the health sector's effectiveness.
2. Improving the effectiveness with which resources are used.
3. Infrastructural upgrades and higher safety requirements in hospitals.
4. Enhancing patient care and quality of life outside of hospitals.
5. Improving service provider abilities, quality, and safety.

6. Promote regional content.
7. Complete support, consideration, and investment in the professional growth of its staff members.
8. Maximizing all opportunities for its staff and giving them access to cutting-edge technologies.
9. The top contract management and material management operational systems in the world.

Despite the company's recent foundation, it has a distinctive work environment built upon the highest quality standards and has earned the credentials of the first positions in the Kingdom.

The worker at Nupco is an important business partner in his line of employment.

All departments working together as a team. . (Alotaibi, 2021) Blue Yonder will enable NUPCO to:

- All hospitals should receive low-touch statistical forecasts, and the level of cooperation with these clients should be raised.
- Increase client satisfaction by providing long-term visibility into demand and inventories for planning purposes.
- Boost internal stakeholder cooperation to decide on the best demand and supply strategies for hospital consumers.
- By using the proper-sized inventory, you may reduce waste and working capital.
- The WMS should be standardized and templated to make it easily scalable across all existing and future warehouses, offering comprehensive business intelligence through reporting and dashboards and automated end-to-end procedures for continuously high service standards and cost optimization.

With Blue Yonder, NUPCO now has planning solutions that can seamlessly connect to its warehousing system, providing confidence and better control of its entire supply chain, ensuring end-to-end visibility of products to ensure inventory is sized appropriately and ensuring supplies are getting to the hospitals who need them to provide care.

The WMS substantially streamlines the administration of intricate warehouse operations, offers real-time interruption response, and optimizes each action in its warehouses to increase throughput and agility. (Alotaibi, 2021)

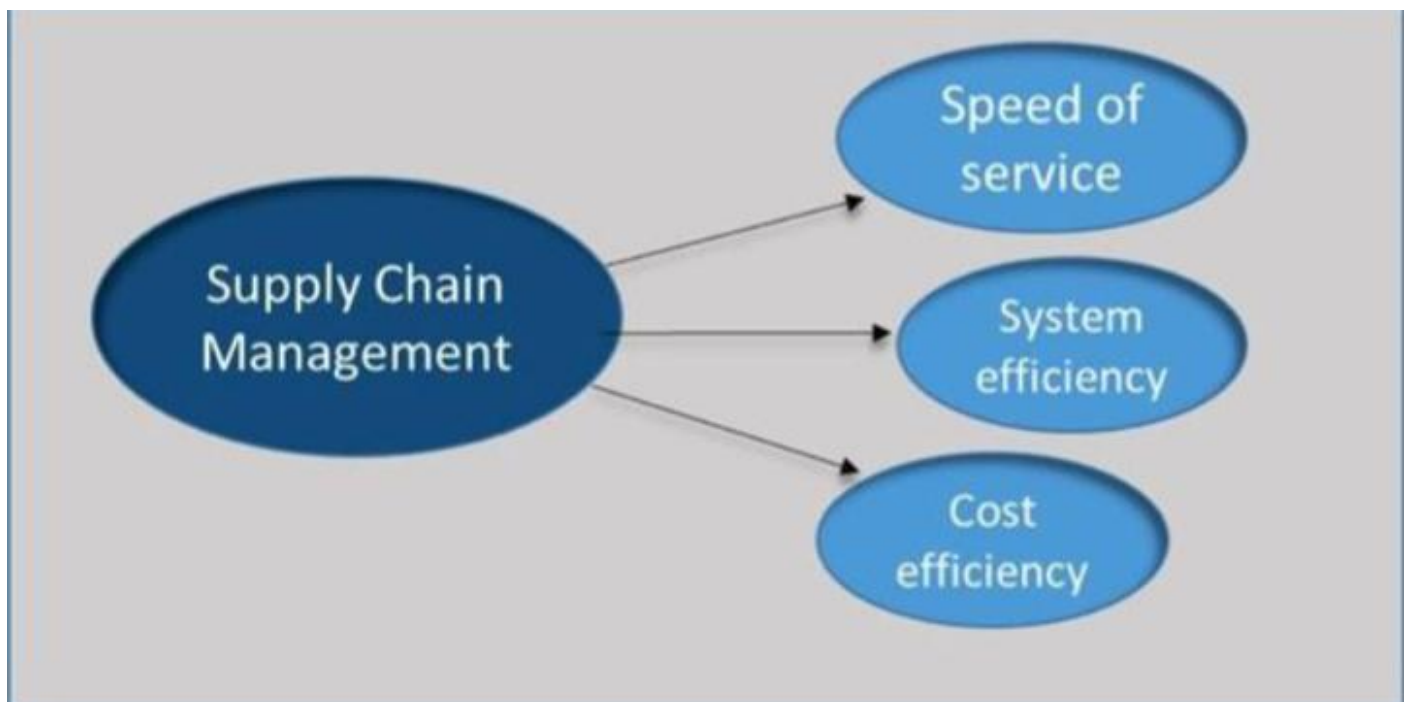


Figure (6): Role of Supply Chain Management

Conclusion

Both small and large healthcare businesses, as well as individual healthcare professionals, are directly impacted by the healthcare supply chain. Cotton swabs, personal protective equipment (PPE), high-tech biomedical imaging devices, and cancer-treating interferon are just a few of the supplies needed to ensure that patients around the world receive the best care possible. To ensure that medical requirements are satisfied globally, all providers and suppliers in the global healthcare supply chain must collaborate. In order to secure dependable sources for the materials and machinery that are essential to a healthcare provider's operation, executives trained to foresee and overcome the particular logistical issues that the healthcare industry encounters are leading this endeavor. Logistics of Healthcare Supply Chain entails a number of procedures, the involvement of personnel from many teams, and the transfer of goods that healthcare professionals need to do their duties, such as medications, surgical instruments, and other products. Supply Chain in Healthcare seeks to identify departmental weaknesses and recommend solutions to strengthen them. To attain specific health outcomes and enhance investments in global health, it tries to pinpoint problem regions. The benefits of a good supply chain in the healthcare industry include enhanced operations, efficient resource usage, content staff, successful treatment, and contented patients. To achieve the goals, an integrated supply chain should be used in hospitals. The supply chain ensures that hospital departments, operations, and the revenue cycle are properly linked. The supply chain might be visualized as an ongoing backend software that is required to integrate all the various processes. The supply chain ensures that the proper medication or product is available when it is needed, reducing inventory waste, enhancing patient care, coordinating efforts across all departments, and reducing human error and pharmaceutical errors. This can be done by taking several actions, such as merging different systems, streamlining processes, and utilizing RFID technology, standard product codes, and global identification numbers (GIN). A new model that illustrates the impact of supply chain management characteristics on service quality measurement in the healthcare industry was established as part of the current study, which was literature-based. The study furthered our understanding of the significance of supply chain management in the service industries and how it affects service quality in addition to reducing costs of healthcare services.

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