

Application of Big Data to Predict Future demand forecasting in Supply chain Management

Divyani Nagesh Jadhav

Master of Science in Information Technology
University of Mumbai
M.L. Dhanukar College of Commerce
Ville parle(East),India

Abstract- This review examines the paper "Application of big data to predict future demand forecasting in supply chain management."

In Supply Chain Management (SCM), when we talk about "application," we're referring to using different tools, software, ways of doing things, and smart strategies to make the whole supply chain work better. For example, technologies like RFID and GPS help us keep track of things in real time, so we can see where our stuff is and avoid delays.

Special software, such as ERP, WMS, and TMS, helps organize our business processes and handle things like inventory and transportation more efficiently. Approaches like Lean and Six Sigma are methods we use to reduce waste and make things run smoother.

Big plans, like making our supply chain respond to what customers want, are part of our strategies. Good planning, using tools and smart calculations, helps us forecast, schedule, and manage our stock better. Doing things, like buying, making, and delivering products, is the execution part, where we might use robots and automation to be faster and more accurate. Checking on everything as it happens (monitoring) helps us catch and fix problems quickly.

Always trying to do better (optimization) is like fine-tuning our processes using data and smart technology. By using all these tools and methods, companies aim to have a supply chain that's flexible, quick, and cost-effective, making customers happy and staying competitive.

Keywords: Supply chain management, Applications, Tools , Software , Technologies , RFID , GPS, ERP, WMS, TMS, Lean, Six Sigma ,Planning, Execution ,Monitoring, Optimization, Customer satisfaction , Competitive.

I. Introduction

Demand forecasting is like predicting how much of a product people will want in the future. But how good that prediction is depends on the quality and amount of information we have, the methods we use to calculate the prediction, and the experience we bring in.

To make a more accurate prediction, supply chain managers often use different ways of forecasting, each with its own methods. How close our prediction is to what actually happens depends on how good our information is and if things outside our control match what we thought would happen.

Forecasting in the supply chain, crucial for predicting future product needs, relies on tools like ERP, WMS, and TMS. ERP, or methods and models like Cost Transparency, Collaboration Efficiency, and Network Perspective enhance forecasting and overall efficiency in supply chain management.

Looking ahead, Big Data emerges as a transformative force, fostering strong partnerships.

This helps us choose the best forecasting methods for the job. For example, do we want to know how much people usually buy at certain times of the year, so we can plan how much to have in stock? Or do we need to use data to find weak points in our supply chain? Looking at past sales can give us an idea of what might happen in the future, but we also need to consider many other things. It's just one piece of the puzzle.

2. Software & Applications

In the world of Supply Chain Management (SCM), using advanced applications is like having powerful tools to make everything work better. These applications, like ERP (think of it as super-smart planner), WMS (a organizing warehouses), and TMS (for transportation), are game-changers. They help businesses run smoother, make smart decisions, and stay flexible in a fast-paced market.

SCM, which is all about making sure things move smoothly from making products to getting them to customers, has gotten a major upgrade with these high-technology applications. They come with innovative techniques and models that make a big difference. By using them, businesses can be more creative, make better choices, and stay competitive in the global market that's always changing.

Enterprise Resource Planning (ERP), Warehouse Management System (WMS), and Transportation Management System (TMS) are critical software components in Supply Chain Management (SCM). These systems play a vital role in streamlining and optimizing various aspects of the supply chain. Let's explore how methods and models, including predictive modeling, can be applied with in these software systems:

2.1 ERP

Enterprise resource planning (ERP) refers to a type of software that organizations use to manage day-to-day business activities such as accounting, procurement, project management, risk management and compliance, and supply chain operations. A complete ERP suite also includes enterprise performance management, software that helps plan, budget, predict, and report on an organization's financial results.

ERP systems tie together a multitude of business processes and enable the flow of data between them. ERP has evolved from older systems to more modern cloud-based ones, providing real-time data and options to customize. Using ERP well is important for getting the most out of it and making a business run smoothly.

Today, ERP systems are critical for managing thousands of businesses of all sizes and in all industries. To these companies, ERP is as indispensable as the electricity that keeps the lights on.

2.2 WMS

A Warehouse Management System (WMS) is a software that helps businesses keep track of their inventory and manage the movement of products from the warehouse to the store. It optimizes the use of labour, space, and equipment. Designed for global supply chains and various industries, WMS is crucial in today's fast-paced market where customers want to buy, fulfil, and return anywhere. Our cloud-based WMS system ensures efficient inventory management and quick response to consumer needs, accessible via smartphone and browser.



2.2.1 Benefits of WMS

A Warehouse Management System (WMS) is like a helpful tool for businesses that deal with inventory. Here are five good things it does:

a.Easier Work: WMS makes warehouse jobs easier by automating tasks. It helps get products in and out more smoothly, reduces mistakes, and can handle more stuff. It also shares information with other systems for a complete picture.

b.Less Waste, Lower Costs: WMS is smart about handling things like food that can go bad. It figures out what to pick first to avoid waste. It also helps organize the warehouse to save time and money.

c.Helps Workers: WMS predicts how many workers are needed, plans their schedules, and helps them work more efficiently. It makes the warehouse a better place to work.

d.Happy Customers and Suppliers: WMS makes customers happy by getting orders right and delivering faster. Suppliers also benefit because things move faster, improving relationships for everyone.

2.2.2 Transforming Warehouses with Smart Tech:

a. Smart Machine:

Smart machines doing warehouse tasks.
Makes things faster, reduces mistakes.

b. Voice-Guided Picking:

Workers use voice instructions instead of paper.
Makes work easier, fewer mistakes.

c. Mobile Efficiency:

Workers use smartphones for tasks.
Makes work faster, important for managing warehouses.

d. AI and IOT in Warehousing:

Smart systems and connected devices improving warehouse operations.
Quick adaptation, smarter decisions for businesses.

e. Robots in Warehouse:

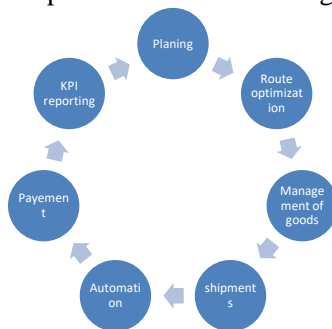
Smart systems and connected devices for better warehouse operations.
Helps businesses adapt quickly, make better decisions.

f. AR (Argument Reality) and VR (Virtual Reality) Applications:

Technology adding information to the real world or creating a virtual one.
Gives instructions in a efficient way, makes work easy.

2.2.3. TMS

A Transportation Management System (TMS) is a smart tool that helps businesses efficiently move goods, ensuring compliance, proper documentation, and timely deliveries. It's part of the larger supply chain management, providing visibility into daily transportation operations and streamlining shipping processes for land, air, or sea transport. In essence, it's like a wizard ensuring smooth and optimized movement of goods.



- **Planning and Forecasting:**
- Strategically anticipating network needs.
- **Route Optimization:**
- Efficiently planning cost-effective routes.
- **Carrier Management:**
- Centralizing control over carrier relationships.
- **Shipment Execution and Tracking:**
- Facilitating real-time tracking and execution of shipments.
- **Process Automation**
- Automating tasks like load booking and tendering.
- **Payment and Settlement Handling:**

-Managing financial transactions for transportation.

- **Network KPI Reporting:**

- Generating reports on key performance indicators for network evaluation

***Application Processes:-**

ERP	WMS	TMS
<ul style="list-style-type: none"> •Accounting •Invoicing •Management 	<ul style="list-style-type: none"> •Order picking •Tracking •shipping 	<ul style="list-style-type: none"> •carrier rating •route •optimization

3.Big Data Methods and Models

3.1.Cost Transparency:-In supply chain management, the concept of "Cost Transparency" involves analyzing historical trade costs and patterns to make informed predictions for future analysis. By examining past transactions and considering factors like pricing strategies, market trends, and supplier performance, supply chain managers can uncover valuable insights. This information helps in predicting potential challenges, optimizing procurement decisions, and strategizing for future transactions. Essentially, "Cost Transparency" in supply chain management serves as a tool to enhance forecasting and make more informed decisions for efficient and cost-effective operations.

3.2. Working Together for Efficiency:-In the world of supply chain and logistics, companies managing goods for multiple businesses find it beneficial to work together more efficiently. This collaboration, emphasizing efficiency, helps minimize costs and save time. By aligning efforts, they enhance overall effectiveness and achieve cost savings in the process.

3.3. Delivery Team Savings:-In the logistics world, your delivery helpers (3PL) work with other companies too. That's great news because it can save everyone some cash. Here's where "Network Perspective" (NP) comes into play.

With NP, they check out the other businesses your helpers are working with and find ways for them to team up even more. It's like finding new pals to share costs without any formalities. This simple approach helps everyone save money by teaming up in the delivery world.

3.4. Easy Material Control for Your Business:-

When you sell things online, and logistics provider helps with storing and shipping, it's important to manage stuff easily. But it's not just about sending out things. Many companies use something called materials control to get affordable raw materials.

Material control is about planning, getting materials, storing, making things, and sending them out. It makes sure your materials arrive on time for making your final product.

When you use a third party logistics(3PL) for material control, they're good at talking to get you better deals. Since they work with many businesses, they can bring down costs for everyone. It's a simple and smart way to handle materials for your business.

3.5. Smart Planning with MRP:-MRP helps businesses plan smartly for making things without having too much stuff. It's like a money-saver, stopping them from buying too many materials and saving on storage costs. MRP is all about buying and getting materials delivered.

***Two MRP Types:-**

Independent Demand: For finished items like cell phones.

Dependent Demand: For parts like phone chips, batteries, or screens.

Even though it doesn't directly deal with raw materials, MRP covers both types of buying. It's a simple and clever way for businesses to plan and save money on what they need to make products.

3.6. Achieving Quality Excellence:-Total Quality Management (TQM) ensures top-notch performance across the supply chain, from staff training to customer satisfaction through reverse logistics. TQM's comprehensive approach focuses on improving every aspect for excellence, making it a straightforward path to quality.

3.7. Streamlining with 3PL's RCM:-A successful partnership with a 3PL relies on Requirements Chain Management (RCM). This involves aligning the supply chain with your needs through open discussions, ensuring efficiency without compromise.

3.8. Navigating Your Supply Chain Strategy:-

Creating a supply chain strategy is like making a detailed map for your whole system. It's a smart plan made through research and teamwork with your 3PL. Together, you figure out how your supply chain should work, thinking about everything. The strategy aims to align goals, handle risks, add value, and keep track of important metrics.

4.Future need of Big Data in scm

In today's supply chains, Big Data is making things better. It's changing how businesses connect with others, make things, predict what people want, handle deliveries, and keep important machines running. With Big Data, supply chains work smoother, faster, and focus more on what customers need. It's like having a power that makes everything in the supply chain better and easier.

4.1.Stronger Partnerships with Suppliers:Big data makes working with suppliers better, building strong partnerships for reliable supply chains.

4.2. Smarter Manufacturing: Big data, manufacturing gets smarter, making our processes efficient and orders seamless.

4.3. Customer-Centric Planning:Big data gives us a complete view of customers, helping us predict and meet their needs on time.

4.4. Effortless Logistics:Big data keeps deliveries smooth, reducing errors and ensuring our warehouses work perfectly

5.Result:

This report looks at how three technologies—Enterprise Resource Planning (ERP), Warehouse Management System (WMS), and Transportation Management System (TMS)—are changing the way businesses manage their supply chains. ERP helps businesses make quick decisions by bringing all their processes together, saving money and making things run smoother. WMS helps with managing products and deliveries efficiently, saving costs and making work easier for employees. TMS focuses on making sure products get to customers on time, making operations more efficient. When these technologies work together, they bring many benefits like saving costs, working more efficiently, making customers happy, and giving businesses a competitive edge in the market.

6.Conclusion:

In summary, the combination of ERP, WMS, and TMS has really upgraded how companies handle their supply chains. They help predict demand and make smarter decisions. ERP plans everything, WMS organizes inventory, and TMS ensures on-time deliveries.

Various methods like cost transparency and smart planning boost supply chain efficiency. Looking ahead, Big Data promises better supplier ties, smarter manufacturing, and smoother logistics.

To wrap it up, this modern supply chain approach, using technology and Big Data, helps businesses save money, work better, keep customers happy, and stay competitive. It's all about using technology for success in today's rapidly evolving business landscape.

REFERENCES:

1. <https://www.hollingsworthllc.com>
2. <https://journalofbigdata.springeropen.com/articles/10.1186/s40537-020-00329-2>
3. <https://www.supplychainbrain.com/blogs/1-think-tank/post/36662-what-will-shape-supply-chains-in-2023-trends-and-predictions>
4. <https://www.investopedia.com/terms/e/erp.asp>
5. <https://www.sap.com/india/products/scm/extended-warehouse-management/what-is-a-wms.html#:~:text=A%20WMS%2C%20or%20warehouse%20management,until%20the%20moment%20they%20leave.>
6. <https://www.ksolves.com/blog/big-data/applications-of-big-data-analytics-in-supply-chain-management>
7. <https://www.threadinmotion.com/en/blog/the-role-of-big-data-in-logistics-and-supply-chain-management>