

# A NOVEL APPROACH TO TACKLE INFORMATION COLLECTION ISSUES USING BIG DATA IN GLOBALIZED SUPPLY CHAIN MANAGEMENT

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*Abstract - With different aspects of supply chain scattered around the world, and with an increasingly complex process for getting products to customers, data collection and oversight can be a huge task. While big data analytics is helping some supply chain managers tackle the problem of information collection, it is still a large problem that has emerged alongside globalization. This manuscript manifests that a centralized dataset is kept which is continuously in sync with other datasets and suggest all the changes to be made.*

**Keywords - Supply Chain Management, Big Data Analytics**

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## I. Introduction -

Supply Chain Management (SCM) is the management of the flow of goods and services and includes all processes that transform raw materials into final products. A supply chain is a network of facilities and distribution options that performs the functions of acquisition of materials, a metamorphosis of these materials into intermediate and final products, and the distribution of these final products to customers. Supply chains exist in both service and manufacturing organizations, although the complexity of the chain may vary greatly from organization to organization [1]. It involves the active streamlining of a business's supply-side activities to maximize customer value and gain a competitive advantage in the market environment. SCM demonstrates an effort by suppliers to bolster and implement supply chains that are as efficient and affordable as possible. The scope of supply chains includes everything ranging from production to product development to the information systems needed to direct these undertakings. The nature of the job of integrating sustainability in supply chain management is complicated and tends to result in conflicts. Furthermore, where conflicts have arisen a resolution framework in supply chain management research is not yet available [2].

In the information era, myriad amounts of data have become available on hand to decision makers. Big data refers to datasets that are not only huge but also high in variety and velocity, which makes them arduous to handle using traditional tools and techniques. Due to the exponential growth of such data, solutions need to be examined and provided in order to handle and extract value and knowledge from these datasets. Furthermore, decision-makers need to be able to gain valuable inputs from such varied and rapidly changing data, ranging from operational transactions to customer interactions and social network data. Such value can be fed by big data analytics, which is the application of advanced analytics techniques on big data.

Big Data facilitates supply chains to enhance services and efficiency by syncing product and external data with business decisions[4]. Big Data proffers huge opportunities to supply chain organizations, as crucial information contained within multiple data sources can now be consolidated and analyzed[4]. These new perspectives can discover the insights imperative to understand and solve problems that were previously considered oblique. New insights can also encourage organizations to escalate intelligent systems across all activities in the supply chain, embedding intelligence in each part of the supply chain business.

One of the key benefits of big data analytics regarding supply chain management is providing efficient customer service. By accelerating the source of supplies in convergence with customer orders, quicker service is delivered economically[7]. Another benefit of big data analytics is to track and monitor real-time orders and shipments. Knowing the precise location of packages, whether receiving supplies or outgoing orders, is vital to scheduling and in turn, service. Since today's technology lets consumers know the exact location of a package, customers expect a business to be able to feed that information when required[7]. If business is over-manufacturing or manufacturing at the wrong time i.e. when consumer demand is not there then chances are there of losing revenue. Data on sales trends, along with technology advances and equipment upgrades can help an organization to analyze the future usage of any product beforehand regarding the actual orders. This allows an organization to work on a proactive ground to fulfill those orders. By increasing or slowing down production of particular items, the speed of filling orders can be increased. Before a product is delivered to the customer, it passes through a line of multiple suppliers that specialize in transportation, third-party logistics, packaging, etc[7]. However, with so many stops along the way, there are ample chances for errors to occur such as delays, wrong deliveries, and other problems.

Big data assist organizations which are unable to provide sufficient stock to their potential customers[7]. Big data solution provides a real-time outlook of the product demand, product sales, and sourcing process. Moreover, once the big data solutions are applied, retailers can stop highlighting certain products as 'backordered' as they always know the exact lead times for producing them. Retailers would distribute catalogs so that their potential buyers can go through it and pick out the items they desire. Personalization is key, and irrelevant product offerings can lead to irritation of customers.

The drawbacks of integrating big data in your organization's supply chain process can seem arduous. It often requires extending the capabilities of present business systems as well as implementing new software tools. There are ways to avoid these concerns. For example, it may be comparatively easy to implement the solution in one department than implementing the system enterprise-wide. The initial implementations will help quick-wins for the organization while the learning will profit following implementations. Big data analysis is not useful for short time-scale. It needs to be analyzed for a longer duration to leverage its advantages[8].

## II. Literature Review -

Before the 80s the information sharing within an organization and between supply chain member organizations was totally paper-based. Moreover, the paper-based transaction and communication is slow. During this period, information was often ignored as a crucial competitive element because its value to supply chain members was often misunderstood. Several eminent firms are involved in the supply chain relationship through information technology. Two factors have deeply impacted this change in the significance of the information. Firstly, customer satisfaction has become a corporate compulsion. Providing the customer in the best, most efficient and effective way has become crucial. Secondly, information is an important factor in the managers' capacities to decrease inventory and human resource requirement to a competitive state. Information flow plays a pivotal role in strategic planning.

After the 1980s, computer applications have outdone supply and logistics usage. Internet utilization has increased significantly, thereby changing our thinking of communication. Yet, supply chain and logistics planning remain concentrated upon the distributed models after the invent of personal computing. With academic research, a new era of supply chain and logistics planning technology based on centralized planning with distributed collaboration is in proximity. The importance of research for the betterment of traditional supply chain and logistics areas like warehousing and distribution, transportation, and manufacturing logistics is impeccable. Even areas like health care and humanitarian logistics which are non-traditional will be rewarded remarkable benefits by using traditional supply chain and logistics and the global inputs accessible with the systematic supply chain is tremendously precious to world markets[10].

While there is no doubt about the significance of apprising in the supply chain and about the fact that information technology can greatly minimize the costs, strategic planning of this process and usage of information is important[3]. Information should be easily available to all companies in the supply chain and the business processes should be organized in a way to make full use of this information[3]. It should be taken into account that the use of information technology, networks, and e-business applications uniquely is not enough to realize the advantages[3]. It was found that Internet adoption alone has exhibited disadvantages in terms of lower transaction costs or improved supply chain efficiency in Scottish small and medium enterprises and has not led to a decline in the inventory level in Slovenian small and middle-sized enterprises. Additionally, only the splitting of information will not lead to improvements, but partnerships of activities are

also important. While the Internet alone cannot reduce certain costs, usage of information is of absolute importance.

Sharing of information can obviously be an arduous task as the companies in a supply chain may not be ready to share their production data, lead times, especially when such companies are independent of each other[5]. Indeed, the lack of understanding between business partners is one of the main hurdles for collaboration in the supply chain context. The primary contribution of this paper is to demonstrate how business process modelling can be helpful in order to build such business process models that will result in improvements in information sharing and integration of processes. Appropriate business processes are an important requirement for the carefully planned utilization of information[9]. Business modelling techniques are very helpful in befriending the processes in question and to improve them. Although the exact possibilities of a model may vary from industry to industry, the business integration concepts, shown in the continuation of the paper, can be implemented without any major modification regardless of the industry in question[6].

### III. Proposed model -

Each channel in Supply Chain Management involves sharing of information from one participant to another so that every participant reap the profit. Timely delivery of information with exact context improves the performance of Supply Chain levels. Amalgamation of shared information has joined ranks like integration and automation which provides a competitive edge in the supply chain organizations. Generally, information sharing is summarised into product information, customer's need and transaction details, and inventory records. The possibilities of above-mentioned types include inventory sales, demand, order status, product prototypes, production cycle, logistics, etc.

ID	Scheduled Delivery Date	...	Sub Classification	Brand	
0	1	02-Jun-06	...	HIV test	Reveal
1	3	14-Nov-06	...	Pediatric	Generic
2	4	27-Aug-06	...	HIV test	Determine
3	15	01-Sep-06	...	Adult	Generic
4	16	11-Aug-06	...	Adult	Generic
5	23	28-Sep-06	...	Pediatric	Generic
6	44	08-Jan-07	...	Pediatric	Stocrin/Sustiva
7	45	24-Nov-06	...	Adult	Generic
8	46	07-Dec-06	...	Adult	Generic
9	47	30-Jan-07	...	Adult	Aluvia
10	60	16-Feb-07	...	Adult	Aluvia
11	61	08-Jan-07	...	HIV test	Uni-Gold
12	62	10-Jan-07	...	HIV test	InstantCHEK
13	64	27-Feb-07	...	Adult	Generic
14	65	18-Jan-07	...	HIV test	Determine
15	68	19-Mar-07	...	Pediatric	Videx

Figure 1: Dataset containing the relevant attributes of SCM

Participants at each level add extra information in the datasheets of their own. Integration of this data becomes very tedious and complicated as a tiny change in the datasheets has an enormous impact on the unabridged system. Minute error in any information may lead to an unintended outcome. A healthy effort is required for the information flow along the chain so that effective and efficient outcomes are achieved.

There is a centralized data sheet which has information like the Scheduled Delivery Dates, Delivered to Client Date, Delivery Recorded Date, product group, sub classification, brand etc. This datasheet can be used to compare the sheets which are present in different departments. By using this comparison model, users at different levels will be able to differentiate the information. The model will provide us with the records possess contrasting information by iterating every record in the dataset and comparing values of each attribute with its correct value. Hence, the proposed model provides us with an efficient method to check the integrity of data by using Big Data tools for quicker processing of the enormous amount of data.

```

ID True
Scheduled Delivery Date False
Delivered to Client Date True
Delivery Recorded Date True
Product Group True
Sub Classification True
Brand True
Name: 0, dtype: bool
ID True
Scheduled Delivery Date False
Delivered to Client Date True
Delivery Recorded Date True
Product Group True
Sub Classification True
Brand True
Name: 1, dtype: bool
ID True
Scheduled Delivery Date False
Delivered to Client Date True
Delivery Recorded Date True
Product Group True
Sub Classification True
Brand True
Name: 2, dtype: bool

```

Figure 2: Output showing boolean values of the compared attributes

#### IV. Conclusion -

Analyzing what is occurring in the world, given the advancements in information and mobile technology, there are no qualms that we find ourselves in big data's epoch. With the advancement of data, there arises a need to maintain the integrity of that data. In SCM, information flow holds a tremendous importance. The whole process depends on the correct and accurate data from the levels about it. Thus it becomes very important that the data/information which is being transformed from one level to another holds its integrity. Information flow in the multilevel hierarchy must be consistent to ensure data integrity for each department. As the output of the company as a whole is derived by integrating the output of individual levels. Thus there arises a need of model which will ensure that in information flow the information is correct at every level and same as the centralized data. Additionally, advanced computational power allows data analytics in a much more dedicated, faster and bigger way. The main purpose of this paper is to provide an efficient model which will help to overcome some specific challenges of Big Data Analytics in Supply Chain Management (SCM) like the handling of a large amount of data and maintaining almost-accurate inventory. This model has illustrated a method through which users of the model will be able to compare data sheets of their department with the centralized data sheet. The output will display the data which is different from the centralized data sheet.

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