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The Yins and Yangs of Automation in Supply Chain

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Abstract

The ever-increasing demand of goods and services is keeping the industry/businesses/companies on its/their toes. The challenge is to keep pace with the increasing demands and providing timely-fulfillment of related goods and services while also maintaining their quality grade and avoiding inventory overruns. Hence, the need of the hour justifies the emergence of automation in almost every aspect of a business.

Every change introduced in a fixed environment has its own pros and cons. It can either be beneficial for both the employees and the company. Or it can turn out to be the most devastating piece of technology in the hands of the company. The functioning of the new automated machinery depends on the handling and before that, the acceptance of it by the employees of the firm.

There is always a positive side to a negative element and a negative side to a positive element. The Yin and Yang always exist simultaneously. This research paper discusses the Yins (bad) and Yangs (good) of automated machineries that enable accurate and time-efficient production while also assuring minimum wastage of resources.

Keywords: **Supply Chain, automated machinery, raw materials, warehouses, automated software's.**

Introduction

Supply chain management can be defined as the process which connects various parts of a functional business such as procurement of raw materials, goods and service manufacturing, transportation, storage, etc. From the point of manufacturing to the point where the product is actually consumed by the customer involves a huge network of processes such as procurement, manufacturing, movement, storage and customer service. Every function in the Supply Chain is different from another but equally important in order to ensure the proper production and supply of the finished product [1].

Problems faced in Supply Chain Management

Although the Supply Chain process divides the work into several departments, making it easier for the company to function properly and smoothly, there are a few problems which a company faces during the execution of Supply Chain processes [2]. They are:

1. **Capacity of production/storage/delivery-** The capacity of different departments of the Supply Chain is different from another. The capacity of the production unit might be higher than the storage unit which creates a problem of storage of finished goods. The goods which have already been finished, waiting to be delivered might take up the space required by the upcoming finished goods produced in order to satisfy the current demand.

2. **Delays in the chain-** The process of Supply Chain is totally dependent on the proper and timely functioning of different departments as it is inter-connected and highly dependent. A delay in one department may lead to delays in other departments as well which may lead to losses to the finances of the firm. For example, if the procurement of potatoes is delayed by an hour, the production of crisps and chips will suffer a huge loss as the production department uses oil which might cool down within the hour or the company might have to keep the oil hot even for the lost hour leading to loss of fuel.

3. **Lack of communication/miscommunication-** Often due to lack of communication or miscommunication, the orders placed by a customer are misinterpreted and because of that a company loses a tentative or an old customer. Due to a chain of processes and a chain of command, the message is somehow lost or gets manipulated while travelling from one person to another which causes losses to the firm.

4. **Lapse in judgement/human error-** Just like the message or feedback sent by a customer gets misplaced or often manipulated due to travelling from one person to another, similarly the data when collected without the use of software's and automation also gets misplaced or wrongly entered. Due to this error, executives make wrong decisions or miscalculate the future demand which leads to losses borne by the company [3].

5. **24×7 demand-** Connectivity through the internet has taken up rapid growth in the past 10 years and due to this infinite amount of connectivity, a person can have access to any information from any part of the world. A person sitting in India can order a pair of shoes from the US [4]. A global market is the ultimate goal of every producer, i.e., every producer desires to capture as bigger a market as possible in order to maximise their profits. In order to do so, companies are opting for technological advancement which ultimately puts a huge amount of pressure on every department of the Supply Chain. The increase in the demands of the customers and the regularity of the change in patterns of buying poses the company the biggest problems. In order to comply with the demands of the customer and satisfy them, the company needs to function 24×7 on every day of the year, thus exhausting the resources and the manual labor being used by the firm.

Demand Planning

The entire Supply Chain is dependent on how to meet the demand of the product at this point of time and forecasting the future demand of the product. Thus, Demand Planning plays the most important role in the proper functioning of a firm [5].

Demand planning is the process of forecasting the customer's needs according to the previous purchase orders in order to meet future needs of the customers. This process helps in maintaining a balance between the future demand and the production of goods and services in the firm. Companies rely on Demand Planning as it helps them to keep their procurement of raw material and actual production in check while keeping a strict eye on the

inventory and future demands of the customers [6].

The importance of Demand Planning in Supply Chain is:

1. Demand planning facilitates in providing a purchase plan for the future needs of the firm which helps release the pressure off the supplier of raw materials in cases of emergency buying behaviour of the company.

2. Inventory management is keeping a track of all the raw material, work-in-progress and finished goods available with the company. Demand planning helps in providing exact data in order to control the inflow of raw materials, current work-in-progress and outflow of the finished goods.

3. When a company has determined the amount of raw material required for production and the quantity of product to be supplied, the Logistics of the firm function properly. Demand planning brings a clarity to the company to help in proper functioning of the Logistics department of the firm.

4. Demand planning forecasts the future demands of the customers. Thus, it affects the proper utilisation of raw material and also the further purchase of raw material by the firm. It ensures that stock of raw material with the firm is utilised in its best possible way and decreases the chances of wastage of good material.

5. Demand planning ensures effective and smooth functioning of every process which is a part of the Supply Chain of a firm. It ensures timely delivery of raw materials to the firm, proper functioning of manufacturing units, safe and on-time transportation of finished goods to the storage facilities and warehouses, proper storage and finally serving the needs and wants of the customers as required.

6. The purchase of the final product by the customer does not ensure the satisfaction of the customer. The follow-up action or feedback from the customer helps in keeping a check on the demands of the customers and also the recommendations put forth by the customer in order to improve the product. Demand planning ensures customer satisfaction and the follow-up action to be taken by the firm. It also ensures customer benefits such as on-time delivery, after-service, customer complaints, etc.

Automation in Supply Chain Management

Automation in the usage of technology in parts or all the departments of a working business firm in order to improve productivity and efficiency of the firm. Automation in any department of a Supply Chain leads to accuracy and time-saving techniques which further leads on to add value to the product produced by the firm [7].

Automation also provides the company with a competitive edge to function and respond to any unlikely event which might lead to a loss borne by the firm.

Information and data used by the firm in order to function can be stored in a computer instead of a human brain which can later be accessed by anyone who makes decisions for the functioning of the firm and not just one person only.

Automation in Supply Chain has been successfully seen in departments such as logistics, billing, sales data, feedback, etc. which improves the quality of data saved by the firm and also, it decreases the time consumption to a great extent.

Feeding the data inputs from all the sections of the Supply Chain into a centralised computer

in order to access it as and when in need is the most basic automation in the process of Supply Chain Management [8]. The centralised data will help the executives to access the data from any previous challenge the firm faced and make a quick decision in any such similar situation. Automation also helps in keeping us up to date with the ongoing trends in the demands of the markets and compares the data with the information a supplier or retailer may provide the company with.

Benefits of Automation in Supply Chain Management

Supply Chain Management is a process through which various departments of one business or different businesses are inter-connected in order to provide better services and productivity to the firm [9]. There are several benefits of Automation in Supply Chain Management:

1. **Improves accuracy-** Due to the rigidity in the process that an automated machinery can perform, the accuracy and precision with which a product that is made by these machineries will be perfect. A human-operated machinery or a product made by a human hand can seldom be accurate to the point and will sometimes differ in the quality or appearance.

2. **Rapid delivery system-** Due to automation in the logistics system, delivery of the product to the warehouse or the end user has turned up rapidly. The products to be delivered are now under a clock due to increase in competition in the markets. So, in order to keep the delivery on-time, automation of the logistics system has helped in keeping the product time-friendly and safe from getting lost during transit [10].

3. **Adaptive to different markets-** Due to a consistent and continuous change in the ever-growing markets, a business suffers a great loss at the hand of the decisions made by the rigid decision-makers. Automation in Supply Chain gives the software being used the power and capability to adapt to the recent changes in markets and make decisions accordingly. Humans can make an error while studying the trends of the markets and make decisions which may prove to be of huge losses to the firms. The software's analyse the past data, study the current position of demand-supply of the firm and predict the future demand of the markets beforehand, giving the business enough time to make necessary changes. For example, E2open, SAP Supply Chain Management, etc.

4. **Meeting customer's expectation-** A customer is the final consumer and a true judge of the product or service provided by the firm. A customer holds a certain amount of expectations regarding the product/service they just ordered. Automation in Supply Chain gives them the opportunity to choose from a range of products available in the markets with just a few clicks. It also provides them with the option of tracking their order status regarding its transit and also enables the company to deliver the product/service on time [11]. For example, a company which delivers a product purchased by a consumer from one location to another like Amazon, Flipkart, Ebay, etc.

5. **Improves efficiency-** The automatic systems used in Supply Chain Management of a firm increase the efficiency and productivity of the firm by a huge percentage. It helps in delivering timely results and the accuracy of the software's used is very high, much more than a human brain. So, if a business decides to use software's in the sections such as payments, billing, customer care services, warehouse management, etc., there will be less of an error and the work will be done on time and maybe even faster. Calculation of costs to be incurred during the transit of the product/service which shall be paid by the customer is also an important part of sales and if a product of value higher than usual is purchased, automated software's directly inform the senior staff members so that they can keep a real-time check on the delivery of the product/service.

6. **Warehouse/Inventory management-** Nowadays, software's used in a warehouse for storage of units and locating them in the warehouse are very common. Some firms have even introduced robots to carry out the work of storing and carrying out the units within the storage units. Robots are expensive and are not affordable by every firm but they increase the efficiency of the firm much more than what humans can do.

7. **Transparency between the customer and the firm-** Customer satisfaction is the ultimate goal which a company strives to achieve. But on a secondary level, customers expect transparency from the firm they are buying products/services from. Using the automated systems, a customer can communicate with the firm and keep a track of their purchase items whereas a company can keep a track of the valuable feedback a customer may provide and provide after-sales services to the said customers.

8. **Designating a fast route for delivery-** With hundreds of orders coming in from different parts of the world, it's impossible to keep a track of each order and the delivery details and routes opted for by the company. An executive cannot keep in mind every location of the warehouses or the delivery vehicles or personnel. Automation in these departments will help the company to assign specific warehouses, delivery vehicles and personnel to the task in order to maintain a smooth outflow of items for delivery.

Disadvantages of Automation in Supply Chain Management

As much as the technology opted for by the firm eases the pressure on it and ensures its smooth functioning, there are a few disadvantages of Automation in Supply Chain Management [12]. These disadvantages arise due to various reasons namely-

1. **Dependent on humans-** From programming to installation to regular updates and greasing, even the most automated machineries and software's are dependent on humans. A single fault in the programming codes or the regular updates could prove catastrophic for the machinery or computer and fatal for the employees working in the company. Some companies are utilising a few machineries for excellent quality of work, efficiency and increase in productivity. But these machines still require a human touch to operate them. These machines are still not advanced enough to operate on their own.

2. **Expensive-** Since automation and use of technology is still an upcoming method used by a firm, many firms are still not sure about making changes in the methods of production or how they function. Since the technology is still new, it is quite expensive [13]. Every Supply Chain Management firm is a bit skeptical about the technology and its use. They are considering its employment, but they do not want to risk a huge sum of money on replacing the existing methods of functioning.

3. **Response to any unprecedented situation-** The programming of a software is done in a manner, a fixed pattern of functions and works in perfect synchronization and harmony with other machines or software's. In a way, a software or machine is purchased to perform certain functions and it is rigid to the core with zero percent of flexibility on an instant's notice. In case of any unprecedented situation, this machine or software won't be able to function hence proving fatal to the company. Similarly, in any unprecedented situation, these automated machines do not have the power or intelligence to make decisions. For this job, a human executive is required, and the software becomes obsolete as soon as the situation arises. Nowadays software's is being coded in such a manner that it can make decisions on its own. But the software's will always lack human intelligence and decision-making abilities after considering every factor.

4. **No feelings-** Automated software's and machines nowadays are making history by doing functions which 10 years ago people wouldn't even have dreamt of. It can make

decisions, can perform 80% of the companies work on its own without the disturbance of any human and keep a check on the data coming in from every section of the business. But there are a few things which a software will lack even after years of research and development such as human intelligence and feelings. It cannot form relationships with the customers which humans can do in order to understand the customer in a better way and fulfill their needs and wants. It also cannot understand the sentiments and health of a human body like a human executive [14]. For example, if an employee approaches the management regarding a sick leave, the software will be unable to understand the reason and will not authorize the leave. A human executive is always needed in order to keep the company functioning smoothly and effortlessly.

5. **Hackable-** Installing a software on a computer or programming a machine to function in a pre-set pattern is the way in which we can achieve automation in Supply Chain Management. But there is always a high risk of malfunctioning or the software from a hack by any unknown person. Both these malpractices can cause a serious loss to the company before it shuts down the entire system or network. Firewalls are built in order to protect these valuable software's and machines from any such event but there is always a risk of a hack.

Impact of Automation of Supply Chain

There are numerous impacts of automation in the Supply Chain [15,16]. They are as follows:

1. **Helps in increasing the production**- With a daily increase in the demands of the consumers and variations of products available in the markets to compete with, production through old techniques such as using skilled/unskilled labour and processing raw material through old methods, can cost a firm a lot money and time as well. By introducing new technology, a firm intends on increasing its amount of production as a whole and thereby increasing their own profits and decreasing the time to produce a certain amount of goods or services [17].

2. **Accuracy and precision-** With the introduction of automated machineries in multiple processes of the Supply Chain, the company can ensure that the finished goods coming out of the production unit are similar in every aspect, i.e., shape, size, color, quality, etc. The functioning of a machinery is accurate and precise to the point. This quality of a machine makes it more desirable than a human operated machinery or hand-made product.

3. **Minimum wastage of resources-** The functions of an automated machine are pre-programmed in it so the machine is set to function in a fixed, proper manner. Hence, it uses as much material as is required in order to produce a unit of that product. This ensures there is minimum wastage of raw materials and the energy that is consumed by the machinery is as minimum as possible [18].

4. **Unemployment-** With the introduction of automated machineries, the human operated machines or hand-made products become less desirable. The company no longer needs to employ a huge amount of workers as the machines can operate on their own and a fewer number of people are needed to keep these machines working [17]. So, this results in loss of jobs for a huge number of employees as they get replaced by a few automated machineries.

5. **Capitalism-** Capitalism, when defined in simple terms, is a system in which private individuals own the goods/services, hence they are able to manipulate the production, the supply and even the price of the products.

For example, firm X and firm Y produced 20 units of cloth each in the last month. After the installation of machines in the firm X, it started producing 25 units of cloth in 1 month and firm Y still produces 20 units of cloth. Since the demand for cloth is ever-increasing, firm X can supply more units of cloth than firm Y. Hence, firm X can manipulate the price of the cloth as the demand for their product is now higher than firm Y's.

Conclusion

As listed above, there are many advantages and disadvantages when automation in Supply Chain comes to mind. A countless number of discussions and debates were helpful in pointing out the pros and cons of automation in Supply Chain but were unable to reach a conclusion whether it was beneficial as a whole or not.

Like all the other things, there are both merits and demerits of automation in Supply Chain. On one hand, automation in Supply Chain is beneficial to the company, the employees, the society and the economy. But on the other hand, it creates fear and stress due to decrease in the amount of conversation among the employees of the firm and the societal elements.

But there are factors that can reassure the employees of their fears such as:

1. The company can ensure that there is a balanced growth between both the automated machineries and the employees.

2. Re-training the employees to help them understand and learn the newly obtained technology in order to benefit the employees to grow and cease the cost to be incurred by the company.

3. With a boom in the Artificial Intelligence industry, instead of pursuing jobs in the firms as unskilled labour, employees can pursue a job in the newly cooking industry i.e., developing and maintaining the Artificial Intelligence sector with a higher pay or higher daily wage.

4. The Government can set limits as to the employment of minimum number of employees and the maximum number of machines that can be employed by the firms. This can ensure there is work available for the unskilled labour and the other firms can also continue to function, and new firms can also be set-up.

In conclusion, there can be no set parameter to determine whether technology is good or bad for anyone. There is always a Yin to a Yang.

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