Artificial Intelligence And Its Impact On Supply Chain Management

What is supply chain management?!

A supply chain management is a set-up of amenities and circulation options that is mainly concerned with procuring materials, transforming these materials into intermediate and finished products in addition to allocating these finished products to consumers. Services and manufacturing organizations is a part of the supply chain where many complications and complexities may vary between industries and firms.

A supply chain for a product is simply when raw material is bought from vendors, transformed into finished goods and finally delivered through distribution centers to customers in due course. Supply chains usually have multiple end products with common components, amenities and abilities. Various modes of transportation must be taken into consideration since the flow of materials in not always known or has a structured network besides the bill of materials for the end items may be huge.

Usually, the supply chain and the other organizations such as marketing, supply, forecasting, and manufacturing operate independently. These administrations have their own goals and intents that are often at odds. Marketing's objective of high consumer service and maximum sales dollars conflict with the goals of manufacturing and distribution. Little consideration for the impact of inventory levels and distribution capabilities are often taken into consideration when manufacturing operations projects to maximize throughput and lower costs. Historical buying patterns and algorithms is weak while purchasing contracts, what leads to poor integration when it comes to organizational planning. Supply chain management is the perfect mechanism to integrate these different functions together.

SCM plays the role of linking between fully vertically integrated firms, where the entire material flow is owned by a single firm, and those where each channel member operates independently. As result coordination between the different players plays a major role to achieve effective and efficient management. Supply chain management can be compared to a well-balanced and well-practiced relay team. Such a team is more competitive when each player knows how to be positioned for the hand-off. The relationships are the strongest between players who directly pass the baton, but the entire team needs to make a coordinated effort to win the race.

What is artificial intelligence?

Artificial intelligence (AI) is the replication of human intelligence manners by machines, mainly computer systems. These methods include learning, cognitive and self-correction. Particular applications of AI include expert systems, speech recognition and machine vision.

AI can be characterized in two categories; weak AI and strong AI. Weak AI is a system that is designed and qualified for a particular mission such as Apple's Siri and is known as a virtual personal assistant. Strong AI is able to find a solution without human intervention when

presented with an unfamiliar task having a generalized human cognitive ability.

Nowadays, AI components are included in standards vendors' offerings knowing that hardware, software and staffing costs for AI can be expensive as well as access to AI as a service platform. AI allows firms to experiment with many platforms before making a decision or making a forecast. Amazon AI services, IBM, Microsoft Perceptive Services and Google AI services are examples of popular AI cloud offerings.

Although AI tools present a range of new practical aspects for businesses, a series of ethical questions take place because deep learning algorithms, which support many of the most advanced AI tools, are only as smart as the data given in training. Therefore, the data used to train an AI program should be closely monitored because the potential for human bias is natural.

Artificial intelligence is a term that according to some experts is linked to popular culture, causing the general public to have impractical fears about artificial intelligence and doubtful expectations about how it will change the workplace and life in general. As such, some researchers suggest that the label augmented intelligence having a more unbiased suggestion will help people recognize that AI will not replace humans but simply improve products and services for the benefits of the firms as well as the customers.

Influence of Artificial intelligence on supply chain management

Currently, we are witnessing an era of greater demand hence, uncertainty, higher supply risk, and aggregated competitive force, Supply chain (SC) quality often hinges on the organization's ability to integrate and orchestrate the entire spectrum of end-to-end processes of attaining materials or modules, converting them into ?nished goods to finally deliver them to customers. The above said, sharing real-time information with SC partners and increasing visibility across the end-to-end SC processes is highly regarded among many leading-edge organizations in order to enrich their information sources.

Consequently, SC management (SCM) is becoming more reliant on concentrated data to a degree of substituting assets such as inventory, equipment and warehouses with information. SC specialists have discovered numerous ways to better manage information and control it to make better business decisions and planning after recognizing the increasing importance of information on the road to SC success. AI is one of those ways that has been in existence for decades and they are trying to fully benefit from it in the SCM aspect.

AI is referred to as the use of computers for reasoning, recognizing patterns, learning or understanding certain behaviors from experience, acquiring and retaining knowledge, and developing various forms of inference to solve problems in decision-making situations where optimal or exact solutions are either too expensive or dif?cult to produce. Altogether, the main purposes of AI are understanding the singularity of human intelligence and to design computer systems that can imitate human behavioral patterns and create knowledge that can be applied in problem-solving. As a result, AI should be able to realize new concepts, perform intellectual reasoning, draw conclusions, assign importance, learn from previous experience and read between the lines when it comes to symbols in any context. Knowing what AI is able for, it has been successfully used in different areas such as and not limited to game playing, semantic

modeling, human performance modeling, robotics, machine learning, data mining, neural networks, genetic algorithms (GAs) and expert systems.

Artificial intelligence did not fully explore supply chain management, what involves understanding complex and correlated decision-making processes and the formation of intellectual knowledge bases crucial for joint problem-solving. In addition, synchronizing a series of interrelated but different stages of joint demand planning and forecasting processes in the SC, an agent-based system was proposed predicting system that has the capability to predict end-customer demand through information exchange among multiple SC partners and learn from the past forecasting experience. As illustrated by these examples, some sub-?elds of AI such as expert systems and agent-based systems can be useful for dealing with various aspects of the supply chain.

Per se, below is a list of important tasks and attributes that should be implemented to fully explore the positive relation between AI and SCM:

1. Decompose and Identify the ?elds of AI that are most appropriate for supply chain management and then illustrate those sub-?elds in terms of their usefulness for improving SC ef?ciency.
2. Synthesize the existing literature dealing with the uses of AI to SCM with respect to their practical effects and technical merits.
3. Develop and improve a ranked classification for the existing AI literature and classify it according to Its SCM application areas, problem scope, and methodology.
4. Summarize AI study trends and identify the possible SCM application areas that have not been discovered.
5. Debate the future view for additions of current AI literature and untapped AI research topics relevant to SCM.

Technology already plays a significant role in some of today’s advanced supply chain and logistics solutions, increasing effectiveness, efficiency, and automating many tasks for supply chain managers and planners and AI can revolutionize Supply Chain Management and Logistics in many ways such as:

1) Providing greater contextual intelligence which delivers the awareness needed to decrease operations costs and inventory and reply to customers quicker. In addition, AI provides new perceptions into a wide range of aspects, including logistics and warehouse management, collaboration, and supply chain management.

According to Artificial Intelligence in Logistics, a report by DHL and IBM outlined a number of technologies capable of doing that. Some of them include:

- A. Intelligent Robotic Sorting – an effective, high-speed sorting of letters, parcels, and palletized shipments
- B. AI-Powered Visual Inspection – taking photos of cargo using special cameras allows to identify damage and identify an appropriate corrective action

2) AI provides visions into improving supply chain management efficiency, it can provide an unmatched analysis of supply chain management performance, which, in turn, helps to determine new factors affecting that performance.

AI chains powerful capabilities of three sophisticated technologies – supervised learning, unsupervised learning, and reinforcement learning – to identify important factors and issues impacting the performance of the supply chain.

For example, supervised learning can detect identity fraud and make informed predictions, while reinforcement learning can facilitate real-time decisions by supplying relevant data.

IBM’s Watson is one example of AI being used to boost insights and productivity in supply chain management.

3) AI is capable of evaluating massive capacities of data, therefore enhancing demand forecasting accuracy. This is one heck of a challenging job, riddled with uncertainty, with everything in change. Earlier technologies couldn’t deliver value because they didn’t take into account this wide variety of factors such as consumer attributes on the demand side where AI took all that into consideration. In addition, AI enables the tracking and measurement of all the factors that are needed to improve demand forecasting accuracy. As a matter of fact, it provides an endless loop of forecasting, continuously adjusting the forecast based on real-time sales, weather and other factors. Having all this information could easily reform warehouse management, with self-driving forklifts, automated sorting, and self-managing inventory systems powered by drones and automats ground vehicles. Amazon is a valid example concerning the above where it has already forged a path in this area with its highly automated distribution centers.

4) “Just one mistake on the part of a supplier, and a company’s reputation can be damaged significantly.” says Darrin Mackay, a logistics expert at A-Writer. AI can improve supplier selection and increase the effectiveness of supplier relationship management where supplier-related risks should be highly taken into consideration.

Analyzing supplier-related data such as on-time in-full delivery performance, audits, evaluations, and credit scoring and provide information to use for future decisions regarding certain suppliers. As the result, a company can make better supplier decisions and improve its customer service.

5) AI-Enhanced Customer Experience where personalizing relationships between logistics providers and customers is an essential role that AI plays. DHL Parcel’s cooperation with Amazon is a great example of a personalized customer experience. The delivery company offered a voice-based service to track parcels and get shipment information using Amazon’s Alexa-powered Echo, where customers can query Alexa to find out the current location of their shipment by asking “Alexa, where is my replica watches swiss parcel?” or “Ask DHL where is my parcel.” If there was a problem with the shipment, Echo users could also ask DHL for assistance and be redirected to the customer assistance department of the company

6) AI Improves Production Planning and Factory Scheduling, it enables companies to analyze a wide range of constraints and optimize for them, whereby before technology such as machine learning, companies didn’t have useful tools to enhance production planning and factory scheduling accuracy.

This works especially well for build-to-order producers because AI helps them to balance the constraints automatically. For example, by using AI technology, businesses can reduce supply

chain latency for parts utilized in the most popular or highly customized products, using AI to forecast demand and improve the flow of those critical parts to keep production moving efficiently.

Prepare for the Future

An explosion of AI technology is likely to happen, driving more refined solutions in the supply chain to speed and increase the delivery of products and services to customers. With the current scientific developments in big information, system changes and ever-increasing processing power, enterprises that rely on manual methods and modest solutions won't be able to compete with up-to-date competitors. AI could well be a deciding factor in many industries, determining supply chain superiority, driving customer service excellence and continually improving operational efficiency. As AI enhanced solutions emerge, Logistics and supply chain managers should be deeply relying on the uprising sophisticated solutions.

AI is regarded as a useful decision-aid mechanism in helping the companies to connect with customers, suppliers, and SC partners where it is very beneficial for SC partners to learn from the improved databases and computerize the SC decision-making processes. AI has not fully reached its maximum potential in order to solve supply chain difficulties where answers are expensive and hard to yield because their nature is not structured properly although AI has been present for a long time now and it's merged somehow in the supply change management system.

The agent-based system is regarded as one of the most influential tools in addressing a variety of strategic issues involving customer relationship management, subcontracting relations, agreements among SC partners, SC organization, collective demand forecasting, and business-to-Business conferences that have often been disregarded by more traditional analytical models as shown by recent AI readings. In addition, an agent-based system helps deal with various aspects of SC problems.

AI may lead to wrong conclusions if it is not programmed in a correct and unbiased way since it is heavily reliant on computers software. Despite the fact that AI solutions may be hard to implement and to be understood properly, AI usually works best for speci?c, narrowly focused SC problems and may not work well in conducting risk analysis tangled in cross-functional and cross-border SC decision environments due to its knowledge restrictions.

Regardless of all these challenges that may face AI and it's relation with supply chain management, artificial intelligence will be a major factor in the supply chain management area. According to previous and forecasted AI studies, the following designated study topics can improve the SCM decision-making processes;

- Numerous agent-based structures is very essential in coping better with complications as well as solving many supply chain problems such as SC integration and SC risk management.
- Bright agents can be exploited for real-time pricing and reverse auctioning involving supply chain partners.
- Merging game theory into agent-based systems to understand supply chain changing aspects and formulating tactical supply chain corporations.

- Knowledge discovery techniques should be used to develop pro?les of needed SC partners, containing suppliers and 3PLs providers.
- Rule-based enhance schemes can be developed in supporting logistics outsourcing or contract engineering verdicts.
- Expert systems that improve airline revenue management can be developed.
- Hybrid meta-heuristics can be developed to integrate the AI traits of GAs with those of ant colony optimization, to solve combinatorial transportation network design problems.
- The ambiguous logic approach can be integrated with the GA or ANN approaches to control total logistics costs.
- A rule-based expert system can be assimilated into the SC knowledge management agenda.
- Machine learning can be explored to address the assessment and selection issues of foreign suppliers or 3PLs.
- Integrating AI with current inherited structures of several SC partners without disturbing data ?ows across the supply chain

The Drawbacks of an AI-Based Supply Chain

AI is still in the rise while numerous explorations and advanced visions are happening across the world. However, at some point algorithms will begin to generate other processes and procedures wherein their turn will be auto-implemented what will present us with what is called a “black box” setup. Scientists and artificial intelligence experts will find hard sometimes to unravel the basic facts and the practical things needed of these AI-generated algorithms. to give a clearer and more accurate idea of these glitches imagine trying to understand as well as predict the “how”, “where”, “what”, and “when” of human imagination and performance.

Auto-driving or what we call self-directed delivery vehicles are motorized by a tremendously complex system that includes sensors driven by an AI algorithm that allows the process to monitor the nearby traffic while foreseeing and accounting the behavior of nearby human drivers. In this case and in some scenarios this might lead to fatal and severe consequences to human life if an incorrect prediction by the AI took place and without forgetting that any software of system security can be hacked or scrambled leading to great danger.

In addition and despite of the benefits of supply chain integration, adopting AI in Supply chain management did not circle the globe and it even started decreasing in some firms. Some results show that the increase of using AI is increasing in a decreasing way where the use of technology is only marginal. This allows us to ask the question: 'Why if the benefits of AI in SCM is so important and beneficial, do companies usually fail to implement it more widely and comprehensively?'

Carrying out AI usually lack structure, good planning, strategy and forward-thinking. Therefore, managers nowadays put efforts on focusing in short-term business welfares for their firms, rather than on strategic supply chain integration. In conclusion, some managers prefer instant gain rather than waiting for the outcome of strategic planning and long-term goal setting through AI.

What to keep in mind regarding AI and its impact on SCM impact

Artificial intelligence is affecting every industry as well as supply chain management. However, data on its own is not sufficient to increase supply chain performance despite the fact that nowadays, enterprises have access to nearly limitless information, records and numbers. Moving forward in the fastest, smartest and cheapest way is by controlling artificial intelligence to use this data in the right possible way. Because short of good information, AI may just as well be making an incorrect judgment.

“Garbage in, garbage out.” Is an old saying in computer science. What this means is that no matter how sophisticated any software is, it is as good as the data fed to it. Therefore, if you nourish it with bad data, the outcome will be out of order.

This is where many corporations are missing the mark when it comes to AI. They are skipping a step on their data journey and are trying to utilize AI with their nonintegrated, inaccurate data. The bad results are then blamed on the AI technology instead of the bad data. This is why sometimes it is better to focus on a simpler definition of AI and utilize AI technology to create combined, accurate data that can then be used by skilled superiors to make smarter choices.

AI is just another tool in supply chain management and this very important to remember. If it is used in a right way and for the right purpose only then it will be operational and effective. Below are 3 essential codes we should keep in mind:

- Artificial intelligence allows supply chain specialists to shift from planned, slow “busywork” jobs, such as confirming and categorization information, to creating and planning cleverly in the most strategic efficient way. The above said it is important to bear in mind that AI is not replacing people; it is empowering them.
- The effort of planning a supply chain is too difficult and is subject to many other variables to be done by AI on itself. Though, structuring a solid data groundwork with AI tools permits leverage experience and creativity to grow into superior strategies. AI can’t do everything on its own.
- Is the data used accurate and whole? This answer must be responded to correctly or your AI tools won’t be as good as we want it to be. Working with incorrect information will only lead to making the wrong decisions without having control over it what could negatively affect your end result. We have to be aware of where the association is on its data expedition. Is the data we have is enough to use it in an AI algorithm, or do we need to harden the database to build a top-notch supply chain strategy? Accurate and complete data is vital.

Conclusion

Artificial intelligence is an incredibly powerful tool that is transforming supply chain management practices all over the world. If used accurately, it can provide decision-makers with better data knowledge and propose advanced policies and implementations. What we can draw from that is that any method is only as good as the information that fuels it. It is important to mention that using AI inaccurate, cohesive supply chain data, any firm or business will be a front runner in boosting its supply chain.

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