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ABSTRACT

E-commerce is a new type of market exchange platform that has been created as a result of the widespread use of technology, which has changed peoples' traditional methods of living. The establishment of Artificial Intelligence (AI) in the e-commerce sector is to improve customer experience, effective supply chain management, and improved operational efficiency, with the goals of designing standard, reliable product quality control methods and the search for new ways to reach and serve customers while maintaining low cost has changed the conventional way of business processes and building business continuity skills using AI is one way to increase the resilience of the supply chain. Machine learning and deep learning are major AI approaches that are employed most frequently to enable the process.

This study examines the possibilities for AI to increase the flexibility of the e-commerce supply chain by enhancing visibility, risk sourcing, and distribution of capabilities in the developing economy, concentrating on five African countries. Finally, this study also examines how to implement an e-commerce supply chain management improvement strategy based on the deployment of AI, which offers substantial support for the computerization of this process.

Keywords: Artificial Intelligence, E-commerce, Supply chain, Machine learning, Analysis

1.0 Introduction.

E-commerce, or electronic trade, is the practice of trading products and services electronically. The widespread availability of mobile devices and internet connectivity has contributed to the rise in the popularity of e-commerce in developing nations in recent years. Streamlining the ordering, shipping, and receiving of goods, e-commerce has the potential to revolutionize supply chain management in developing nations.

However, many obstacles remain that must be overcome before the benefits of e-commerce can be completely realized in these nations. Inadequate infrastructure is just one of these issues.

E-commerce is now a crucial part of the business operations of all different kinds of chain store operators. E-commerce is merely the act of buying and selling goods online. In fact, it includes the entire online process of producing, marketing, selling, delivering, and providing services for goods and services for the global markets of customers. A vast network of business associates makes this feasible. (Sachenko, A. 2011) The "e-commerce system" is thought to be essential to internet commerce. E-commerce technologies are designed to help companies enter domestic and international marketplaces quickly and affordably.

A key element that could greatly affect costs is the supply chain (SC), in particular where the warehouses are located. Choosing which warehouses to open and which of these warehouses should supply the different retailers is always the main objective. Which could reduce the total expense of supplies and maintenance. Any flexible system, including delivery routes, can be controlled by employing a heuristic approach.

(Bucki, R 2010) In order to convey goods efficiently, it is crucial to reduce the distance between delivery routes. With the establishment of new delivery centers', the stocking process becomes more challenging (Burd, S.D.2005).
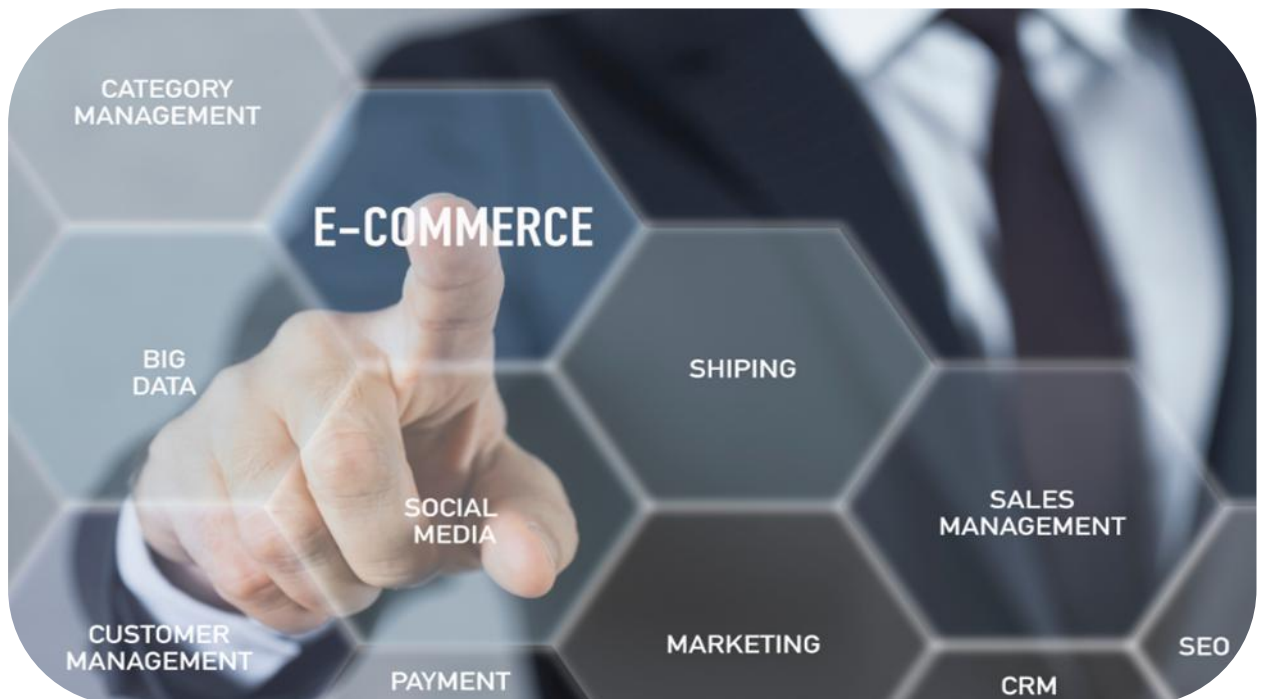
Modern companies can't function without e-commerce and effective supply chain management. Companies are now able to expand into new markets and better meet the requirements of their existing clientele as a direct result of technological advancements. While e-commerce and SCM have flourished in developed nations, this is not the case in less-developed nations. Even though there is a lot of room for expansion, many countries still encounter obstacles that prevent them from fully embracing e-commerce and supply chain management. The obstacles facing e-

commerce and supply chain management can be surmounted, however, with the implementation of suitable strategies and policies. Let's dive deeper into the pros and cons of bringing e-commerce and supply chain management to underdeveloped nations.

Infrastructure

Inadequate infrastructure is a major hindrance to emerging nations' efforts to embrace e-commerce and SCM. Electronic trade and supply chain management relies heavily on constant and dependable access to electricity, the Internet, and transportation networks. Many emerging nations, however, suffer from inadequate infrastructure in these areas, making it tough to launch successful e-commerce and supply chain management enterprises.

Investments in infrastructure, both public and private, are necessary to meet these obstacles. Governments can encourage private sector investment in infrastructure like electricity grids, broadband networks, and transportation networks by providing financial incentives. To lessen the demand for conventional energy, governments may offer tax breaks to businesses that switch to green energy sources like solar power.

Payment systems

Developing nations also face difficulties in integrating e-commerce and supply chain management due to the absence of trustworthy payment systems. Electronic payment methods are not widely used and cash is still king in many third-world countries.

Governments should encourage the use of electronic payment methods to help people get around this problem. To this end, it is important to educate consumers about the advantages of electronic payment systems, provide subsidies to businesses that make investments in such systems, and provide financial incentives to businesses that employ such systems.

Regulation

The introduction of e-commerce and supply chain management presents major challenges for developing countries, not the least of which is regulation. Companies have a hard time operating in many developing countries because of the lack of clear laws governing e-commerce and supply chain management.

Clear government rules regarding electronic commerce and supply chain management are essential for overcoming this obstacle. Data privacy laws, cyber security policies, and customer safeguards are all included in this category. The government should make sure the rules are easy to understand and follow while still being effective.

Opportunities

Despite the difficulties, there are many possibilities for growth when e-commerce and supply-chain management are introduced to countries in development. Examples of such possibilities include:

Emerging Markets

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1.1 E-commerce

E-commerce websites are composed of information systems with unique designs. An information system's architecture includes all of the hardware and software used to give the solution to the client. It is an explanation of the parts and the framework of a computerized system. Every important domain must be supported by the system design. The top ten categories of accountability are management, administration, sales,

production, finance, logistics, supply chain, personnel, planning, IT, and security. One subsystem usually supports each significant topic. Each component must function properly for an e-commerce system to be successful overall. An average e-commerce system consists of customers, the Internet, a web server, customer relationship management (CRM), enterprise resource planning (ERP), local area networks (LAN), suppliers and customers cooperating, payment systems, warehouse systems, delivery systems, and after-delivery services (Suchnek, P.2010).

The following are the elements of a conventional e-commerce system: clients, the Internet, a web server, and client relationships.
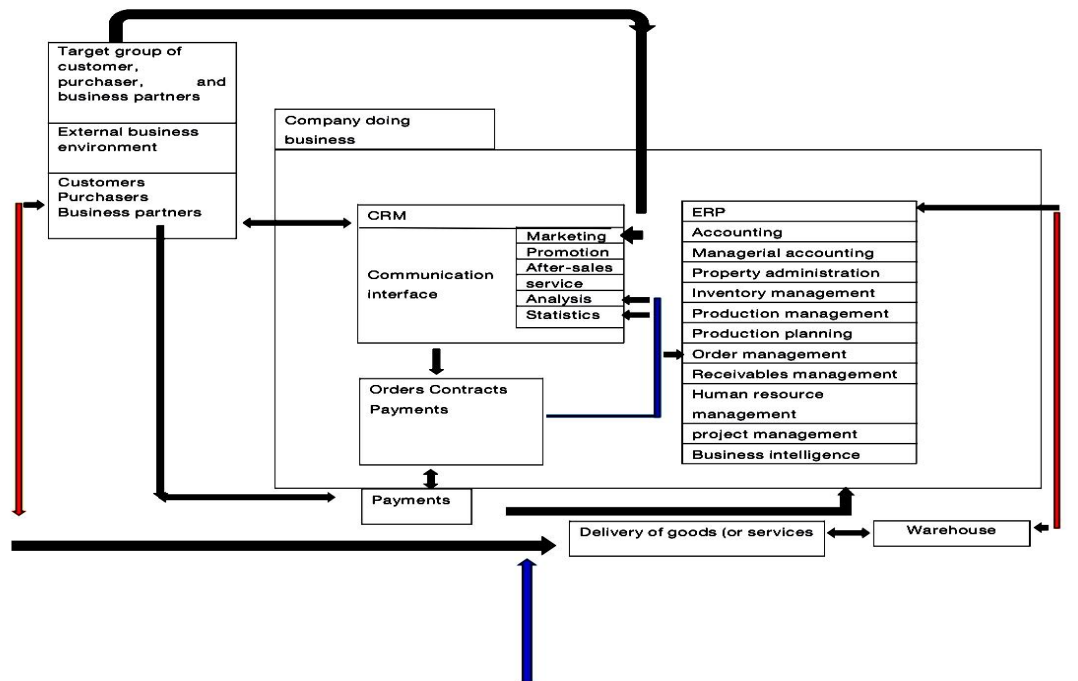

Fig. 1: E-commerce system
Source: own

The objective of the supply chain is to send goods as soon as is practical, at the lowest possible cost, and without compromising on quality. For instance, quality may be impacted by safe transportation that is suitable for the nature of the goods and/or services. Additionally, the expedited delivery of products reduces the cost of storage. One distinctive aspect of the supply chain is the network idea, which comprises a number of subjects, each with particular objectives that must be achieved through the use of the appropriate management system.

2.0 Literature Review

Business innovation and agility are the backbones of providing the ultimate customer experience (CX), which are the biggest competitive differentiator in today's digital-first landscape across all B2B and B2C verticals. Here are questions that come to mind; how can the supply chain be optimized, advancement of CRM offer greater personalization or fine-tune the fulfillment process? Each of these can be an area of innovation for e-commerce companies.

On-time Delivery of every product and service has been a key factor for every e-commerce platform. Hence the management of the spiked demands and warehouse management is also crucial to put an eye on it. The platform would help in optimizing the process of supply chain management and introduce effective models to expedite the delivery process.

Business innovation can be applied anywhere from within the supply chain to advertising, and post-purchase touch points. It's about adapting existing and introducing new processes, ideas, services, or products to address challenges, increase efficiency, and, often, to boost the bottom line. Modern technology has helped the industry to use these e-commerce platforms through social media, mobile devices, and email tools. Technology has extended its support to vitalize personalization and customization by the e-commerce development company.

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Modern innovations have also played a critical role in developing port management tools and creating hack-proof rfid chips for inventory management. The e-commerce developers have introduced robotics for picking orders and introduced automation in warehouse management. E-commerce development companies have deployed drones to develop their infrastructure and deliver shipments.

2.1 Supply chain in e-commerce

Oliver and Webber's book [5] from 1982, a very recent publication, is where the term "supply chain management" first emerged in literature. Although many people believe that supply chain management is a brand-new idea in management, a comparison to earlier work reveals similarities. The guiding principles of supply chain management are much more established. One of the most crucial elements of internet shopping is the supply chain. The supply chain, which is generally understood to be a multi-system of operators, manufacturers, distributors, resellers, and customers, entails the flow of goods, information, and money. The quality of the supply chain and other parts of the e-commerce system are greatly influenced by the specified management processes. In this case, the SCM is utilized. (Supply Chain Management). SCM concept includes.

The term supply chain management (SCM) refers to the logistics procedure as well as the strategic management of the entire supply chain, including supplier selection, delegating manufacturing duties, contracting out capacity, and processing customer requirements. For a company to successfully implement the SCM idea, enterprise resources, along with ERP and CRM, must be integrated. This is the fundamental building block of information and corporate strategy.

The supply chain's goal is to deliver items as quickly as feasible at the lowest cost while maintaining the best quality. For instance, safe transportation that is appropriate for the nature of the goods and/or services might affect quality. What's more, expedited delivery of goods lowers storage expenses. The network concept, which includes a number of subjects, each with specific goals that must be attained via the use of the proper management system, is a distinguishing element of the supply

chain.

Fig. 2: Supply chain network diagram
Source: own
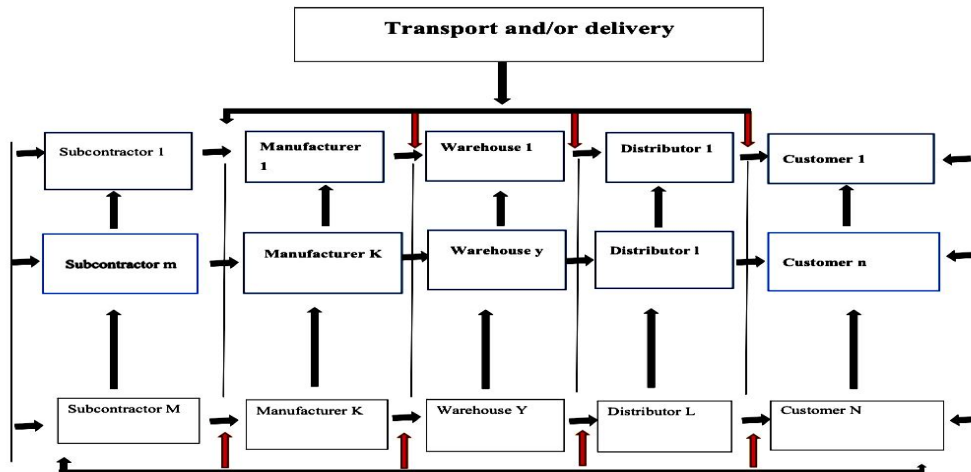
A network of warehouses must be properly mapped to a network of manufacturers, distributors, and subcontractors. Fig. 2's schematic shows several entities that may own individual warehouses or groups of entities (businesses) that specialize in warehouse operations. There are numerous techniques to model supply chain networks. Process-oriented and value-chain-oriented approaches are the fundamental techniques in this situation, and multi-agent system approaches are frequently used for simulation purposes. Process modeling provides "how" a process is realized and implemented, whereas value chain modeling specifies "why" the process occurs in terms of added value to the process participants. This is the major distinction between the two types of modeling. The fundamental benefit of the value modeling technique is that it specifies "why" and "what," as opposed to the process-oriented approach, which emphasizes "how" and leaves out "why". Linear and mixed integer programming can be used to optimize each of these methods. E-commerce is a direct sale that calls for little to no middlemen in the product distribution process.

The overarching goal should be for all distribution channel participants to collaborate to provide the final client with the best value. The so-called ECR is one of the techniques employed in the SCM (Efficient Customer Response). The four pillars of demand management, supply management, enabling factors, and integrating elements form the foundation of the ECR philosophy, which calls for cooperation between retailers and their suppliers. In the end, ECR enables us to achieve the greatest possible cost reduction, increased service, stock management optimization, and production optimization. A benefit of ECR for suppliers is the chance for more efficient production planning and lower transport costs. ECR, on the other hand, assists clients in expanding product availability and decreasing relative pricing. CRP (Continuous Replenishment), QR (Quick Reaction), VMI (Vendor Managed Inventory), or CPFR are further strategies for improving SCM (Collaborative Planning, Forecasting, and Replenishment). Several businesses all over the world are now using supply chain modeling and optimization techniques. Knowledge of the business environment and a clearly defined corporate strategy are prerequisites for

supply chain optimization. Businesses should concentrate on making the most significant improvements in order to adapt to current market demands.

The number of order entry points, the number of inventory locations, the amount of inventory, the number of manufacturing sites or locations, the cost of storage, the cost of shipping, and the rate at which information and materials move through the supply chain should all be considered when making improvements. Time, cost, and variability are often the three main performance indicators for supply chain management (SCP, 2011). Any of these indicators with high values indicate expensive and ineffective supply chains.

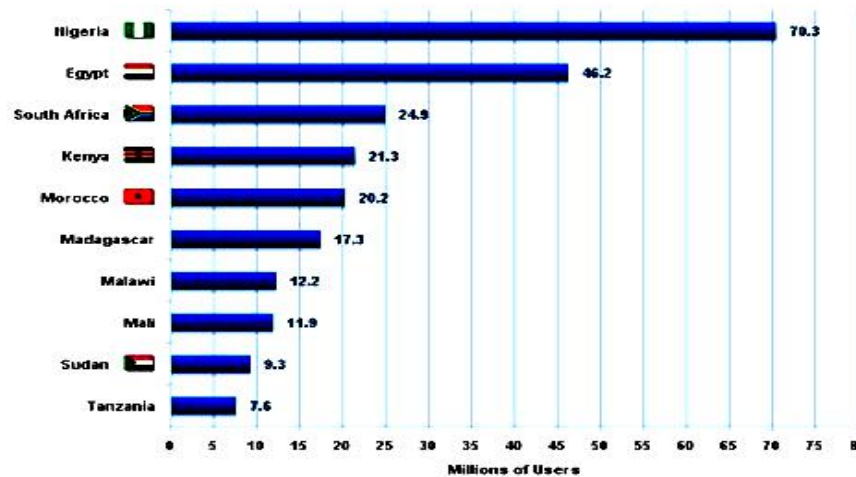## 3.0 Choosing the ideal warehouse location

The warehouse location selection is the process of selecting the allocation center in the economic region where there are certain supply stations and specific demand points. Typically, the warehouse location selection model has to match the concepts of adaptation, coordination, efficiency, and strategy. Selecting the best warehouse location to minimize shipping costs in the e-commerce systems remains the issue that requires finding the optimal allocation of resources and must be addressed carefully. The type of e-business will have a big impact on the location that is selected.

Before coming to a decision, there are a number of things to think about. In order to effectively meet client and customer delivery requirements, the warehouse must be situated so that road access is available in all feasible locations. Moreover, supply chain management is a high-impact mission that must win market share and customer loyalty as well as result in reducing total supply chain costs and increasing forecast accuracy. Another important issue is the need to improve order-fulfillment cycle time and extend the strategic capability. Proper strategic logistics planning should unavoidably lead to reducing the costs of logistics operations in order to improve customer service levels. Distribution network design is a key business priority. Optimized distribution operations will significantly reduce distribution costs and product flows. These also let us model risk profiles and facilitate effective decision-making. Potential alternative distribution strategies must take into account customer locations while maintaining the present network design and consolidation of existing distribution depots. (HAUSMAN et al 2004), In order to reduce overall transportation costs, fixed and operating costs, and routing costs, it is necessary for e-commerce systems to present an integrated model for the location of a warehouse, the allocation of retailers to warehouses, and the determination of the number of means of transport to deliver the demand. Such models presume that the number of plants has already been determined and give us information on what the number of warehouses to open is as well as how warehouses are distributed to plants. Moreover, we should know how retailers are allocated to warehouses and who the retailers really are. There is also the need to know in what order they will be visited and how many means of transport are required for each route. Minimum costs must be searched for. It is necessary to integrate location, allocation, and routing decisions in the design of a supply chain network. Relocation of the manufacturer has adverse side effects such as causing the readjustment of many existing systems and creating many imminent strategic problems. One of these issues is the location of freight forwarders' warehouses; they must choose whether to locate them in new, existing, or both locations. The freight forwarders have to make responsible decisions and evaluate some potential warehouse locations.

3.1 The effects of E-commerce in developing countries (Africa)

The advent of e-commerce has greatly altered the global commercial landscape. Businesses can now expand their customer bases beyond national boundaries thanks to the convenience of Internet shopping. Although it is still in its infancy, e-commerce in Africa has the ability to significantly impact the continent's economy.

Africa Top 10 Internet Countries 2014 Q2

Country	Millions of Users
Nigeria	70.3
Egypt	46.2
South Africa	24.9
Kenya	21.3
Morocco	20.2
Madagascar	17.3
Malawi	12.2
Mali	11.9
Sudan	9.3
Tanzania	7.6

Source: Internet World Stats - www.internetworldstats.com/stats1.htm
297,885,898 Internet Users in Africa estimated for June 30, 2014
Copyright © 2014, Miniwatts Marketing Group

E-commerce relies heavily on the efficiency of the supply network. A well-oiled supply system is essential for any business that wants to keep up with customer demand. This encompasses everything from product procurement to production to distribution. Inadequate infrastructure, a scarcity of qualified workers, and political unpredictability are just a few of the obstacles that make supply chain management difficult in Africa.

Despite these obstacles, a number of projects are currently underway to boost e-commerce and enhance supply chain management across Africa. The African Continental Free Trade Area (AfCFTA) is one such initiative that seeks to integrate the continent's economies into a single market. This has the potential to streamline the distribution process and facilitate cross-border trade for companies.

The African Union's e-commerce plan is another initiative with the goal of fostering the growth of e-commerce in Africa through the establishment of favorable legal and regulatory frameworks, the development of supporting physical infrastructure, and the encouragement of the acquisition of appropriate digital skills. E-commerce and better supply chain management in Africa are also being promoted by the private industry. While logistics firms like DHL and UPS are investing in infrastructure and technology to improve supply chain effectiveness, e-commerce pioneers like Jumia, Konga, and Mall for Africa are setting the pace. Even with these efforts, there are still obstacles to be dealt with. The widespread absence of reliable internet access throughout much of Africa is a major obstacle. The World Bank estimates that only 22% of people in Africa have access to the Internet. This hinders the ability of both businesses and consumers to utilize e-commerce sites. The lack of faith in internet deals is another issue. Due to worries about scams and security, many Africans are still hesitant to shop online. This highlights the significance of e-commerce platforms making investments in safe payment methods and gaining their customers' confidence.

3.2 Advantages of e-commerce in Africa

The integration of e-commerce and supply chain management has enormous potential to transform Africa's economy. Some of the benefits of these ideas will be investigated in this study. The creation of new jobs is the primary benefit of implementing supply chain and electronic trade in Africa. Because of the volume of work involved, a big workforce is essential to the success of the online retail industry. In addition, a high level of technical knowledge is needed for the creation of e-commerce platforms. Africa's youthful and growing population, which is projected to

double by 2050, can benefit from the introduction of e-commerce platforms by finding gainful employment on the continent.

Africa's E-Commerce Giants

Number of monthly visits on main online marketplaces in Africa in 2021 (in millions)

	HQ	
JUMIA		32.0
takealot.com		10.0
SOUQ* an amazon company		10.0
konga		3.0
bidorbuy		1.5
Kilimall Affordable Online Shopping		0.5
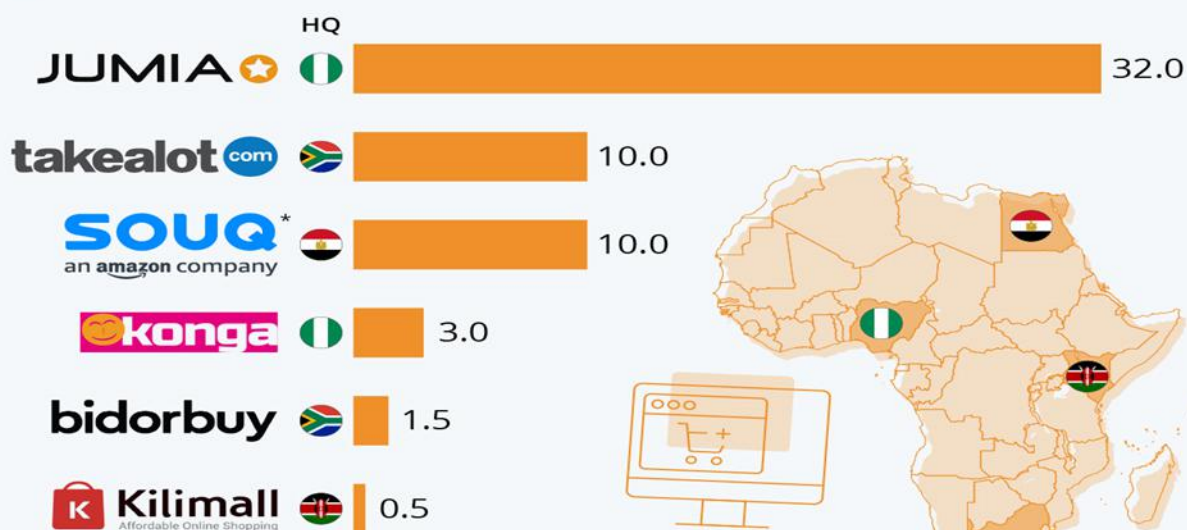
* Formerly Souk, changed to amazon.eg in September 2021.
Source: webretailer via Statista DossierPlus

statista

The improvement of the availability of products and services is the second benefit of establishing an electronic commerce and supply chain infrastructure in Africa. Remote communities may not have ready access to retail outlets, but they can still benefit from e-commerce platforms. Since most Africans still call rural regions home, this is especially crucial there. Through online marketplaces, these individuals can gain access to products and services that were previously out of their reach.

Efficient product delivery is the third benefit of implementing e-commerce and supply chains in Africa. When compared to modern supply chains, Africa's conventional one is slow, inefficient, and expensive. The supply network, time, and efficiency can all benefit from the use of an online marketplace. As a consequence, both businesses and consumers will be able to save money, which will stimulate economic growth.

Boosted competitiveness is the fourth benefit of e-commerce and supply chain implementation in Africa. The growth of e-commerce sites in Africa can give local companies an edge in the worldwide market. African companies can increase their profits by reaching a larger consumer base and opening up enterprises in new marketplaces due to the technological advancement of the Internet. The region's economy will flourish and advance as a consequence.

Transparency is the fifth benefit of implementing e-commerce and the supply chain in Africa. Supply chain visibility can be improved with the help of e-commerce networks. As a result, corruption will decrease, accountability will rise, and good administration will flourish. Investors will feel more secure, which will spur more development and progress in the economy.

The sixth benefit of e-commerce and supply chain implementation in Africa is broader access to banking services. People who aren't able to use conventional banking institutions may be able to gain access to financial services through e-commerce platforms. This will aid in broadening access to banking services, bolstering economic expansion, and decreasing poverty.

Boosted creativity is the seventh benefit of expanding Africa's access to e-commerce and the supply network. Innovation in the area may be aided by e-commerce sites. New goods and services, as well as improvements to the production process, can be created by African business owners with the help of e-commerce sites. The region's economy will flourish and advance as a consequence.

3.3 The Impact of Technology on Supply Chain Management

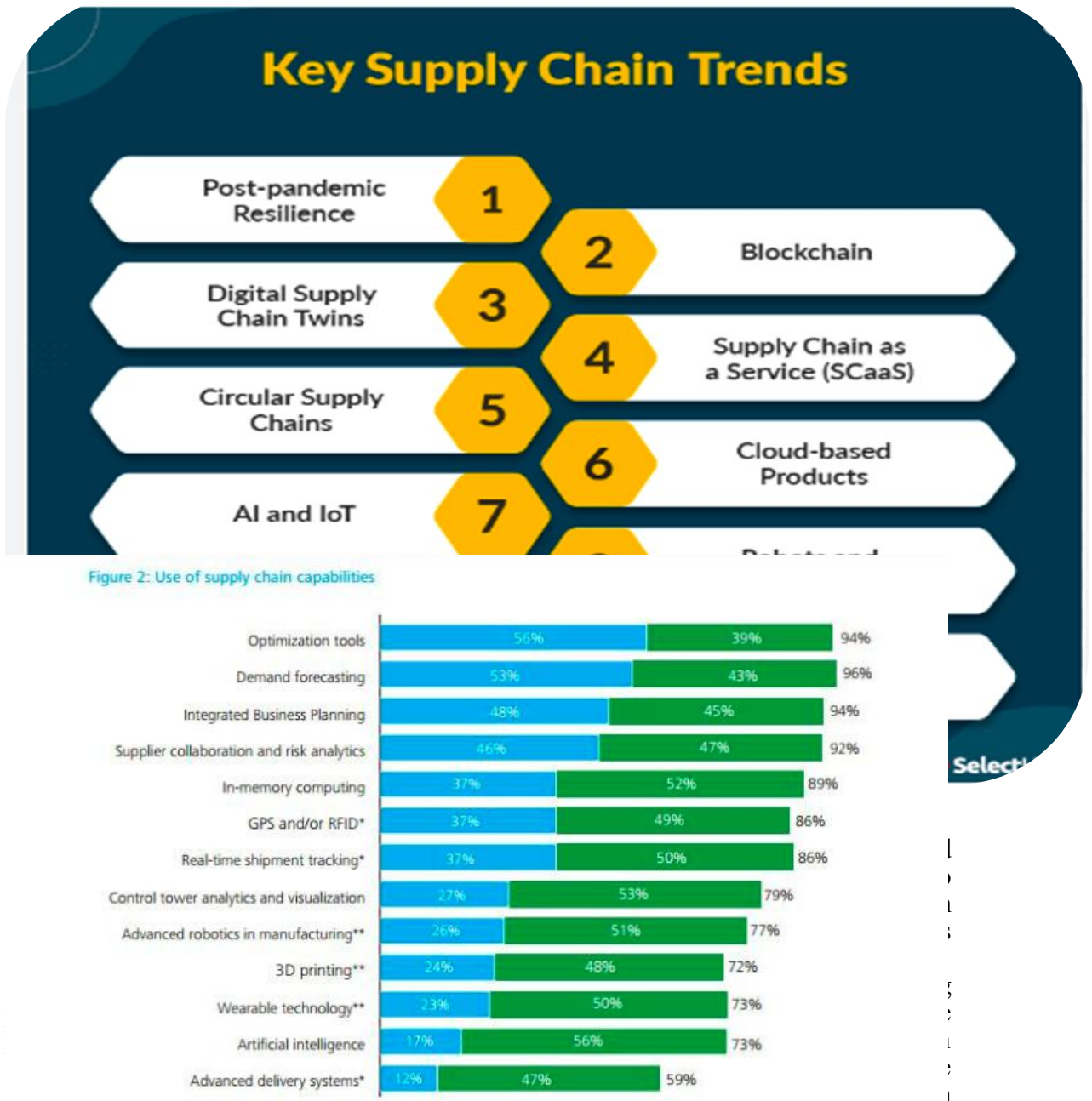Visual Representation of All Keywords Co-occurrence Network
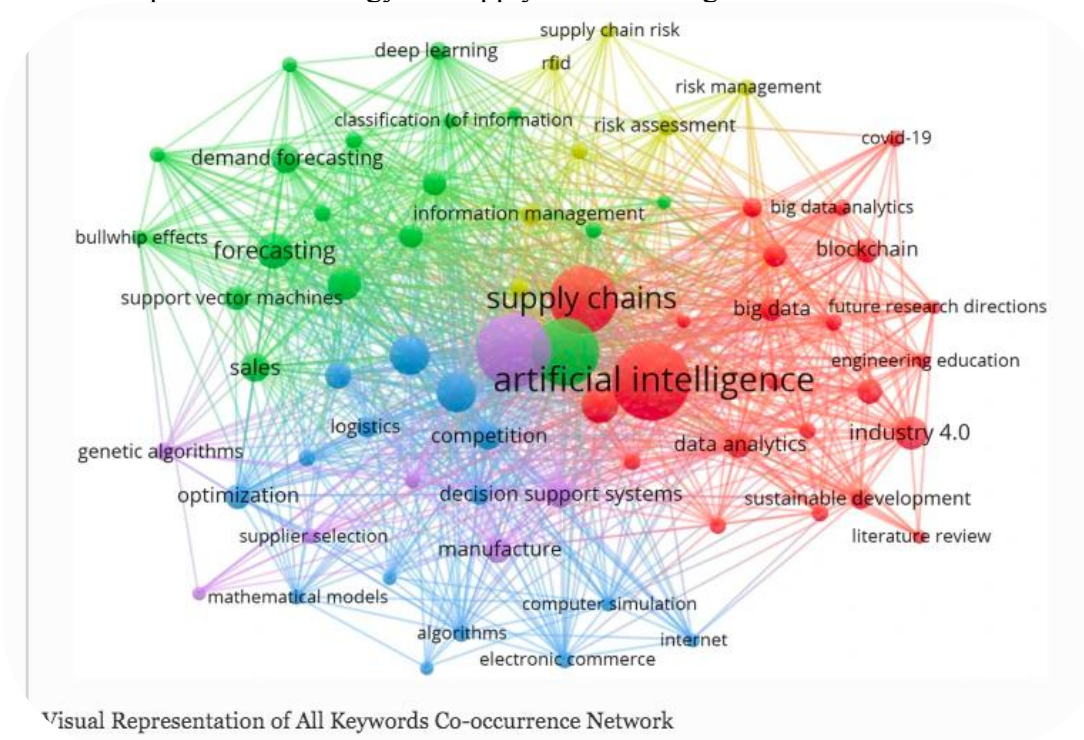
Logistics, analysis, and innovation are the lifeblood of supply chain management. This process has changed over the past few decades as a result of the advent of new technology, becoming a more effective, transparent, and collaborative undertaking. As supply chain management enters the twenty-first century, some clear effects and advantages of technology include:

Increased communication within the supply chain

Without proper and effective communication, supply chain management cannot be successful. Synergy and several codependent or reciprocal elements are key components of these intricate networks. In order to produce a smooth production flow where operations move forward without hiccups that would lower the overall quality of the finished product, communication is essential for connecting each link in the chain.

The instant connection between employees and supervisors, and constant visibility of all the working parts of manufacturing from warehouse to delivery to corporate tasks, keeps all functions simultaneous, quick, and accurate, achieving maximum productivity and eliminating unnecessary waste or lulls, which leads to the ultimate outcome of a satisfied customer. In addition, the organization achieved by optimized communication with mobile devices, voice-based directives, scanners and location trackers, and monitoring capabilities that allow for immediate solutions to hiccups in the chain, can speed up fulfillment rates equating to rapid service, happier customers, and increased revenues.

Key Supply Chain Trends

1. Post-pandemic Resilience
2. Blockchain
3. Digital Supply Chain Twins
4. Supply Chain as a Service (SCaaS)
5. Circular Supply Chains
6. Cloud-based Products
7. AI and IoT

Figure 2: Use of supply chain capabilities

Capability	Currently use	Expect to use	Total
Optimization tools	56%	39%	94%
Demand forecasting	53%	43%	96%
Integrated Business Planning	48%	45%	94%
Supplier collaboration and risk analytics	46%	47%	92%
In-memory computing	37%	52%	89%
GPS and/or RFID*	37%	49%	86%
Real-time shipment tracking*	37%	50%	86%
Control tower analytics and visualization	27%	53%	79%
Advanced robotics in manufacturing**	26%	51%	77%
3D printing**	24%	48%	72%
Wearable technology**	23%	50%	73%
Artificial intelligence	17%	56%	73%
Advanced delivery systems*	12%	47%	59%

More Transparency in Supply Chain Visibility
The data journalism site Statista cites a 2018 survey which "found that the biggest challenge (21.8%) for global supply chain executives was visibility." [2]
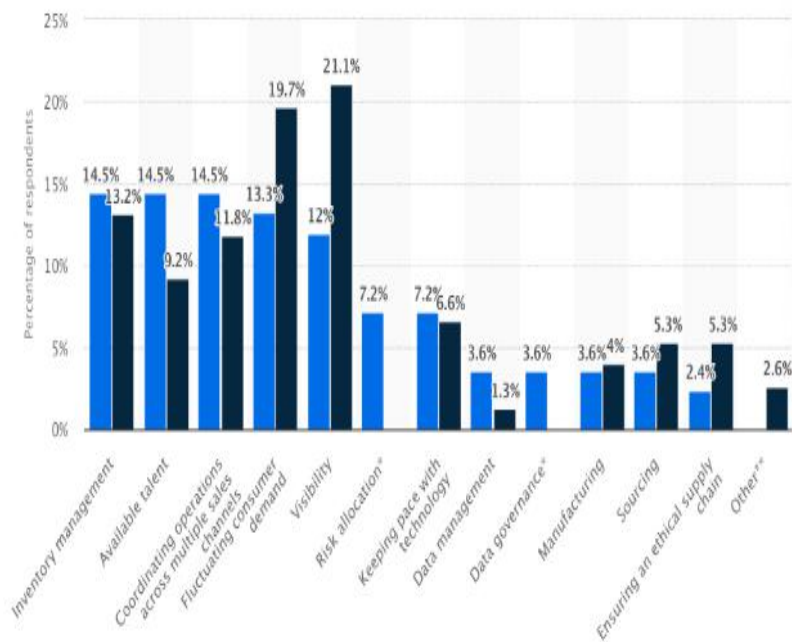
Consistency is important to deliver a presentable and acceptable product that aligns with the company brand. To ensure proper and reliable handling of operations, transparency is essential.

Easy access to up-to-date visibility allows employees and supervisors to intercept when necessary to safeguard the end-product.

Transparency also extends to consumers, enabling them to check on the status of deliveries and be a part of the production process. Customization and instructions direct to the manufacturer keep the buyer in the loop and guarantee a product they'll be proud to purchase and own as it meets their individualized standards. Manufacturing leaders and customers alike know exactly what they're going to get with improved visibility enhanced by supply chain technology.

Top Supply Chain Technology for the Future

Supply chain technology is growing and changing with a new era of digitization to improve manufacturing processes and automate operations. Implementing innovative technologies can provide your company with the competitive edge you need to stand out within the industry and make an impact on your customer base. As your clientele evolves, your business must take note and transform alongside it. Products are becoming more complex, companies are operating more globally, and customers are making heightened demands. Going digital is the only way to organize and streamline your practices to ensure quality performance from start to end.

Seven supply chain technologies to progress your manufacturing business forward include:

1. The Internet of Things (IoT)

Industry insiders project the IoT market to grow by 24.9% by 2027. As a result, more and more aspects of manufacturing will become connected and integrated to deliver insights and inform supply chain management. IDC manufacturing insights expects specific manufacturing businesses, including discrete manufacturers, process manufacturers, and transportation companies, to invest most heavily on IoT

deployments, taking advantage of improved manufacturing operations, production assets management, and freight monitoring and fleet management.

For example, advanced tracking methods and analytics can alert suppliers to save goods that might otherwise spoil en route to consumers by rerouting packages to closer distribution centers due to equipment malfunctions or poor traveling conditions. Eliminating waste and having the ability to intervene with other inventory mishaps or misplacements can reduce lost revenues resulting purely from logistics failures or oversights, thereby generating higher revenues based on more streamlined processes and successful outcomes.

IoT isn't without risks. Using the internet to control your business operations opens you up to cybersecurity dangers, but its impact on your manufacturing processes can outweigh any inherent hazards. IoT can help pinpoint what you need to pay heed to and what you can dismiss, detecting patterns and possible problems before they happen, giving you insight into what works and what doesn't, and how you can do better. This is valuable and indispensable information for anyone to have if they want an edge on others.

2. 5G and Starlink

Along with IoT associations, the introduction of 5G into supply chain management will be a massive shift to the industry, improving internet speed and latency or processing time for manufacturing processes. Cellular phone companies began rolling out this technology around the globe in 2019. In less than five years, researchers expect that nearly 2 billion mobile users worldwide will subscribe to 5G. 5G networks differ in that they involve cloud technologies to drive wireless connections. Software-based capabilities can advance automation and data processing.

3. 4. Blockchains for Supply Chains

Blockchain technology ensures that transactions are validated, recorded, and encrypted. They replace slow, manual processes and strengthen traceability. Created to support bitcoin or cryptocurrency transactions, blockchains are expanding into other business sectors, including the manufacturing industry, to address supply chain management issues, such as tracing the ownership of goods.

This internet-based technology operates as an independent, digitized ledger to record transactions and distribute them to other users within the network worldwide. Blockchains use encryption for these transactions, ensuring heightened security and immediate transmissions. Each transmission or block links together to form a chain, deriving the name blockchain.

Permissionless ledgers exist on public domains allowing for consensus verification. At the same time, known or trusted users can centralize permissioned ledgers, which users cannot change once "nodes" within the transaction approve all actions within the sequence or data set. This distinction is important for supply chain management to gain private validations of data in real-time for superior analysis and visualization.

4. AI and Machine Learning

The harrowing year of 2020 forced businesses to rethink their operations to remain relevant and competitive amid a pandemic that rocked the globe, making innovation imperative to avoid disrupting demand and revenues and keep "doors open" in new ways. As a result, digitization and automation became necessary to keep the wheels of commerce turning. An Oxford Economics Survey found that 70% of businesses surveyed have implemented or tested artificial intelligence (AI) solutions in the wake of one of the most memorable years in manufacturing and consumer sales.

AI can make better decisions and has already been used to help reduce empty freight trips or plan labor resources. Companies implementing AI perform stronger with better results than companies lagging in technological advancements. The unconventional software uses algorithms modeled on human thoughts and behaviors and can modify its processes over time based on intel from past operations. In other

words, it learns and evolves to improve methods established by previous failures and successes.

In the manufacturing world, this means smart manufacturing or using machines to analyze, compute, and make decisions in real time, often in ways far superior to human capabilities. Machine learning leads to increased productivity and accuracy to keep costs low and operations running efficiently. The programming of machines to sense problems and send data makes it easier to maintain tools and avoid lapses in production.

Manufacturers can use predictive analytics for more than just real-time product intelligence. Supply chain analytics can help improve customer experiences, reduce costs, and optimize inventory visibility and strategic sourcing per Deloitte's 2019 Supply Chain Digital and Analytics Survey. Supply chain management relies on details and data quality to deliver big-picture values. Analytics is the way to drive the technological elements that lead to insightful tactics and beneficial results.

5. Automation and Robots

Robots are already utilized in the supply chain to move materials or build products faster and more efficiently than humans. With the utilization of AI and IoT, robots will become more sophisticated. Manufacturing automation isn't simply using machines to replace human labor. It encompasses software and other advanced technologies to enhance and streamline operations, such as using AI to quickly detect errors in products, tools, or processes and find solutions in real-time rather than identifying problem post-production and burdening the company with unnecessarily wasted resources.

Additionally, using robotics in manufacturing helps ensure consistency. Engineers can program robots to do repetitive task in the exact form every time, eliminating human error and slight deviations in product quality. For high-volume output, this type of robotic application proves successful in repeating processes in the same way and leaves room for flexibility when needed. Programmers can adjust mechanical rigidity with AI that enables a more human-like mimicking of thought patterns and problem-solving skills, giving manufacturers the speed, accuracy, and efficiency of a machine and the adaptiveness of human reasoning.

By integrating digital applications, such as IoT and PLM, into your automation strategy, you can help your machines communicate and better share data across your organization. Management can use the information to adjust processes based on its thorough analysis and measurement of success and better plan for future production. The implementation might look different for every company, but the benefits are the same. Automation allows for heightened transparency, visibility, collaboration, planning, results, and return.

Some ways in which robots and automation are revolutionizing the manufacturing industry include:

✓ Delivery robots: These robots can help companies save on labor costs and eliminate the need to place humans in a hazardous role, thereby also reducing health and safety costs and costs due to missed work.

✓ Automated trucking: Self-driving vehicles are likely in the future, with humans and machines working together to ensure the safe transport of products and materials.

✓ Sorters: Utilizing vision technology, these robots can learn as they go (AI) to recognize various materials and categorize them accordingly, eradicating a menial and time-consuming task for humans.

✓ Automated storage and retrieval: These are computer- and robot-aided systems that can move inventoried products as needed for storage or use per consumer

demand. IDC predicts that by 2023, 65% of warehouses may be using robots and analytics to optimize storage and increase warehouse capacity by over 20%.

6. Digital Supply Chain Twin

A digital twin of your supply chain system can help you optimize and make business decisions by manipulating and finding how changes would affect your supply chain management. In other words, it's a simulation model replicating current performance to help forecast and analyze various supply chain behaviors and potential problems to devise a plan. In addition, these digital supply chain twins are detailed and integral, providing live data feeds, so information and predictions are continually updated.

Analysts create digital twins using specialized supply chain software integrated within company systems to represent and connect hundreds of assets and positions across a business chain. This software is flexible, scalable, and interoperable to identify risks in advance and make changes accordingly. Users need transparency along the supply chain for accurate and informed decision-making based on anticipated events. Essentially, digital supply chain twins provide you with data-driven insights to help improve or test processes before mistakes happen or as they're happening to prevent significant company losses.

Manufacturers can use digital supply chain twins for the following purposes:

- ✓ Understanding the way your supply chain operates
- ✓ Bottleneck discoveries (i.e., anything presenting a "kink" or break in the chain, such as limited resources, poor planning or execution, inefficient time management, lack of innovative processes, etc.)
- ✓ Testing changes or new developments to the supply chain
- ✓ Risk management and monitoring with the assessment of possible contingencies
- ✓ Transportation planning
- ✓ Inventory optimization
- ✓ Forecasting and testing of various operational methods
- ✓ Predictive and determinative analytics

7. Product Lifecycle Management (PLM) Software

Product lifecycle management (PLM) software manages data and processes at each stage of production, servicing, and sales across the supply chain. Propel PLM is a cloud-based software built via Salesforce that aims to get better quality products in the hands of consumers faster. PLM mitigates a variety of issues faced by manufacturers throughout the lifecycle of a product, helping companies align and integrate critical resources and extend information to the team quickly, accurately, and uniformly for quick and efficient analysis and solutions.

PLM offers a way for manufacturers to collaborate and control data while allowing for customer, partner, and organizational feedback due to increased transparency, ultimately creating better, more complex products, resulting in greater revenues and speed to consumers. Propel PLM specifically utilizes cloud technology to create a single source of truth, expediting and improving processes. Our collaborative software enhances the user experience to accommodate an evolving workforce that now operates remotely and globally, enabling multi-level communication in real-time and from different locations.

Our goal is to shorten delivery timelines and increase your company margins up to 20%. We want to help lead your business into the future with our modern PLM software designed for the next phase of manufacturing. Contact us today to discuss your supply chain management needs and how our PLM technology can help deliver your goods.

The Future of Supply Chain Management Technology

Supply chain management technology aims to take a good thing and make it better. Advanced manufacturing trends are getting consumers higher quality products at a quicker pace and helping manufacturers definitively pinpoint what's working and

where they can see improvement to continue serving the customer per their ever-increasing and changing needs and demands.

The future of manufacturing is years in the making and still evolving, but its far-reaching benefits are already evident throughout the industry. We are just beginning to scratch the surface of the many capabilities of future manufacturing. As the world and consumers shift and grow, manufacturers need to be ready to advance, too. It's not enough anymore to simply meet consumer demand. Industry leaders now need to adapt to, analyze, and predict consumer demand before the customer is even aware of their requests and as events are unfolding, further influencing consumer desires.

What Artificial Intelligence Can Do for Business
Artificial intelligence is an umbrella term that simply means making machines think and act intelligently like humans. It encompasses many technologies that are designed to discover patterns, learn, and create optimal choices and actions. AI is a major field of computer science that branches into subfields of robotics, machine learning, speech processing, and much more.

How AI Solves Supply Chain Challenges
When you leverage AI, you can elevate your business to maximize the efficiency and responsiveness of your supply chain logistics. Smart technology like AI can achieve total transparency across your business networks, drive business processes to close the experience economy gap, and participate in sustainable business practices.
For example, SAP offers the Digital Supply Chain management software to optimize the supply chain process with innovative technology. The solution utilizes AI for processes like streamlining manufacturing and strategizing market-driven plans. With intelligent technology in this supply chain management solution, your supply chain will undergo a digital transformation.

Accurate Demand Forecasting For Optimal Inventory Levels
For Any Consumer-Based Business, Success Is Reliant On Maintaining Optimal Inventory Levels. Supply Flaws Like Overstocking Or Understocking Can Lead To Disaster For Your Company, Which Means Demand Forecasting Is Especially Important For Your Supply Chain Strategy.
Implementation Of A Forecasting Engine With Machine Learning Can Prevent Your Business From Suffering Losses. The Technology Can Discover Patterns Within Supply Chain Data And Provide Predictive Analysis For You To Make Informed Decisions In A Timely Manner. Save On Operational Costs By Becoming Proactive With Predictive Power.

Increasing Efficiency Of Warehouses
Who Doesn't Want An Efficient Warehouse? With A Fully Automated Warehouse, Small Tasks Are Simplified, And Your Operations Become More Cost-Effective. Technology Can Increase Productivity And Efficiency While Driving Down Manual Labor At Your Warehouses.
Redefining Customer Support

AI not only benefits supply chain logistics but also the marketing and operational procurement landscape. AI-powered technology like chatbots can personalize the relationship between logistics providers and customers.

Chatbots can handle 80% of all customer engagement and, therefore, your company can provide better customer experience. Chatbots make it easy and fast for your customers to receive the support they need in real-time. The technology behind chatbots allows them to understand and solve your customers' challenges, and then learn from these interactions to give better customer experiences in the future.

Improved Shipping Efficiency and Speed

In the logistics business, every mile and every minute counts. One of the biggest challenges that supply chain logistics face is the continuous improvement of delivery times. With expectations set by shipping giants like Amazon, customer demand calls for faster and faster delivery. AI technology can improve the last-mile delivery process with route optimization software to save time.

Carriers like UPS uses AI-powered GPS tools to find the most efficient route. The GPS tool collects data from customers, drivers, and more sources to find the best route when the carrier has many destinations to deliver shipments to. Not only can AI improve delivery efficiency, but it's also sustainable for the environment by reducing emissions into the environment.

The Future of AI in Supply Chain

The future has a lot in store for the supply chain as AI continuously improves with time. For example, carriers will normalize autonomous transportation like drones and self-driving trucks soon enough. Currently, it's still a concept in development but it is set to drastically change your supply chain strategy.

Modern supply chains are complex with many moving parts in which the integration of AI into the supply chain process is vital to keep your business moving forward. Companies with AI-enabled supply chains are up to 60% more effective. Now is a time to start investing in AI!

According to a 2020 market report, various AI-based technologies are set to reach in the billions of dollars in the supply chain management market globally by 2025. AI is truly in the development of revamping the operational process of supply chain logistics to improve overall performance. There will be many new possibilities and opportunities for your company to grow!

Conclusion

To sum up, there are substantial prospects for companies and governments in emerging markets that take advantage of the synergies between e-commerce and supply chain management. There are, however, major obstacles that must be overcome. Together, public officials and business owners can find solutions to the obstacles standing in the way of the success of e-commerce and SCM. This will allow underdeveloped nations to reach their maximum potential through the implementation of e-commerce and SCM.

Additionally, Starlink may allow faster internet in more rural areas, allowing for manufacturing expansion into these currently neglected regions. Starlink provides satellite Internet access to extend online communications and connections. This new technology replaces expensive and unreliable services, giving remote locations an opportunity to invest more readily in commerce and essentially opening up an entirely new customer pool.

Reference

Electronic commerce systems SACHENKO, A. [on-line] 20th March 2011: retrieved. URL:

Managing a Flexible Economic System. BUCKI, R. Acta Academica Karviniensia, Volume 2, Issue 1, 2010, Pages 51–58, Slezská University in Opava, Obchodna Podnikatelská Fakulta in Karviné. ISSN 1212-415X.

BURD, S.D., 5th ed., Systems Architecture, Course Technologies, 2005, 656 p., ISBN 978-0619216924.

Datta, P. (2011). A preliminary study of ecommerce adoption in developing countries: Ecommerce adoption in developing countries. Information Systems Journal, 21(1), 3–32. https://doi.org/10.1111/j.1365-2575.2009.00344.x

Developing Asia in the Era of Cross-border E-commerce. 31.

Kravchenko, O., Leshchenko, M., Marushchak, D., Vdovychenko, Y., & Boguslavska, S. (2019). The digitalization as a global trend and growth factor of the modern economy. SHS Web of Conferences, 65, 07004. https://doi.org/10.1051/shsconf/20196507004

Li, J. (2020). Cross-border E-commerce Trade between China and Africa: Review of the Literature. Journal of Business and Enterprise Development, 9(0). https://doi.org/10.47963/jobed.2020.04

Sirimanne, S. N. (2018). Liberia: Rapid eTrade Readiness Assessment. United Nations Conference On Trade And Development (UNCTAD), 60.

SUCHNEK, P. Business Intelligence as an Aid to E-Commerce Systems in Relation to Decision Making and Cross-Border Online Purchasing. Spring 2010, Volume V, Issue 1, pp. 94–102 in Journal of Applied Economic Science. ISSN 1843-6110.

SUPPLY CHAIN PLANNING UK LTD., number five (SCP). Supply chain and logistics strategy. [online] Retrieved March 25, 2011. URL:

Supply Chain Performance Metrics [6] HAUSMAN, W.H. Hau Lee, Terry Harrison, Corey Billington Terry Harrison, Hau Lee, and John Neale, eds., The Practice of Supply Chain Management. New York: Springer Science & Media Inc., 2004.

Uzoka, F.-M. E., Shemi, A. P., & Seleka, G. G. (2007). Behavioral Influences on E-Commerce Adoption in a Developing Country Context. The Electronic Journal of Information Systems in Developing Countries, 31(1), 1–15. https://doi.org/10.1002/j.1681-4835.2007.tb00213.x