Deep Science Publishing
https://doi.org/10.70593/978-93-49307-44-5_1

DeepScience
Open Access Books

Chapter 1: The transformation of wholesale and supply chain ecosystems through intelligent cloud technologies

1.1. Introduction

In recent years, wholesale operations and supply chains have experienced a metamorphosis resulting from the advent of Intelligent Cloud Technologies. Among those technologies, technology clouds have emerged as powerful enablers, driving efficiency-improving transformations across wholesale operations and supply chain ecosystems. Intelligent Cloud Technologies are a category of cloud services consisting of cloud computing infrastructures, functional cloud solutions, and service cloud solutions conceived to enhance B2B operations and marketplaces. The transformation of wholesale operations and supply chain ecosystems through Intelligent Cloud Technologies is examined in a three-part model that includes those entry-cloud technology offerings, supply chain functionality transformations, and their techno-business effects on the wholesale ecosystem.

Cloud computing has written a new chapter in the story of Information Technology (IT) development. The Simply Connected Cloud was initially offered by the IT service provider. It enabled automatic information storage and processing through Internet-service access without the need to purchase IT hardware or software. Its uniqueness lay in its simple operation mode and lack of any direct user interaction. The remarkable progress in broadband Internet proved to be the ideal background for this model stock-keeping and supply management. Generally speaking, the emergence of product clouds is considered the second wave of the cloud revolution. They represent specialized technology clouds based on IT and/or Internet-based operational functionalities outside the scope of

ordinary platforms or clouds adopted by vendors. Their advent has provided a wealth of new options from which companies could select in aligning their purchasing and operational practices and monitoring information creation cloud technologies.

Cloud services are already proliferating in factories and supply chains to realize networked supply and value chains with large numbers of suppliers and producers that without cloud technologies are not practically manageable. Traditional IT and networking solutions would be unfit due to the staggering amounts of sensor-generated information and their processing. In this new chapter of this story, the benefits of cloud services in factories and supply chains are considered, summarizing key enablers reflecting their transformational roles. Nonetheless, the adoption and profitable exploitation of cloud technologies raise important managerial issues. An investigation was conducted to uncover the key transformational roles of cloud technologies in factories and supply chains and their managerial implications. Formulation of entry cloud technologies offering clouds and emerging transformational cloud solutions in factories and supply chains is considered.

Fig 1.1: Supply chain digitisation and management

1.1.1. Background and Significance

Today's wholesale and supply chain ecosystems comprise a complex set of interlinked networks which involves stakeholders across multiple, often globally distributed, organisations. They are increasingly becoming cloud centric, requiring those

organisations to work collaboratively with a wider ecosystem of partners, sub-contractors and supply-chain organisations. New intelligent cloud services have the potential to assist organisations in dealing with a variety of data sets which underpin supply chain operations. The exquisite handling of this data will drive efficiencies, markedly enhancing performance and competitiveness. In particular, the intelligence enveloped in cloud services and advanced analytics could provide the critical insights demanded for success in today's marketplace.

Intelligent cloud services have been gaining traction across many sectors including finance, transportation and supply chains. Nevertheless, existing cloud services for supply chain and logistics are rudimentary, lacking the breadth necessary for broader implementation. These often currently only address high-volume, low-value parcel volumes which do not align with the market's forecast trajectory towards higher e-commerce penetration and changing consumer expectations. It is envisaged that this constraining perspective of the supply chain will change with a new generation of intelligent cloud services, with a far broader understanding of the wholesale and supply chain.

Intelligent cloud services now offer a true alternative to the tsunami of data choking organisations. Cloud services combining space frameworks, advanced analytics, artificial intelligence and machine learning techniques for computer vision could enable new insights from what is evolving as a new big data set. Not only do cloud services enable the application of new technologies, but they could also liberate logistics from monolithic installations. Instead, rapid prototyping of new ideas and technologies through hackathons or co-design workshops is possible in collaboration with partners, suppliers and customers, who only need access to a browser.

1.2. Understanding Wholesale and Supply Chain Ecosystems

The contemporary business spheres are migrating towards a more direct use of the Internet. The upsurge of the concept of Cloud Computing constitutes a vivid manifestation of this occurrence. In recent years, a growing assemblage of organizations has put considerable importance in the analysis of the arrival of Cloud Computing, alongside associated inquiries related to its use and impact within organizations. As the services offered up by Cloud Computing evolve in variety and complexity, its fostering organizations inevitably have to rethink their new roles and the significance of applied IT services in general. The maturation of the Cloud Computing epoch necessitates a holistic view of how IT service provision comes into harmony with organizational pursuits. More accurately, a reflection on the way how supply and provision of IT services can be more effectively and efficiently performed is vital. Thereby, a conceptual model for activity systems of organizations should be built that succeeds in highlighting

the pivotal aspects and their pertinencies on one coherent view. In addition, attention should be directed towards the analysis of logical dimensions and mechanisms that can lead to an enhanced supply and provision of IT services in the era of Cloud Computing. This review scrutinizes the current comprehension of IT services critically as well as provides a conceptual model for inquiry and action. The diversified facets of IT services are seen as the manifestation of Technology or Objects, Human Agency Attributes of execution, and Execution-Based Results. Through the background specified, this work aims at inspiring the theoreticians and practitioners who are interested in diving into the significance and dynamics of Cloud Computing and its influence on organizations' IT services in a more wholesome way. The reason for this interest in Cloud Computing lies with the ascent and diversification of services that in recent years have come under this label. These services have offered rather simple and raw environments for storage of files or back up of data. However, an influx of more complex, composite, and integrated offerings has occurred that is indecipherable through classical lenses of understanding IT services. The increasing old age of those models calls for a more overarching perspective on the emerging complex panoply of activities, results, modalities, and characteristics that constitute IT services today.

1.2.1. Definition and Scope

At the beginning of the year 2012, it was estimated that the global spending with Cloud Computing infrastructure Services was approximately 16 milijard dollars. Cloud Computing adoption is increasing worldwide and it is specifically in the Supply Chain Management field due to its benefits related to technology change or upgrade, flexibility, collaborative approach and forecasting. Esses properties turns the Supply Chain Management Cloud Computing an attractive service. This paper aims to organize and discuss the current knowledge regarding the Cloud Computing application and diffusion on supply Chain Management, as well as the possibilities of future research. Exploratory and descriptive bibliographical research was performed based on a collection of 73 international academic journal articles regarding the Cloud Computing application and diffusion on Supply Chain Management published between 2009 and 2017. The bibliographic compilation was organized in five thematic groups with contents and novelty: General considerations; Models/methodologies and methods; Applications/empirical cases; Cases; and Technologies. The conclusions point out the absence of theoretical models addressed to Cloud Computing diffusion on Supply Chain Management as research opportunities. In addition, the need for empirical scientific research regarding Cloud Computing services applied in the Supply Chain Management field geographically speaking, investigating service and logistics providers and third party logistics Cloud Computing services in more depth. Cloud Computing refers to a huge network of data centers with high performance computing resources, and their

implementations offer many advantages over traditional information technology solutions. Cloud Computing can help corporations gain decreased total cost of ownership and improved flexibility in a fast and relatively easy way. In addition to this, corporations can boost their performance, because they are able to react quickly to sudden spikes in computing power requirements and demands. This research will examine the business opportunities and database security issues of big data services, and how Cloud Computing can effectively enable enterprises to gain new business opportunities and revenue streams while maintaining operational stability. These advancements in technology have supported large amounts of data being processed and stored electronically. Businesses can better evaluate and measure their data and draw business intelligence from these analysis efforts. This presents lucrative new business opportunities, however it also presents the challenge of how to manage this data.

1.3. The Role of Intelligent Cloud Technologies

The Evolution of Intelligent Cloud Technologies Intelligent cloud technologies are multi-component systems that require hardware, software, and networking components that drive vision and decision making through the applications of cloud computing, big data, AI, and internet of things (IoT). Cloud computing is an on-demand service provisioning model that includes public models and private ones. Cloud computing enables ubiquitous on-demand access to a pool of configurable computing resources that can be provisioned rapidly with minimal management effort. Serious concerns do exist about data privacy and security, and cloud computing members create special teams to proactively address these concerns. Cloud analytics is software solutions that deal with data extraction, preparation, and reports. A broader definition of cloud analytics is to use cloud resources for analytical purposes. A broader definition of AI is any technology or system that attempts to mimic human behaviors and processes. An Internet of Things (IoT) network is a physical phenomenon to connect the physical world with the digital world through the use of sensors and wireless connectivity. Smart IoT is the combination of IoT and automation technologies that allow for non-programmable actions in the processing of data traffic.

The Transition towards Intelligent Cloud Technologies The wholesale supply chain ecosystem has evolved from the integrated model to the intelligent model. The integrated model is characterized by heterogeneous supply chains operated under the enterprise resource planning framework. The drivers include the large volume of data and the increasing compute power and networking capacity enabling the merger of computing and storage resources that drive analytics and business process optimization over the cloud computing of cloud suppliers. The intelligent model consists of a network of cloud partners and local supply chains that leverage the cloud infrastructure, platform, and

analytics to emulate and automate business transactions. The drivers include the openness of public cloud services, the demand for high-capacity computing and storage, and low-cost scaling up and down due to competition among suppliers.

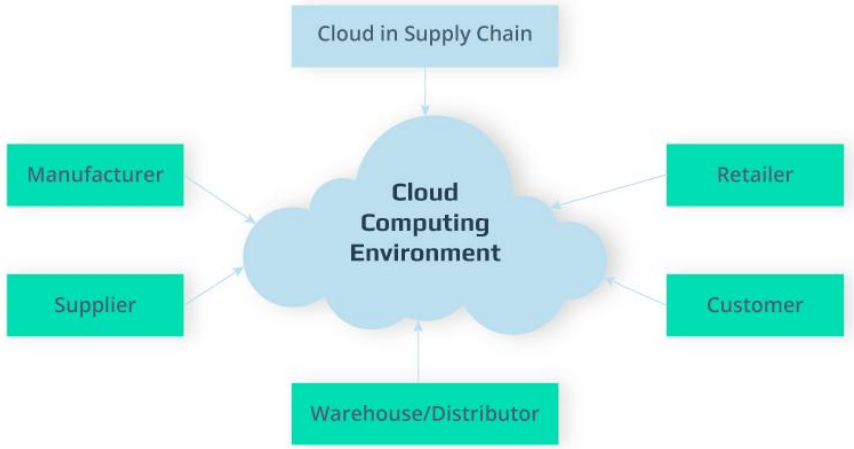

Fig 1.2: Role of Intelligent Cloud Technologies

1.3.1. Overview of Intelligent Cloud Technologies

The emergence of intelligent cloud technologies has catalyzed a transformation in supply chains. Greater automation and quality of services is being provided to consumers and businesses, producing unprecedented operational efficiency gains. Moreover, it provides benefits to people through its capability to reduce required time and costs. A cloud service is any service provided through the Internet using cloud computing technology that is not restricted to rigorously defined parameters and that can be freely requested, formulated, or terminated regardless of its utility. This service space does not contain any physical resource, which means that the organization will not have to bother with anything hardware related. Cloud services allow android and iOS to access metrics, check sales, compare performance, and carry out many other tasks from anywhere in the world. Cloud computing refers to the storing and accessing of data, programs, and software over the Internet instead of on the hard drive of a local computer system.

Cloud infrastructures are composed of a client, an application, a user interface, data storage systems, servers, and computers that run applications. The “cloud” is composed of these intermediary servers; if there is a connection problem or if the server does not respond, nothing works. Cloud computing is a distributed architecture that centralizes server resources in a data center or cloud to supply on-demand computing services such as servers, storage, applications, and services over the Internet. Similar to electricity, cloud computing allows consumption of software, platforms, storage, or processing

without prior installation. With cloud computing, human resources can be allocated to improving business productivity instead of building and maintaining IT infrastructure.

Users globally benefit from cloud infrastructure by effectively sharing processing power, data storage and recovery, bandwidth, and software. Costs are shared according to the hours a given resource is used. Flat, sophisticated pricing models allow users to pay as they go, using only what they need at any given month or time and reducing costs significantly lower than if they supported the entire computing power alone. Cloud computing is based on five essential characteristics: on-demand self-service, broad network access, resource pooling, rapid elasticity, and measured service. Three service models can be defined: Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS). Four ownership models can be defined: public, private local, private hosted, and hybrid clouds.

A cloud service provides a fundamental function, such as storing and processing data or supporting economic activity or information exchange. A cloud service may also not provide a fundamental function but may be nevertheless important in supporting or augmenting a fundamental service. Due to their great compatibility in both technical and business terms, the most studied and the most popular services in the media have been SaaS services, which can generally be provided as standalone services or as a piece in a larger integrated service. Many superficially similar SaaS services may have had highly disparate architectural solutions, which makes it important to begin such a review with classifying them according to their architectural type.

1.4. Impact on Wholesale Operations

To understand how cloud computing technologies can help transform the distribution and wholesale ecosystem, it is essential to know the operations of wholesalers and suppliers (Datategy, 2024; Axios, 2025; Hashed Analytic, 2025). Wholesalers help manufacturers sell their products to retailers, and numerous players have created ecosystems around this transaction. These wholesale and distribution companies could be purely wholesalers or optimize a multi-grade scheme where wholesalers also act as suppliers. A significant problem of wholesale and distribution is that offering wholesale prices requires having a stock of products, and one must have enough goods to deliver quicker than competitors or sell it below wholesale prices. So initial costs are high and extensive investment in transportation, warehouses, or distribution centers is needed.

Additionally, the distribution model is pure selling; customers buy goods at a fixed price, and supply and demand balancing is done by manufacturing and transportation. Transferring titles to goods only happens upon payment; therefore, if sold goods need to be accessed later, goods are always a solvable debt (accounts receivable). Some

distributors are paid before selling the goods or even accessing payment before the orders are executed on rare occasions with advance payments. Discussing all possible types of distribution contracts is beyond the scope of the assignment, but a majority of products come without additional regulations; therefore, the distributor must bear high default risk (i.e., asset risk).

Another important problem for wholesale and distribution operations is the nature of the specialized wholesale market. Although wholesale prices offered to retailers by wholesalers are lower than retail prices, either competitors or retailers could sell the products below wholesale price, thus harder to reach target margins. Retailers need to buy at least ten sources, thus opening more profitable retailers and distributing wholesaler products within competitors. Financial statements of retailers must be checked strictly, several visits must involve potential suppliers, or mutual firmness must build partnerships with trusted retailers to prevent maldistribution. Similar actions lose their efficiency with growing numbers of customers, and relationships usually switch to manual ones, thus not scalable.

1.4.1. Streamlining Processes

As one of the major functions of supply chain systems, it has been gathering attention for research and development these recent years. The development of the cloud computing paradigm and its services is contributing to the emergence of Cloud Supply Chains. These chains are provided by service suppliers promptly, scheduled and monitored automatically, adaptive and scalable to change conditions, operated in a self-service manner, and charged in a pay-per-usage way. As a result, expected benefits include fast delivery time and low cost of the supplied services or available resources. Wildly applicable generic cloud services for supply chains have been designed using currently available technologies. Generic cloud services include those at the cloud management side based on cloud computing infrastructure, such as auto-scaling, load balancing, etc., and those at the cloud interface side based on the Internet of Things, web services, Grid Service-style interfaces, etc. These generic cloud services can be adopted to accelerate the construction of concrete public cloud supply chains. Intelligent Cloud Supply Chain (ICSC), known as Cloud Supply Chain 2.0, is recognized as the evolution of current cloud supply chains. Environmental changes for supply chains are becoming more complicated and rapid in business applications. As a consequence, supply chains significantly lose their rigidity for better adaptability and are treated as a long-life system to be evolved. In return, staying ahead in competition requires more intelligence to anticipate disruptive events and mimic the human brain to be aware, adaptable, and agile. Following the cloud computing paradigm, business executions of the supply chain domain become service-based and offered from the public domain by competing service

suppliers. It has been gathering attention for research on availability, scalability, recovery, and automation of supply chain systems in early studies. Light-weight, on-demand, and resource pooling services on distributed resources promise fast and low-cost supply chain operations. Focused supply chain cloud services are designed with specialized components obeying shared cloud services on standard cloud computing infrastructure at service suppliers.

1.5. Impact on Supply Chain Management

Artificial intelligence (AI) focuses mainly on mimicking human decision-making behavior, whereas machine learning (ML) uses data and human-created algorithms to improve decision-making (Lifewire, 2025; Snowflake, 2025). One way to analyze the literature used to explore this phenomenon is through bibliometric analysis. A document co-citation analysis and author co-citation analysis ensure that the most influential works and authors in the field have been examined. In addition, a keyword co-occurrence analysis has ventured into identifying which applications and techniques are currently being studied in the supply chain management (SCM) and smart manufacturing domains. Machine learning techniques, a subfield of AI, have an immense possibility to be the driving force behind fine-grained sophisticated production practices in smart manufacturing and providing real-time decision-making in SCM.

For this, new and advanced mathematical models aiming at the intelligent computation of sensor data must be combined with new networking technologies that allow remote processing and fast communication with the cloud. Though this combined technology is not widely available yet, sensing technologies have widely matured. Consequently, interest in the identification of constraints in production and SCM from a holistic view is growing. Besides the technological demand, a major shift focusing on customer-specified and customized production with a manufacturing horizon of a few hours represents a big cultural change for many industries. Based on this literature, future research opportunities in the Supply Chain Management domain have been identified, for example, applications of intelligent systems to optimize supply chain resources, optimize the decision on control parameters in SCM, and optimize processes in the entire supply chain.

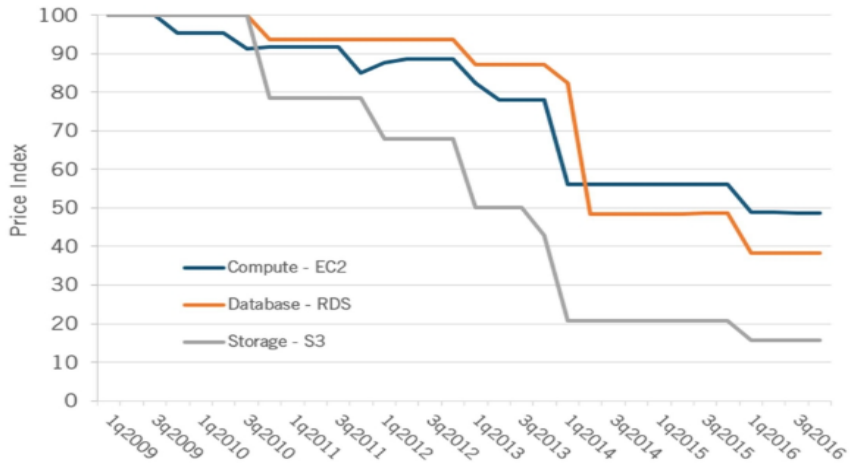

Fig : Secrets From Cloud Computing

1.5.1. Real-Time Tracking and Visibility

Real-time tracking technologies provide supply chain partners with an unprecedented level of visibility to see what happens to their products and assets in transit. Distributing Internet of Things (IoT) devices by producers or logistics service providers in conjunction with powerful cloud computing algorithms enables massive data storage, management, and processing and real-time communication between business partners. IoT devices automatically gather and send data to the cloud about the current location of shipments or sensor measurements from monitoring devices, identifying potential problems proactively. Forecasting algorithms combined with historical data about traffic jams and weather conditions allow supply chain partners to anticipate delays in deliveries. Blockchain further enhances the level of visibility by ensuring that the information sent by IoT devices on the status and conditions of shipments are authenticated and tamper-proof. Continuous track-and-trace capabilities improve the responsiveness and resilience of the entire supply chain ecosystem. Significant advances in geolocation-based technologies concerning asset tracking and visibility available on the junk market are capable of bringing similar tracking and visibility capabilities to the supply chain ecosystems involved in specific sectors and business lines with much smaller financial volumes, thus balancing the competitive forces within the ecosystem.

1.6. Conclusion

Since the launch of the AWS cloud in 2006, the need for centralized servers for storage and computing capacity has been decreasing worldwide. Several cloud providers are currently offering these services to the traditional chains of wholesale and supply, either focused on computing capacity or on the processing of secondary information. The cloud

services may vary from providing big data lakes to act as global headquarters and selling points in a marketplace. The cloud services are spread throughout the Earth, on a framework that guarantees a responsible procedure for operating and storing the data.

The advent of faster Internet connections made it possible to completely change the way supply chains are designed. The creation of new types of businesses that sell high-capacity servers to third-party companies, which provide these services to companies in need, has brought the massive help of the cloud services. The use of servers through the cloud has drastically reduced the required investments and the running costs.

Essentially, cloud services may be grouped into three main categories: IaaS, PaaS, and SaaS. IaaS is the raw machinery that allows any software to be run; PaaS is the middleware that helps acquisition and access to several other services; SaaS consists of ready-made services through the cloud. By offering an additional service set, cloud service providers are forming an ecosystem of services. A multitude of new services are launched every day either directly by the suppliers of cloud computing capacity or by other firms that see a new opportunity to develop their business. They usually advertise their services in their web pages, and trials are often free or of minimal cost besides the acquisition of more expensive central processing unit time.

1.6.1. Future Trends

The future may hold a cross-industry revolution in wholesaling and subsequent supply chain activities powered by intelligent cloud technologies (ICTs). Wholesalers have discovered how ICTs can handle a diverse range of important tasks, including product weathering, enlarging consumer data sets, mobile accessibility of dissemination products, and templating channel profile reports for commercial partnerships. They recognize how these technologies facilitate auditing, cement online routes-to market, complete product sorting and forty-parameter problem reduction segments. The use of ICTs allows wholesaling and subsequent supply chain activities to handle the esoteric nature of this important area of trading. The use of intelligent cloud technologies in wholesaling is still in its infancy, preferably leaving enough scope for future research. Future possible areas of investigation include the nature of inputs necessary for contemplation by cloud 'engineers,' mixing energy inputs, throughput, output and waste forms, and scale ranges. Possible future retail-channel profile analyses enabled by cloud technology include patterns of consumer's favourite weather report formats, disparities in storage methods between retail formats, and future energy savings potentials in display fridges. One would be surprised if new explainable artificial intelligence algorithms capable of grasping brain signals and processing them in the cloud capable of producing pictorial renditions of future perceived wholesale environments did not appear or become accessible soon.

The cloud benefits of increased flexibility, scalability, competitive pricing, and the capacity to test hypotheses about potential supply chain changes on actual operational data have encouraged several organizations to adopt cloud solutions to process their supply chain data. It is anticipated that future supply chain services will increasingly be supplied through the cloud and that environmental factors will become a concern but must remain in the background for the moment. It is affirmed that manufacturers extract supply chain data from data lakes in the cloud, perform incremental computations there, and upload intelligence back into local warehouses to trigger in-situ event management. In detail, it is noted on the one hand that high availability and robustness gained from replicated data can be valuable to manufacturers and on the other hand data slicing schemes must allow for agility on cloud/data rentability pricing.

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