



**Block Chain and Artificial Intelligence
Technologies in Supply Chain and Logistics to
increase Transparency and Efficiency**

FINAL THESIS

By

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Abstract

The diversity of product mix, volatile consumer preferences, and the need for a high quality of service are all major challenges in today's supply chain management. Flexible processes are needed to achieve a competitive advantage and economic advantages in order to satisfy increasing customer expectations for product transparency.

The supply chain is intertwined with the complicated processes of product production and delivery. The supply chain may have several stages, multiple geographic locations, multiple accounts and payments, as well as multiple persons, organizations, and modes of transportation, depending on the product. As a result, the supply acquisition process took several months. Because of the difficulty and lack of accountability in conventional supply chains, it is in the best interests of all parties involved in the logistics process to implement and build blockchain technology to improve and sustain supply chain logistics processes. While blockchain technology is most commonly associated with and used in the context of cryptocurrencies, it has a far broader range of applications. Blockchain describes shared data, synchronized and geographically spread with a wide range of possible uses. Used as data exchange, including contracts, shipment monitoring, and financial transactions (payments). Each operation is recorded in a block, and the data is dispersed through a large number of nodes (computers), rendering the device transparent. The device is more stable since each block is linked to other.

One of the most interesting use cases for blockchain's characteristics is supply chain traceability. The main area of focus for blockchain implementation is in the supply chain market, where decentralization combined with immutability is expected to dramatically improve transaction processing transparency and robustness. Currently, systems can only monitor basic products that haven't gone through the manufacturing process.

A feasibility study was conducted to contribute to permissioned blockchains, machine learning, artificial intelligence (AI), and Internet of Things (IoT) smart devices to enhance supply chain management and product traceability in the context of logistics at the world's largest multinational retailer (IKEA). This paper investigates the concept of decentralized data storage, which is exemplified by.

Keywords

Supply Chain, Retail, IKEA supply chain, Block Chain, Inventory Management, Logistics, Smart Contract, Traceability, Supply Chain Transparency, Supply Chain Visibility, Stakeholders, Supply Chain Visibility, Artificial Intelligence, Machine Learning, Deep Learning, Augmented Supply Chain

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Acronyms

AI	Artificial Intelligence
AMB	Amazon Managed Blockchain
ANN	Artificial Neural Networks
AR	Augmented Reality
AWS	Amazon Web Services
B2B	Business to Business
B2C	Business to Consumer
CSR	Customer Social Responsibility
ETH	Ethereum blockchain
GA	Genetic Algorithms
GDM	Grey decision making
ICT	Information and Communication Technology
IoT	Internet of Things
IT	Information Technology
ITS	Intelligent Transportation System
JIT	Just In Time
LSCM	Logistics and Supply Chain Management
SC	Supply Chain
SCM	Supply Chain Management
WES	Warehouse Execution Systems

Chapter 1

Introduction

The aim of this study is to show how customer preferences are rising in Europe's supply chain industry, with the goal of increasing accountability of goods sold through retail stores (such as IKEA) and e-commerce portals. Individualization and customization have enabled consumer behaviours to demand more product, supplier, seller, price, tender, and shipping details to determine what to buy, where to shop, where the product is sourced, environmental footprints, product quality, how much to pay, supply cost, and how the product is shipped, driving competition among supply chain industries to bring in more trillions of dollars. To maintain and attract new customers, retailers must adapt a much quicker, more granular, accurate, and efficient process.

Consumers are more interested in products that meet certain environmental and ethical expectations. The complexity of global supply chains has hampered quality control in manufacturer procurement. Furthermore, new criteria for supply chain management systems are posed by legislation, international standardizations, and increased market awareness. The European Parliament, for example, mandates food traceability, requiring food producers and market participants to include details about products' provenance. Furthermore, the ISO 9001:2015 specification requires organizations to track product and service identifiability and traceability.

Traditional supply chain management systems, on the other hand, are disconnected from other actors and unable to provide comprehensible provenance information, resulting in flaws such as a lack of confidence between parties, segregated data storage, and unsatisfactory standardization in communication and data formats.

The supply chain is a multi-step process that includes the production and distribution of products. The supply chain may have several stages, multiple geographic locations, multiple accounts and payments, as well as multiple persons, organizations, and modes of transportation, depending on the product. As a result, supply transactions can be spread out for several months. Because of the difficulty and lack of accountability in conventional supply chains, it is in the best interests of all parties

involved in the logistics process to implement and build blockchain technology to improve and sustain supply chain logistics processes.

The highly complicated system like supply chain has challenges involved in dispersal of products. The supply chain may have several stages, multiple payments and accounts, several geographical areas, as well as multiple persons, organizations, and modes of transportation, depending on the product. As a result, supply purchases can be spread out across over a period of time. Due to this difficulty and lack of accountability in conventional supply chains, it is in the best interests of all parties involved in the logistics process to implement and build blockchain technology to improve and sustain supply chain logistics processes.

Blockchain is a digital book with a wide range of applications, including data sharing, contract management, shipment monitoring, and financial transactions (payments). Each behaviour is reported in a block, and the data is spread through a large number of nodes (computers), rendering the device transparent. Each individual blocks is linked together, making the application more secure.

Blockchains are expected to dramatically improve transaction processing transparency and robustness in the supply chain industry, a combination of decentralization and invariability is significantly increase robustness and process of transactional transparency efficiency. Using permissioned blockchains, collaborations, investigate the types, and the number of events that occur during a product's life cycle, from creation to ownership transfer. As a general rule, event tracing in the sense of a supply chain for an organization with several actors handling goods requires immutability.

Blockchains have the ability to allow open and trustworthy documentation of supply chain events involving multiple entities, where no individual should be able to manipulate data without being detected. When using centralized databases, achieving the same degree of accountability involves complex auditing processes, which is still debatable in a global environment.

The aim of a traceability system is for a consumer to be able to check a product's origin as well as how it was transported and treated. The traceability of manufactured products, including their parts, is possible using a suggested block chain process. Non-fungible digital tokens are used to represent items, which are generated on a blockchain for each batch of manufactured goods. The proposed solution of "token recipes," which describe the amount of tokenized goods necessary for minting a new token, is intended to establish a connection between a commodity and the components required to produce it. Since input tokens are consumed automatically and transparently when generating a product token, the physical process is not necessary.

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The application of 4th industrial revolution technologies such as Block Chain, Machine Learning, Artificial Intelligence, and IoT devices to increase operational effectiveness in Inventory management through demand forecasting, sourcing, scheduling, and product traceability in Logistics.

Smart systems are linked via wired or wireless networks for connectivity, computing the procedures, observing in a number of simulations in real-time, making the Internet of Things (IoT) one of the commonly used innovations in the previous decade.

The use of IoT smart devices in a supply chain management system has the potential to radically alter the conventional method of monitoring the transportation system. The material is easily found, their current state, packaging information, and it is easy to monitor how products pass through the supply chain using the IoT technique. It increases the ability to maintain good demand-supply ratios, making material movement easy to track in real time, allowing for efficient storage, energy conservation, and distribution. The retail industry is also using IoT services and artificial intelligence to increase productivity, optimize store operations, and make real-time inventory management decisions.

Finally, the research study explains how Block chain and Artificial Intelligence provide supply chain transparency by allowing retailers to obtain product information and transactional details through a chain of distributed ledgers and quality assessments by multiple trading partners such as producers, manufacturers, registrars, standard organizations, customers, certifiers, and auditors to a centralized database.

1.1 Research Background

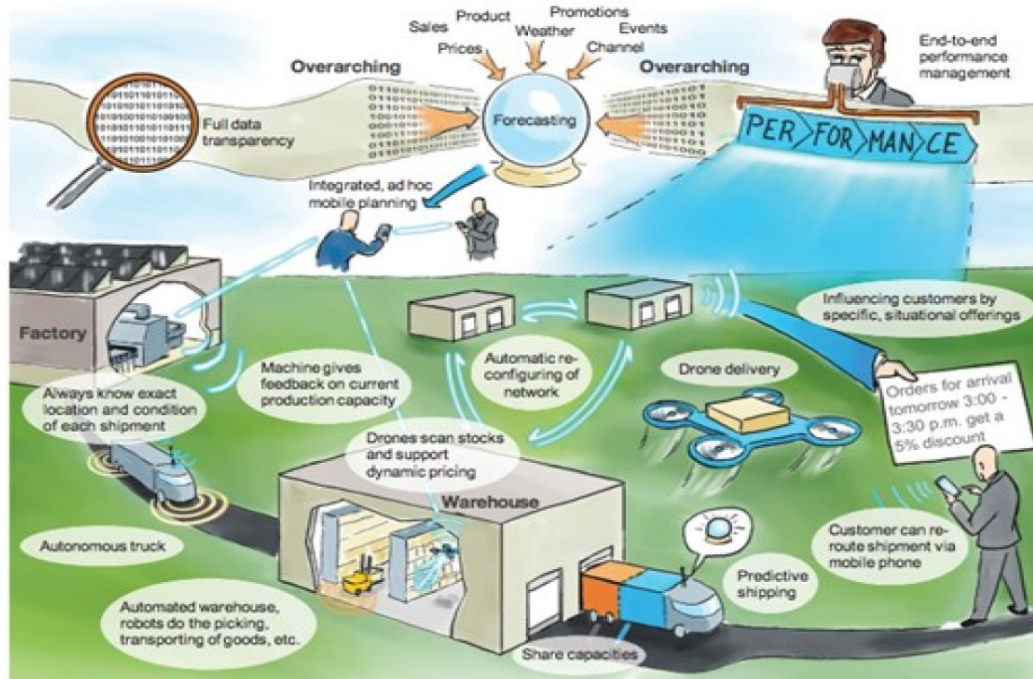
Over the past 30 years, supply chain has developed dramatically. Previously, logistics' primary function in reporting to production and distribution firms was to ensure the availability of raw materials to manufacturers and the distribution of finished products to customers. However, logistics has grown into an independent entity to oversee the supply chain process's effective inventory management. Sales that are integrated, request analysis and planning operations are examples of procedures for planning ahead of time. Logistics given by third party vendors are often used to handle logistical support and many industries have tried-and-true market practices. The supply chain ascertains that all procedures are coordinated from manufacturers to customers, making decisions on expenses, inventory, and customer service from an end-to-end perspective rather than function by function.

Futerra, 2018 [19], according to a survey conducted by the Consumer Goods Forum, 70 percent of customers today are more concerned with product accountability than with the businesses that produce the products. Transparency, according to 91 percent of executives, fosters confidence. The more authentic the goods are, the more good the company's brand is. Challenger labels, according to the report. "Products must behave more like people," encapsulating the ideals that allow people to trust one another in the peer-to-peer environment.

Consumers want accountability on social, health, financial, and safety issues, according to 92 percent of respondents. Consumers are more interested in openness regarding these topics now than they were five years ago, according to 90 percent of respondents. Consumer interest in openness regarding social, health, environmental, and safety issues is expected to grow in the future, according to 90 percent of respondents.

Consumers' interest in transparency has increased in the last five years, as they want to learn more about the inner workings of companies, how ingredients are sourced in products (whether food or home furnishings), how nutritious the product is, and whether it is sustainable. The younger generation is even more picky about what they eat. Consumers today are early adopters, interested in who and what is behind the brand, how it is made, and what is in it. In the industry, complicated questions emerge about how to build and maintain customer habits and trust.

Supply chain Knut Aliche, et al., 2018 [24]:



Source: McKinsey

1.1.1 The Product Dilemma in the Era of “Post-Truth”

Consumers no longer trust businesses in today’s world. Just half of the world’s population could read in the 1950s, knowledge was tightly guarded, and social norms firmly defined deference to those born to, or trained for, leadership. Doctors, priests, police officers, and even politicians were thought to have a higher moral status than the average citizen, owing to their access to information and influence that others lacked. This was the setting for the development of a brand, the logos alone inspired confidence - and even deference - from the primary purchasers of food, home, and personal care products: female customers who are illiterate.

1.1.2 Supply Chain Process

Peter, et al., 2020 [34], consider a chair as an example of a product. A chair’s life cycle begins with a tree trunk in the forest and finishes with a chair purchased from a nearby store. In the manufacturing and commercial industries, there are several phases to go through from start to finish. Cutting the tree bark, shipping it to a furniture factory, designing the chair, and crafting the log into the chair are all examples of manufacturing activities. The furniture maker purchasing logs from a timber supplier, the manufacturer hiring shipping firms for the transfers, and so on are all financial operations. These are the only events that occur during a product’s

life cycle. The supply chain of a product or service is described in the business and financial world as the network of organizations, businesses, retailers, manufacturers, and customers, as well as the activities and transactions that occur between them.

An example of Supply chain flow for the furniture products.

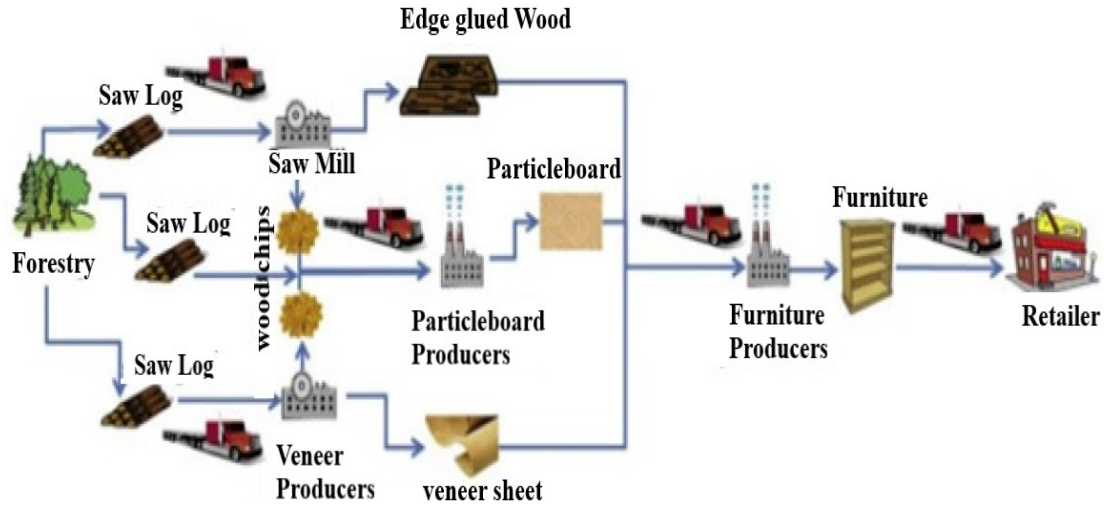


Figure 1.1: Source: Peter, et al., 2020 [34]

1.1.3 Blockchain Technology Introduction

Akram, 2018 [1], “The term blockchain technology refers similar to accounting ledger that records each and every transaction that take place inside a P2P network”. Beck, et al., 2017 [6], Kosba, et al., 2016 [25], the word Blockchain means that blocks are related in some way. Swanson, 2015 [38], “A block is a collection of data, classified as content and meta-information. Usually, the information provided is transactional in nature”. Pilkington, 2016 [35], the header stores metadata, which includes a hash value determined from the block’s content and a reference to a previously generated block. Crosby, et al., 2016 [15], Beck, et al., 2016 [7], “The preceding blocks are used as reference for measured hash value”.

Crosby, et al., 2016 [15], Milutinovic, et al., 2016 [30], the consensus mechanism is a fundamental principle in Blockchain technology that addresses the difficulty of reaching consensus on transaction correctness. Yli-Huumo, et al., 2016 [43], cryptographic algorithms are used to ensure that transactions are accurate.

Crosby, et al., 2016 [15], it is important to decide the order of the Blocks that will be applied to the Blockchain due to the existence of a distributed system; this is also part of the consensus seeking process.

Nakamoto, 2008 [33], the described problems were solved with a consensus process known as "proof-of-work," which emerged as the backbone of the Bitcoin network. Crosby, et al., 2016 [15], since a "hash code token" is created by addressing an analytical or arithmetical problem, the construction of a block needed a specific level of effort, the term Becker, et al., 2013 [8], "proof-of-work" was coined.

This method is inefficient and depends on computing power, which is costly, and it's all a waste of money in the end Yli-Huumo, et al., 2016 [43]. The consensus mechanism is, the rationale behind Blockchain refers to as tamper-resistant is due to the feature, If some-one attempted to modify or delete a block, the hash values of all subsequent Blocks would have to be determined. Owing to computing capacity constraints, this is almost impossible by today's standards Nakamoto, 2008 [33].

According to Bentov, et al., 2016 [9], alternative methods of reaching consensus are being studied due to the disadvantages. a demonstration of Stake is a consensus process that does not rely on computing resources for its operation. Bentov, et al., 2016 [9], "The participants in the scheme have authority to make decisions, and new blocks are developed using a predetermined strategy based on consumers interest".

Buterin, 2014 [12], because of this technique, transactions are performed faster and less energy is consumed. Xu, et al., 2016 [42], "A possible assailant would need a significant share in the system, but the value of a pile drops when network has been compromised, reducing the likelihood of an assault".

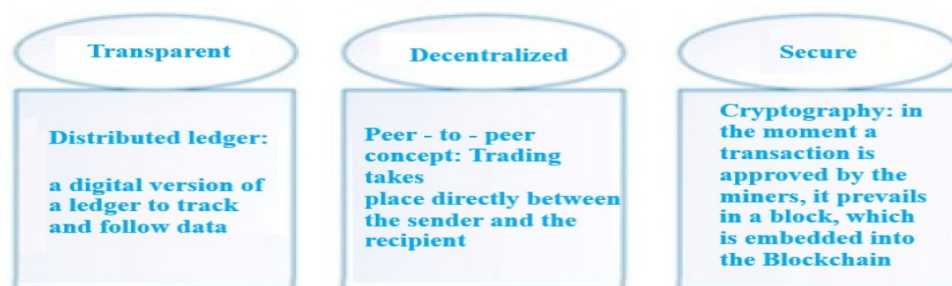


Figure 1.2: Source: Edvard, et al., 2019 [18]

1.2 Research Aim

The aim of the research is to learn about customer demands and knowledge about product transparency, as well as how companies are using technology like block chain and artificial intelligence to incorporate solutions in the supply chain industry for goods they buy in retail stores and e-commerce portals. Individualization and customization allowed consumers to be more aware of the social, health, financial, and safety impacts of goods manufactured by producers and distributed by suppliers, dealers, and retailers as demand grew. Customers are also interested in product shipping and logistical information in order to determine the source and establish an efficient framework for lost or counterfeit goods shipped to their locations. This allows consumers to choose what to purchase, where to shop, where the product is sourced, environmental footprints, product quality, how much to pay, supply costs, and how the product is delivered, resulting in increased competitiveness among supply chain companies to improve product transparency and traceability. To maintain and attract new customers, retailers must adapt much quicker, more granular, accurate, and reliable processes to meet consumer demands.

In addition, this research looked at the use of blockchain in the supply chain and logistics industries, where safety, accountability, and trust were discussed as key issues in the industry.

Last but not least, merging Artificial Intelligence (AI) and Internet of Things (IoT) smart devices with blockchain technology to improve operational efficiencies and product traceability for retailers, distributors, and suppliers.

1.3 Research Objectives

The primary goal of this study is to determine how customer trust and brand image are affected by product transparency, as well as how retailers, suppliers, and sellers are able to meet consumer requirements, and how successful innovations have become in meeting those demands, as well as how technologies are addressing data privacy concerns.

1.3.1 Transparency, Privacy and Trust

According to Ball, 2009 [5], “Transparency, which is akin with see-through judgemental decisions by administrations and charitable organizations. Accountability is a dynamic tool for strong administration, in services, strategies, countries and organizations, its’ a collective value embraced by society to fight bribery”.

Privacy, or more specifically, data Privacy is described as having control over one's personal information and not having that information used without one's permission by others.

Pilkington, 2016 [35], since the basic concept behind Blockchain is transparent, transactions are private and accessible to all, privacy and openness are twisted together in the sense of blockchain technology. Blockchains, on the other hand, aren't accessible in the conventional ways, It's important to distinguish "public and private" blockchains. Christidis, et al., 2016 [13], there are no limitations on network users in a decentralized Blockchain, and all transactions are marked by a public hash value, which is used to verify the transaction.

Pilkington, 2016 [35], a proprietary Blockchain, as well as the control of read and write permissions and the restriction of network access. Xu, et al., 2016 [42], as a result of the various methods, private Blockchains are unable to achieve the same degree of decentralization as public Blockchains. Since users are identifiable and not anonymous, the degree of openness can be managed thanks to the system's user rights management in private Blockchain. The users of public Blockchain and their transactions remain anonymous, but transactions are visible. As seen in the diagram below, the degree of privacy and transparency in a Blockchain is defined by the type of Blockchain used.

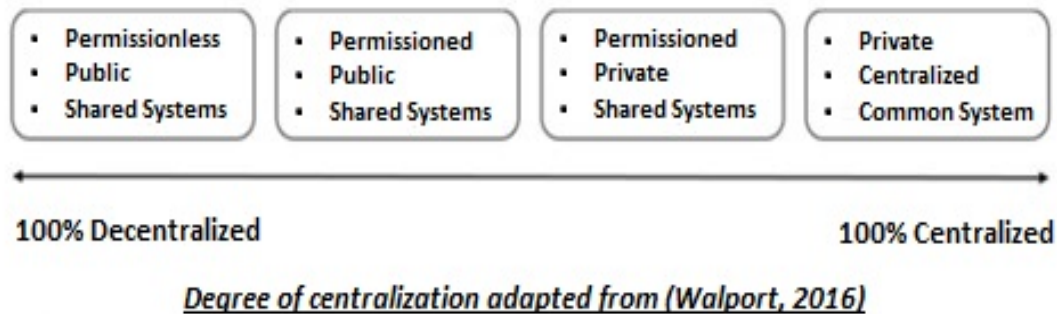


Figure 1.3: Source: Walport, 2016 [41]

1.3.2 Improving Logistics Processes Through the Use of Blockchain, AI, and the Internet of Things for Goods Tracking and Traceability

Akram, 2018 [1], the project's goal in logistics was to find use cases for using blockchain as a data base in conjunction with Internet of Things (IoT) devices. A IKEA and supply chain industries uses the Internet of Things equipment's to verify the slant, ambient temperature, wetness were among the factors that could be calculated and documented. A mobile app visualizes the status of shipped products. As a result, the project acted as a test bed for exploring the capabilities of IoT devices combined with blockchain technology in logistics. For a business, the transit time of vital deliveries to other countries is critical.

The primary aim was to enhance the monitoring of shipped goods as well as the flow of information between them. IoT sensors are installed on the shipped goods to collect data about them and monitor their location during their journey. Hyperledger, an open-source implementation of a distributed ledger architecture, was used to build the blockchain platform and the required infrastructure supported by an external service provider. The platform was used as the foundation for IoT devices and knowledge flow between participants, as well as to introduce smart contracts for automating transactions between them.

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As seen below, blockchain aids in the automated tracing and authentication of goods from an ecosystem to store shelves and, eventually, to customers. IKEA, IBM, Walmart, and Nestle all continue to use suppliers to get goods to store shelves and then to consumers, as seen below, and are more likely to use blockchain to build a more open, credible, and trustworthy global supply chain. Several current implementations use blockchain technology to provide protection as a primary target. The reasons are in line with the goal of making goods that are healthy, sustainable, and transparent.

Ex:

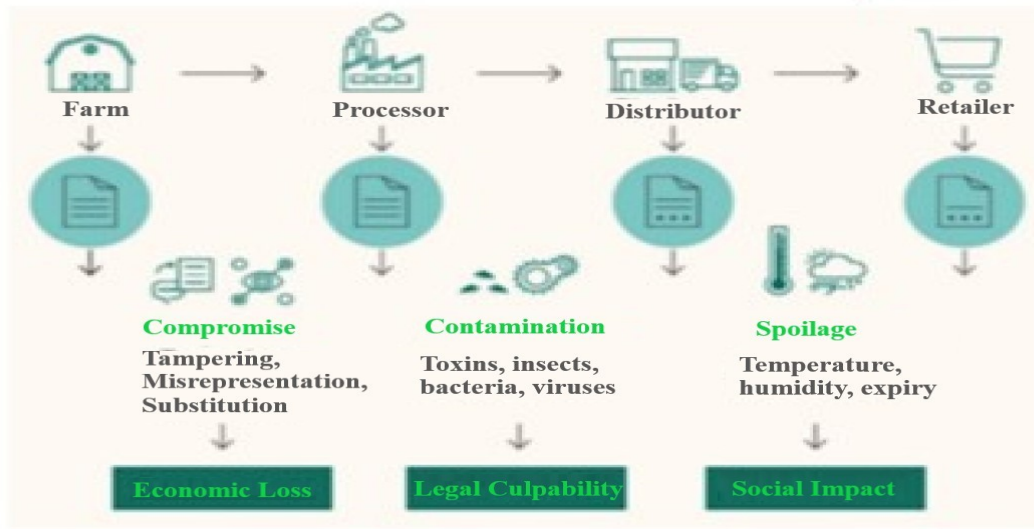


Figure 1.4: Source: IBM, 2017 [22]

1.3.3 Transaction Scalability & Operational Efficiency using AI

According to Akram, 2018 [1], the transaction in the sense of Blockchain technology as a distributed and decentralized ledger is a combination of different definitions. Beck, et al., 2017 [6], the number one concern is of operational data, and number two products, real estate, cash and informational transactions. As a consequence, a transaction is a set of data blocks that are entered into a database that is autonomous and dispersed, as described by the technology.

Nakamoto, 2008 [33], the Blockchain technology primarily used in digital currencies to develop Bitcoins. The latency was key problem in Bitcoin, with an input/output rate of 7 tps. VISA, on the other hand, processes about 4000 transactions per second. Becker, et al., 2013 [8], the proof-of-work consensus process has high energy costs, and according to Croman, et al., 2016 [14], it costs between \$1.4 and \$6.9 to validate a transaction on the Bitcoin network when hardware costs, energy costs, storage costs, and bandwidth costs are all taken into account. Croman, et al., 2016 [14], developing alternatives to the widely used consensus process known as proof-of-work is one way to cut costs.

AI for Operational Efficiency:

- Reliable Inventory Management
- Efficiency in the warehouse
- Improved Safety
- Lower Operating Costs
- Delivery on time

1.3.4 Sustainability

The cloud-based Amazon web services (AWS), IKEA's recent use of smart contracts on Ethereum blockchain (ETH) as the world's first "smart-invoice" at the IKEA Iceland facility - Nordic Shop, Microsoft Azure block chain, and IBM blockchain all provide end-to-end capabilities that clients need to rapidly enable and effectively build, run, rule, and protect their own business networks. IKEA's use of Ethereum Block Chain via the Trade Shift platform was effective in settling an invoice and collecting payment for products. IKEA, AMAZON with its AMB (Amazon Managed Blockchain) services, Walmart with IBM, and Maersk all see blockchain adoption as a way to improve; by offering a clear view of all transactions taking place among a complex network of parties, blockchains help to reduce significant resource waste. All parties involved in shipping can use blockchain to improve sustainability, minimize and eradicate counterfeit/fraud goods and mistakes, improve inventory management, reduce courier costs, reduce delays caused by paperwork, waste, and quickly identify problems. This could result in a five percent rise in global GDP and a five percent increase in overall trade volume.

1.4 Research Questions & Hypothesis

The research aims to address the following questions:

- How does TRANSPARENCY, INTEGRITY, AND PRIVACY Impacts on security, social, health, the economy, and safety?
- How does transparency offered by a company impact consumers' (a) willingness to pay, and (b) actual purchasing of the company's products and services? (c) increase of consumer TRUST and Brand Image?
- Does the end consumer able to trust retailers and suppliers with integration of new technologies helpful to bring in transparency in Supply chain industry?

- How does Bloc chain, Internet of Things (IoT) devices, Artificial Intelligence with real time analytics and tracking helpful in bringing transparency from supply chain planning, warehouse management, fleet management to Automated Freight brokerage to deliver the desired goods to consumer location?
- Does suppliers and retailers would be able to achieve the expected Operational efficiency, product traceability with integration of Block Chain to track goods?
- What are the potential risks associated with disclosing supply chain information to the public? In addition, how should a company mitigate risks from such disclosure?

1.5 Significance of Study

1.5.1 Transparency

The study's first goal is to determine consumer understanding of accountability, confidence, and privacy, as well as their effect on brand image. Furthermore, customers are concerned about the social, health, financial, and safety consequences of the goods they buy. The main study focuses on the home furniture segment of the supply chain, and it is aimed at customers who are online/offline shoppers who frequent IKEA or other home furniture retailers in France and Europe.

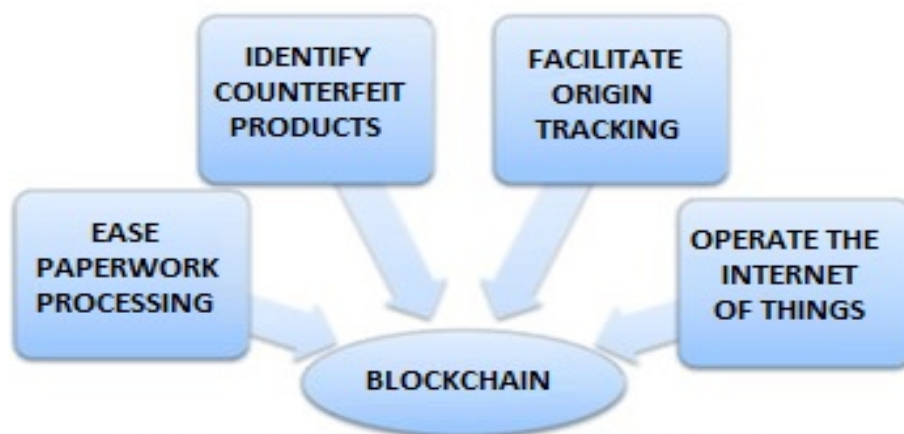
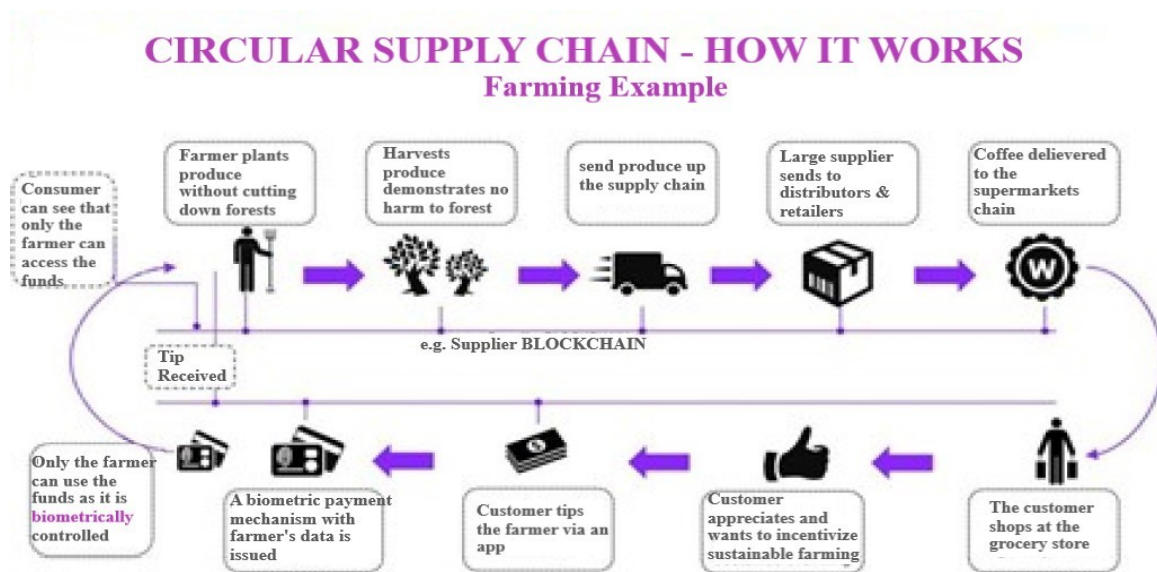
The second section of the research looks at how sales managers can answer customers' questions, provide specific product information, increase seasonal sales volume, their day-to-day operations, internal store processes, and product distribution mechanisms like logistics, as well as returned goods due to faulty or counterfeit products and their processes.

The third section of the study focuses on the corporate side, specifically IT and Business Analysts, and how they are able to meet increasing customer expectations for transparency and product traceability while also improving supply chain and logistics department operational efficiencies. And their internal mechanism or solution, which is based on 4th industrial revolution technologies like blockchain, AI, and IoT devices.

1.5.2 Blockchain Technologies in Logistics: Advantages and Drawbacks

According to Edvard, et al., 2019 [18], implementing decentralized principles for tracking products and mode of transportation such as trucks ships would support retailers and suppliers to increase the efficiency and traceability in the logistics services and industries. Comprehensive technological solutions are needed to meet the demand for greater supply chain accountability, which allows for traceability from start to finish. Solutions that are centralized and provide a lot of access privileges. Since these problems have already been discussed, blockchain or derived concepts provide a solution.

For a number of purposes, logistics and supply chain management are considered areas where blockchains are a good match. Each phase of the goods are tracked as a transaction in the value chain, and providing a finalised record of the product's past. Blockchain technology leads to: (a) monitoring all the documents as it passes via supply chain process; (b) Keeping track of each asset (c) monitor digital IDs in a coherent and concurrent manner with physical assets. Furthermore, due to its decentralized existence, the blockchain will effectively contribute to the exchange of knowledge about the manufacturing process, distribution, repair, and wear-off of goods between manufacturers and vendors, opening up new modalities of collaboration in complex assembly lines. The problems in logistics parameters, such as delivery delays, missing documents, unknown product source, errors, and so on, can be reduced and prevented by implementing blockchain. Inventory control and efficient transfer of goods, fewer mistakes and inconsistencies, faster detection of the problem, reduced delivery cost, improved both customers and sellers confidence, and enhanced long-term perseverance are some of the main benefits of integrating supply chain with blockchain. As a result, Blockchain technology allows for complete supply chain visibility.



The Potential of Blockchain Technology in Logistics

Figure 1.5: Source: Edvard, et al., 2019 [18]

1.5.3 Summary

I provide a comprehensive review of the research on blockchain adoption in supply chains in this paper. As a result, we will comprehend market demands, analyse the successful use of technologies such as block chain, AI, and IoT devices, and summarize the acceptance obstacles, threats, and advantages that have been discussed in the relevant literature, from the consumer, industrial, distribution, and technical experts' perspectives. I'll present and summarize customer demands for product transparency in terms of social, economic, health, environmental, and safety implications, as well as alternatives, use cases, and proof of concepts for supply chains based on a blockchain framework, and critically examine their technological characteristics and limitations.

Chapter 2

Literature Review

2.1 Introduction

A comprehensive analysis on customer understanding of product transparency and IT solutions on how innovations like blockchain, AI, and IoT devices can be used to incorporate use cases based on consumer demands, as well as the benefits for corporations to develop their brand reputation and stay ahead of the competition in the supply chain and logistics market. The following literature review and study reviews go into greater depth to discuss some of the current supply chain shifts.

2.1.1 IKEA case study - Supply chain event processing on the blockchain

Tobias Sund, et al., 2020 [40], in this research paper on the IKEA case study helps to define the use of blockchain-based event management in the supply chain for product life cycle and performance traceability.

- Characterization of supply chain activities for a multinational retailer, including structure, volume, and dependencies.
- Defining criteria for a supply chain system from a business standpoint.
- Development of a blockchain-based prototype to allow multiple actors to process events.
- Timeliness of the event processing prototype was examined, with the goal of finding optimum throughput and output bottlenecks.

Producers and customers are genuinely global for a global business-like IKEA, a furniture and household goods retailer. Nearly four billion items were sold in IKEA's 403 stores across 49 countries, resulting in a volume of 36,622,756 m³. IKEA's supply chain and distribution network are much too complicated, with over 1000 home furnishing suppliers spread across 51 countries, each with their own suppliers of component parts and materials, for example. The ability to decide the variety of blockchain solutions are efficient to manage supply chain retailers like IKEA's came from the classification of the model of occurrence and capacity, as well as the associations.

As all public data stored on the blockchain is replicated for every node in the network, the author defines Smart Contracts archives all the data objects in the data source and keep track of each and every detail. (e.g., shipments, goods, etc.). The smart contract was created with the aim of storing as little data as possible.

2.1.2 Blockchain in Logistics

Edvard, et al., 2019 [18], the article addresses the use of blockchain solutions, which are based on non-centralized data storage, and their long-term opportunities in supply chain and logistics. While the financial advantages of blockchain technology have gained the most coverage, significant logistical problems such as order delays, damage to goods, mistakes, and multiple data entry can all be avoided by incorporating blockchain technology. This research article offers all required details and a thorough analysis on blockchain, including latest and potential innovations, in order to improve supply chain process and logistics quality and traceability.

The supply chain's efficiency and transparency were boosted by blockchain, from storing to delivery and monetary exchange, both logistical processes benefit from this. The bodily activity of the goods to be speeded up thanks to the improved openness and security offered by blockchain.

2.1.3 Blockchain in the Logistics Industry: How to Make Use of and How to Get Started

Mario Dobrovnik, et al., 2018 [28], the aim of this research paper is to identify potential blockchain applications in logistics, as well as to present and discuss real-world examples. The evaluation was carried out using a method to evaluate the impact on organizational structures and processes. In the first phase, the characteristics of creative methods were used to identify possible use cases based on 5 advantages of creativity: benefits in comparison, similarity, sophistication, trialability, and observer ship, establishing a theoretical foundation for categorizing applicable applications.

The second stage addressed real-world blockchain implementations and their effects on logistics systems and processes, as well as an additional framework that distinguished four distinct transition phases. The framework was developed to assist logistics managers in better understanding the various aspects of blockchain challenges, such as desired or even needed levels of cooperation and consensus, as well as legislative and regulatory barriers.

2.1.4 The Lean Methodology in developing blockchain case studies in supply chain and logistics

Guido Perboli, et al., 2018 [21], according to the research paper, blockchain improves the overall supply chain's performance, reliability, and accountability while also optimizing inbound processes. There was no common structure for developing and verifying the overall solution based on blockchain technology and integrating it into a strategic plan in this journal on non-monetary applications of blockchain. As a result, the purpose of this document has shifted to address the flaw. First, to incorporate existing literature into a common methodology for designing Blockchain technology use cases that are not relevant to finance applications, thereby filling a gap in the digital strategy literature. Second, the outcomes of a fresh food delivery use case, highlighting the crucial aspects of deploying a Blockchain solution. In addition, the paper explores how Blockchain can aid in lowering logistics costs, as well as improving operations and overcoming research challenges.

A group of researchers from the Politecnico di Torino created the GUEST methodology used in the paper for use case design. GUEST aims to provide enterprises with a cutting-edge business management system. The goal is to provide an easy-to-understand approach that can be applied to the entire decision-making process to help businesses maximize productivity and enhance quality. The GUEST approach guides the process from conception to execution, offering conceptual and realistic tools to the various stakeholders and allowing them to convey their visions, challenges, and opportunities within the same framework.

Each phase of the approach (GO, UNIFORM, ASSESS, SOLVE, and TEST) helps the actors to track their projects while also maintaining the standardization of documentation and resources that can be used to evaluate proposals, successes, actions, and outcomes.

To correctly apply the technique, the first step is to describe the various actors involved in the process, defining the jobs (what they want to accomplish in their work), rewards (the tangible benefits sought), and pains for each actor (problems connected to their work).

2.1.5 Twenty-first century AI-based expert systems in supply chain and logistics

Angappa, et al., 2018 [4], describes how logistics, especially 3PL (third party logistics), has become increasingly important for businesses to succeed in long-term global operations. Since global operations have a diverse organizational climate characterized by various cultures, languages, socioeconomic structures, and manufacturing systems. Some of the obstacles that exist as a result of these disparities can be resolved by implementing appropriate automation of information and material flows across the supply chain.

To make supply chain management and logistics easier, “ES - Expert Systems, ERP - Enterprise Resource Planning, AI - Artificial Intelligence and RFID - Radio Frequency Identification”, are few examples of systems, applications and technology to be used to successfully implement the solutions for goods traceability and accountability.

According to Vlachos’ research work, "RFID Best principles effect on supply chain efficiency is a paradigm of hierarchy," Radio frequency Identification implementation has a major impact on supply chain performance in producer, inventory, delivery, planning, sales, and forecasting. RFID will boost distribution system efficiency by 33.8 percent for goods dispatched and inventory in transit, and 45.6 percent for stock availability.

JIT (Just in Time) is a logistics and supply chain management (LSCM) strategy that involves storing cargos for a limited period of time. Trucks on their way in to carry freight to a cross port, where it is organized, re-packed, put to rout, and stuffed onto trucks right away before being shipped to customers in a day. One of the most important aspects of effectively operating a cross dock is to create an effective truck-dock assignment module in the cross-dock management system, so that all cargos can be shipped on time to customers. In their paper, “Optimizing docking for trucks technique in the Cross-docking methodology in loading and unloading of materials using Tabu Search method," “ATS designs are using machine and deep learning techniques to increase the efficiency to overcome truck-docking problem in the cross-docking transportation process, and conduct mathematical experimentation, demonstrating their solution outperforms IBM CPLEX optimizer,” Miao, Cai, and Xu wrote in their paper.

2.1.6 “Grey Decision Model and AI” for Transportation 4.0

Logistics and Industry 4.0 are being pushed forward by AI as per research by Joanna Oleśków-Szłapka, et al., 2019 [23]. The problems that emerge in the revolutions in industry 4.0 are perfectly suited to AI research. Deep learning, neural network, and AI all take part in pivotal roles in shaping the culture and financials. The application of artificial intelligence (AI) in logistics and robotic equipment production entails the extensive use of data from each element in the supply chain to identify and locate products in real time.

Oleśków-Szłapka, et al., 2019 [23], suggest a “framework of Logistics 4.0 sophistication model” for business processes that consists of three dimensions that make up the Model Area and can be used to determine the maturity and understanding of managers in terms of Logistics 4.0 solutions. The dimensions are (1) management, (2) material flow, and (3) knowledge flow. The word ‘Logistics 4.0 maturity,’ according to the authors, refers to the degree to which an organization or supply chain has adopted Logistics 4.0 principles.

Ignoring, Defining, Adopting, Managing, and Integrated are the five maturity stages identified by the authors. Grey decision-making (GDM) was used to determine the respondents’ level of knowledge on Logistics 4.0 and to choose decision models that included grey elements or combined the general decision model and grey systems models.

2.1.7 Theoretical framework in supply chain process using smart contracts

Giovanni, 2020 [20], conducted studies on supply chain processes in two markets, one as a distributor and the other as a merchandiser, in order to discuss operational challenges. The supplier sells merchandise to the manufacturer and coordinates the service plan. The retailer chooses the best amount to buy and the best-selling price. A conventional online network or a blockchain may be used to control the supply chain. Firms face business risks due to distribution and service in the conventional online environment, as well as high transaction costs. The work on the block chain platform is aimed at eliminating all supply chain risks and decreasing transaction costs. The blockchain, on the other hand, necessitates initial implementation expenditures as well as variable costs. The firms also profit in terms of visibility, openness, and stability, all of which are summed up in tokens.

The research paper identifies the situations and stochastic cases in which blockchain implementation is not worthwhile. The paper explores many of the aspects that smart contracts make blockchain implementations more operationally and economically appealing.

De Giovanni, 2019 [16], Supply Chain to follow a blockchain project while allowing a Virtual Machine or Artificial Intelligence (AI) to automatically change certain contract terms. Smart contracts, which are best implemented using Ethereum, allow self-executing scripts to run on the blockchain, allowing for the incorporation of these principles into Supply Chain negotiations and the development of proper, distributed, and heavily automated workflows.

A smart contract is described by Raskin, 2017 [36], as an agreement whose execution is automated by a computer, ensuring efficiency and execution without recourse to the courts and eliminating any human discretion. As a result, a smart contract is a computer protocol designed to digitally facilitate, check, and execute contract negotiation and execution Szabo, 1994 [39]. Many types of contractual clauses can be made partially or completely self-executing, self-enforcing, or both, according to proponents of smart contracts Brown, 2015 [11], and can be dependent on both forward and reverse actions De Giovanni, et al., 2019 [17]. The proposal of two smart contracts is based on the system under investigation. An Intelligent wholesale's cost arrangement and an Intelligent revenue-sharing agreement to unlock these two contracts, oracles must be used to bind blockchain technology to the ecosystem. Oracles are drivers that allow businesses to transition from the physical to the digital environment and solve off-line operational issues such as the first mile and last mile.

Software oracles (data from the online world), hardware oracles (data from the physical world), inbound oracles (external data as input for the smart contract), outbound oracles (data from the smart contract) and human oracles (consensus for data validation) are all examples of oracles (smart contract as an input for the external world). The oracles gather data from the real world, build and modify rewards for each action, and allocate tokens and/or cryptocurrencies through smart contracts and based on the information exchange.

The aim of this paper is to examine a simple supply chain (SC) model with the goal of determining the operational and economic benefits that SC participants will gain by switching from a conventional platform to blockchain while conducting transactions. SC is the subject of an inquiry involving one supplier, firm S (he), and one retailer, firm R. (she). In an online forum, the companies discuss and set their plans. The supplier is the chain's boss, and he or she determines a certain number of online services, A, that must be supplied. The retailer is a chain follower who expresses a desire to buy from the supplier and determines the final product price, p , as well as the quantity of goods to be purchased.

2.1.8 Machine learning approaches to improve third-party logistics

Author Alessandro, et al., 2020 [2], presented an implementation of machine learning unsupervised algorithms to identify product families in a 3PL (third-party logistics) manufacturing plant in this research paper. Based on product or process characteristics, products are clustered using k-means, Gaussian mixture models, and hierarchical clustering (weight, sizes, description, the package used). This approach was applied to a real-world setting defined by a 3PL packaging plant in the automotive sector in a case study. Logistics KPIs are used to assess the effect of each clustering algorithm. On the basis of the time workload assignable to each cluster, the findings are compared to those of capacitated clustering. Even if they are incapacitated, Gaussian Mixture models based on product characteristics (i.e., sizes and weight) outperform the others, providing a more balanced workload.

The author described the methodology for grouping products into families and the KPIs for evaluating a product family's logistic effect. There is often a lack of data about the product and the mechanism for 3PL providers to work with. Family grouping strategies, in particular, often necessitate the specification of each resource's development cycle, i.e. determining which resource (e.g., machine or operator) can able to complete a particular mission on the product. Because of the lack of integration with the suppliers' systems, many 3PL providers do not have the concept of the production cycles in their information system. By marking each and every commodity, 3PL providers describe the cycle mission (For example, the label shows the amount quantity, a list of tasks to be completed, and the final customer).

Alternatively, describe narrowly the type of task that a manual operator will perceive during workbench operations (for example, a "packing" task must be interpreted by an operator in order for the packaging to be chosen correctly based on the type and quantity of the product). As a result, the clustering approach was focused on the limited data available for each incoming product: definition, weight, duration, height, and width. 3PL providers frequently provide all of this information: suppliers typically exchange product descriptions (to prevent manufacturing errors), while product weight and sizes (i.e., length, width and height) are almost always calculated by the provider to determine the appropriate package. The design of a small number of product families with a predefined development cycle using a precise collection of resources results from grouping products into homogeneous clusters.

2.1.9 Usage of Blockchain in the supply chain industry

Supply chains are intricate webs of remote connections, independent bodies that share commodities, financial settlements, information from a variety of sources, constantly changing environment, according to Alexandre, et al., 2018 [3], research paper. Consumers can see how the supply chain operates and get knowledge about product traceability thanks to blockchain technology.

In the retail supply chain industry, the research study focuses on inefficiencies in current data exchange processes and how to solve them through an efficient block chain operation. Basic block chain characteristics such as secured, immutability, distributed, traceability and incorruptible data transmission to bring absolute transactional transparency in supply chain and logistics movement to create trust among customers, retailers, merchandisers, and suppliers through "Smart Contracts."

The findings demonstrate how "Smart contracts can make the negotiation process and contract performance easier and more effectively" by allowing for autonomy, efficiency, backup, accuracy, and cost savings. Reduced intermediaries, paperless transactions with faster speed and lower costs, and product traceability and provenance from sellers to end users are all benefits of block chain.

2.1.10 Supply Chain Transparency Research Possibilities

The benefits of retailers disclosing supply chain details (including Suppliers, Environmental footprints, Supply chain expense, workplace safety enforcement, shipping logistics tracking) to the public as a mechanism are presented in a research study by Sodhi, et al., 2018 [27]. Gaining supply chain visibility is a requirement for providing supply chain transparency, which is one of the primary factors that can help retailers create consumer trust and maintain competitive advantages. Retailers must invest in Supply chain visibility by mapping out their supply chain activities, performing audits and interviews, and producing or commissioning reports that increase the economic benefit through better operating decisions as essential measures to add transparency.

According to the study, retailers may choose to reveal the information as a customer social responsibility (CSR) operation to both internal and external stakeholders, including product and supplier specifics, in order to improve buyer, investor, and regulator confidence. Some research questions were posed for Operation Management researchers to examine and help retailers understand and attempt to incorporate various methods for reporting supply chain and product-related information to the public, based on their knowledge of supply chain transparency and the related literature.

2.1.11 AI-assisted supply chain process: Applications and Theories

Min, 2008 [31], discusses how Artificial Intelligence (AI) tools such as Expert systems, Genetic Algorithms (GA), and Artificial Neural Networks (ANN) are increasingly being used to solve Supply Chain Management (SCM) problems such as inventory management, ordering, location planning, freight consolidation, and routing/scheduling issues. The study outlined the SCM areas that have been investigated for AI applications, identified particular AI sub-disciplines that have been shown to be useful in improving Supply Chain decisions, and evaluated their contributions to the decision-making process.

2.1.12 Applications of Machine Learning Techniques in Supply Chain Optimization

Author Makkar, 2020 [26], explores the specifics of various machine learning techniques such as predictive analysis for demand and forecast sales in retail based on sales trends, customer behaviour, and seasonality in this study. In the supply chain industry, the best logistics routing options for commodity delivery routes of enormous raw materials are available. AI-enabled Warehouse Execution Systems (WES) embedded in Automated Guided Vehicles are used to handle warehouses. If a customer places an order, automated procurement using AI-enabled machines such as Amazon's Alexa will deliver the order. Finally, AI-enabled chatbot applications for sales/marketing automation services to respond to questions from customers, employers, and partners about order status, shipment status, stock availability, stock prices, supplier status, and contract details, among other things.

2.1.13 The Augmented Supply Chain

Massimo, et al., 2016 [29], The author of the trend research explains why Augmented Reality (AR) is the industry's next big thing. AR supply chain applications include improving efficiencies in the production, distribution, and logistics industries by layering computer modelling models over the physical structure of the environment. Picking Optimization, Facility Preparation, Freight / Container Loading, and Dynamic Traffic Support are some of the advantages of AR in supply chain logistics.

2.1.14 Block IoT Intelligence

Sushil, et al., 2019 [37], research study highlights how Artificial Intelligence (AI) plays a significant role as a powerful analytic tool and delivers a scalable and accurate analysis of data in real-time that is received from real-world IoT (Internet of Things) applications such as smart transportation or Intelligent Transportation System (ITS) (Ex: Logistics) by producing an excessive amount of data. But there are some obstacles to designing developing a successful information analytics system using Artificial Intelligence. For example, fundamental design, restrictions on resources, obscurity, protection, as well as a scarcity of information. As an emerging technology, Blockchain, on the other hand, supports a decentralized architecture, allows for safe data and resource sharing among IoT network nodes, is encouraged to eliminate centralized power, and can overcome AI's current challenges.

Shippers can now access more data about product location, shipment status, delays, injury, and more thanks to the Internet of Things. The amount of data is immeasurable, and through the Internet of Things, shippers will gain knowledge, which will help them negotiate better contracts with carriers, minimize inventory issues, enhance operational management, and provide better customer support by providing real-time distribution information at the customer's fingertips. This research paper presents a productive method of integrating all three technologies with the most cutting-edge methods and frameworks to help in real-time asset monitoring in the logistics and supply chain industries, using block chain-based cognitive Internet of Things with AI.

2.1.15 Internet of Things Safety Audit: Problems and suggestions with Block chain and AI

The authors Bhabendu, et al., 2020 [10], demonstrated how product traceability could be tracked and traced in real-time using an IoT method in the supply chain and logistics. Similarly, the authors explored IoT-based architecture and risk management before proposing artificial intelligent IoT integration for the retail shop supply chain structure.

Since conventional based existing security protocols are not appropriate for IoT devices, the implementation of an IoT system in supply chain and logistics presents security and privacy challenges. The authors then looked into the numerous security issues that may arise in IoT applications.

The primary security concern CIA “(Confidentiality, Honesty, and Availability)” is defined, as well as layer-wise issues. Second, the authors conducted a survey to discuss current security concerns.

According to the report, some research has already been performed on different technologies such as machine learning, artificial intelligence, and blockchain technology, all of which are capable of solving the current security problem. As a result, a detailed review of three technologies, namely machine learning, artificial intelligence, and Blockchain technology, as well as their integration with IoT, has been performed. The authors of this survey discuss how new technologies such as machine learning, artificial intelligence, and blockchain can be integrated with IoT to make the system more stable.

Chapter 3

Research Methodology

3.1 Introduction

The study reveals consumer awareness on transparency (openness), trust (confidence), and privacy, as well as “how salespeople handle day-to-day business with customers to answer questions about product details,” and “how 4th industrial technologies like blockchain, AI, and IoT devices enable IT and business teams to meet the growing demands of customers.” Public knowledge of the social, health, safety, and environmental impacts of goods supplied through supply chain companies, as well as “traceability of the products” from the source of raw materials, production, and distribution to consumer locations, was revealed in the report.

For this study, a set of questionnaires was created for consumers, IT professionals, Business Analysts, and sales representatives, each of which included qualitative and quantitative techniques as well as some open-ended questions to better understand consumers’ attitudes toward product transparency and traceability, as well as transparency in the current process. By integrating cutting-edge technology such as block chain and artificial intelligence with the aid of IoT devices to improve logistics transparency and operational performance across Europe’s supply chain industry.

This study explored how customers feel about adding clarity to the retail sector in terms of how, when, and where goods are sourced from manufacturers and delivered to end user locations, and knowledge on social, safety and health concerns via electronic survey semi-structured interview with a count of 8-10 retail executives (Sales, Business and IT professionals).

A greater understanding of customer knowledge and professionals’ views on technology to offer improved clarity in various supply chain sectors such as inventory management, demand forecasting, and logistics of everyday product use can be highlighted by conducting this mixed interview and survey.

Due to the lack of direct access to customers due to geographical differences, an electronic internet-based survey has been created. The aim is to collect about 150 responses from consumers of various ages, genders, places, and professions in Europe and other locations in order to compare responses from Parisians, Europeans, Asians (Indians), and Americans. The responses of sales executives, retail workers, and IT experts working on Blockchain and AI technologies in the company are also analysed in this report. Since the literature review showed that customers around the world have varying attitudes toward logistics and supply chain transparency, and the data collected hasn't focused on the new age of start-ups, I assume my data would be more important and useful for future supply chain trends.

The findings include valuable knowledge, such as a clearer understanding of customer concerns about accountability, sales, and the potential of IT and business teams to apply blockchain and AI use cases in supply chain and logistics to resolve some of the major concerns.

3.2 Data Collection

The knowledge was gathered from the participants through surveys and interviews. The information was gathered from three separate category groups: consumers, sales, and corporate (IT and Business Analysts).

Consumer sample size of approximately 155 people provided online survey with various age groups, genders, students, working professionals, individuals and different nationalities who are locals or foreigners, currently living or travelling in France/Europe and/or have previously visited the region. The consumers of diverse cultures, different ethnicity, linguistic and nationalities from across Europe (France, Germany and Spain and Italian nationals) Asia (India, China, Cambodia), Africa (Ghana), South America's (Brazil, Portuguese etc) who are either frequent or sporadic shoppers of retail stores or E-commerce online portals. This questionnaire has no age restrictions, so anyone can take it. However, data has been collected with different age groups, which are divided into under 15, 15-24, 25-34, 35-54, and 55 and above. The survey focused on home furniture segments, but the opinions and feedbacks were more general in nature, covering topics such as product protection (in home furniture and food), health, social, and environmental impacts (chemicals use, etc.), and product transparency and traceability.

A good group of 8 people from the corporate sector, such as Information Technology (IT), program, and business teams, participated in face-to-face, WhatsApp, and on-call interviews.

These individuals are either subject matter experts with experience and expertise in supply chain, blockchain, Internet of Things, and AI technologies, or they are subject matter experts with understanding, experience, and expertise in delivering market transparency solutions.

A few interviews with IKEA salespeople were conducted to learn about their perspectives on customer service and their experience answering questions in order to collect useful data for qualitative research. As some members of the sales department requested that their identities not be revealed, only a brief overview of the participants is provided below.

Type	Activity	Participants
Online Survey - Consumers	Aimed at gathering information about consumer awareness on transparency on supply chain and logistics industry transparency, privacy and trust on retailers, suppliers and manufacturers and their day to day purchase preferences, important sections in the home furniture segment	Online Customers - Both local and International (Students, Young couples, Middle aged and above 55 age groups). Different age groups, different nationalities currently living in France, who are frequent and occasional shoppers (both online and offline)
Face-to-Face Interview, Semi Structured - Sales	Aimed at gathering information on Sales representatives, day-day-to day activities, and the type of questions received from consumers and how they are able to address consumers questions on detailed knowledge on products, the type of products the consumers purchase and the product details they are looking it in terms of social, health, environmental and safety impacts along with source of raw materials, manufacturing details, and store operation processes and delivery process	IKEA Sales Manager at La Madeleine, Paris(Direct Contact with Customers – Sales Manager at IKEA)

Face-to-Face , Telephonic Interview, Structure and Semi Structured - IT. (Technical) and Business Team	Aimed at understand the technical and business analysts view on providing the consumer transparency and the technical challenges associated in implementing the technologies blockchain, AI and IoT	Technical Leads, Supply chain functional experts, Lead Engineers, Block Chain Developers, Program managers and Business Analysts – SMEs (Subject Matter Experts) in technical and functional knowledge.
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Table 3.2: The Survey

In the first section, consumers who are currently residing or visiting France/Europe were asked to complete an online survey. Local and foreign students, young couples, middle and elderly people, tourists, and regular visitors to online and offline stores were surveyed.

The online survey included 28 comprehensive questions about their age, gender, seasonal shopping experiences, and interests in the social, economic, health, and safety implications of the items they buy.

Second and Third parts Semi-structured interviews were chosen as a data collection method for IT and business analysts, as well as program managers and sales managers, because they allow for the exploration of interesting aspects during the investigation (Myers, 2007 [32]). The importance of blockchain was discovered in this project through the process of engaging in discussions with experts to gain in-depth understandings and expert feedback on technological "know-how" from people with deep technical and practical knowledge of the system. In general, these interviews were created with two goals in mind: On the one side, to learn about current supply chain and logistics information systems, as well as the concepts of privacy, openness, and trust as identified in the literature.

The interviews, on the other hand, focused on the capabilities of blockchain in logistics as well as the problems that come with it. These interviews were conducted with technical teams, program teams, and top management who are well-versed in the field and experts to inquire about their personal experiences with blockchain in logistics.

Brand managers, business analysts, salespeople, IT guides, designers, Lead Engineers, developers, and researchers, both internal and external to IKEA, are among the interviewees. For the research work, 8 In-depth analysis and discussions were carried out, each with a different IT technological and business background retail resources

with various job roles and locations (see - above Table). Last but not least, each interview was taped so that transcriptions could be made later.

Apart from conference calls and unstructured records, a total of six online surveys were conducted for information gathering. Transcripts of meetings with program managers, business analysts, lead engineers, and developers are used to obtain a deeper understanding of what is going on. To meet customer standards, internal policies, procedures, implementation issues, and processes involved in goods traceability and accountability in retail, supply chain, inventory, and transportation.

3.3 Data Analysis

Data was obtained in two ways: one through an online survey, and the other through face-to-face or telephonic interviews. The data was then subjected to a qualitative and quantitative examination.

The survey on market transparency in supply chain and logistics among local and foreign consumers was conducted in France, with 155 participants of various ages and genders, with 23.9 percent under the age of 15, 50.3 percent under 25, 23.2 percent under 35-54, and male and female populations of 59.4 percent and 39.4 percent, respectively. Consumers ranging in age from first-time shoppers to those who have been shopping for 5 years or more have shopped all over Europe and the world.

According to a survey, 52.3 percent of customers are more interested in product accountability than in the companies that produced the goods. Transparency, according to 70.3 percent of customers, fosters confidence. The more authentic the goods are, the better the company's brand is.

Consumers who are either regular visitors to IKEA stores or online shoppers, according to a research report on the home furniture market. And a technical and business team with expert opinions on how to use 4th industrial revolution innovations like blockchain, AI, and IoT smart devices to boost supply chain and logistics transparency and operational performance in response to ever-increasing market demands. I performed an online survey for customer reviews as well as face-to-face and telephone interviews with IT experts, sales, programmers, and business team members to get their feedback on the following use cases: TRANSPARENCY, INTEGRITY, AND PRIVACY Impacts on security, social, health, the economy, and safety, as well as obstacles, facilitators, and the long-term prospects of blockchain in logistics and supply chain management The majority of their participants were optimistic about blockchain technology and the advantages it provides, as well as the challenges, facilitators, and general prospects of blockchain in logistics and supply chain.

The majority of the participants were enthusiastic about introducing cutting-edge technologies such as blockchain, artificial intelligence, and IoT smart devices for product traceability. However, the benefits of these technologies over current ICT (Information and Communication Technology) solutions must be carefully carved out, and the use cases for logistics must be further explored. The blockchain system's data is secured by encryption algorithms, as well as the distributed data storage and use cases it provides. The reasons why blockchain technology outperforms current ICT solutions must be carved out more thoroughly in order to pique the interest of a traditionally conservative industry like logistics in blockchain. And there are use cases to be discussed further in a more traditional market, such as logistics. As more people can query transaction data on the blockchain, it means that the entire blockchain community is transparent. The blockchain allows participants to query transaction data, ensuring the platform's security. Furthermore, data in the system is secured by encryption algorithms and distributed data transparency across the entire network, and data in the system is protected by encryption storage, removing the risks and concerns associated with data theft. The knowledge gathered through semi-structured interviews with sales, IT, and business analysts, as well as documents and meetings, is analysed using quantitative analysis.

Chapter 4

Findings

4.1 Introduction

According to the results, consumers are much more conscious today and have a higher level of knowledge about the goods they buy among the younger generation than among the older generation, and they trust companies that include all product information, including social, economic, environmental, and safety impacts. Based on customer reviews and IT input, the sales and business teams have agreed to the popular demand for customers to have more openness in order to increase their brand satisfaction and confidence. To digitally track and authenticate items from an ecosystem supplier to store shelves and eventually to customers, blockchain, AI, and IoT devices are being used. IKEA, AMAZON, IBM, Walmart, Nestle, and other major corporations across a wide range of industries, from furniture to food, are eager to incorporate technology to create a more open, credible, and trustworthy global supply chain. Several existing implementations merge blockchain, home furniture, and food technology, with the main goal of resolving safety concerns. Their motives are in line with the goal of creating a healthy, long-lasting, and clear home accessory that is compatible with social, health, environmental and safety standards.

4.1.1 Research Design

- This study used an online survey to assess how consumers felt about bringing transparency, to the retail sector in terms of how, what, and where products are sourced from suppliers and shipped to end user locations and the consumer's satisfaction level and Trust on suppliers, retailer's or manufacturer's Brand image

- Consumer surveys were used to collect data for the study, and semi-structured interviews were conducted with product managers, business managers, IT managers, sales representatives, and researchers both internal and external to the enterprise
- Furthermore, during the interviews, both retroactive and anticipatory reflections on conducting a semi-structured interview were used
- The collected data was then analysed using Quantitative and Qualitative analysis techniques to identify, analyse, and report on various themes. The analysis was carried out in six stages: familiarization with data, generation of initial codes, search, review, defining and naming themes, and finally the production of a product report

4.1.2 Consumer Online Survey - Summary

Based on the theoretical portion of my thesis, an online survey was conducted with consumers living in Europe (France) of various ages, genders, and nationalities to better understand the factors influencing consumer awareness of the retailers, suppliers, and manufacturers who source, produce, and sell the products. The ever-increasing demands of consumers for product details, as well as the factors that are most interested in knowing the transparency of products such as social, safety, environmental impacts, and health concerns such as the use of chemicals or adhesives associated with while manufacturers to source and produce the products, and the delivery of goods in a transparent and efficient manner. And questions about consumer awareness of the latest technologies used in the supply chain industry based on the blockchain framework, in order to critically examine the potential use of technological characteristics and their limitations.

The online survey included 28 comprehensive questions, including questions 1-10 about their age, gender, seasonal shopping experiences such as frequent purchases, online/offline, type of products purchased, and questions 10-21 about product detailing, transparency, and interests in the social, economic, environmental, health, and safety implications of the items they buy, trust factors, and so on. The questions ranging from 22 to 28 address consumers' perceptions of trust and brand image enhancements as a result of the use of technologies such as blockchain, Internet of Things, and Artificial Intelligence, as well as the privacy and data risks associated with the technologies.

The online survey had a consumer sample size of approximately 155 people response , and the selection processes for different age groups are detailed in the Data collection section. The survey response had a mixed age range of 23.9 percent for those aged 15 to 24, 50.3 percent for those aged 25 to 34, 23.2 percent for those aged 35 to 54, and

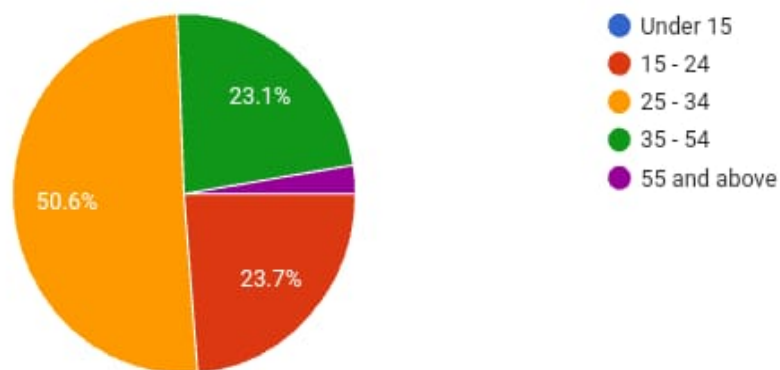
a small percentage for those aged 55 and up. In addition, the female to male gender ratio is 39.4% and 59.4%, respectively.

The majority of customers are Amazon online shoppers (47.1%), followed by 22.6 percent of IKEA retail store shoppers (22.6%), and the remaining retailers Mobiler de France, Roche bobols, and so on. Of these respondents, 59.4 percent shop for home appliances both online and offline, with 20.6 percent shopping online and 20 percent shopping offline.

Some of the responses are mentioned below, while the more in-depth responses can be found in the Appendix Section.

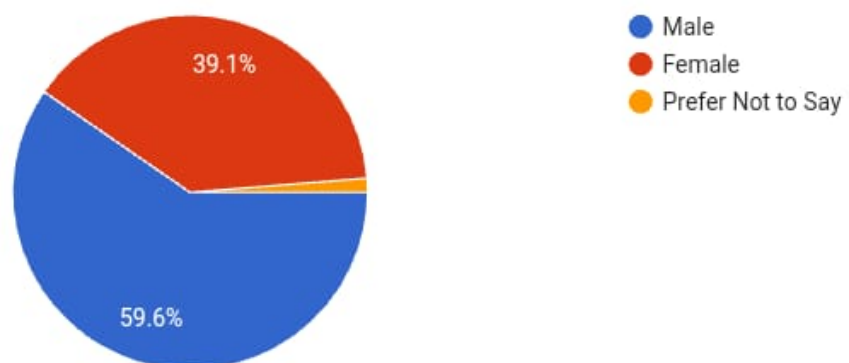
1. What's your age?

156 responses



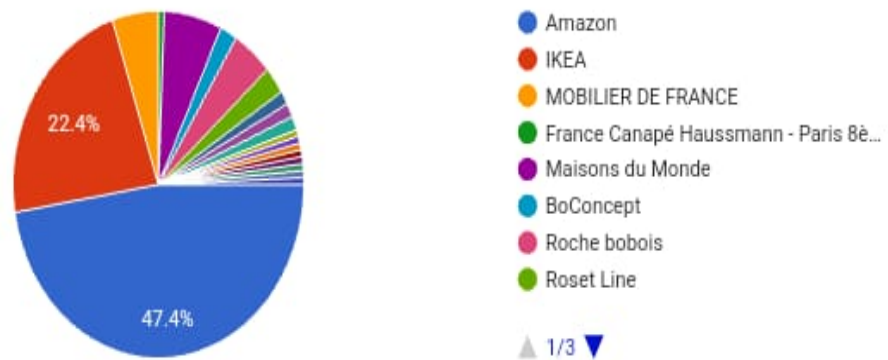
2. What's your gender?

156 responses



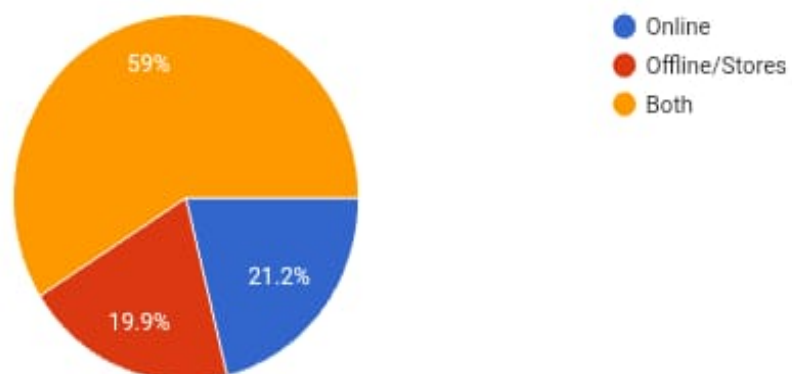
5. Which is your most preferred retailer to purchase home accessories, kitchen appliances, furniture, etc?

156 responses



6. Which of these would you prefer when buying home appliances?

156 responses



4.1.3 Corporate Feedback – Semi-structured Interviews On-line Survey

The interview questions were distributed to the interviewees via an online survey prior to the scheduled interviews. The discussions had lasted about an hour and a half on average, via WhatsApp calls and face-to-face meetings. Because some of the business users had no prior experience with blockchain technology, the interviews from the sales, business, and IT teams began with a presentation covering the fundamentals of blockchain technology. Following that, the final discussion was held by addressing each question one at a time.

The questions are divided into two groups: The purpose of questions 1–4 is to gain a better understanding of the individual's context, responsibilities, supply chain experience, and customer perception of accountability in the current era, as well as to recognize traceability-related incidents.

Questions 5–8 focused on understanding the role of blockchain, AI, and IoT technologies in supply chain planning, warehouse and fleet management, and automated freight brokerage using real-time data analytics.

Questions 9-13 concern the risk of businesses disclosing too much information to the public, data protection concerns, legislation, and so on.

13 - Information on Blockchain smart contracts and their application in the logistics industry.

14-16 questions about how transparency affects brand image, how a traceability framework can be used, and which aspects are most relevant to improving operational efficiency with AI, IoT devices, and blockchain.

Question 17 focuses on the perspectives of IT and business analysts on the use of technology to increase customer loyalty and company recommendations.

The role that blockchain technology or artificial intelligence (AI) could play in the supply chain and logistics industry is discussed in depth during the discussion of these issues. A comprehensive discussion of the new capabilities and opportunities that this new technology could bring to both B2B (business to business) and B2C (business to consumer) marketing services in store, warehouse management, inventory planning, demand forecasting, inventory transfer, product traceability, and logistical operational performance.

The backgrounds of the interviewees in IT, supply chain, inventory, merchandising, logistics, and store/warehouse management naturally steered the conversation in that direction.

In addition to the above-mentioned questions, I asked some semi-structured interview questions to gain a better understanding of the true benefits and risks of implementing transportation innovations.

4.1.4 Sales representatives Semi-structured Interview's On-line Survey

The interview questions were distributed to the interviewees via an online survey prior to the scheduled interviews. The interviews were conducted in person at one of IKEA's French stores, Paris La Madeleine, and lasted approximately an hour. The salesperson was briefed on the research report prior to the final interview, and while the salesperson did not have much knowledge of the technology or internal supply chain processes, the interviewee did have experience addressing customer questions about product specifics, store layout, and seasonal demand for the goods at IKEA.

4.2 Research Analysis (Results)

Market knowledge of product life cycles, transparency, safety, trust and operational efficiency as well as the solutions offered by incorporation of blockchain, AI, and IoT devices in supply chains and logistics, are detailed in the following findings.

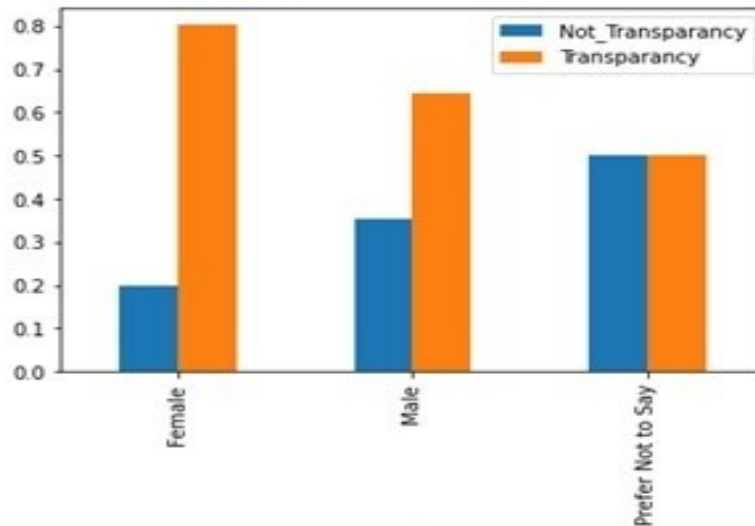
4.2.1 Transparency & Traceability

The study of data gathered from survey's and interviewees with consumers, experts such as sales, IT, and business analysts reveal that views on openness transparency are more diverse. In this regard, the degree of openness is determined by a variety of dependencies and plays an important role in the development of diverse opinions.

4.2.1.1 Transparency

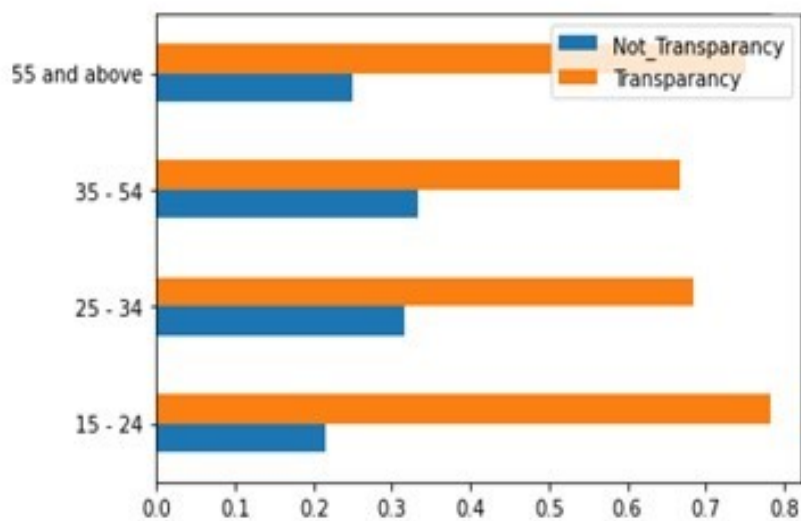
4.2.1.1.1 Transparency based on Gender

The proportion of people in various gender groups who are inclined towards product transparency is called out in customer feedback. The survey results high lights the female population is more significant (80%) than the male population (65%) and others (50%).



4.2.1.1.2 Transparency Based on age

According to age groups, the proportion of people inclined toward product transparency is higher at the young age community, millennials, than in the middle age and boomer groups.

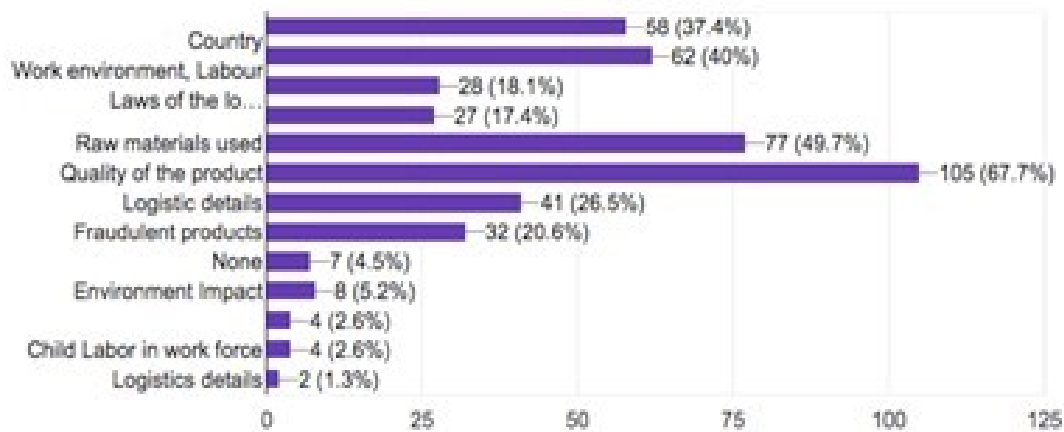


4.2.1.1.3 Transparency Based on different factors in the supply chain sector

Consumers are concerned about product quality in 67.7% of cases, raw materials in 49.7% of cases, logistics transparency in 26.5 percent of cases, job environment, worker safety and safeguards in 40% of cases, minimum wage requirements in 40% of cases, and child labor in factories or manufacturing sectors in 2.6 percent of cases.

18. With regard to product transparency, what details are most important to you?

155 responses

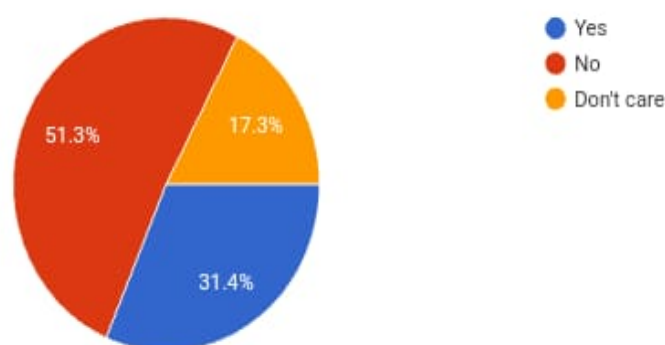


4.2.1.1.4 Consumer awareness on Environmental & Safety precautions

Out of 155 responses, 31% choose to buy goods that include information on social and labor rights, health and safety, and environmental impacts before making a purchase.

16. Did the products you purchased provide all the information on social, health, safety and environmental impacts along with other product details?

156 responses



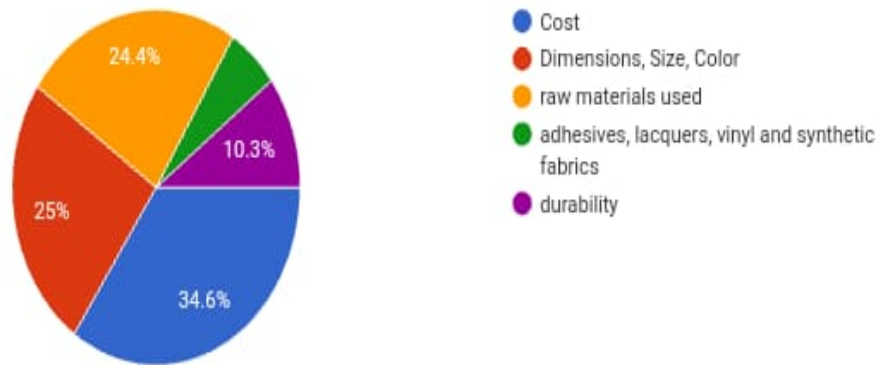
4.2.1.1.5 Consumer Knowledge of PRODUCT Specifications

While consumers are interested in learning about a product's internal details, a significant percentage (30 percent = 24.5 percent + 5.5 percent) are also interested in product specifications such as raw materials used, safety impacts (Ex: Chemicals or Adhesives, Vinyl and synthetic fabrics) of the goods produced (Retailers must quickly learn about the product's roots, as well as any other challenges that suppliers or manufacturers may pose. They must ascertain the origins of the commodity as soon as possible. as well as which other items are infected and need to be withdrawn from stores.

Survey Results:

21. What information would you prefer to view in the product labels before you purchase any product?

156 responses



4.2.1.1.6 Examining the responses of the Sales, IT and Business Teams

Customers' questions about the health, ecological, social, health, financial, and safety implications of the products they purchase have prompted IT and business professionals to recognize and resolve the issues. And the IT teams working with the business applications in the retail sector agree that the awareness among consumers are growing and the corporate teams trying to adopt new innovating solutions to address these concerns.

Interviewee	What's your role and background?	In your opinion, how much awareness does the public have the social, health, environmental, and safety impacts of the products they purchase?	How does transparency offered by a company impact consumers' (a) willingness to pay, and (b) actual purchasing of their product and services?

Suresh Muthumani	Program Manager	40% of awareness	It's based on the transparency of Information - For example if a retailer is providing the transparency of the Original value of the product from the Manufacturer - It will make the consumers to think and get the product in much cheaper price than the market value.
Anurag Gupta	Lead Engineer	Very little	Decide on whether they are buying environment friendly product or not
Abhinandan kumar	Associate Manager, Functional & Technical Architect	Very little	Decide on whether they are buying environment friendly product or not
Gaby Abdul Nour	Supply Chain Management and Purchasing	The awareness levels are increasing year to year. so a few years ago the public were not interested in the impact that the products they purchase have. but nowadays, the public are much more informed and willing to go the extra mile to get the needed information about their products	a) the more transparent the better of course, and in general the more the customer is willing to pay b) it might depend on the type of product or service they want to buy. and the different brand image they are looking to buy
Sheri	I am working as a data strategist for an asset management company	"Consumers are getting much more aware these days not just for themselves but they are opting for eco-friendly products, but a major proportion of consumers go for value for money without taking into consideration the adverse health effects"	With complete transparency a customer can make an informed decision. It becomes easier for him to trust the product and would be willing to pay more too. It's like purchasing products from an Apple store because of its after sales services and reliability

Ganesh Naik	Software engineer	Less	Willingness to pay
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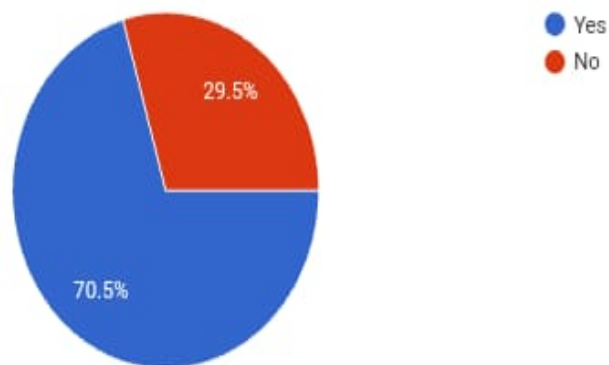
4.2.1.2 Traceability in Logistics

Customers expect product traceability in logistics, according to a market survey, with 70.3 percent expecting it. Customers' preferences are aligned with IT and business teams' strong opinions on integrating Industry 4.0 innovations like Blockchain and Internet of Things, which allows retailers/supply chain companies to monitor various goods and raw materials from the first supplier all the way to the final customer on a per unit basis, increasing overall reputation. By assigning a QR code or barcode to the Internet of Things devices as part of innovative solution for product traceability will make the details more accessible to customers. They'd be able to track down the products' sources as well as important knowledge about them.

Consumer Inputs:

23. Do you think there should be transparency required in the transport process for goods transferred from the production plant upto delivery of the products?

156 responses



4.2.1.2.1 Analysis of Sales, IT and Business Teams' responses

- According to feedback from the program, business and IT teams for the responses on consumer's demand on transparency, introducing the most cutting-edge technologies improves the ability of customers to monitor their goods and know with high confidence that what they receive is exactly what was advertised and communicated
- A more thorough investigation into the cause of the lack of transparency reveals an unwillingness or inability to be open about internal aspects of the supply chain and logistic operation. Transportation service providers' cost-cutting and replacement of defective goods are examples of this. The introduction of block-chain technology addresses the lack of transparency in logistics problems, as detailed below by the corporate Sales, IT and program team
- The response of the Block Chain, AI, and Internet of Things Technical Experts, as well as the Supply Chain Inventory Logistics Program Team

Interviewees	What's your role and back-ground?	Do you have knowledge on Blockchain? If yes, provide the definition of Blockchain and explain the advantages of using the technology in supply chain and logistics?
Suresh Muthumani	Program Manager	Yes. Blockchain is a general Ledger process to record all the transactions in multiple locations to have a global data which will reduce lot of fraudulent cases in the digital world. Advantages: - 1. Transparency towards the consumers. 2. Trusted transactions for the products. 3. Can reduce more manual effort on shipping and receiving process
Anurag Gupta	Lead Engineer	No
Abhinandan kumar	Associate Manager, Functional & Technical Architect	No

Gaby Abdul Nour	Supply Chain Management and Purchasing	Blockchain is a chain of nodes that act as a ledger where all of these nodes compare the information that they have in an instance which provides a high level of accuracy and prevents the loss of data and make it extremely difficult to change the data that has already been written. It will allow for a better control and trust in the whole supply chain. it will give the needed transparency and the ability to track the different products and raw materials from the first supplier all the way to the final customer on per unit bases. which will increase the ability of the customer to track their products and know with high certainty that what they get is what has been advertised and communicated.
Sheri	I am working as a data strategist for an asset management company	Blockchain is a distributed ledger system, which allows complete transparency and compliance to GDPR; furthermore, owing to its decentralized nature it restricts complete authority of an individual or a pool of people to control or sabotage the chain. It unlocks new avenues into future and practically everything will be on the blockchain in near future be that rental agreements, health care sector, banking, engineering or investments
Ganesh Naik	Software engineer	No

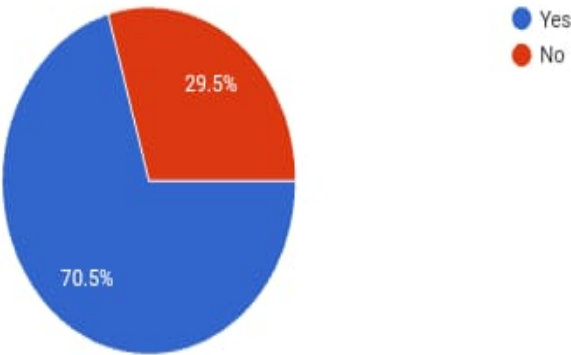
4.2.2 Trust

4.2.2.1 Consumer Inputs on Trust

- Consumers trust 70.3 percent of retailers that provide complete product details, while 52.3 percent trust the goods rather than the company to learn about the products' social, health, financial, and safety impacts, according to the survey. Despite this, a majority of them (roughly 70%) are willing to switch brands if the latter provides adequate product details

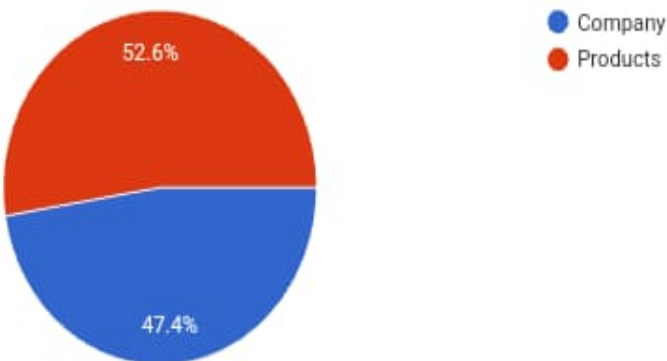
19. Do you trust and purchase products from the retailers who provide complete details of the product?

156 responses



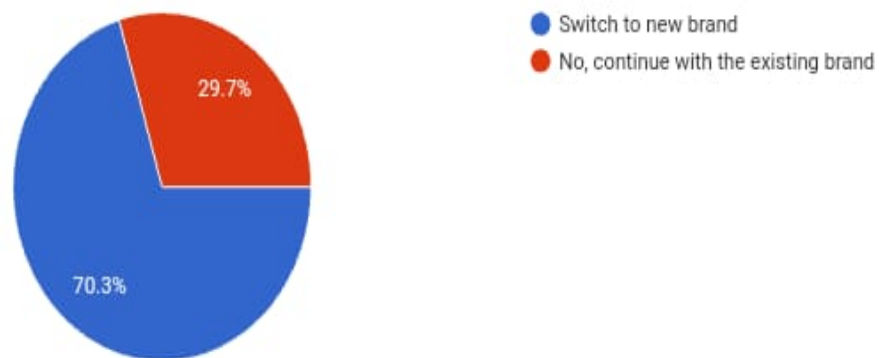
24. Are you most interested in hearing about the social, health, environmental and safety impacts of the products you buy or the company that makes them?

156 responses



27. Would you switch to the brands who are transparent to the consumers than the usual brand with fewer detail?

145 responses



- Recognize COUNTERFEIT Goods - Counterfeit products, which include branded, high-priced, and innovative products like IKEA luxury bags, kitchens, mattresses, and luxury beds, are a growing problem in the supply chain industry. Retail establishments must sell "the right thing" to customers. In terms of manufacturing, blockchain would aid in the global patenting of knowledge, reducing the number of counterfeit goods on the market
- Survey findings: According to customer feedback, 50.7 percent of the 144 respondents bought counterfeit or faulty goods. Consumers are becoming more cautious about their purchases, with the bulk of returns and 71.5 percent boycotting items from stores, distributors, or manufacturers. One noteworthy finding is that 16.5 percent of people leave negative feedback or change negative reviews about products or vendors, causing the brand's credibility to suffer

4.2.2.2 Consumer Inputs on Counterfeit products

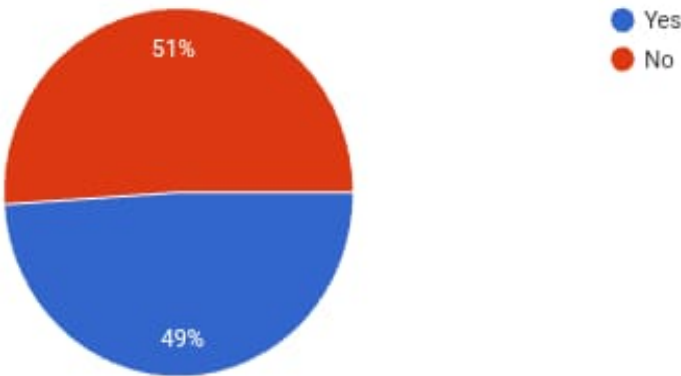
Traceability in Logistics achieved by simple Execution of paperwork, goods transport around the world requires a large amount of paperwork, which takes duration, money and resources. Freight records are also vulnerable to theft, tampering, and fraud. Hence increase the usage of Technologies such as Block chain, Internet of Things and AI can easily track the assets or goods transferred from manufacturing facilities either by suppliers or retailers to end customer location in stores or home delivery.

4.2.2.3 Brand Image

One-fifth of customers (15.5%) Strongly agree, 18.1 percent agree that more clear product information provided by the company increases brand value and position, and 70.1 percent are willing to turn to a new brand if more granular level details

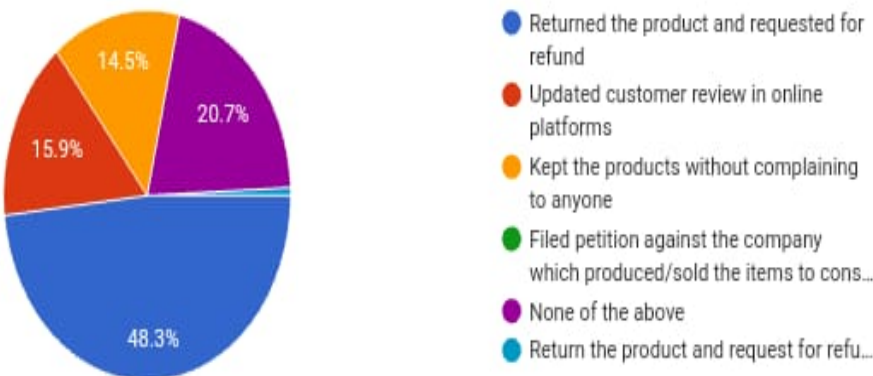
13. Have you ever purchased any defective, counterfeit or fraudulent products?

145 responses



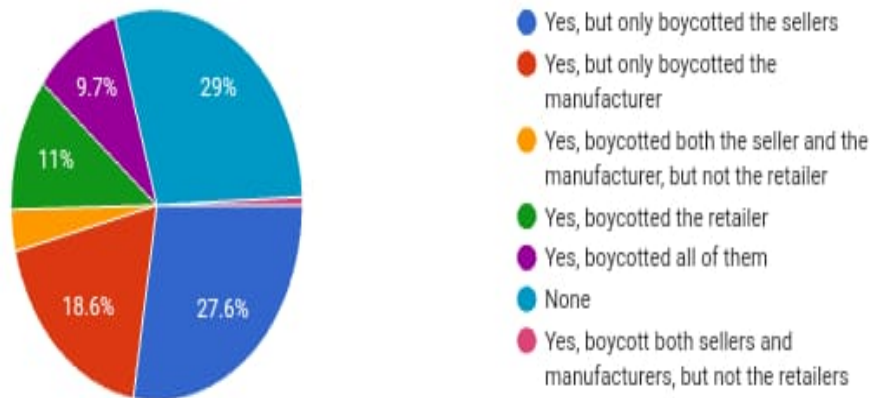
14. If Yes, what was your reaction or action?

145 responses



15. Did you boycott the seller, retailer or manufacturer who sold you the fraudulent product?

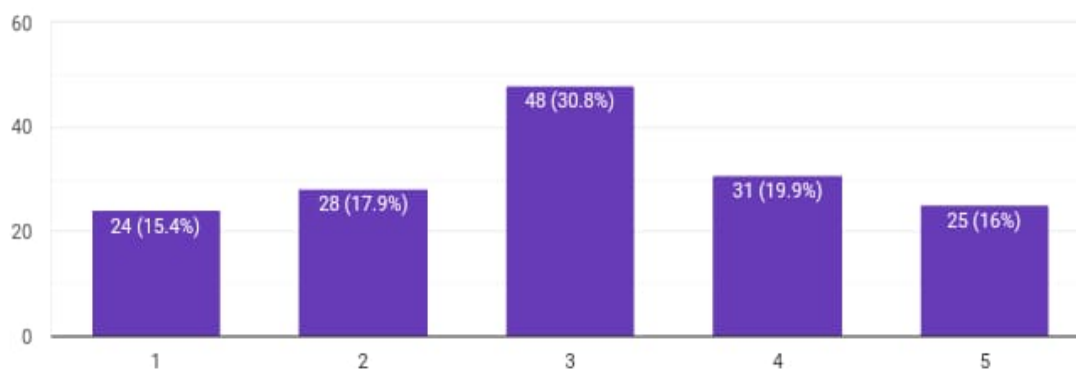
145 responses



provided improve overall confidence and brand image of the retailer or manufacturer.

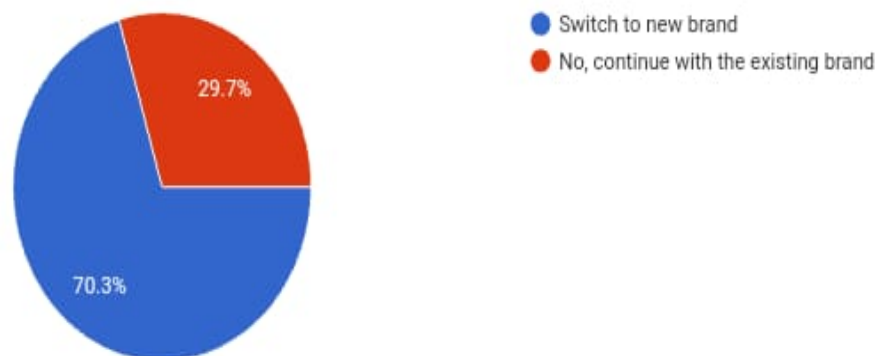
26. Do you believe brand value and position depends on the transparent product details shared by the company that produces them?

156 responses



27. Would you switch to the brands who are transparent to the consumers than the usual brand with fewer detail?

145 responses



4.2.2.4 Findings from Block Chain Developers on Trust

In supply chain and logistics use cases, the digital identity (QR code, RFID or block chain) is used to increase trust and avoid fraudulent transactions.

42.9 percent believe that “Consumer Trust Increases” when detailed product information is given to customers on key factors such as “Social, Safety, Environmental, and Health Factors,” according to input from Sales, IT and business professionals.

14. What are the benefits of providing details about social, health, environmental and safety impacts of the products?



7 responses



Interviewee	What's your role and background?	How does transparency offered by a company impact consumers' (a) willingness to pay, and (b) actual purchasing of their product and services? (C) Trust	Do you think Blockchain and AI can detect the fraudulent products? If yes, how?
Suresh Muthu- mani	Program Manager	It's based on the transparency of Information - For example if a retailer is providing the transparency of the Original value of the product from the Manufacturer - It will make the consumers to think and get the product in much cheaper price than the market value	
Anurag Gupta	Lead En- gineer	Decide on whether they are buying environment friendly product or not	Not sure
Abhinandan kumar	Associate Manager, Functional & Tech- nical Ar- chitect	Decide on whether they are buying environment friendly product or not	Not sure

Gaby Abdul Nour	Supply Chain Management and Purchasing	<p>a) the more transparent the better of course, and in general the more the customer is willing to pay.</p> <p>b) it might depend on the type of product or service they want to buy. and the different brand image they are looking to buy.</p>	Of course. this can help when the customer is buying a product from a third party not directly from the company that produced it. this can be done for example by having an RFID or a QR code that can be easily identified and that connects back to the blockchain which can verify from where the product came and what were the steps taken in the assembly and shipping.
Sheri	I am working as a data strategist for an asset management company	With complete transparency a customer can make an informed decision. It becomes easier for him to trust the product and would be willing to pay more too. It's like purchasing products from an Apple store because of its after sales services and reliability	With AI in place, machines would be easily able to recognize the patterns, textures, viscosity and type of materials and when paired up with blockchain, the information would be available to everyone involved in the process of consumption, therefore making it more transparent
Ganesh Naik	Software engineer	Willingness to pay	Not always

4.2.3 Privacy

4.2.3.1 Findings from IT & Business Teams on Privacy & Data security concerns

An analysis of the data shows that the IT and business teams' input on privacy in the implementation of supply chain and logistics technologies has been the most consistent. To put it another way, information management is crucial for providing effective solutions and, eventually, market competition. Everyone who took part in the interview was upbeat and agreed on the value of data security, and that Block chain technology reduces the possibility of data leakage.

Customers in the offline retail sector are unconcerned about product transparency or security problems, but questions about the payment process are effectively resolved with the advent of secure online payments, whether by credit card or crypto currency.

Interviewee	What are the potential risks associated with disclosing product details and logistics to the public? In addition, how should a company mitigate risks from such disclosure?	Are there regulations in place regarding data privacy and non-disclosure agreements to prevent disclosure of any critical information that will provide transparency to consumers?	How do block chain, smart contracts, machine learning, AI and IoT devices enable consumers to trust the retailers and security related challenges associated with the technologies?
Anurag Gupta	Disclosing product information can lead to dissatisfaction to consumer if product is not environment friendly	Yes	Gives more visibility on how the company functions and pros/cons are there for the product they purchasing
Abhinandan kumar	Disclosing product information can lead to dissatisfaction to consumer if product is not environment friendly	Yes	Gives more visibility on how the company functions and pros/cons are there for the product they purchasing

Gaby Abdul Nour	<p>Risks might come from the competitive side where some of the product details that will be disclosed are the prices and the different suppliers, which will make it easy for competitors to take advantage of that and might cause some contractual problems in terms non-disclosure agreements some of the risks can be mitigated by having an agreement between suppliers and customers and having a clear regulation regarding what needs to be disclosed and what needs to be kept</p>	<p>I do not know for sure. but I guess there is some in place</p>	<p>there has to be a basic trust in the system when it is first implemented. because these systems should be able to make their own decisions in terms of what is better for the company in terms of the tasks that they are handling. and this can happen when the public are more informed about these technologies and can understand the benefits that they bring</p>
Sheri	<p>Brands fear that full disclosure would lose them the competitive advantage. The disclosure should be made in a way that information should be provided to a regulatory body instead of making it public and products should be certified by that regulatory authority. Those certificates should be made publicly available through the blockchain network</p>		<p>Majority of the consumers are not really concerned with the transparency of the products when it come to retail sector as they are generally concerned with the brand name, however while shopping online they are usually concerned with the origin of the product and spams. Blockchains, smart contracts AI and Iot would ensure that the consumers get the right products and are fully aware of the information that a product contains, be it origin of the products or the delivery method or even secure online payment</p>

Ganesh Naik	By increasing data security	Yes	
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4.2.3.2 GDPR Regulations & Privacy Aspect

Blockchain enables total transparency and compliance with GDPR; furthermore, due to its non-centralized nature, it restricts complete authority of a person or a group of people to manipulate or sabotage the chain. It opens up new possibilities for the future, and in the not-too-distant future, almost all will be on the blockchain, including leasing deals, health care, finance, engineering, and investments.

4.2.4 Operational Efficiency

According to the IT, Program and Business Team's notes, operational efficiency in the supply chain sector was achieved by reducing the system to a more "lean and agile" state through the incorporation of Block Chain, AI, and IoT devices. B2B transactions will be more reliable and open as a result of this. The system will be leaner and more agile. The transaction data will be available in real time, ensuring a smooth and automated workflow.

Interviewees	What's your role and background?	How would suppliers and retailers be able to achieve higher operational efficiency and product traceability with the integration of Block Chain, AI and IoT devices to track goods?
Suresh Muthumani	Program Manager	
Anurag Gupta	Lead Engineer	Any good movement can be tracked and will help in identifying any delay on the route
Abhinandan kumar	Associate Manager, Functional & Technical Architect	Any good movement can be tracked and will help in identifying any delay on the route
Gaby Abdul Nour	Supply Chain Management and Purchasing	better shipping ratios, faster order treatment, optimized shipping and moving routes and less loss of products to theft and breakage

Sheri	I am working as a data strategist for an asset management company	It would make B2B transactions more secure and transparent. It would reduce the fat and make the system more lean and agile. The transaction data would be available in real time keeping the whole workflow automated and smooth
Ganesh Naik	Software engineer	

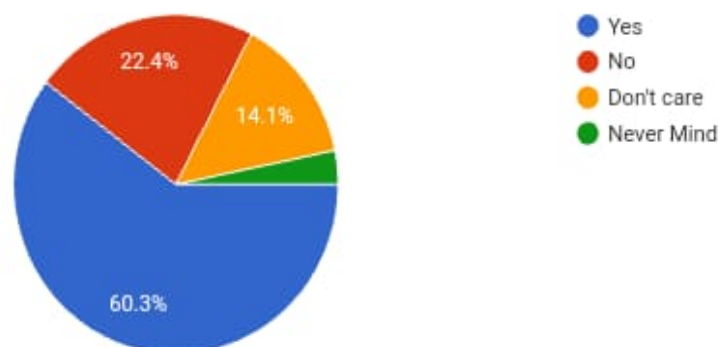
4.2.5 Integration of Technologies to Improve Transparency, Privacy, Trust & Efficiency

4.2.5.1 Consumer Technology Awareness in the Supply Chain

- Consumer Awareness on BLOCK CHAIN, ARTIFICIAL INTELLIGENCE & INTERNET OF THINGS – (logistics items are fitted with sensors using IoT devices and blockchain, which produces data along the supply chain, such as the status of a shipment). This data must be preserved and processed in a permanent and usable manner
- Survey Findings: Sixty percent of the 155 respondents want retailers to use cutting-edge technology like blockchain and artificial intelligence to boost supply chain and logistics transparency

22. Do you think retailers should adopt latest technologies to enable higher consumer transparency before purchase? Ex: Block Chain and Artificial Intelligence

156 responses



4.2.5.2 Sales, IT & Business Team Responses

When it comes to the retail market, the majority of customers are more concerned with the brand name than the transparency of the products; but, when shopping online, they are more concerned with the origin of the product and spams. Smart contracts, blockchains AI and IoT will ensure that customers get the right goods and are completely informed about the information contained in them, whether it be about the products' origins, distribution methods, or safe online payment.

- Sales Response:

While IKEA salespeople may not have sufficient knowledge of either of these innovations or the benefits of incorporating either of these factors to address consumers' concerns about product specifics, this helps positivity of company's or manufacturer's brand image

4.2.6 Exploratory analysis of attribute effect on transparency

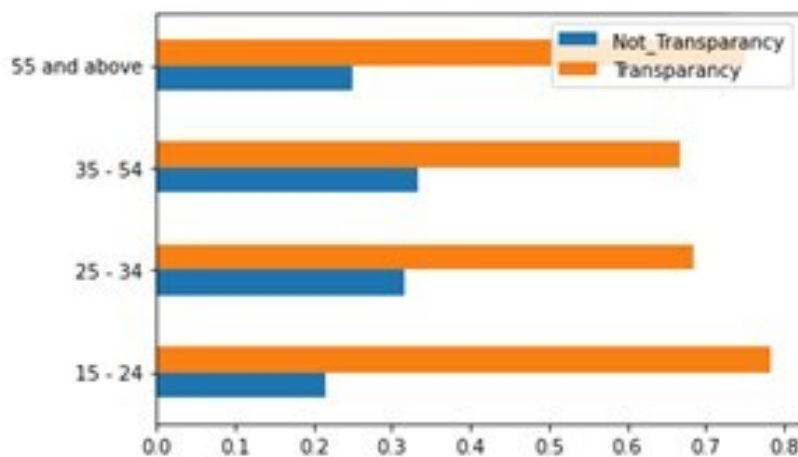
An in-depth look at different attributes and their impact on transparency, as well as the key factors thought to affect consumer transparency behavior.

4.2.6.1 Transparency Factors

4.2.6.1.1 Effect of age on transparency

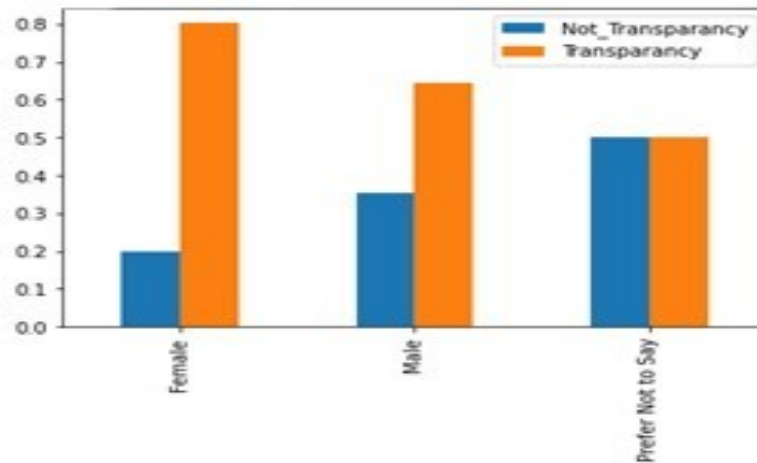
According to age groups, the proportion of people inclined toward product transparency is higher in the younger population (around 80%) than in the middle age, and group of people aged 55 and above tends to consider transparency.

We can notice also that in the middle age group the proportion on person that are inclined on transparency does not depends on age.



4.2.6.1.2 Effect of gender on Transparency

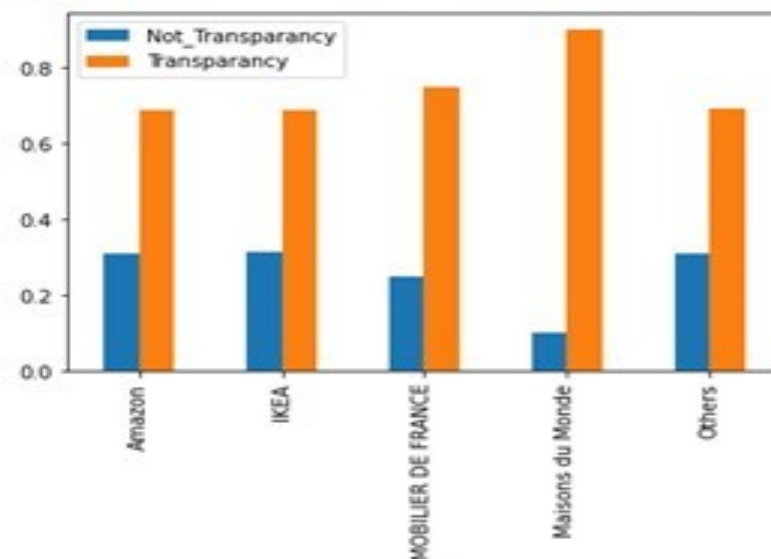
The percentage of people from different gender groups who favour product openness, the female population is larger (80 percent) than the male population (65 percent) and others (50 percent).



4.2.6.1.3 Effect of Retailers (Online Offline stores) on Transparency

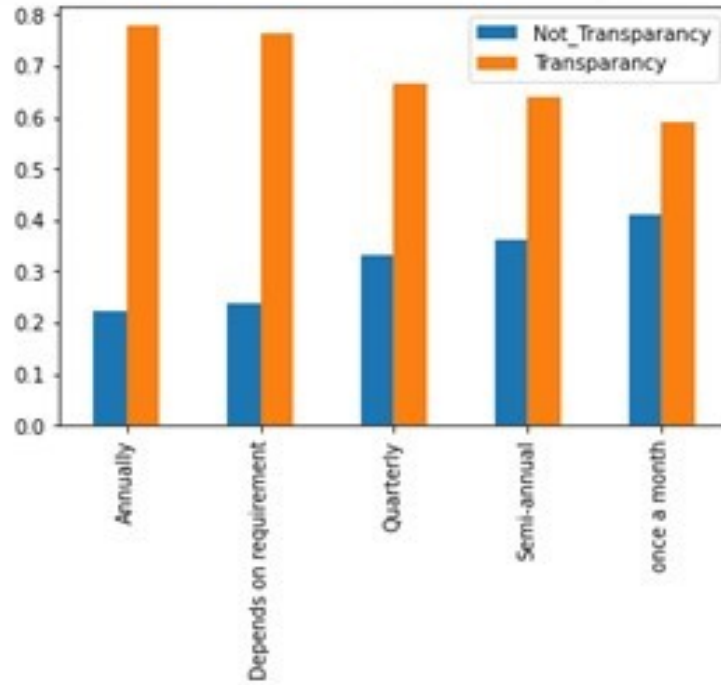
According to customer reviews, the openness rate at the retail business "Maisons du Monde" is higher; this may be explained by the fact that this retailer is a local company in France with a market profile that values product quality over price.

Amazon and Ikea, two global companies, have similar market profiles in terms of openness. This may be explained by the fact that Amazon customers are more concerned with price and availability of products than with transparency.



4.2.6.1.4 Effect of Consumer purchase frequency on Transparency

Consumer behaviour on transparency varies depending on purchasing frequency; frequent or daily shoppers, whether online or offline, are less concerned with product transparency than annual shoppers or non-frequent shoppers.



Chapter 5

Conclusion

The research study sheds light on consumer perceptions of transparency, trust, and privacy, as well as “how salespeople handle day-to-day business with customers to answer questions about product details,” and “how 4th industrial technologies like blockchain, AI, and IoT devices enable IT and business teams to meet the growing demands of customers.”

The findings reveal valuable information about customers’ perceptions of openness and revenue, as well as IT and business teams’ ability to incorporate blockchain in supply chain and logistics, and answer some of the key concerns. Furthermore, the research was limited to one form of home furniture, namely an IKEA store in France. Many organizations in retail business have various backgrounds, corporate cultures, and various operational challenges involved in handling the efficient supply chain process and transportation of goods to meet the consumer expectations. Similarly, each nation has its own geographic and social characteristics. In the end, forthcoming research projects to focus on the phenomenon in various organizational and geographic settings. Lastly, integration of the supply chain researched thoroughly for various segments and organizational sizes, like Small Medium Enterprises and individual enterprises in order to be included in the 4th Industrial revolution technologies.

Blockchain technology provides a ground-breaking forum for a modern decentralized and open transaction process in industry and company. The features of this technology improve trust by providing transparency in any data, products, or financial resource transaction. In the logistics and supply chain industry, the blockchain has the potential to rapidly have stable business operations.

In addition to financials and crypto currency, blockchain methodology shall be utilized in IoT devices (such as logistics with Radio Frequency Identification), risk-assessment and administration, as well as Services provided by the government, community and organization to identify the counterfeit products, theft and deceived consumers and suppliers.

Increased Supply Chain Transparency, Traceability, Faith (Trust) and Security (Privacy): In the supply chain and logistics industries, blockchain technology provides a revolutionary forum for a modern decentralized and open transaction process. This technology's features improve trust by ensuring accountability in all data, products, and financial transactions. In the logistics industry, blockchain, Internet of things and AI enabled systems makes it simple to ensure successful business outcomes. The technological foundation is built on a non-centralized framework that keep tracks of information that can be exchanged indefinitely and is accessible to everyone.

Block chain makes it possible to track any forms of settlements in a safer manner (Ex: Financials, goods etc). Blockchain technology has greatly reduced time delays, additional costs, and human errors in the logistics industry. By collecting, transferring, and sharing data, the use of RFID (as part of IoT devices) and blockchain technology in the development of IKEA's home furniture supply chain traceability system allows traceability with trustworthy information across the entire supply chain process (from sourcing raw materials, primary suppliers, secondary suppliers, manufacturers, and retailers), effectively ensuring product safety.

An overview of ongoing implementation projects and implementations of blockchain technology integration with AI and IoT devices is defined in the above sections, "Possibilities of blockchain technology use," with examples in the product tracing, inventory control, warehouse management, financial, and logistics sectors.

Blockchain enables goods to be digitally tracked and authenticated from a network of manufacturers to store shelves and, eventually, to end users. IKEA Iceland recently agreed to settle an invoice for products purchased by Nordic Store, a local retailer, using a smart contract on the Ethereum blockchain (ETH). This is an illustration of how blockchain can be used to help retailers' transition to digital currency systems.

Clients can use the blockchain platform to easily enable and effectively build, run, rule, and protect their own business networks because it provides end-to-end capabilities. Blockchain technology can help to improve logistics by reducing or eliminating counterfeit goods and mistakes, lowering overall costs, reducing waste and delays, improving inventory management, and providing digital identification and reducing process delays far more quickly.

Finally, by using blockchain technology, the logistical problems will be reduced, if not removed, and the logistics sector's viability will be greatly enhanced. The technology aids logistics activities by monitoring purchase orders, order shifts, and freight documents, as well as exchanging knowledge about the production and distribution processes. Blockchain technology has enormous potential for growth and deployment in the logistics and supply chain sectors, posing research challenges.

5.1 Recommendation

According to the results of the current report, consumers are much more conscious of product transparency than they were 5 years ago. However, the majority of consumers today are more interested in knowing about the cost, dimensions, size, and colour of the product (around 60 percent combined), however a sizeable percentage (30 percent) of people are interested in knowing the raw materials used e.g. And 70 percent of customers trust retailers and suppliers and will remain loyal to the company that makes or sells them, even though they can turn to a clearer brand. Companies should innovate and invest further in blockchain and other technology to provide transparency in the supply chain and logistics in order to maintain existing and attract new customers and improve their brand image.

Despite the fact that blockchain, AI, and IoT devices are only in their early stages of adoption in supply chain and logistics, there is a lot of research and development work going on across industries and retailers. IT and business teams should prefer to use blockchain solutions to provide customer transparency and to highlight the technology's value propositions through various proofs of concept and use cases that are currently being developed. In terms of observability in blockchain innovation, the technology's immaturity in the supply chain sector, as well as its lack of scale, make it difficult to determine empirical outcomes, implying that further study and realistic implementation is needed before drawing conclusions. IT service providers, on the other hand, are already providing estimated cost savings from decreased labour and paperwork costs based on many proofs of concept.

5.2 Research Limitations

Despite the fact that the blockchain has been used in bitcoin or crypto currency since 2008, there is a lack of expertise on how to implement blockchain, AI, and IoT devices in the supply chain and logistics sector, which makes it difficult for IT (Information Technology) service providers and market analysts to comprehend and meet growing consumer demands for a transparent framework.

Consumer demands and understanding of product transparency, as well as their increasing interests, were the subject of the report. More support and services should be placed in place for businesses to implement the solution in order to improve their brand image. The use of block chain, AI, and IoT technologies should be further extended to sectors such as inventory management, warehouse management, freight brokerage, and logistics within the supply chain industry, as evidenced by IKEA's recent adaptation of Ethereum blockchain in the Nordic Store for the Invoice payment using crypto currency.

Seeking Industry Experts to understand expert views on the use of technology in the supply chain sector is a research constraint. Just a small percentage of size 8-10 interviewees have extensive knowledge of the industry and technology, but there are still insufficient expert opinions from market analysts and sales representatives to do a comprehensive analysis on my findings.

5.3 Future Scope of the Study

The latest research leads to a better understanding of consumers' increasing knowledge of product transparency, safety, social, and environmental factors, as well as the growing research initiative to incorporate solutions that integrate block chain, AI, and IoT devices into supply chains and logistics to meet customer demands and expectations.

There may be some drawbacks to my research methodology; for example, determining what counts as a minimal definition is arbitrary, and there's a good chance that a current project won't get enough traction to show up on the radar. However, I believe that my approach has gathered a critical mass of existing work, both in industry and among customers, on providing transparency in supply chain and logistics through the use of technologies such as blockchains, AI, and IoT devices, allowing for a well-founded study of the topic.

Due to the early adaptation of the process by industries or retailers to unlock the maximum potential in the supply chain and logistics market, it's difficult to evaluate the potential benefits to companies in terms of value addition, improved brand image with respect to customer understanding, and some technical implementation limitations from a single case study. As a result, further case studies are needed to discuss and examine the specifics of the issues posed by end users.

The research was focused on one type of home furniture, specifically IKEA retail stores in France. Many organizations in retail business have various backgrounds, corporate cultures, and various operational challenges involved in handling the efficient supply chain process and transportation of goods to meet the growing consumer interests and expectations to address core issues like product traceability and transparency on health and safety concerns, social, labour, environmental factors. Similarly, to address each nation's geographical, governmental policies and social characteristics while procuring or producing and selling the products to consumers. As a result, future studies will look into the phenomenon in various organizational and geographic settings. Lastly, in order to be included in the 4th Industrial revolution innovations and advances, integration of the supply chain to be researched thoroughly for various segments and organizational sizes, like Small Medium Enterprises, and individual enterprises.

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Appendix A

Appendix

A.1 Survey Questions from Consumer, IT and Sales Representative

A.1.1 From Consumer view:

- What's your age?
- What's your gender?
- When was the first time you started shopping home appliances?
- How often do you shop household accessories?
- Which is your most preferred retailer to purchase home accessories, kitchen appliances, furniture, etc?
- Which of these would you prefer when buying home appliances?
- Which season do you usually buy home furniture/appliances?
- What kind of products do you like buying from IKEA or other furniture stores?
- Which is your favourite section in IKEA or any other furniture store?
- What factors do you consider while purchasing products?
- Would you like to hear about product transparency prior to making a buying decision? Ex: Product detailing
- Are you satisfied with the details given on product descriptions?
- Have you ever purchased any defective, counterfeit or fraudulent products?
- If Yes, what was your reaction or action?

- Did you boycott the seller, retailer or manufacturer who sold you the fraudulent product?
- Did the products you purchased provide all the information on social, health, safety and environmental impacts along with other product details?
- Do you usually look for the source of the product in the product labels?
- With regard to product transparency, what details are most important to you?
- Do you trust and purchase products from the retailers who provide complete details of the product?
- Do you think, you are more concerned about product transparency today than you were a few years ago?
- What information would you prefer to view in the product labels before you purchase any product?
- Do you think retailers should adopt latest technologies to enable higher consumer transparency before purchase? Ex: Block Chain and Artificial Intelligence
- Do you think there should be transparency required in the transport process for goods transferred from the production plant up to delivery of the products?
- Do you want to know more about the health, financial, social and safety consequences of the goods you purchase or the business that produces them?
- How do you find out about the health, financial, social and safety implications of the goods?
- Do you believe brand value and position depends on the transparent product details shared by the company that produces them?
- Would you switch to the brands who are transparent to the consumers than the usual brand with fewer detail?
- What additional details will you expect the manufacturers and/or retailers to provide while producing and selling the products?

A.1.2 From IT and Business View:

- What's your role and background?
- Do you have knowledge on supply chain or retail industry?
- Do you think the general public is aware of the health, financial, social, and safety implications of the goods?
- How does a retailers or seller's accountability affect customers' (a) ability to pay and (b) actual purchases of its goods?
- Do you have knowledge on Blockchain? If yes, provide the definition of Blockchain and explain the advantages of using the technology in supply chain and logistics?
- In your view, how can retailers, manufacturers use digital identity to enable supply chain visibility and transparency? What are the challenges involved in it?
- How does Artificial Intelligence (AI) with real time analytics and tracking help in bringing transparency in the following processes: supply chain planning, warehouse management, fleet management, automated freight brokerage and delivery of the desired goods to consumer location?
- How should a retailer use Blockchain and AI in collaboration with suppliers and manufacturers to enable operational efficiency and product visibility?
- Does retailers or sellers face consequences of revealing product information and logistics details to consumers? In addition, how should a company mitigate risks from such disclosure?
- Based on consumer feedback and data analytics using AI, what are the key areas the consumers are most interested in when it comes to transparency?
- Do you think Blockchain and AI can detect the fraudulent products? If yes, how?
- Are there regulations in place regarding data privacy and non-disclosure agreements to prevent disclosure of any critical information that will provide transparency to consumers?
- What are smart contracts in block chain and how does it help in logistics?
- What are the advantages of presenting information about the products' health, financial, social and safety implications?

- How would suppliers and retailers be able to achieve higher operational efficiency and product traceability with the integration of Block Chain, AI and IoT devices to track goods?
- How do block chain, smart contracts, machine learning, AI and IoT devices enable consumers to trust the retailers and security related challenges associated with the technologies?
- Do you think retailers or manufactures should implement Block chain, AI or IoT devices in supply chain and logistics? if not, why?

A.1.3 From Sales:

- Could you please state your role and department?
- Which type consumer segments quite often visit the stores for shopping?
- What's the busiest season for shopping?
- What's the most common questions from consumer's about products?
- Do consumers enquire about any specific details from the product labels? and any additional questions not in labels?
- Which areas are consumers most interested in transparency about?
- What's the process behind identifying fraudulent and defective products?
- Do you get any enquiry from consumers about source of the products?
- Do you see any issues with the current logistics process and customers reaction, on defective or missing products?
- Do you have any ideas for enhancing logistics efficiency?
- Do you think by introducing new technologies can improve the process such as AI or Blockchain?
- Do you see current process in the store fulfil customer demands to provide the details, or do you see any additional improvements is necessary?

A.2 Survey Answers

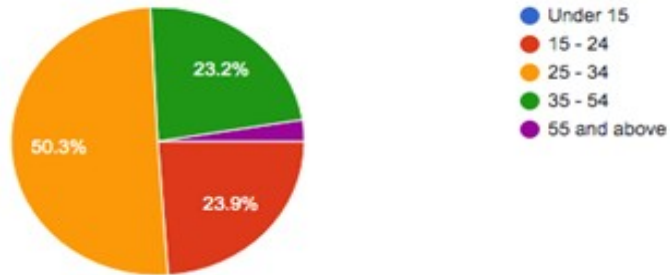
A.2.1 Consumer's view:

- Consumer Survey Online link is as follows.

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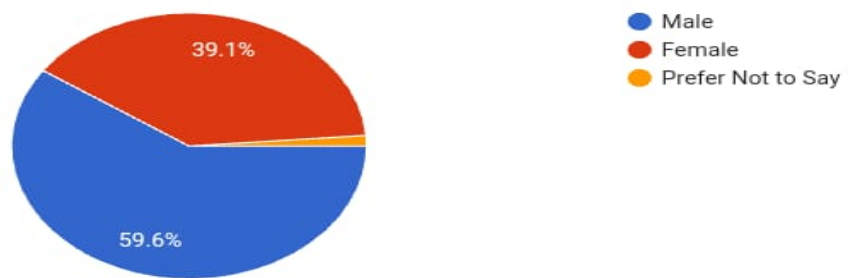
1. What's your age?

155 responses



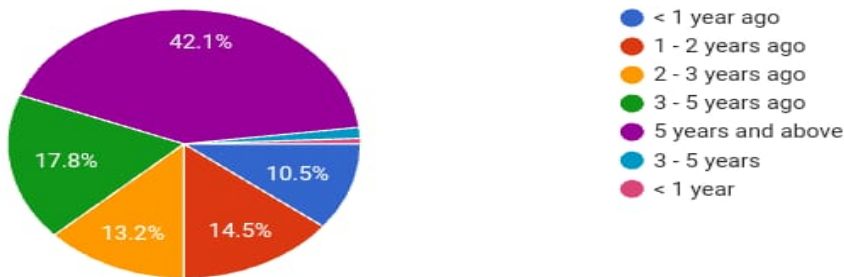
2. What's your gender?

156 responses



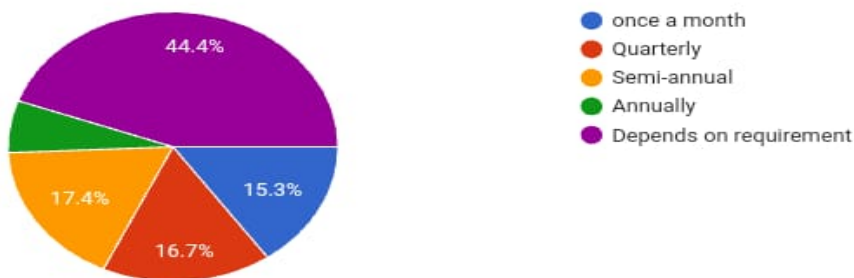
3. When was the first time you started shopping home appliances?

152 responses



4. How often do you shop household accessories?

144 responses



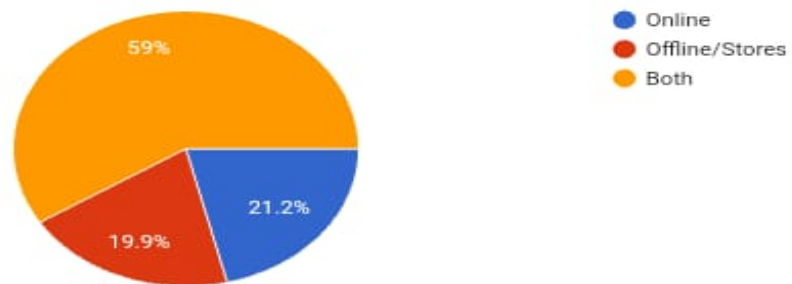
5. Which is your most preferred retailer to purchase home accessories, kitchen appliances, furniture, etc?

156 responses



6. Which of these would you prefer when buying home appliances?

156 responses



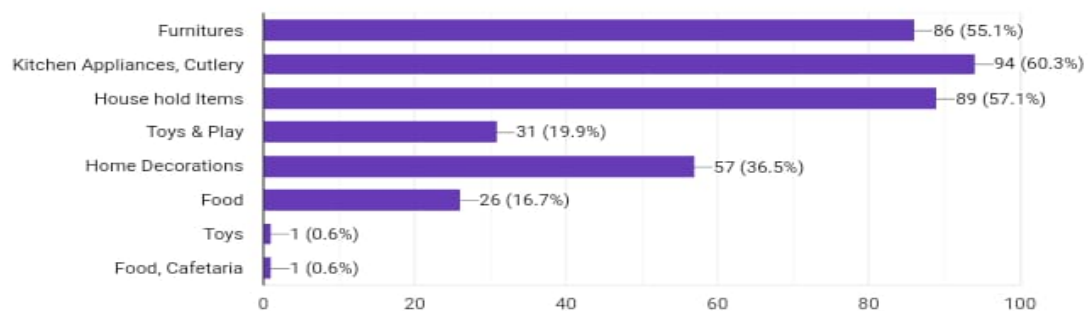
7. Which season do you usually buy home furniture/appliances?

151 responses



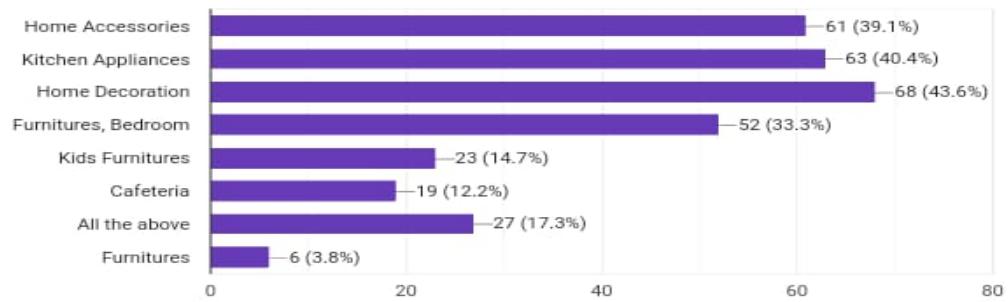
8. What kind of products do you like buying from IKEA or other furniture stores?

156 responses



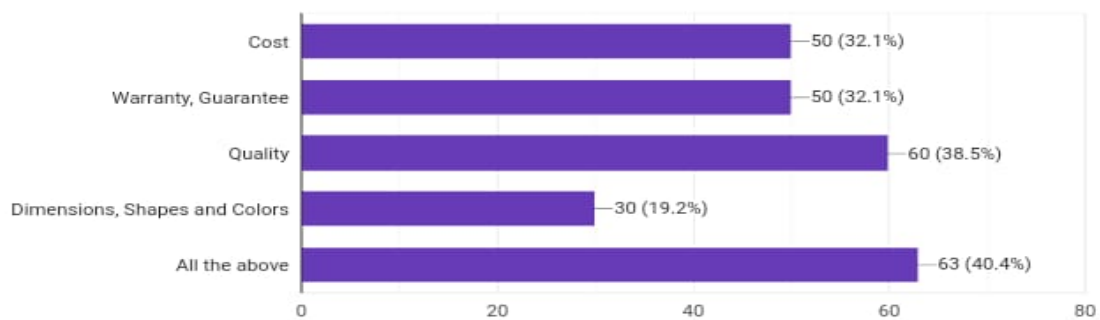
9. Which is your favourite section in IKEA or any other furniture store?

156 responses



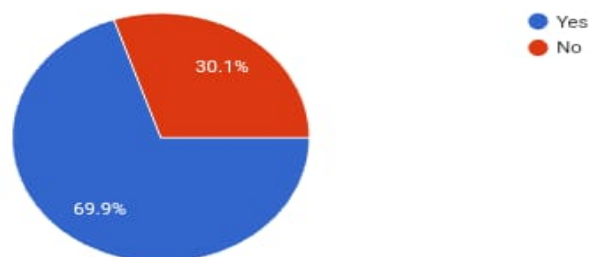
10. What factors do you consider while purchasing products?

156 responses



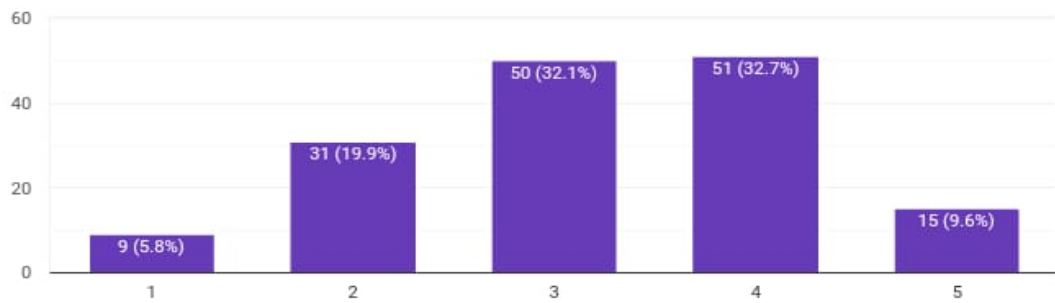
11. Would you be interested to know transparency of products before you make a decision to purchase? Ex: Product detailing

156 responses



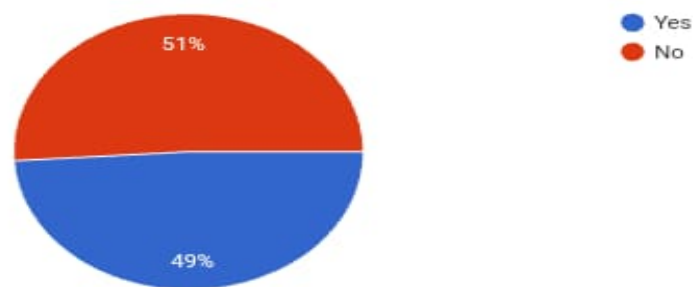
12. Are you satisfied with the details given on product descriptions?

156 responses



13. Have you ever purchased any defective, counterfeit or fraudulent products?

145 responses



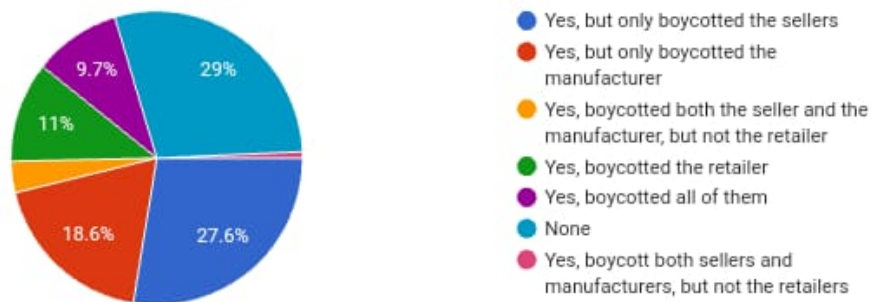
14. If Yes, what was your reaction or action?

145 responses



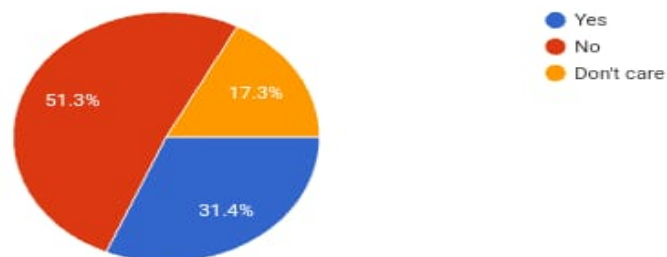
15. Did you boycott the seller, retailer or manufacturer who sold you the fraudulent product?

145 responses



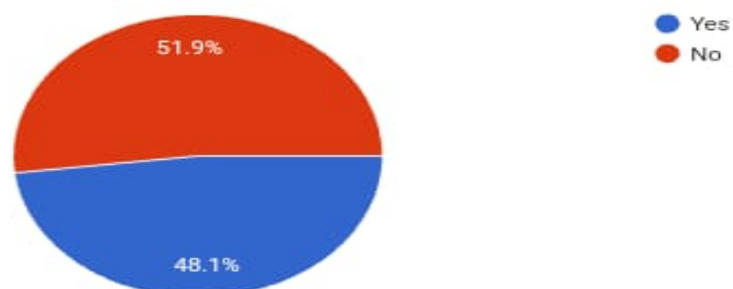
16. Did the products you purchased provide all the information on social, health, safety and environmental impacts along with other product details?

156 responses



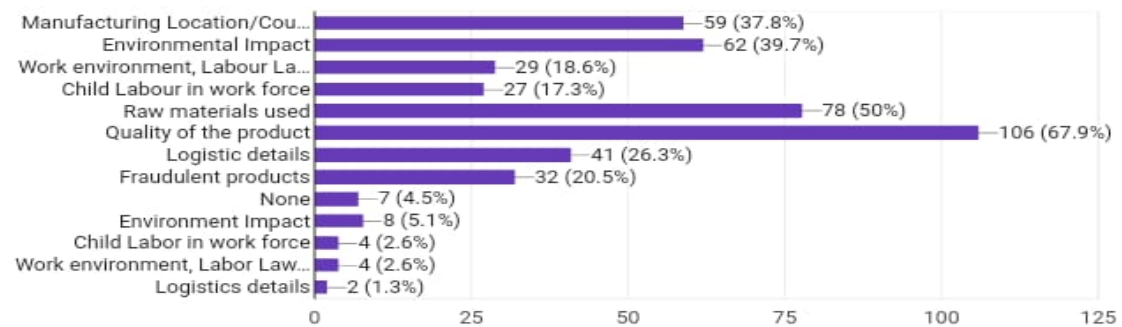
17. Do you usually look for the source of the product in the product labels?

156 responses



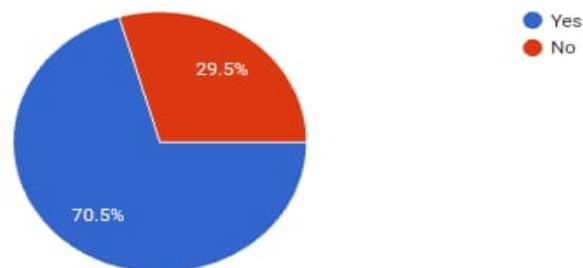
18. With regard to product transparency, what details are most important to you?

156 responses



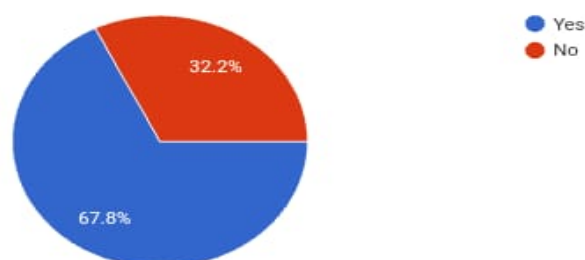
19. Do you trust and purchase products from the retailers who provide complete details of the product?

156 responses



20. Do you think, you are more concerned about product transparency today than you were a few years ago?

152 responses



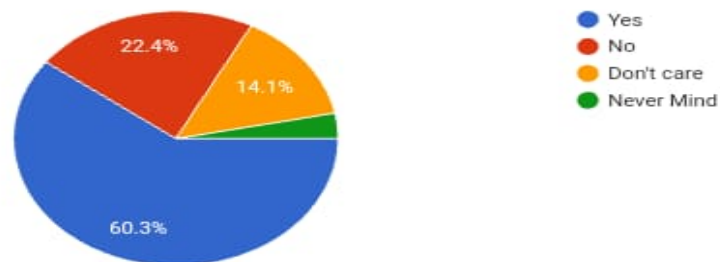
21. What information would you prefer to view in the product labels before you purchase any product?

156 responses



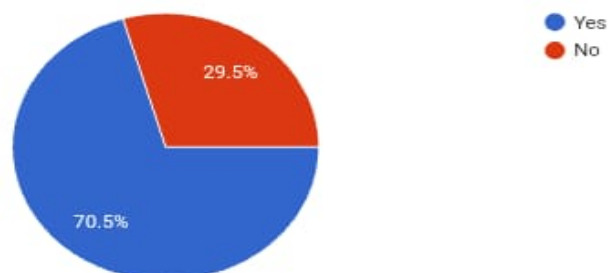
22. Do you think retailers should adopt latest technologies to enable higher consumer transparency before purchase? Ex: Block Chain and Artificial Intelligence

156 responses



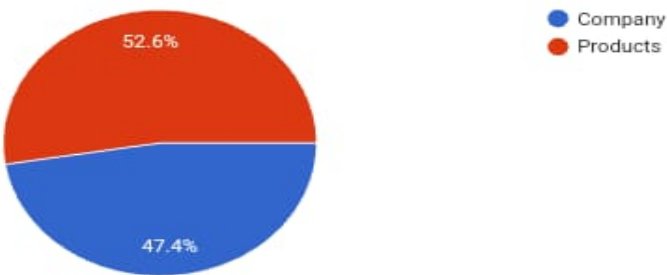
23. Do you think there should be transparency required in the transport process for goods transferred from the production plant upto delivery of the products?

156 responses



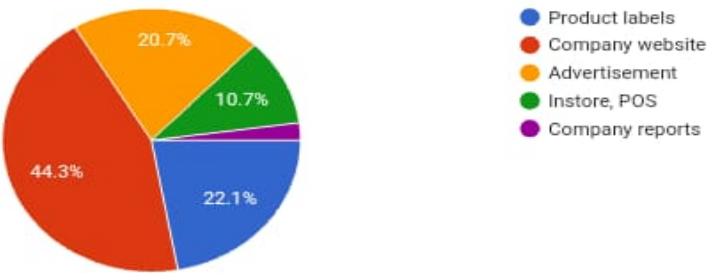
24. Are you most interested in hearing about the social, health, environmental and safety impacts of the products you buy or the company that makes them?

156 responses



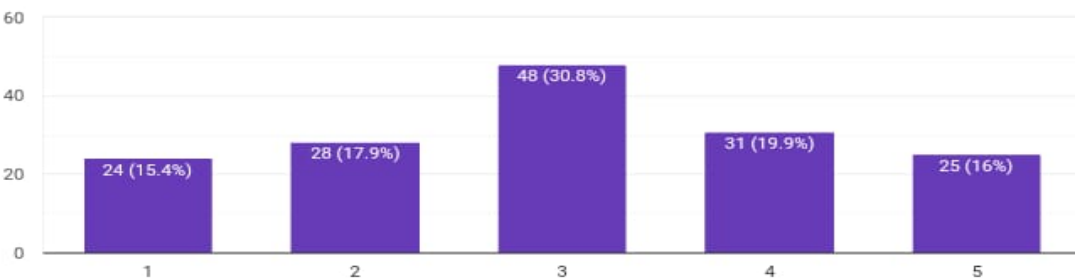
25. Where do you most likely look for information about the social, health, environmental and safety impact of the products you buy?

140 responses



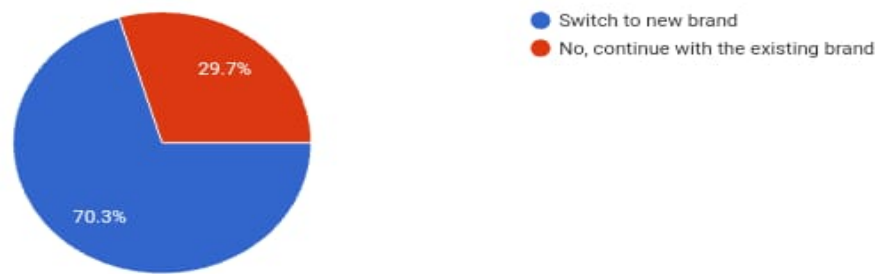
26. Do you believe brand value and position depends on the transparent product details shared by the company that produces them?

156 responses



27. Would you switch to the brands who are transparent to the consumers than the usual brand with fewer detail?

145 responses



28. What additional details will you expect the manufacturers and/or retailers to provide while producing and selling the products?

156 responses



A.2.2 Business and IT Responses:

- Semi Structured Interviews and Interview Transcripts

Profiles of the IT and Business Teams:

Name	Email ID	Role & Background
Suresh Muthu- mani	msuresh843@gmail.com	Program Manager @TCS – Cli- ent – BESTBUY, US
Anurag Gupta	anuragg7@gmail.com	Lead Engineer @Accenture – Client -BESTBUY, US
Abhinandan ku- mar		IT Associate Manager @ Accenture- Functional & Tech- nical Architect - Supply Chain – Client BESTBUY, India
Gaby Abdul Nour	gabyabdulnour@gmail.com	Supply Chain Management and Purchasing, Student – Paris
Sheri	dwyers490@gmail.com	Block Chain Developer - Data strategist for an asset manage- ment company @Dublin
Ganesh Naik	naikganesh133@gmail.com	Software Engineer @ Accenture – BESTBUY, India
Nithin Kop- padaka Sateesh	ksn.nithin@gmail.com	Masters in International Busi- ness and Engineering, Student Germany
Subash Raikar		Program Manager - Supply Chain Free Lance, India
Osama		Block Chain Developer - Master Student, Paris

- Business IT Interview – Audio Links

https://drive.google.com/drive/u/0/folders/1Z3tW35hWWPibCnoynvc8uI_GkLLTtxEU

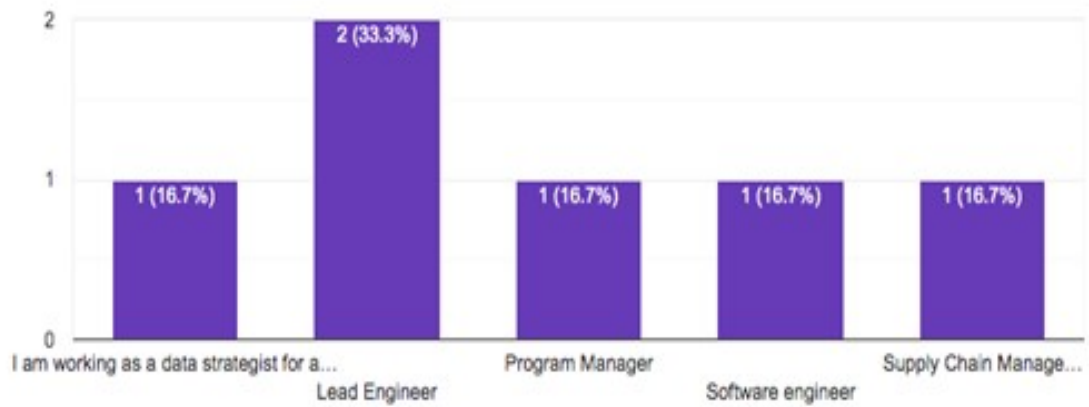
- Corporate Survey (Business IT) Online Survey Link

https://docs.google.com/forms/d/1aKLDcKQ3gD6fp3n8Y8gjZE8Zb0JBxmLpn1RBtdjRcK8/edit#response=ACYDBNhbLZMeW6f0GzwqyifJbKdC2K4PZ_sg-CCUNGkE1-LJ6SBiBoWXpLR6wyY3t

1. What's your role and background?



6 responses



2. Do you have knowledge on supply chain or retail industry?

6 responses

Both

Yes

Yes. I have the knowledge and working on retail IT for the past 17+years.

No

3. In your opinion, how much awareness does the public have the social, health, environmental, and safety impacts of the products they purchase?

6 responses

Very little

40% of awareness.

the awareness levels are increasing year to year. so a few years ago the public were not interested in the impact that the products they purchase have. but nowadays, the public are much more informed and willing to go the extra mile to get the needed information about their products

Consumers are getting much more aware these days not just for themselves but they are opting for eco friendly products, but a major proportion of consumers go for value for money without taking into consideration the adverse health effects.

Less

4. How does transparency offered by a company impact consumers' (a) willingness to pay, and (b) actual purchasing of their product and services?

6 responses

Decide on whether they are buying environment friendly product or not

It's based on the transparency of Information - For example if a retailer is providing the transparency of the Original value of the product from the Manufacturer - It will make the consumers to think and get the product in much cheaper price than the market value.

a) the more transparent the better of course, and in general the more the customer is willing to pay.
b) it might depend on the type of product or service they want to buy. and the different brand image they are looking to buy.

With complete transparency a customer can make an informed decision. It becomes easier for him to trust the product and would be willing to pay more too. It's like purchasing products from an Apple store because of its after sales services and reliability.

a

5. Do you have knowledge on Blockchain? If yes, provide the definition of Blockchain and explain the advantages of using the technology in supply chain and logistics?

6 responses

data which will reduce lot of fraudulent cases in the digital world.

Advantages:-

1. Transparency towards the consumers.
2. Trusted transactions for the products.
3. Can reduce more manual effort on shipping and receiving process

Blockchain is a chain of nodes that act as a ledger where all of these nodes compare the information that they have in an instance which provides a high level of accuracy and prevents the loss of data and make it extremely difficult to change the data that has already been written.

It will allow for a better control and trust in the whole supply chain. it will give the needed transparency and the ability to track the different products and raw materials from the first supplier all the way to the final customer on per unit bases. which will increase the ability of the customer to track their products and know with high certainty that what they get is what has been advertised and communicated.

Blockchain is a distributed ledger system, which allows complete transparency and compliance to GDPR ; furthermore owing to its decentralized nature it restricts complete authority of an individual or a pool of people to control or sabotage the chain. It unlocks new avenues into future and practically everything will be on the blockchain in near future be that rental agreements, health care sector, banking, engineering or investments

6. In your view, how can retailers, manufacturers use digital identity to enable supply chain visibility and transparency? What are the challenges involved in it?

5 responses

Teach their inventory more accurately and identify when it needs to be replenished. Data governance is one of the biggest challenge.

This goes to the same argument of Blockchain with the ability to track the produced units from the beginning and with the help of IoT it can be a powerful tool in the hands of a company to show to their customers/governmental agencies that their products are complainant with the regulations. the challenges are that this is difficult to implement and it might have some IT risk

I believe by assigning a unique identifier similar to a QR code or barcode on the blockchain would make the information more accessible to consumers. They would be able to trace the origins of the products and the concerned information regarding it. In terms of manufacturing blockchain will help in patenting the information globally which would reduce a major chunk of counterfeit products in the market.

Payment security

7. How does Artificial Intelligence (AI) with real time analytics and tracking help in bringing transparency in the following processes: supply chain planning, warehouse management, fleet management, automated freight brokerage and delivery of the desired goods to consumer location?

4 responses

It can help in identifying the delay as well as identify track whether inventory is low and needs replenishment . This would better customer experience if there is transparency.

AI can help a lot with real time analytics in
Supply Chain Planning :- Advance inventory planning can be done based on the product selling, seasonal products can be stocked based on the Calendar dates, Threshold limits and product maintenance can also be handled with AI process.
Warehouse Management:- Product receiving can be automated by grading the suppliers - If more trusted supplier then the warehouse receiver can scan the truck once to receive all the products on it. Also based on the ranking it can be minimized to container level, Pallet level, Carton or Unit level as well.

In my opinion, AI can help in increasing the efficiency of the SC by reducing different types of waste and reducing bottlenecks and increase the system capacity to take orders and optimizing the orders and shipping.

8. How should a retailer use Blockchain and AI in collaboration with suppliers and manufacturers to enable operational efficiency and product visibility?

4 responses

Identify the demand and plan in advance and have inventory closer to the area where demand is high to have faster response time to customer orders.

similar to last one

Operational efficiency would be in place as every transaction would be recorded in real time, keeping everyone on the same page. Transparency would ensure product's authenticity which in turn would increase the visibility

9. What are the potential risks associated with disclosing product details and logistics to the public? In addition, how should a company mitigate risks from such disclosure?

5 responses

Disclosing product information can lead to dissatisfaction to consumer if product is not environment friendly.

risks might come from the competitive side where some of the product details that will be disclosed are the prices and the different suppliers, which will make it easy for competitors to take advantage of that and might cause some contractual problems in terms non-disclosure agreements.

some of the risks can be mitigated by having an agreement between suppliers and customers and having a clear regulation regarding what needs to be disclosed and what needs to be kept.

Brands fear that full disclosure would lose them the competitive advantage. The disclosure should be made in a way that information should be provided to a regulatory body instead of making it public and products should be certified by that regulatory authority. Those certificates should be made publicly available through the blockchain network

By increasing data security

10. Based on consumer feedback and data analytics using AI, what are the key areas the consumers are most interested in when it comes to transparency?

5 responses

Product details and how it is fulfilled to consumer.

the social responsibility of the company and how green and ethically sourced the product is.

Product authenticity
Product Origin
Health and Safety
Security

Payment gateway

11. Do you think Blockchain and AI can detect the fraudulent products? If yes, how?

5 responses

Not sure.

of course. this can help when the customer is buying a product from a third party not directly from the company that produced it. this can be done for example by having an RFID or a QR code that can be easily identified and that connects back to the blockchain which can verify from where the product came and what were the steps taken in the assembly and shipping.

With AI in place, machines would be easily able to recognize the patterns, textures, viscosity and type of materials and when paired up with blockchain, the information would be available to everyone involved in the process of consumption, therefore making it more transparent.

Not always

12. Are there regulations in place regarding data privacy and non disclosure agreements to prevent disclosure of any critical information that will provide transparency to consumers?

4 responses

Yes

I do not know for sure. but I guess there is some in place

13. What are smart contracts in blockchain and how does it helps in logistics?

4 responses

Not sure

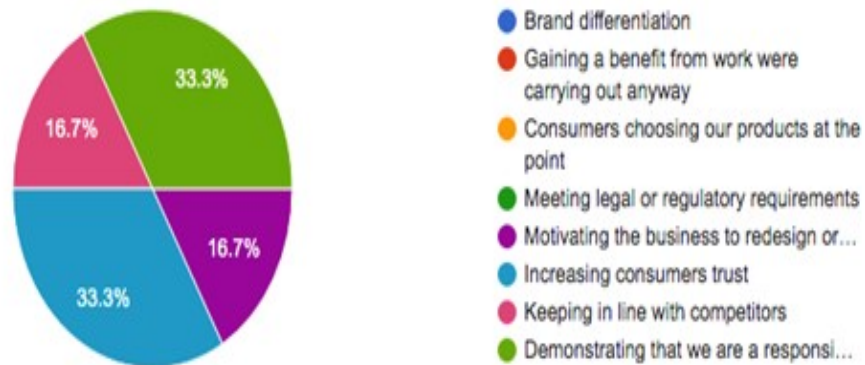
I do not know smart contracts

Primarily, it eliminates the involvement of third parties or middlemen and cannot be altered once they become a part of the blockchain. In logistics it basically automates the whole process, makes it much more transparent and secure.

14. What are the benefits of providing details about social, health, environmental and safety impacts of the products?



6 responses



15. How would suppliers and retailers be able to achieve higher operational efficiency and product traceability with the integration of Block Chain, AI and IoT devices to track goods?

4 responses

Any good movement can be tracked and will help in identifying any delay on the route.

better shipping ratios, faster order treatment, optimized shipping and moving routes and less loss of products to theft and breakage.

It would make B2B transactions more secure and transparent. It would reduce the fat and make the system more lean and agile. The transaction data would be available in real time keeping the whole workflow automated and smooth.

16. How do block chain, smart contracts, machine learning, AI and IoT devices enable consumers to trust the retailers and security related challenges associated with the technologies?

4 responses

Gives more visibility on how the company functions and pros/cons are there for the product they purchasing.

there has to be a basic trust in the system when it is first implemented. because these systems should be able to make their own decisions in terms of what is better for the company in terms of the tasks that they are handling. and this can happen when the public are more informed about these technologies and can understand the benefits that they bring.

Majority of the consumers are not really concerned with the transparency of the products when it come to retail sector as they are generally concerned with the brand name, however while shopping online they are usually concerned with the origin of the product and spams. Blockchains, smart contracts AI and lot would ensure that the consumers get the right products and are fully aware of the information that a product contains, be it origin of the products or the delivery method or even secure online payment

17. Do you think retailers or manufactures should implement Block chain, AI or IoT devices in supply chain and logistics? if not, why?

5 responses

Yes

disregarding everything, yes. but when we start considering the different aspects that we need to take into account, I cannot recommend all companies to do it.

this is a very high-risk investment and it is super expensive to get it up and running and not all companies have the needed know-how and the ability to track all of these things even if they started slow.

I believe AI and IOT are already in place the retail sector, a Canadian fuel company came up with their own automated store, however it would take them significant time to completely transition from conventional supply chain methods to blockchain as the process is relatively new and people are not properly equipped with the right kind of knowledge to implement it

Yes

A.2.3 Sales Team Inputs/Transcripts via online:

- Sales Team Interviewee details:

Name	Email ID	Role & Background
Luna	lunaz98@hotmail.com	Bachelor Student, Paris
Anonymous		IKEA Sales Manager, La Madeleine, Paris

- Sales Team Audio Recordings

https://drive.google.com/drive/u/0/folders/1Z3tW35hWWPibCnoynvc8uI_GkLLTtxEU

- Sales Team Survey Online Survey Link

https://docs.google.com/forms/d/1Le6nCaA9cv4HkE_gwosv-XpvqE-9jQbqxunYQzO6AmY/edit?usp=forms_home&ths=true

which type consumers quite often visit the stores for shopping?

1 response



What's the most busiest season for shopping?

1 response

Winter

What's the most common questions from consumer's about products?

1 response

Is it durable, Is it expensive, Does it look good...

Do consumers enquire about any specific details from the product labels? and any additional questions not in labels?

1 response

From the label the dimensions of the product. No additional questions usually.

Which areas are consumers most interested in transparency about?

1 response



What's the process behind identifying fraudulent and defective products?

1 response

Calling the shop or talking to a worker there

Do you see any issues with the current logistics process and customers reaction, on defective or missing products?

1 response

Not really no

Do you have any suggestions on process improvement on logistics?

1 response

Having more technology involved. Using more online shopping to reduce human fault.

Do you think by introducing new technologies can improve the process such as AI or Blockchain?

1 response

Yes probably.

Which events, you think can change some information in regards to a products state in IKEA Supply Chain? An event can be, for example, when a batch leaves the supplier, when it arrives at a DC etc.

1 response

Most of the times yes, however occasionally the workers are really busy with a lot of people and you might have to do things alone.



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Declare that I / we have written the capstone project in the PSB MSc-IMBA program-
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Block Chain and Artificial Intelligence Technologies in Supply Chain and Logistics to increase Transparency and Efficiency.

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STUDENT'S NAME	FIRST NAME	MAJOR in :
CHINNA SHANMUGAM	Suresh	MBA IN MARKETING STRATEGY AND DATA ANALYTICS

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