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College of International Transport and Logistics

A research project report submitted in the department of supply chain
in partial fulfilment of the requirement for the award of the degree of **B.SC**
in
INTERNATIONAL TRANSPORT & LOGISTICS

Artificial Intelligence and its Impact on Supply Chain Sustainability Applied on Delma Company

Under Supervision
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2022

بسم الله الرحمن الرحيم

(شَهِدَ ٱللَّهُ أَنَّهُ لا إِلَـهَ إِلاَّ هُوَ وَٱلْمَلَـٰئِكَةُوَأُوْلُواْ ٱلْعِلْمِ قَائِمَاً

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صدق الله العظيم

سورة آل عمران:18

Declaration

I hereby certify that the material in this research project that is my own work has been identified, and that the contents of this research project reflect my own personal views, and are not necessarily endorsed by the Academy

Signatures

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Acknowledgment

We would like to express our sincere appreciations to our graduation project monitor, Dr. Abdelmonaim fakhry kamel for her guidance, continuous encouragement and support during the course.

Abstract

"Artificial Intelligence is probably the most important thing humanity has ever worked on. It is more profound than electricity or fire." – Sundar Pichai (CEO of Google).

This quote emphasizes that we are facing another transformational time period. Analogous to the agricultural and industrial revolution, the digital revolution is having a profoundon many facets of our society (Gesing et al. 2018). At the center of this revolution is Artificial Intelligence (AI), which has expanded beyond research labs to become omnipresent in our everyday lives. Already today, AI-driven applications such as speaking and perceiving devices, smart robots or self-driving cars are starting to deliver real-life business and consumer benefits.

As a result of globalization, the openness of the world and the increase in demand for global trade, supply chains have become very long and complex, and in some cases there are many problems due to the length and complexity of the supply chain.

With technological progress and the emergence of modern technologies, we have found that artificial intelligence may be able to shorten many stages and process of supply chains in addition to being able to facilitate many internal processes in the supply chain, and from this point of view we will try to focus on the role of artificial intelligence on supply chain performance.

The research aims to find out the impact of artificial intelligence on supply, In its methodology, The search uses the survey design. Qualitative: As collected data, it is used to reveal patterns of thought and attitude and to dig deeper into problems, descriptive and analytical methods through an inductive approach. Note: If the primary and secondary data are already available, they will be the data that will be collected.

Table of Content

Contents

List of Table

List of Figure

List of Abbreviations

Acronyms	Definition
(AI)	**Artificial Intelligence**
(ANNs)	**Artificial neural networks**
(ML)	**Machine learning**
(AGI)	**Artificial general intelligence**
(SCM)	**Supply Chain Management**
(GDA)	**Global Distribution Alliance**
(WFA)	**World Freight Alliance**
(ROS)	**Return on Sales**

Chapter One

Background of the Study

1.1. Introduction

"The most important thing humanity has ever worked on is definitely artificial intelligence. It is more profound than fire or electricity. Sundar Pichai (CEO of Google).

This comment makes it clear that we are living in yet another transformative era. The digital revolution is having a significant impact on many aspects of our society, much like the agricultural and industrial revolutions did (Gesing et al. 2018). Artificial intelligence (AI), which has moved beyond research labs to become pervasive in our daily lives, is at the center of this revolution. Self-driving cars, intelligent robots, and other AI-driven applications are already beginning to offer tangible advantages to both businesses and consumers.

Companies need to review every part of their organization in light of the data-driven economy and disruptive effects of technology. This includes the supply chain, which many view as the foundation of every business (SC). It is one of the corporate functions where AI can add the most value, according to McKinsey (2018a). SC managers must comprehend the potential applications of AI, as well as the advantages and hazards associated with it, in order to fully realise this huge potential. By using a hands-on approach and presenting and evaluating prospective AI applications inside the SC environment, this work aims to make this comprehension easier.

By examining AI's broader environment, chapter two of this research seeks to establish a fundamental understanding of the technology. This covers a look at the definition, main subfields, and driving forces of AI. The analysis of use cases from various industries and businesses will then serve to highlight the technology and its potentials. The first section will be concluded with a comparison of the advantages and disadvantages of AI as well as a look ahead. Building on these observations, the second half of chapter two will look at the technology in the context of SCs. The ensuing analysis of AI use cases in the field will be built on the definition of generic SC components. Finally, chapter three discusses research technique, followed by chapter four's assessment of a research case, and chapter five's conclusion and advice. The effect of artificial intelligence on SCM will be the main topic of this study.

1.2. Problem Statement:

As a result of globalization, the openness of the world and the increase in demand for global trade, supply chains have become very long and complex, and in some cases there are many problems due to the length and complexity of the supply chain.

With technological progress and the emergence of modern technologies, we have found that artificial intelligence may be able to shorten many stages and process of supply chains in addition to being able to facilitate many internal processes in the supply chain, and from this point of view we will try to focus on the role of artificial intelligence on supply chain performance.

1.3. Research Question:

The main focus of this reseach would be to answer the main following questions:

Q1: What is the impact of artificial intelligence on supply chain?

This question has led to the following sub-questions:

1.1 What is the impact of artificial intelligence on warehousing process?

1.2 What is the impact of artificial intelligence on manufacturing process?

1.4. Conceptual Framework:

Independent Variable **Dependent Variable**

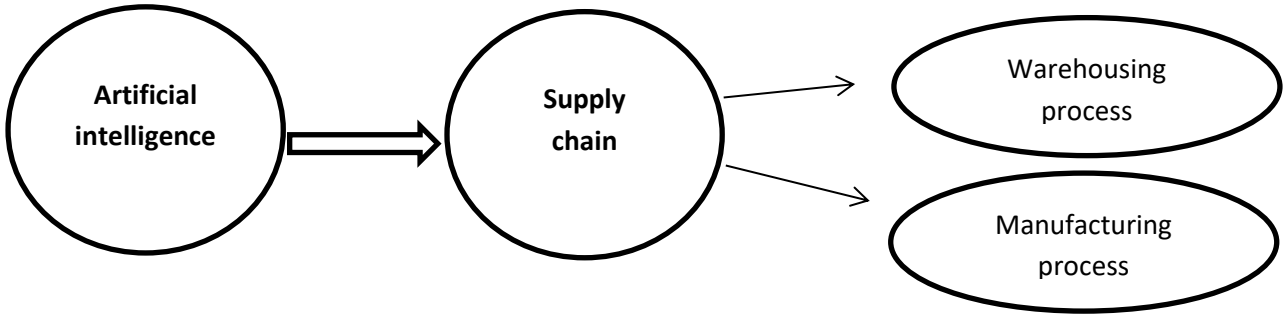


Figure 1.1 Conceptual Framework

Source: Prepared by Students

1.5. Research Aim and Objective:

The research aims to find out the impact of artificial intelligence on supply chain through the specific objectives as follow:

1. To analyze the impact of artificial intelligence on warehousing process.
2. To invstigate the impact of artificial intelligence on manufacturing process.

1.6. Research Importance:

The discussion of supply chain and artificial intelligence is what gives this research its significance. They rank among the most crucial concerns in supply chain management.

The significance of study is also derived from the likelihood that its conclusions and suggestions will assist officials in the logistics and supply chain management fields, improve worker productivity, and support their experiences and skills.

1.7. Research methodology:

In its methodology, Search uses Research Design: Qualitative: as a collected data, it will be used to uncover patterns in thought and attitudes, and to dig deeper into the problem, the descriptive method and the analytical method through a inductive approach. Information: primary and secondary data as already available will be the data to be collected.

1.7.1. Types of Research:

Many researchers in the scientific community may have different definitions of the collaborative research technique. You may find that the term "survey strategy" in a particular publication refers to the difference between qualitative and quantitative methodologies, as well as general methods of data collection and analysis. Inference Strategy Describes the investigation of qualitative assessment data using a wide range of

inductive methods. The inductive approach is used for the following purposes: (a) Condensate raw text data into a concise summary format. (b) Establish a clear link between the purpose of the evaluation or study and the summary results obtained from the raw data. Develop a basic structural framework for the experience or process evident in the raw data. The general inductive approach is a systematic procedure for qualitative data analysis that can provide reliable information about a topic. It's not as effective as some other methods for theory or model creation, but it's easy to use and reliable. The general inductive approach to qualitative data analysis is likely to be easier for many evaluators than other methods (Thagard, 2005). Observations are the starting point of the inductive approach, also known as inductive reasoning, and theories are proposed as a result. Observations towards the end of the research process. Inductive research is the process of looking for patterns in the data collected from observation and then developing theories to explain those patterns.

1.7.2 Research Paradigm:

A research strategy refers to the step-by-step plan of action that gives direction to the researcher’s thought process. It enables a researcher to conduct the research systematically and on schedule. The main purpose is to introduce the principal components of the study such as research topic, areas, major focus, research design and finally the research methods.

Research strategy helps a researcher choose the right data collection and the analysis procedure. Thus, it is of utmost importance to choose the right strategy while conducting the research. The following section will focus on the different types of strategies that can be used.

This research used qualitative method to gain an understanding of underlying reasons, opinions, and motivations. It provides insights into the problem or helps to develop ideas for potential quantitative research.

1.7.3 Research Strategy:

Descriptive research is a type of research that details the characteristics of the population or phenomenon under investigation. This research approach focuses on the objective facts of the research topic, rather than the reasons for conducting the research. The descriptive research method focuses on identifying the features of a group of people, rather than "why" a particular event happens. The research involved conducting descriptive research. Zikmund et al. (2003) define descriptive research as a type of research that describes the characteristics of objects, people, groups, organizations or environments and attempts to "paint a picture" of a given situation. The purpose of the study was to describe the circumstances. creating templates for AI; challenges and implications for the Egyptian sector.

1.7.4 Research Design:

A research topic's design identifies the type of study (experimental, survey, correlational, semi-experimental, review) and also the sub-type of study that it is (experimental design, research problem, and descriptive case-study). Data collection, measurement, and analysis are the three primary categories of study designs.

The case study approach was utilized in this research because it is a design that aids the researcher conducting research on one or more persons and can also be used for conducting research on a real-life case, which is the case in that research.

The reason a (single) case study was utilized in this study is because it allowed us to observe and examine a phenomenon that few people in Egypt are aware of.

1.7.5 Data Collection:

Data collection process collected on 20-5-2022 the research also conducts interviews. On the other hand, the researcher also interviews 12 employees by phone responsible in DELMA Company.

The research uses secondary data. Data used for a research project that were originally collected for some other purpose (Zikmund et al., 2003.). Secondary sources included articles, books, journals, Newspapers, academic surveys and the Internet (Saunders et al., 2009). The researcher gathered information through literature review; from other literature authored by other writers which are relevant to the top of study this included journals, and books.

1.8. Research Limitation:

The limits of the research are as follows:

1- The spatial boundaries: DELMA.

2. The time limits: the academic year 2022.

3. The human frontier: employee in DELMA.

4- Scientific boundaries: through the objectives of the research.

1.9. Research Structure:

The research includes five chapters as follows:

- Chapter One, entitled: Background of the Study
- Chapter Two, entitled: Supply Chain trough Artificial intelligence
- Chapter Three, entitled: Comparative Study of ARAMEX.
- Chapter Four, entitled: DELMA Case Study.
- Chapter Five, entitled: Conclusion and Best Practices

Chapter Two

Supply Chain Through Artificial intelligence

2.1. Artificial Intelligence:

Artificial intelligence (AI) is a field of science and engineering that focuses on developing systems that have the traits we associate with intelligence in human behaviour, such as perception, natural language processing, problem solving and planning, learning and adaptation, and acting in response to the environment. Its primary scientific objective is to understand the mechanisms that underlie the intelligent behaviour of humans, animals, and artificial entities. This scientific objective directly supports a number of engineering objectives, such as the creation of intelligent agents, the formalisation of knowledge and the mechanisation of reasoning in all spheres of human endeavour, the ease of interaction between humans and machines, and the creation of human-machine systems that benefit from the complementary nature of human and automated reasoning.

With roots in and linkages to many different academic fields, such as mathematics, linguistics, psychology, neurology, mechanical engineering, statistics, economics, control theory and cybernetics, philosophy, and many more, artificial intelligence is a broad interdisciplinary field. Although these fields have contributed, many of their ideas and methods have been embraced.

While some developed systems—such as an expert or planning system—can be categorised as pure AI applications, the majority of AI systems are created as parts of complex applications to which they add intelligence in a variety of ways, such as by enabling them to reason with knowledge, process natural language, or learn and adapt.

For characterising AI systems, the agent metaphor has gained popularity. Figure 1 depicts the possible architecture of an intelligent agent and lists all of its main parts. An agent, in its simplest form, is a knowledge-based system that perceives its environment (which could be the physical world, a user via a graphical user interface, a group of other agents, the Internet, or any other complex environment); uses logic to interpret perceptions, draw conclusions, solve puzzles, and choose actions; and acts on that environment to accomplish a set of objectives or tasks for which it was designed. In order to continuously improve its knowledge and effectiveness, the agent will also learn from input data, a user, other agents, and/or other humans. When interacting with people or other agents, it might not only mindlessly obey orders; instead, it might be able to modify orders, get more information, or even refuse to comply with some demands. High-level requests specifying what the user wants can be accepted, and it can decide how to respond to each request independently or autonomously, displaying goal-directed behaviour and dynamically deciding which actions to do and in what order. If it is aware of their goals or desires, it can collaborate with users to help them complete their duties more effectively or can act on their behalf. It can help users keep track of activities or processes, offer guidance on how to do certain tasks, train or educate them, and facilitate collaboration.

On the other hand, the majority of modern AI agents either don't have any of the parts depicted in Figure 1 or just have very limited functionality for some of them. A user might, for instance, communicate with an automated agent who will help her troubleshoot her Internet connection and who represents her Internet service provider.

The agent might be able to use natural language, advanced speech, and reasoning, but not vision or learning. A face recognition system might only be capable of learning and visual

perception, but a natural language interface to a database might only be able to process natural language. Artificial intelligence researchers look at effective tactics in their quest to realise intelligent behaviour. However, these methods are no longer regarded as AI once they are widely used. Examples include time-sharing, graphical user interfaces, computer games, object-oriented programming, the personal computer, email, hypertext, and even software agents. Symbolic programming languages (like Lisp, Prolog, and Scheme) and symbolic mathematics systems (like Mathematica) are also examples. Although this tends to minimise AI's advantages, the field is continually producing new discoveries, and because of its current state of maturity and better accessibility to affordable computing power, it is a crucial technology in many of today's creative applications.

2.1.1. Brief History of Artificial Intelligence

Since computer scientists have long been interested in creating intelligent computer systems, artificial intelligence is as ancient as computer science itself. The phrase "artificial intelligence" was first used by John McCarthy and a number of significant AI pioneers, including Marvin Minsky, Allen Newell, Herbert Simon, and others, in a 1956 summer workshop at Dartmouth.

Early studies on artificial intelligence focused on simple "toy" domains and produced some impressive findings. In Russell and Whitehead's Principia Mathematica1, pp.17–18, Newell and Simon developed a system for proving most of the theorems. A checkers teaching programme designed by Arthur Samuel used games from books as well as competitions with other players and the programme itself. After training, the software was "a somewhat better-than-average novice, but definitely not an expert," showing that rote learning alone may produce significant and measurable learning. The memory had

approximately 53,000 locations. Students of Minsky built systems that demonstrated a variety of intelligent behaviour, including problem solving, vision, natural language understanding, learning, and planning, in simplified domains known as "microworlds," such as the one made of solid blocks on a tabletop. The resolution method was created by Robinson5 and can theoretically be used to establish any first-order logic theorem.

These developments have raised hopes and predictions that AI will soon be able to produce machines that are intelligent enough to think, learn, and create at levels that are superior to human intelligence. On the other hand, attempts to apply the found approaches to challenging real-world problems have consistently failed horribly. The automatic translation of "the spirit is willing but the flesh is weak" to "the vodka is wonderful but the meat is awful" resulted from the phrase. An AI winter has resulted from a considerable reduction in the previously abundant funding for AI research.

Interest in developing agents that integrate several cognitive capacities has been sparked by developments in a number of AI domains. In order to facilitate and profit from their integration, it is now obvious that various AI approaches and methodologies (such as natural language processing, knowledge representation, problem solving and planning, machine learning, robotics, computer vision, and others) must be interoperable. As a result, it has also become clear that the symbolic and subsymbolic approaches to AI are complementary rather than competitive and that both may be necessary in a single creature. Agent architectures like ACT, SOAR, and Disciple, as well as agents for diverse applications (including WWW, search, and recommender agents), robots, and multi-agent systems, have been developed as a result (for instance an intelligent house). Another aspect of reintegration and interoperability is the application of techniques developed in one

domain to enhance another. For instance, machine learning and probabilistic reasoning are applied in statistical natural language processing.

2.2. How does artificial intelligence work?

The first generation of primitive AI methods was known as "symbolic AI," or expert systems. A computer can use exact rule-based processes created by human specialists, known as "algorithms," through which it can follow each step of how to make an informed decision in a given situation. In order to capture intuitive knowledge and enable the algorithm to make wise decisions in the presence of numerous uncertain variables that interact with one another, fuzzy logic is a type of approach that allows for varying levels of confidence in a scenario. Symbolic AI functions best in situations with few variables that change little over time, explicit rules, and unambiguous, quantifiable variables. Although these techniques may seem archaic, they are actually fairly current and are successfully applied in a number of disciplines, earning the admiring appellation "good old-fashioned AI."

Modern "data-driven" techniques that make up the second wave of AI have developed quickly over the past 20 years and are primarily to blame for the present AI revival. Bypassing the first wave AI's human experts, these automate the algorithm learning process. The functions of the brain form the foundation of artificial neural networks (ANNs). Signals from inputs are transformed into outputs that can be perceived as responses to the inputs after being sent via a network of artificial neurons. By incorporating more neurons and layers, ANNs are able to handle increasingly challenging problems. Deep learning is the term used to describe ANNs with many layers. Machine learning (ML) is the reconfiguration of the network to produce meaningful or intelligent responses to the

inputs. Machine learning algorithms can automate this learning process by progressively improving individual ANNs or by using evolutionary principles to vast populations of ANNs.

The phrase "third wave of AI" refers to potential future waves of AI. Strong or generic AI refers to algorithms that can conduct intelligently across a broad range of contexts and problem spaces, while first and second wave AI techniques are classified as "weak" or "narrow" AI in the sense that they can behave intelligently in specific tasks. Such artificial global intelligence (AGI) is not feasible with current technology and would require a paradigm shift. Brain emulation, quantum computers, and advanced evolutionary algorithms have all been suggested as potential solutions. Although self-explanatory and contextual AI appear to have modest objectives, their potential significance and implementation difficulties should not be disregarded.

2.3 Why does artificial intelligence matter?

Today's AI presents a number of issues. They can be seen of as a balancing act between avoiding underuse, in which we miss out on possible possibilities, and overuse, in which AI is used for activities for which it is not well suited or produces undesirable results. Some algorithms are subject to bias as a result of the ML process, and their complexity makes their decision-making logic difficult to comprehend and explain. There are several significant hurdles in ensuring that the costs and benefits of AI research are evenly distributed, avoiding resource concentration in uncompetitive markets, and prioritising applications that alleviate rather than worsen existing structural inequities. Other major obstacles include public acceptance of the technology, social values alignment, and worries about some military applications.

There are a number of longer-term opportunities and difficulties that are dependent on future developments that may or may not occur. Although some utopian and dystopian possibilities may lead to hype cycles, they also provide an opportunity to plan for more moderate trends and consider what we want from technology. For example, it has been suggested that AI could result in significant job losses or render the concept of employment obsolete, that it could elude human control and take control of its own development, that it could challenge human autonomy or develop artificial emotions or consciousness, all of which raise interesting – albeit speculative – philosophical issues.

2.4. Importance of AI

- Game Playing

For a few hundred dollars, you can get a machine that can play master level chess. They contain some AI, but they primarily compete with people via brute force calculation, which involves looking at hundreds of thousands of spots. To defeat a world champion using brute force and well-established heuristics, you must be able to scan 200 million places per second.

- Speech Recognition

In the 1990s, computer voice recognition had progressed to the point where it could be used for limited purposes. As a result, United Airlines has replaced its flight information keyboard tree with a system that recognises flight numbers and city names using speech recognition. It's very convenient. On the other hand, while certain computers may be

programmed via speech, most users have returned to the keyboard and mouse as being more comfortable.

• Understanding Natural Language

Just getting a sequence of words into a computer is not enough. Parsing sentences is not enough either. The computer has to be provided with an understanding of the domain the text is about, and this is presently possible only for very limited domains.

• Computer Vision

The world is made up of three-dimensional things, but the human eye and computer TV cameras only receive two-dimensional data. Although some useful systems can operate merely in two dimensions, true computer vision necessitates partial three-dimensional data that is not simply a collection of two-dimensional views. There are just a few techniques to directly represent three-dimensional information at the moment, and they aren't quite as good as what humans utilise.

• Expert Systems

A "knowledge engineer" interviews specialists in a particular field and attempts to encapsulate their expertise in a computer programme that performs a certain task. The success of this hinges on whether the cognitive mechanisms required for the activity are currently available in AI. When it found out that this was not the case, there were a slew of negative outcomes. MYCIN, a 1974 expert system that identified bacterial illnesses of the blood and recommended therapies, was one of the first expert systems. If its limitations were observed, it performed better than medical students or professional doctors.

Its ontology, for example, includes bacteria, symptoms, and therapies but excluded patients, doctors, hospitals, death, recovery, and time-related events. Its interactions were based on the consideration of a single patient. It is evident that the knowledge engineers coerced what the experts informed them into a preset framework because the experts consulted by the knowledge engineers knew about patients, doctors, death, recovery, and so on. Current expert systems are only useful if their users have common sense.

- Heuristic Classification

Given current AI understanding, one of the most possible types of expert system is to categorise data into one of a fixed number of categories utilising several sources of data. Giving advice on whether or not to accept a proposed credit card purchase is one example. The owner of the credit card, his payment history, as well as the item he is purchasing and the institution from which he is purchasing it (e.g., whether there have been previous credit card frauds at this establishment) are all available.

2.5. The applications of AI:

- Consumer Marketing
  - ✓ Have you ever used any kind of credit/ATM/store card while shopping?
  - ✓ if so, you have very likely been “input” to an AI algorithm
  - ✓ All of this information is recorded digitally
  - ✓ Companies like Nielsen gather this information weekly and search for patterns

    – general changes in consumer behavior

    – tracking responses to new products

– identifying customer segments: targeted marketing, e.g., they find out that consumers with sports cars who buy textbooks respond well to offers of new credit cards.

- ✓ Algorithms ("data mining") search data for patterns based on mathematical theories of learning

- Identification Technologies
  - ✓ ID cards e.g., ATM cards
  - ✓ can be a nuisance and security risk: cards can be lost, stolen, passwords forgotten, etc
  - ✓ Biometric Identification, walk up to a locked door

    – Camera

    – Fingerprint device

    – Microphone

    – Computer uses biometric signature for identification

    – Face, eyes, fingerprints, voice pattern

    – This works by comparing data from person at door with stored library

    – Learning algorithms can learn the matching process by analyzing a large library database off-line, can improve its performance.

- Intrusion Detection
  - ✓ Computer security - we each have specific patterns of computer use times of day, lengths of sessions, command used, sequence of commands, etc

    – would like to learn the "signature" of each authorized user

    – can identify non-authorized users

- ✓ How can the program automatically identify users?

  – record user's commands and time intervals

  – characterize the patterns for each user

  – model the variability in these patterns

  – classify (online) any new user by similarity to stored patterns

- Machine Translation
  - ✓ Language problems in international business

    – e.g., at a meeting of Japanese, Korean, Vietnamese and Swedish investors, no common language

    – If you are shipping your software manuals to 127 countries, the solution is ; hire translators to translate

    – would be much cheaper if a machine could do this!

  - ✓ How hard is automated translation

    – very difficult!

    – e.g., English to Russian

    – not only must the words be translated, but their meaning also! .

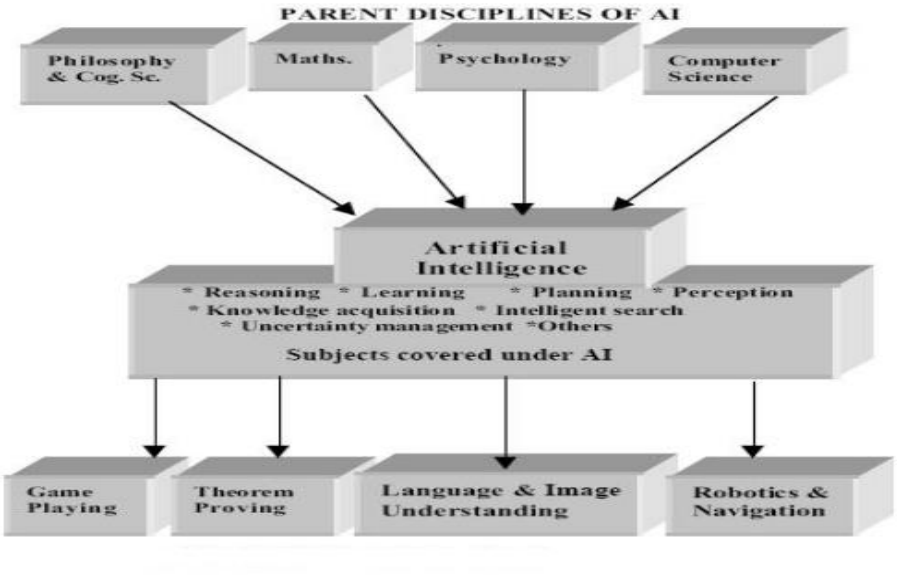


Fig : 1.2 Application areas of AI

2.7. Supply Chain Management:

The finest companies in the world are discovering a significant new source of competitive advantage. Supply chain management refers to all of the connected processes that bring a product to market and help customers be satisfied.

The Supply Chain Management System includes problems with ordering, transportation, and physical delivery into a unified platform. Then, effective supply chain management controls all of these processes and combines them into a seamless operation. All the chain's partners are so warmly welcomed and brought together. In addition to the departments within the company, there are also distributors, retailers, outside companies, and information system providers. The supply chain within the organisation covers a wide range of functional domains.

They consist of supply chain management activities like warehousing, inventory control, and shipping both inbound and outgoing. The supply chain also includes sourcing, sourcing, and inventory control. Forecasting, production planning and scheduling, order administration, and customer service are all included in the cycle. In addition, it depicts the knowledge systems that are crucial for keeping track of all those actions.

The supply chain, put simply, is all that has to do with getting products from the raw material stage to the consumer. Advocates for this business process concluded that managing relationships, information flow, and material movement across corporate borders was the only way to achieve meaningful productivity benefits. Bernard J. (Bud) LaLonde, retired professor of supply chain management at Ohio State University, provided one of the greatest definitions of supply-chain management to date. The delivery of increased customer and economic value through coordinated management of the flow of tangible items and related information from sourcing to consumption is how LaLonde defines supply-chain management. However, as the phrase "from sourcing to consuming" in our previous definition shows, realising the potential of supply-chain management necessitates integration of both these internal and external partners. Suppliers, distributors, carriers, clients, and even final consumers are included in the latter group. All of them play crucial roles in the extended supply chain, as defined by James E. Morehouse of A.T. Kearney. To better serve the final consumer is the aim of the extended enterprise. He goes on to say that better service increases market share. Increased market share, in turn, results in advantages over competitors such decreased warehousing and transportation costs, inventory levels, reduced waste, and transaction costs. Shrawan Singh, vice president of integrated supply-chain management at Xerox, affirms that the customer is the key to

determining the value of the supply chain and expressing it to others. According to Singh, "you can relate customer values to profit & loss and to the balance sheet if you can start evaluating customer satisfaction associated with what a supply chain can accomplish for a customer and also link customer satisfaction in terms of profit or revenue development." The world's top businesses are finding a potent new source of competitive advantage. The integrated processes that bring products to market and produce happy customers are collectively referred to as supply-chain management. The Supply Chain Management System includes problems with ordering, transportation, and physical delivery into a unified platform. All of these activities are then managed and incorporated into a simplified operation, which welcomes and unites all of the chain's partners. These suppliers include distributors, airlines, third-party companies, and information system providers in addition to the many divisions inside the company.

2.7.1The importance of Supply Chain Management

Supply Chain Management is essential for any business of any size. Supply chain management is the successful management of supply chain operations to optimize customer satisfaction and achieve sustainable competitive advantage in finished products from where they were made to go. Modern supply change management involves the strategic integration of end-to - end business processes in order to maximize customer and economic benefit, as well as give a company the competitive edge over its rivals.

Supply chain management has a tremendous effect on companies. Effective SCM will boost customer satisfaction right away. To please both manufacturers and retailers the right product and the right amount must be supplied in a timely manner. Consumers want to learn where they have to go to get the product they want.

Consumers do want customer service to a high degree. If the goods are not delivered on time, a company's supply chain management departments must ensure they get their products as quickly as possible. SCM has a huge impact on a company's bottom line, too.

Good supply chain management can make factories, warehouses, and transportation vehicles more effective. Cash flow is improved directly when a product is shipped in a timely manner, so customers may purchase their products.

Supply chain management is well known to be an important part of most companies, and is necessary for business success and customer satisfaction. Supply Chain Management is mainly concerned with:-

Reduce operating cost:

- Decreases Purchasing Cost – Companies typically prefer fast delivery of expensive goods and raw materials to prevent costly inventories

- Decrease Production Cost – A secure supply chain provides supplies for assembly plants and prevents any expenditure that may arise due to delays.

Improve customer services:

- Right quantity and quality – Customers want goods to be delivered in the right quantity and price.

- On-time delivery – Customers expect the appropriate product mix and the correct amount to be delivered on time. A reliable supply chain can help avoid any impediments and ensure that customers get their products within the promised timeframe

- Services – One of the essential aspects of any company is after-sales operation. If any issue exists in the product, the consumer assumes that it will be solved quickly. A proper supply chain ensures consumers are having the service they want.

2.7.2.Objectives of Supply Chain Management

The fundamental objective is to "add value".

That gets us to the fish finger illustration. A participant in a supply chain management course at the Supply Chain Management '98 conference in the UK this fall stated that the entire process for his company's frozen fish fingers from the fishing dock through manufacturing, distribution, and final sale took 150 days. It only took 43 minutes to manufacture. That implies that supply chain managers have a huge target. Capital for the company is effectively frozen during that entire period. What is valid for fish fingers is valid for the majority of goods. Any extended supply chain will most likely be a lengthy one when examined. According to James Morehouse, a vice president at the consulting firm A.T. Kearney, the average cycle time for the pharmaceutical sector is 465 days, whereas the whole cycle time for corn flakes is close to a year. In fact, Morehouse contends that if the supply chain of a "extended enterprise," which includes everything from the initial supplier to the fulfilment of the final customer, could be shortened to 30 days, that would result in not only more inventory turns but also fresher goods, better customization options, and better customer responsiveness.

He claims that "all that offer value." Additionally, it offers a blatant competitive advantage. Supply Chain Management is used as a tool to support the achievement of company strategic goals:

- Reducing working capital,
- Taking assets off the balance sheet,
- Accelerating cash-to-cash cycles,
- Increasing inventory turns, and so on.

2.7.3. Supply-Chain Principles/ Methodology & Solutions

Supply-Chain Principles

If supply-chain management has become the new "religion" of top management then a doctrine is needed. Andersen Consulting has stepped forward to provide the necessary guidance, espousing what it calls supply chain management's "Seven Principles." Those seven principles bring a host of competitive advantages when consistently and comprehensively followed, the consulting firm says.

The seven principles as articulated by Andersen Consulting are as follows:

1. Segment customers based on service needs. Traditionally , businesses have grouped consumers by market, commodity, or trade channel and then provided the same quality of service to everyone within a category. Active supply chain management, on the other hand, groups consumers into different service demands-regardless of sector-and then tailors services to those particular segments

2. Configure the supply chain management network to meet your specific needs. Companies need to focus intensely on the service and profitability needs of the customer segments they identify in designing their Supply Chain Management network. The

conventional way of building a single, monolithic Supply Chain Management network is counterproductive to successful supply-chain management..

3. Pay attention to signals that market demand is strong and plan accordingly. A sales and operations plan must extend throughout the entire supply chain in order to detect early warning signals of changing demand. This could include tracking customer orders, analyzing customer promotions, and more. This demand-intensive approach results in more accurate forecasts and more efficient use of resources...

4. Differentiate product closer to the customer. Today, companies can no longer afford to stockpile inventory to offset possible forecasting errors. Instead, they must postpone product differentiation closer to actual consumer demand in the manufacturing process.

5. Strategically manage the sources of supply. Through working closely with their main suppliers to reduce the total cost of owning goods and services, supply chain management executives are improving margins for themselves and their suppliers alike. Multiple suppliers beating over the head for the lowest price is down, Andersen advises.

6. Develop a supply-chain-wide technology strategy. Information technology will enable multiple layers of decision-making as one of the cornerstones of effective supply-chain management. It should also give a straightforward view of the movement of goods , services,

7. aAdopt channel-spanning performance measures. Excellent supply-chain measuring devices are doing more than just tracking internal processes. They take measures which apply to all links in the supply chain. Importantly, these measurement methods cover

both service and financial indicators, such as the true profitability. ND details for each account.

The principles are challenging to put into practice, the Andersen consultants say, because they challenge the way companies traditionally operate and serve customers. Successful supply chain organisations have shown that it is possible to please customers and grow rapidly by following a well-established process.Expected Results / Benefits

Where Value is Created in the Supply Chain It should not be surprising that supply chain management can impact profitability and shareholder value. Supply chain management has an impact on almost every facet of a company's operations, as Richard Thompson, a partner in Ernst & Young's supply chain department, notes. He says, "Everything is intertwined." Plan-buy-make-move-and-sell are affected by supply chain management. The list goes on to include improved customer service, more revenues, stricter cost control, and better asset use. Supply chain management can directly affect business value in five ways, according to Thompson and his coworkers. They consist of: * Profitable expansion. By enabling the assembly of "perfect orders," fostering after-sale assistance, and getting involved in new product development, supply chain management supports profitable growth. The solution is revealed by the final figures. A.T. Kearney's research indicates that inefficient supply chains can waste up to 25% of a company's operational expenses. The consultants point out that with profit margins of only 3 to 4 percent, even a 5-percent reduction in supply-chain waste can treble a company's profitability.

* Reductions in working capital. Supply chain execution has an impact on increasing inventory turns, controlling receivables and payables, reducing days of supply in inventory,

and expediting the cash-to-cash cycle. Thompson uses the example of a consumer products company that created a product in 20 minutes but required five and a half months to get paid for it. There are millions of dollars there, he claims, if you can shorten the cash cycle.

Efficiency of fixed capital. This is a reference to network optimization, such as making sure the organisation has the proper number of warehouses in the right locations or outsourcing tasks where it is more advantageous financially.

2.8. Artificial intelleigince in supply chain

Artificial intelligence (AI) is increasingly being used in a variety of commercial sectors thanks to advancements in robotics, artificial neural networks, mobile computing, cloud-based machine learning, information processing algorithms, and more. Due to AI's considerable competitive advantages, many organisations are utilising it extensively across their whole value chain. Most notably, AI technologies have aided in the elimination of numerous manual tasks at various levels, including supply chain, assortments, and marketing. The e-commerce company uses AI to forecast trends, optimise logistics and warehousing, determine prices, and personalise promotions, among other things. Some even go a step further by anticipating requests and shipping things before receiving payment authorization. The same is true for the realities of smart manufacturing.

To fully profit from AI, however, a number of adjustments are required. More crucially, the changes will force many businesses (both in the manufacturing and retail sectors) to embrace new strategies, such as plant designs, reorganise their industrial footprints, and develop new supply chain models. The move from human operators to AI-enabled machines and robots will need businesses to alter the way they conduct business. It is

important to highlight that the trend in global industrial operations powered by AI is rapidly growing, indicating that AI is either now a priority for many organisations globally or is quickly moving in that direction.

Chapter Three

Comparitive Study of Aramex

3.1 ARAMEX Overview:

Aramex is a top international supplier of complete logistics and shipping solutions. The business, which started out as an express operator in 1982, quickly grew into a global brand known for its creative multi-product offerings and specialised services. Aramex, which was traded on the NASDAQ from 1997 to 2002, is now a publicly traded firm on the Dubai Financial Market (DFM: ARMX). It employs more than 8,600 people globally over more than 310 locations, and it has a solid alliance network that gives it a global presence. Aramex provides a wide variety of services, such as domestic and international express delivery, freight forwarding, logistics and warehousing, document management, and online shopping.

3.3Global Network

The Global Distribution Alliance (GDA), which unites over 40 top express and logistics providers from around the world, each specializing in their own region and together covering the world with the same, unified quality standards and technology of ARAMEX, is headed by ARAMEX, a founding member of the organization. The network's more than

12,000 offices, 33,000 vehicles, and 66,000 workers work around the clock in more than 240 countries to serve alliance customers and take care of their business. ARAMEX is also a founding member of the World Freight Alliance (WFA), a world-wide network of freight forwarding experts that offers clients services for both air and ocean freight.

3.4Aramex Offices

Today, there are over 300 ARAMEX offices in 58 countries and 200 major cities worldwide. The network is continuously growing and expanding.

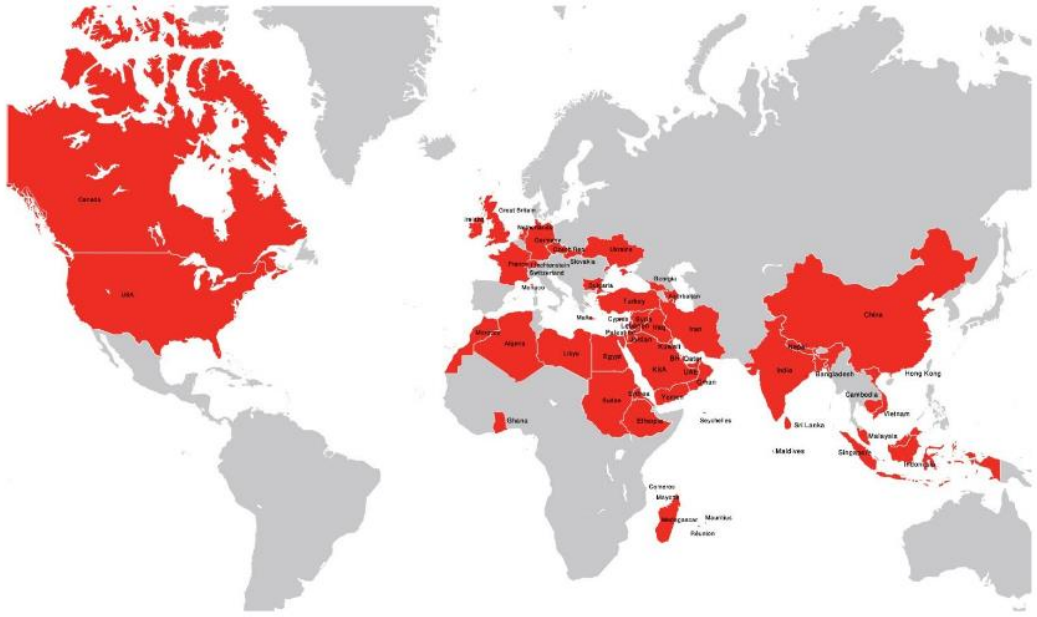


Figure 1.3 ARAMEX countries

3.5Value Added Services:

3.5.1Cash on Delivery:

ARAMEX guarantees speedy delivery of your products to your customers and a convenient and reliable payment method in which we collect the value of sold goods upon delivery.

3.5.2Document Return:

ARAMEX offers you this convenient service in which it picks up important documents that need to be signed, delivers them to your customers and then returns them without delay.

3.6Aramex Competitors

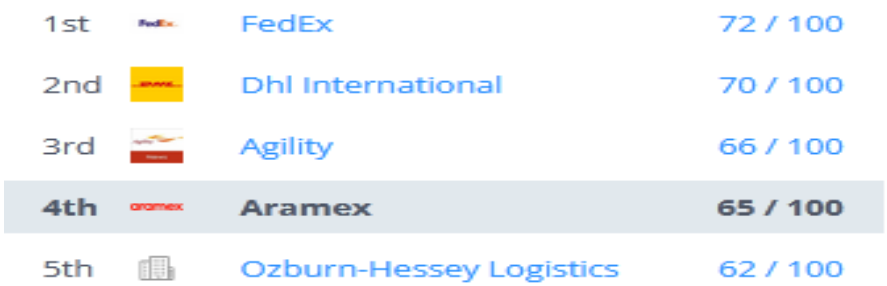
FedEx, DHL International, Agility, and Ozburn-Hessey Logistics are among of ARAMEX'S rivals. Comparably, ARAMEX comes second among its rivals in terms of diversity score. View the table below to see how ARAMEX stacks up against its rivals in terms of CEO Rankings, Product & Services, NPS, Pricing, Customer Services, Overall Culture Score, eNPS, Gender and Diversity Scores, and Overall Culture Score.

Table 2.3 Rank of ARAMEX

CEO Rank	5th	eNPS Rank	4th
Gender Rank	N/A	Diversity Rank	2nd
Product Quality	3rd	NPS Rank	3rd
Pricing Rank	3rd	Customer Service	3rd

Sourse: Aramex.com

Table 3.3 ARAMEX Competitor



Source: www.Aramex.com

3.7.TWOS Analysis of ARAMEX

Table 4.3 ARAMEX TWOS

	Opportunities	Threats
Strengths	**Strength Opportunities (SO) Strategies** Using ARAMEX strengths to consolidate and expand the market position.	**Strength Threats (ST) Strategies** ARAMEX can use two approaches - building on present strengths, or analyze the trend and build processes to two pronged market penetration approach.
Weaknesses	**Weakness Opportunities (WO) Strategies** Building strategies based on consumer oriented product development and marketing approach.	**Weaknesses Threats (WT) Strategies** ARAMEX should just get out of these business areas and focus on strength and threats box , or on weakness and opportunities box.

Source: prepared by Stidents

3.7.1.Strengths

The capabilities and resources of ARAMEX are its strong points, which it may employ to obtain a sustained competitive edge in the market. Strengths are a result of the positive attributes of five key competencies and resources: activities and processes, people resources, historical experiences and successes, physical resources like land and buildings, and financial resources.

• First Mover Advantage - ARAMEX enjoys the first mover advantage in respect of the quantity of segments. It has experimented with a variety of operations management techniques. Thanks to the methods and solutions from Leadership & Managing People, Aramex Ghandour was able to develop a novel approach to reach underserved markets.

• The Diverse Product Portfolio of ARAMEX – ARAMEX'S product and brand portfolio enables them to simultaneously target several home market segments. As a result, Aramex Ghandour has been able to diversify both the sources of its income and the composition of its profits.

• High Profit Margin: Compared to its rivals, Aramex Ghandour charges a greater premium. According to Dima Jamali, Cedric Dawkins of Sustainability in the Arab World: The Aramex Way case study, this has given Aramex Ghandour the wherewithal to not only resist competitive pressures but also to engage in research and development.

• Aramex Ghandour's solid financial position and balance sheet enable it to invest in novel and varied projects, thereby diversifying its revenue sources and raising Return on Sales (RoS) and other KPIs.

• Intellectual property rights - Through innovation and acquisition of the original owners, Aramex Ghandour has collected a sizable collection of patents and copyrights. This can help Aramex Ghandour overcome obstacles posed by rivals in a variety of industries, including operations management.

• Managing Regulations and the Business Environment – The environment in which Aramex Ghandour operates is regulated and governed by the government. • Aramex Ghandour's Robust Domestic Market - The domestic market in which Aramex Ghandour operates is both a source of strength and a barrier to the company's growth and innovation. According to data from the book "Sustainability in the Arab World: The Aramex Way case study," Aramex Ghandour can expand without much innovation in its own market, but doing so internationally will require greater investment in R&D. Executives at Aramex Ghandour have previously felt tempted to focus only on the domestic market.

3.7.2.Weakness

The areas, talents, or abilities that Aramex Ghandour lacks are considered his shortcomings. It limits the company's ability to gain a sustained competitive edge. Weaknesses result from a dearth of or an inability to access five crucial resources and abilities: prior knowledge and accomplishments, physical resources including land, structures, activities, and procedures, human resources, and financial resources.

• Staff homogeneity – Given that the majority of Aramex Ghandour's growth has taken place in the local market, I believe the company's workforce is too homogeneous. This might make it more difficult for Aramex Ghandour to compete successfully on the global market, say Dima Jamali and Cedric Dawkins.

• There isn't much of a track record when it comes to environmental concerns - Aramex Ghandour's record on environmental issues is not encouraging. According to Dima Jamali and Cedric Dawkins, customers today view environmental protection as a necessary component of doing business. According to Dima Jamali and Cedric Dawkins, this can cause customer reaction.

• Cash flow management and inventory management are both inefficient at Aramex Ghandour, according to the data from the case study Sustainability in the Arab World: The Aramex Way. Dima Jamali and Cedric Dawkins believe that there is much room for improvement in inventory management.

Why The Aramex Ghandour business model is straightforward to duplicate, despite the company's numerous patents and copyrights. Intellectual property rights are very challenging to enforce in the sector where Aramex Ghandour works. According to Dima Jamali and Cedric Dawkins, intellectual property rights are successful at preventing same-sized competition, but it can be challenging to stop start-ups from upending markets on many levels.

• Aramex Ghandour appears to be lacking in crucial skill, especially in the area of technology and digital transformation. Aramex Ghandour is striving to restructure processes in light of recent developments in the disciplines of artificial intelligence (AI) and machine learning.

• Organizational Culture - It seems as though Aramex Ghandour's organisational culture is still characterised by rivalries between divisions over territory, which leads to managers holding information close to their chests. This might severely impede future growth since

knowledge silos can result in missed market opportunities, according to Dima Jamali, Cedric Dawkins of Sustainability in the Arab World: The Aramex Way case study.

3.7.3.Opportunities

Aramex Ghandour can use opportunities to either strengthen or enlarge its current market position by taking advantage of macroenvironmental conditions and changes. Opportunities include things like shifting consumer tastes, economic expansion, technology improvements, political developments and regulatory changes, and an increase in consumer disposable income.

• Changing Technology Landscape - As machine learning and AI proliferate, the technological environment in which Aramex Ghandour does business is changing. According to Dima Jamali and Cedric Dawkins, Aramex Ghandour may use these advances to boost productivity, reduce expenses, and revolutionise procedures.

• Limited access to the market for high-level talent owing to a tight budget — One of the problems Aramex Ghandour is now dealing with is a lack of access to the market for high-level talent. By stepping out into new markets, Aramex Ghandour might be able to enter the global talent market. According to Dima Jamali and Cedric Dawkins, it can also help in luring talent into the domestic market and expanding into new sectors of operations management.

• Improvements in Artificial Intelligence - Aramex Ghandour may use improvements in artificial intelligence to enhance recommendation engines, better estimate client demand, and cater to particular industries.

Rising consumer disposable income is an opportunity for Aramex Ghandour to develop a new business model where clients pay in instalments for the goods they use. According to Dima Jamali, Cedric Dawkins of Sustainability in the Arab World: The Aramex Way case study, Aramex Ghandour can take advantage of this development to expand in neighbouring areas.

• Lowering the Cost of Market Entry and Marketing in International Markets - According to Dima Jamali and Cedric Dawkins, the rise of digital marketing and social media has considerably reduced the risks of market entry and marketing in international markets.

• Profitable Chances in the Global Market - Globalization has opened up prospects in the global market. To capitalise on these opportunities and increase its market share, Aramex Ghandour is in a strong position. Dima Jamali and Cedric Dawkins assert that by lowering Aramex Ghandour's reliance on the domestic market for income, growth in the global market can help the company reduce its exposure to risk.

3.7.4.Threats

Threats are macro-environmental factors and developments that may disturb the profitable operations of Aramex Ghandour. Potential concerns include rising consumer disposable income, economic expansion, political developments and regulatory changes, technological breakthroughs, and shifting consumer preferences.

Aramex Ghandour is coping with these costs as governments try to collect more environmental fees in order to promote greener solutions. • Increasing costs component for operating in the developed market as a result of environmental rules. Aramex Ghandour can incur higher shipping and packaging costs as a result.

• Government Regulations and Bureaucracy – With protesters and non-governmental organisations putting more and more pressure on the government, Aramex Ghandour should keep a careful eye on how the law is evolving, particularly in relation to environmental and workplace safety concerns.

One of the biggest risks to globalisation and capitalism is the squeeze on the middle class in both developed and developing countries. Middle-class consumer demand for its products in the US and EU markets has decreased, as witnessed firsthand by Aramex Ghandour.

Geopolitical considerations at the international level have altered in favour of more protectionism since Trump's victory. The global business environment is being impacted by events like Brexit, Russian sanctions, Venezuela's inflation and foreign exchange issues, lower oil prices, and others. These incidences should be taken into account by Aramex Ghandour and taken into account in its plan.

• Growing Protectionism - Aramex Ghandour can take precautions against this risk by keeping data in international markets and diversifying its risk exposure by conducting business in nations with various economic cycles.

• Threats from New Entrants Due to Reduced Costs and Enhanced Efficiencies — Both domestic and foreign rivals can benefit from low-cost customer acquisition methods such as social media and e-commerce, much like Aramex Ghandour may.

3.8. Comparative between Aramex and Delma

Table 5.3 Comparetive between Aramex and Delma

Elements	Aramex	Delma
Transport	Availability all of modes of transportation	freght forwarder services less than Aramex
Number of employee	5000	1000
Technology system	ERB	Tradetional systems
Services	3pl	3pl
CRM	Department of CRM	-
SRM	Department of SRM	-

Source: Prepared by Students

Chapter Four

DELMA Case Study and Analysis

4.1. Overview of DELMA Company:

DELMA Co. was established in 2005, After noticing that the Egyptian market needs a store, and the majority of the importers are in debt, and the manufacturers need stores from this date, the company has noticed the Egyptian market's need for importers and manufacturers inside Egypt for modern stores and modern means and equipment that keep suit with the scientific progress in the field. At this time, the idea of the company is to establish these stores in the new cities. So, Delma company has been keen that these stores have a legal status and in places that can be legally licensed. The construction was done with the latest methods and the processing of these stores and modern equipment. Some of them are warehouses and modern equipment. Some have a central air-conditioner, and some are stored in normal weather, including cooling and freezing.

The company has established a warehouse in each of the industrial zones in New Cairo, in the area of 1000 factories, Obour City, 15 May City, Sadat City and Burj Al Arab City, and the size of the storage space in this company is 150,000 square meters. Delma company deals with international and Egyptian companies such as Some of the companies are El-Ezaby Pharmacies, Seif Pharmacies, Mazaya, Yasser Hefni, 19011, Ibn Sina for Pharmaceutical Distribution, Hussam Omar for Pharmaceutical Distribution, NASCO for Coaching Trading, Bisco Misr, Alfa markets, Indomi, and Danon for nutrition materials. And all these companies, Delma Company has been dealing with them for a long time and provides them with all the necessary equipment for the warehousing process and the

preparation of warehouses to suit the goods that have been stored according to each activity.

4.2.DELMA Mission and Vision:

Delma company does the following:

- Estimating an area equipped with the necessary equipment, such as storage racks and cargo lifting equipment, at normal temperature.
- The company supplies the aforementioned equipment, but at a temperature of 20 degrees (cooling).
- The company supplies the warehouses with the same equipment at a degree of freezing.
- The entire company does a warehousing work, which is to do the receipt of goods from the factory or customs and store them with our knowledge based on the fumigated wood pallets, storing and disbursing these goods and distributing to customers, and the company does all the logistical work.

And our goal is that Delma company noticed an increase in the demand for warehouses and for physical work. Therefore, the company believes in expanding the storage space and increasing the company's capital to reach the Egyptian market requirements of the required storage space. The company believes that achieving this during the 5 years that will come until 2027 Storage space up to 500,000 square meters

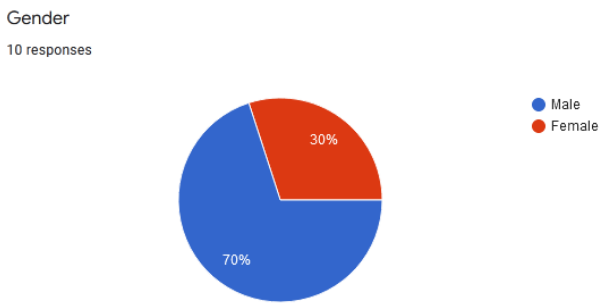
4.3.DELMA Competitors:

The company is working on expanding the physical work and the warehouse, and reaching an area of 500,000 square meters during the next five years. There are some competing companies that operate with the same efficiency. This company is considered a competitor, such as Aramex, Alfa, Logistica and some other companies, and all of these companies are not sufficient for the Egyptian market and the current needs, as there is always an increasing demand for warehouses and logistic businesses.

4.4.DELMA Analysis:

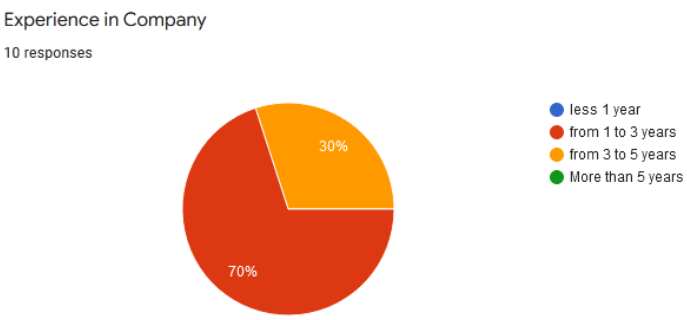
4.4.1 Demographic analysis:

Every scientific and applied research features a demographic aspect that has to be checked out so as to achieve an entire and clear picture, and during this part we are going to cope with knowing the ages of the study sample additionally to their gender, whether male or female, and at last their experiences and their administrative level, so we discover the following: As for the gender, the percentage ranged from 70% to males and 30% to females, as shown in the following chart.



With regard to the level of expertise, we found a variation in the percentage of experiences, where the largest percentage of years was from 1 to 3 at a rate of 70%, followed by the

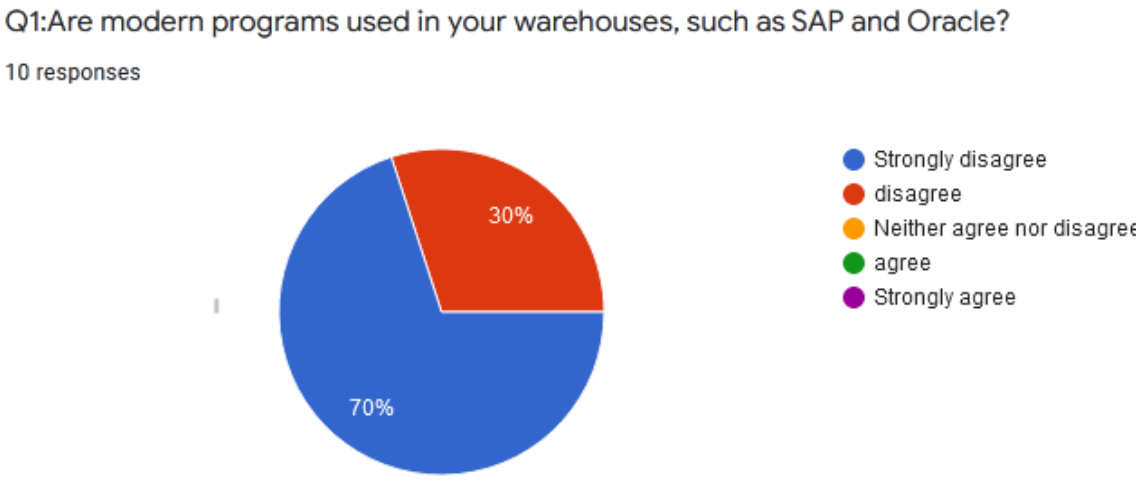
number of years of experience from 3 to 5 years at a rate of 30%, as shown in the following chart



4.4.2 Questionnaire analysis:

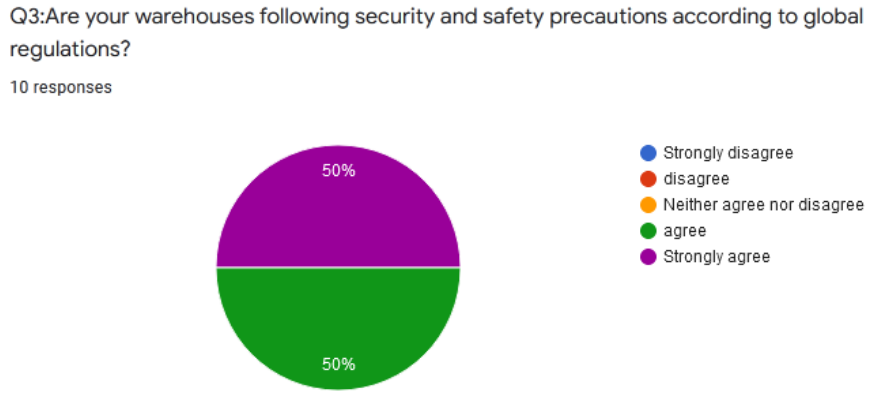
Through a survey conducted by students at DELMA Company about the impact of the artificial intelligence on the supply chains at DELMA Company, we found the following:

At the beginning of the questionnaire we asked them Are modern programs used in your warehouses, such as SAP and Oracle? The answers of the study sample were 70% strongly disagree, and 30% disagree.

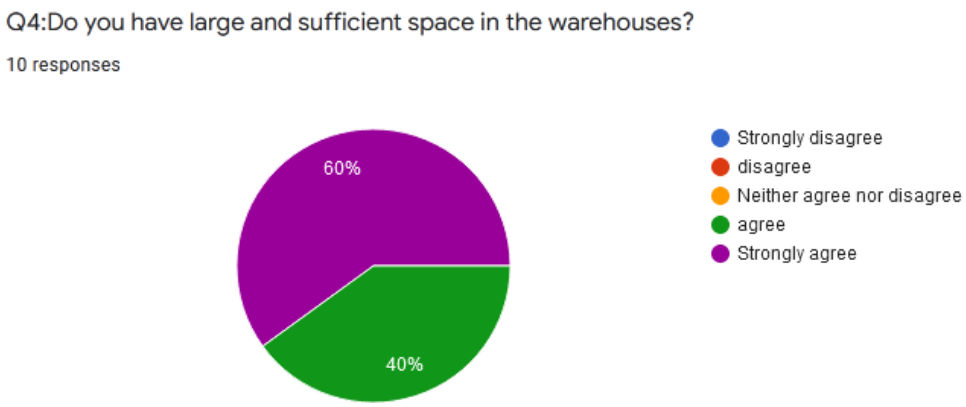


As for the second phrase, which states Is there a large volume of labor in your warehouses? The answers of the study sample were 70% who strongly agree, then 30% agree.

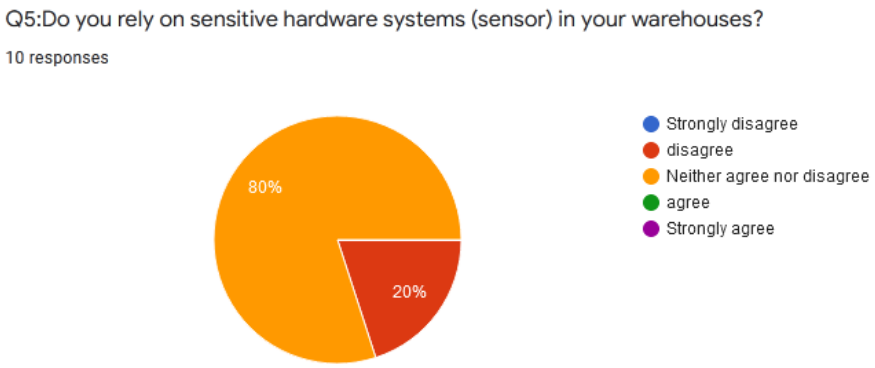
As for the third phrase, which states Are your warehouses following security and safety precautions according to global regulations? Here, we find that the answers of the study sample varied, as the percentage of strongly agree 50%, agree 50%.



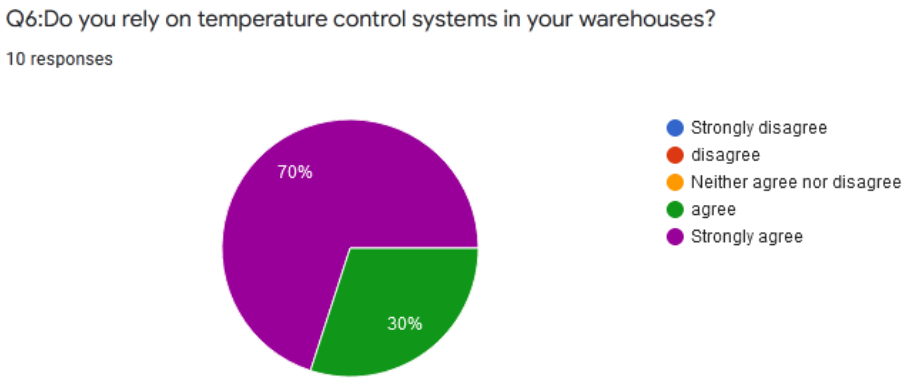
As for the fourth phrase, which states do you have large and sufficient space in the warehouses? The answers of the study sample also ranged between strongly agree 60%, with percentages reaching 40% agree.



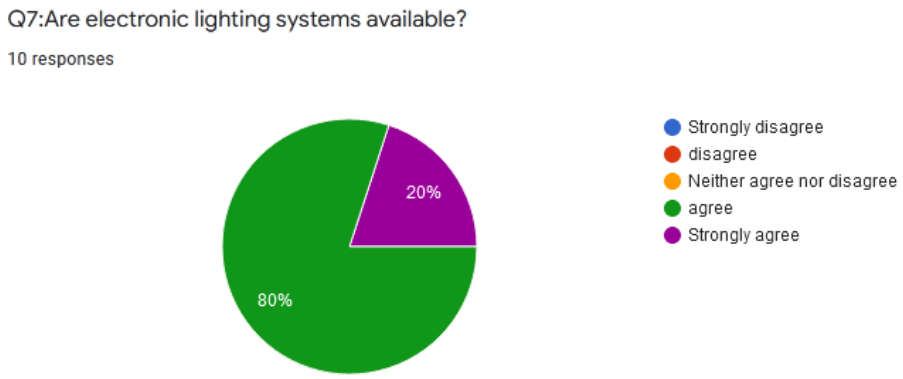
As for the fifth phrase, which states do you rely on sensitive hardware systems (sensor) in your warehouses? The answers of the study sample also ranged between neither and disagree, with percentages reaching 80% and 20% respectively.



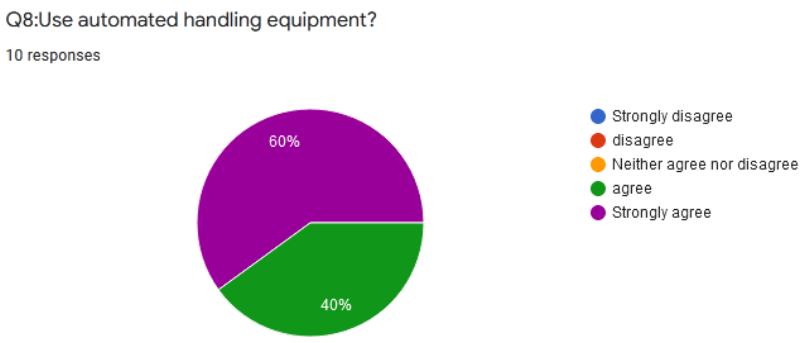
As for the sixth phrase, which states Do you rely on temperature control systems in your warehouses? Here, we find that the opinions of the study sample 70% strongly agree and 30% agree.



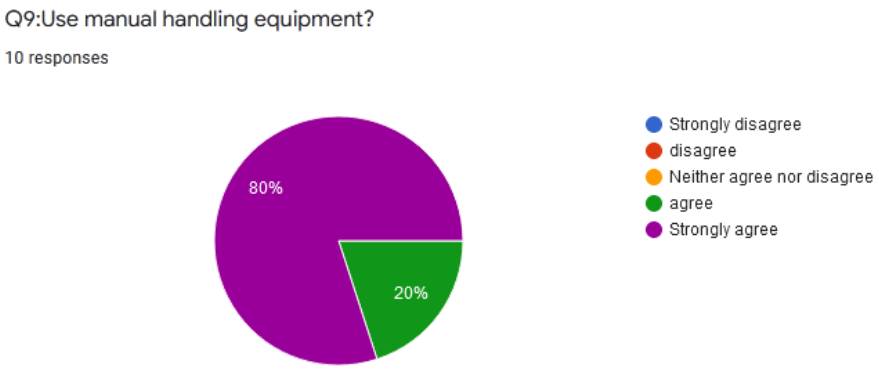
As for the Seventh phrase, which states Are electronic lighting systems available? The answers of the study sample, most of them indicated the positive, as the percentages were 80% in agreement and 20% strongly agree.



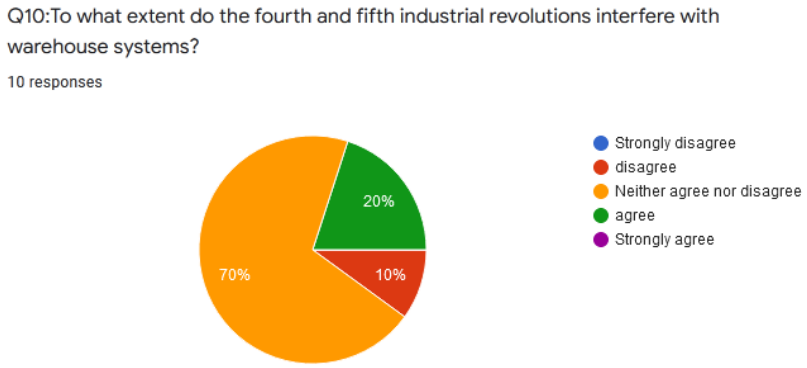
As for the Eighth phrase, which states Use automated handling equipment? Here, the answers of the study sample were 60% strongly agree and 40% agree.



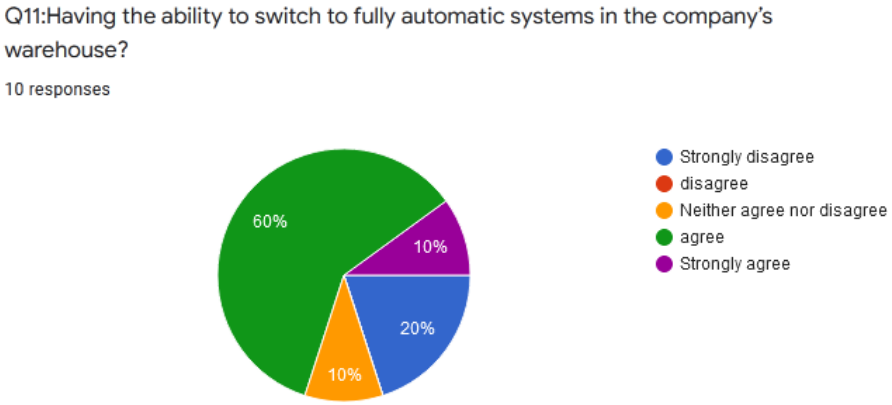
As for the Ninth phrase, Use manual handling equipment? Regarding this question, we find that the largest percentage is strongly agree with 80% then 20% agree as shown below.



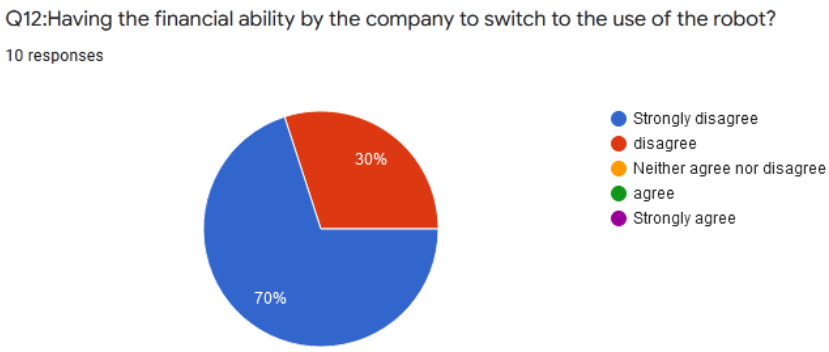
As for the tenth phrase, which states to what extent do the fourth and fifth industrial revolutions interfere with warehouse systems? The answers of the study sample ranged, 70% neither agree nor disagree, 20% agree then 10% disagree.



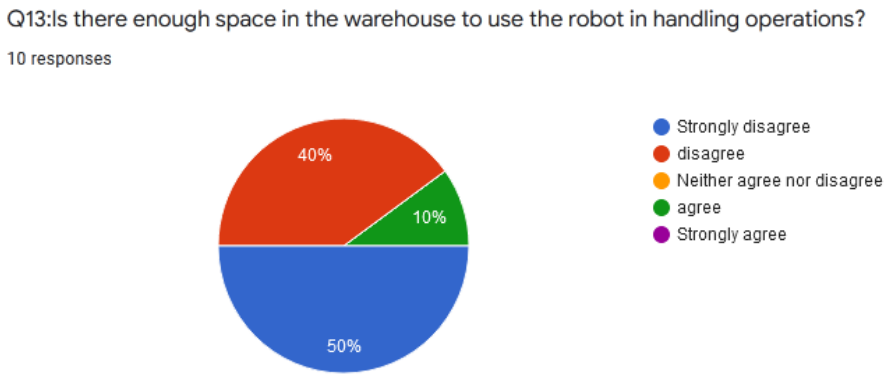
As for the eleventh phrase, having the ability to switch to fully automatic systems in the company's warehouse? The answers of the study sample ranged, where the highest percentage of agree with 60%, then 20% strongly disagree and 10% for neither agree nor disagree finally 10% for strongly agree.



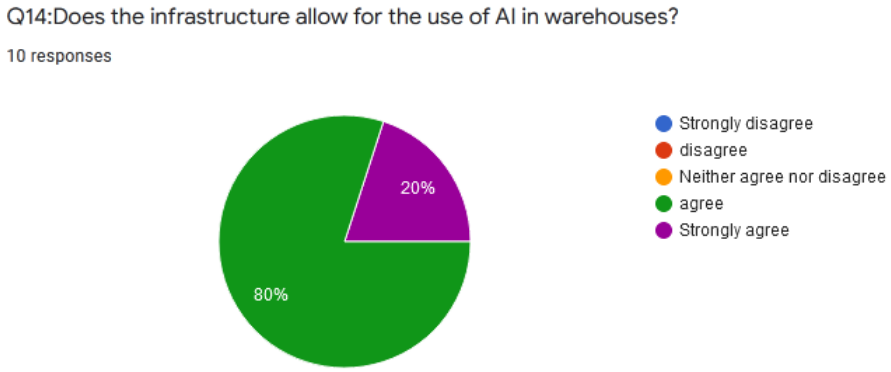
As for the twelfth phrase, having the financial ability by the company to switch to the use of the robot? The opinions of the study sample varied, as they reached the largest percentage of strongly disagree with a rate of 70%, followed by disagree 30% .



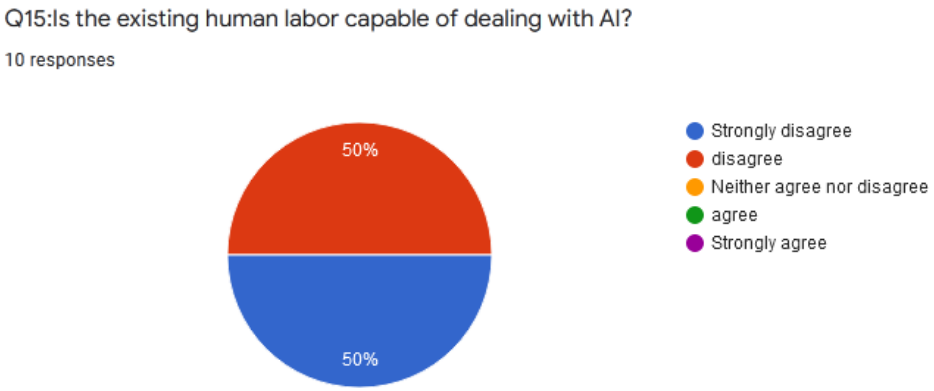
As for the Thirteenth phrase, which states is there enough space in the warehouse to use the robot in handling operations? The answers of most of the study sample were strongly disagree 50% then disagree 40% and 10% agree.



As for the fourteenth phrase, does the infrastructure allow for the use of AI in warehouses? The answers of most of the study sample were in strong agreement with this statement 80% strongly agree then 20% agree.



As for the fifteenth phrase, is the existing human labor capable of dealing with AI? The answers of most of the study sample were in strong agreement with this statement 80% strongly agree then 20% agree.



Summary:

Through this chapter, which is the practical part of the research, the general situation of DELMA Company was discussed, in addition to clarifying the vision, mission and objectives of DELMA, in addition to the administrative performance used by DELMA in Egypt. Let's move to the next chapter, which is the Conclusion and Recommendations.

Chapter Five

Conclusion and Best Recommendations

Introduction:

This chapter, which concludes the effort made in preparing this article, is dedicated to discussing the main conclusions based on the above analysis,
theoretical interpretation and intellectual training, as well as scientific verification, where it is found in the paragraph with the conclusions. In light of the results come the recommendations and what the researchers believe is right and for its development. This chapter contains conclusions and best practices.

5.1 Conclusion:

The purpose of this review was to outline the scope and boundaries of AI research in the area of SCM. We employed a multi-method approach to carry out a systematic review of the available literature. Our bibliometric and text/clustering analyses were informed by an AI taxonomy that split AI publications into three research areas: sensing and interacting, learning, and decision making. Following a general summary of the state of AI research in SCM, our study included in-depth analyses of each topic group.

We recognized the academic disciplines that had matured. There has been substantial research done on decision-making models and how they are used in SCM. The categories of learning and sensing/interacting were also identified as emerging research areas and examined. There is a caveat that our review does not go into great detail about AI techniques and how they work in SCM. In addition, we only provide a high-level summary

of forthcoming work, which hardly scratches the surface of ongoing academic study in this area. Our AI taxonomy has specific limitations of its own. The problem is that AI is a very interdisciplinary field. Therefore, attempts to compartmentalize AI methods are inevitably wrong. To fully realise the potential benefits of AI for SCM research, the proposed taxonomy was required to pinpoint the weak points and future study directions.

With regard to the applied study on DELMA Company, the research students concluded that the company uses modern technology in stores and has the financial ability to use artificial intelligence, but the problem is the weakness of the technological infrastructure in the company and in Egypt in general, in addition to the lack of awareness of workers in the company and in Egypt with the concept of artificial intelligence in addition to The most important do not have the ability to work according to this modern technical concept.

5.2. Recommendations:

1. Strengthening government efforts in cooperation with the Ministry of Communications to support technology infrastructure to keep pace with modern technologies.
2. Work to complete the Ministry of Communications' plans to develop internet speed.
3. Participation of the private sector in the necessary investment for research and development of technological capabilities in Egypt.
4. Private companies, including DELMA, should take care of the technological infrastructure.
5. Employees must be trained in the use of artificial intelligence.
6. Conducting training courses for employees on artificial intelligence.

7. Private companies should start using IOT systems as an input for artificial intelligence.
8. The use of foreign specialists to learn how to apply artificial intelligence and benefit from it.
9. Experimental application of some artificial intelligence models and then evaluation of supply chains before application and after application.
10. Relying on artificial intelligence to predict the market, which will positively affect the supply chains, and then the company as a whole.
11. Attempting to apply artificial intelligence in DELMA Company as one of the entrances to competitiveness.
12. Attempting to introduce the robot into production and warehousing operations, which will reduce time and increase the company's profitability.
13. Benefit from the experiences of a developed country that implements the concept of artificial intelligence.

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Appendix A

Questionnaire Template

Name:

Mobile Number:

E-mail:

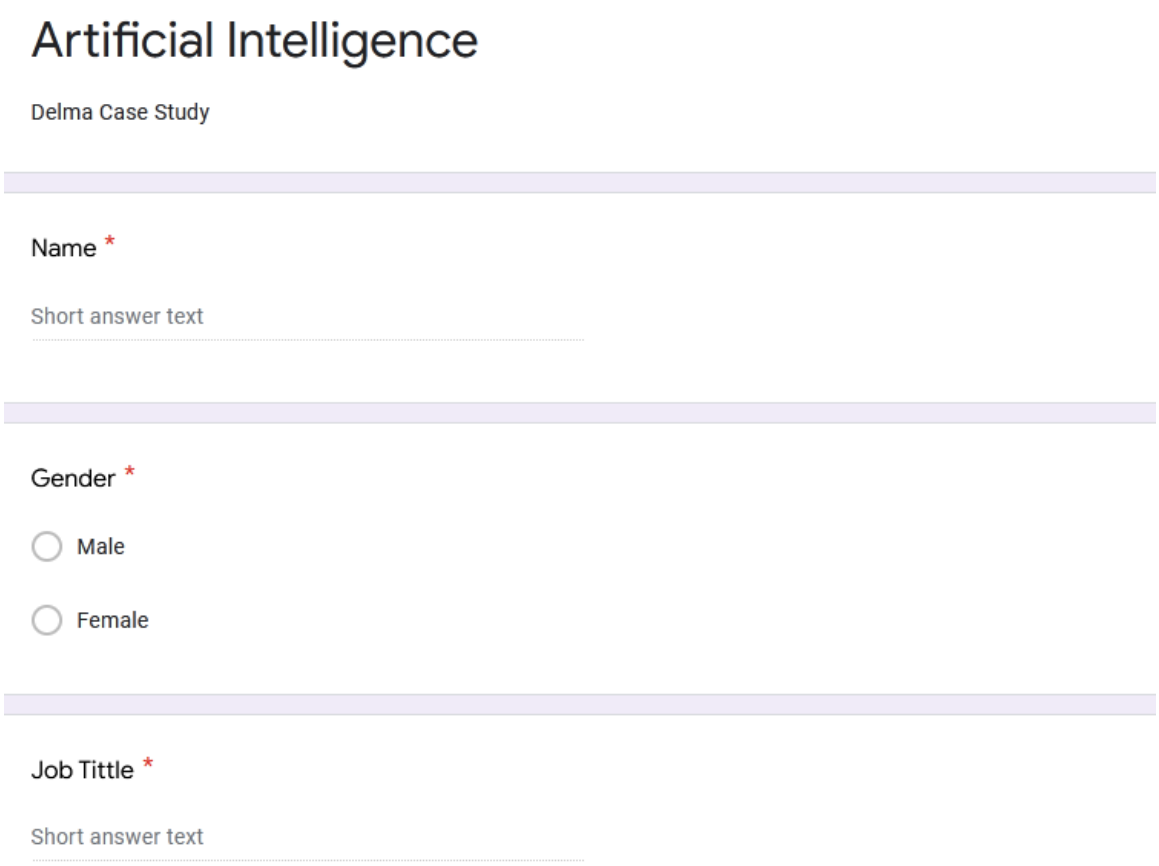
Job description:

No	items	Strongly agree	agree	Neither agree nor disagree	disagree	Strongly disagree
1	Are modern programs used in your warehouses, such as SAP and Oracle?					
2	Is there a large volume of labor in your warehouses?					
3	Are your warehouses following security and safety precautions according to global regulations?					
4	Do you have large and sufficient space in the warehouses?					
5	Do you rely on sensitive hardware systems (sensor) in your warehouses?					
6	Do you rely on temperature control systems in your warehouses?					
7	Are electronic lighting systems available?					
8	Use automated handling equipment?					

9	Use manual handling equipment?					
10	To what extent do the fourth and fifth industrial revolutions interfere with warehouse systems?					
11	Having the ability to switch to fully automatic systems in the company's warehouse?					
12	Having the financial ability by the company to switch to the use of the robot?					
13	Is there enough space in the warehouse to use the robot in handling operations?					
1*4*	Does the infrastructure allow for the use of AI in warehouses?					
1*5*	Is the existing human labor capable of dealing with AI?					

Appendix B

Google Form Questions



Experience in Company *

- less 1 year
- from 1 to 3 years
- from 3 to 5 years
- More than 5 years

Q1:Are modern programs used in your warehouses, such as SAP and Oracle? *

- Strongly disagree
- disagree
- Neither agree nor disagree
- agree
- Strongly agree

Q2:Is there a large volume of labor in your warehouses? *

- Strongly disagree
- disagree
- Neither agree nor disagree
- agree
- Strongly agree

Q3:Are your warehouses following security and safety precautions according to global regulations?

Multiple choice

- Strongly disagree
- disagree
- Neither agree nor disagree
- agree
- Strongly agree

Q4:Do you have large and sufficient space in the warehouses? *

- Strongly disagree
- disagree
- Neither agree nor disagree
- agree
- Strongly agree

Q5:Do you rely on sensitive hardware systems (sensor) in your warehouses? *

- Strongly disagree
- disagree
- Neither agree nor disagree
- agree
- Strongly agree

Q6:Do you rely on temperature control systems in your warehouses? *

- Strongly disagree
- disagree
- Neither agree nor disagree
- agree
- Strongly agree

Q7:Are electronic lighting systems available? *

- Strongly disagree
- disagree
- Neither agree nor disagree
- agree
- Strongly agree

Q8:Use automated handling equipment? *

- Strongly disagree
- disagree
- Neither agree nor disagree
- agree
- Strongly agree

Q9:Use manual handling equipment? *

- Strongly disagree
- disagree
- Neither agree nor disagree
- agree
- Strongly agree

Q10:To what extent do the fourth and fifth industrial revolutions interfere with warehouse systems? *

- Strongly disagree
- disagree
- Neither agree nor disagree
- agree
- Strongly agree

Q11:Having the ability to switch to fully automatic systems in the company's warehouse? *

- Strongly disagree
- disagree
- Neither agree nor disagree
- agree
- Strongly agree

Q12:Having the financial ability by the company to switch to the use of the robot? *

- Strongly disagree
- disagree
- Neither agree nor disagree
- agree
- Strongly agree

Q13:Is there enough space in the warehouse to use the robot in handling operations? *

- Strongly disagree
- disagree
- Neither agree nor disagree
- agree
- Strongly agree

Q14:Does the infrastructure allow for the use of AI in warehouses? *

- Strongly disagree
- disagree
- Neither agree nor disagree
- agree
- Strongly agree

Q15:Is the existing human labor capable of dealing with AI? *

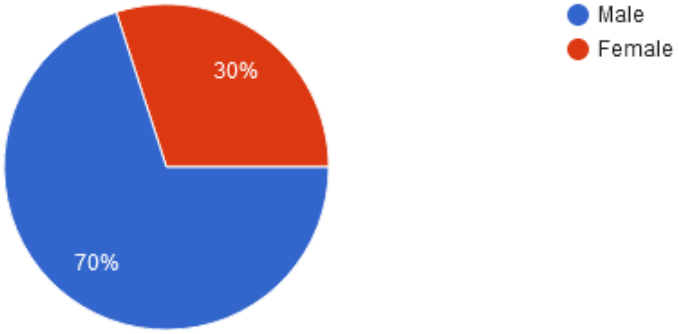
- Strongly disagree
- disagree
- Neither agree nor disagree
- agree
- Strongly agree

Appendix C

Chart Analysis

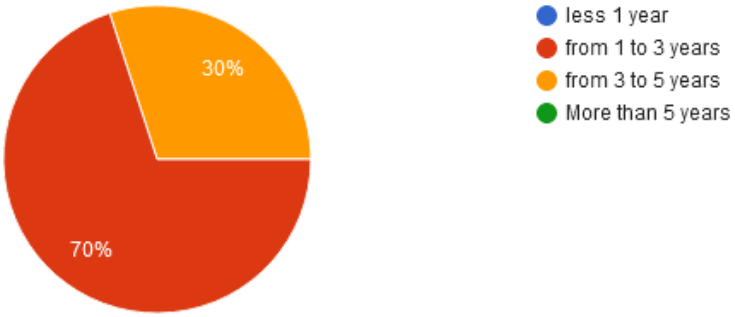
Gender

10 responses



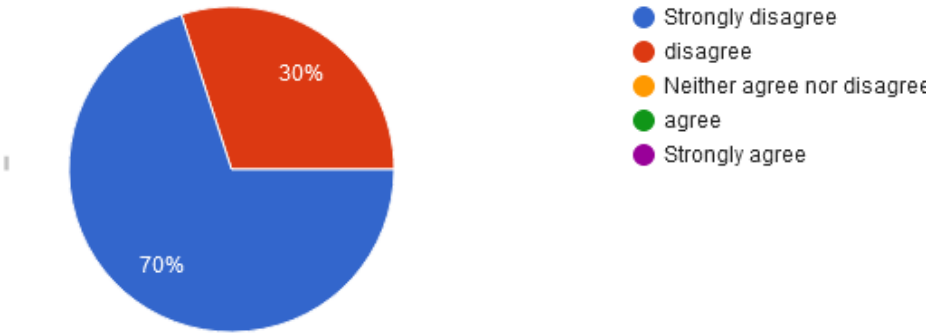
Experience in Company

10 responses



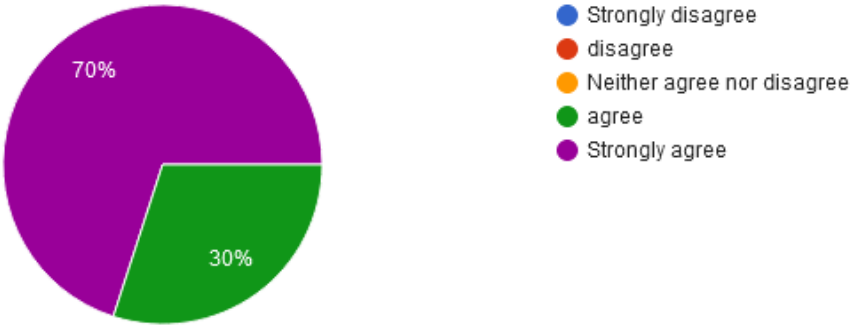
Q1:Are modern programs used in your warehouses, such as SAP and Oracle?

10 responses



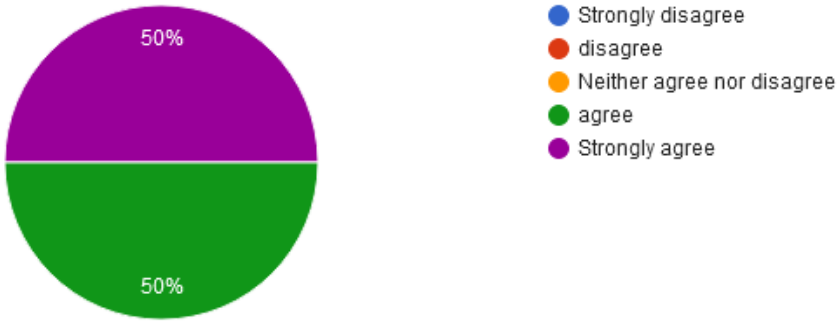
Q2:Is there a large volume of labor in your warehouses?

10 responses



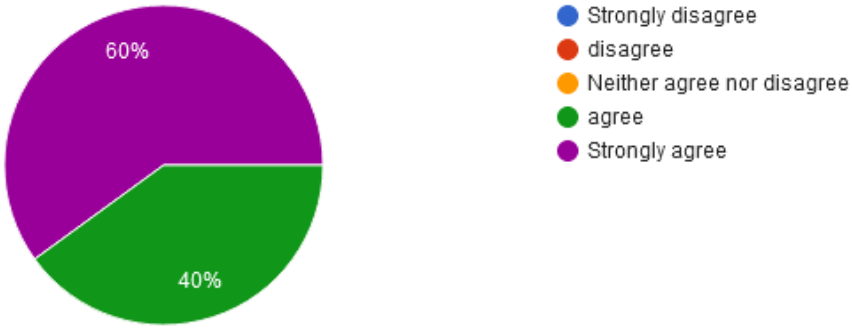
Q3:Are your warehouses following security and safety precautions according to global regulations?

10 responses



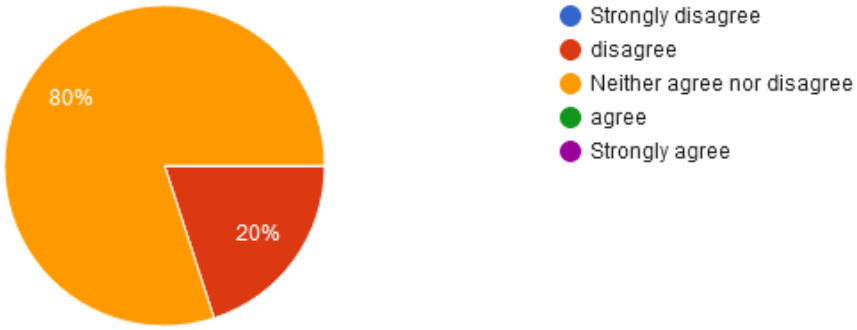
Q4:Do you have large and sufficient space in the warehouses?

10 responses



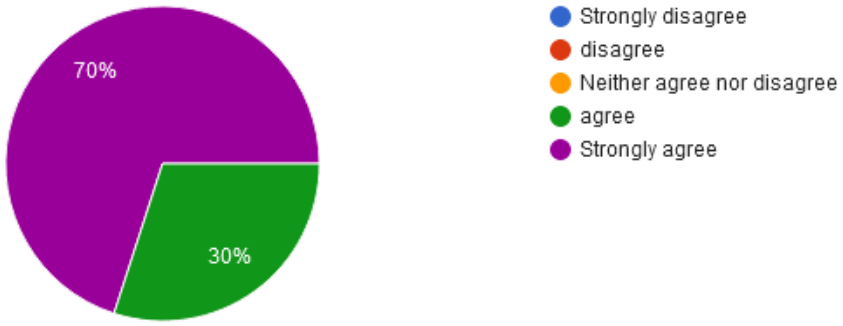
Q5:Do you rely on sensitive hardware systems (sensor) in your warehouses?

10 responses



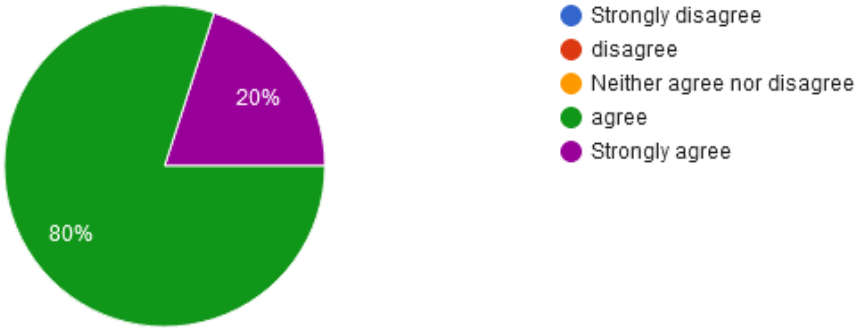
Q6:Do you rely on temperature control systems in your warehouses?

10 responses



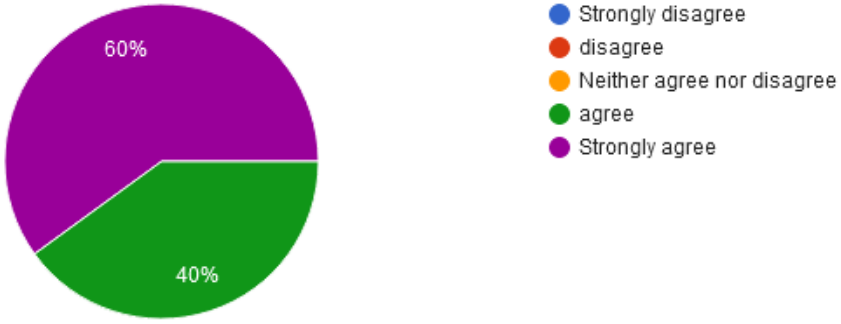
Q7:Are electronic lighting systems available?

10 responses



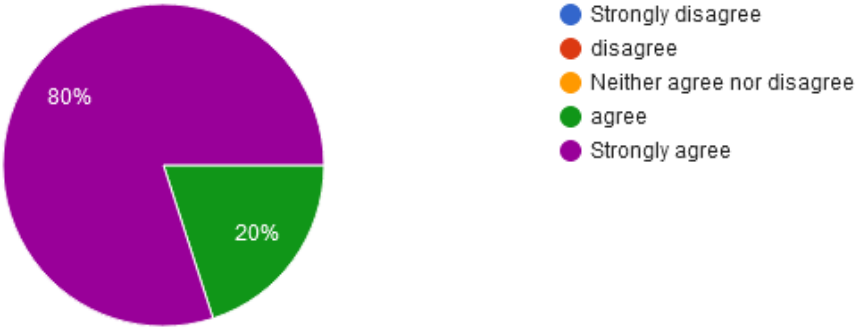
Q8:Use automated handling equipment?

10 responses



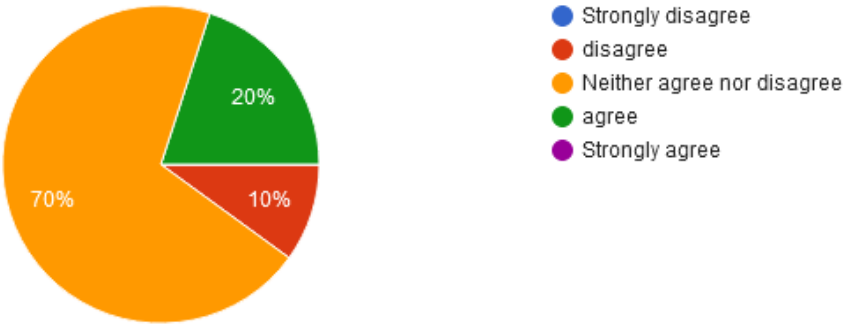
Q9:Use manual handling equipment?

10 responses



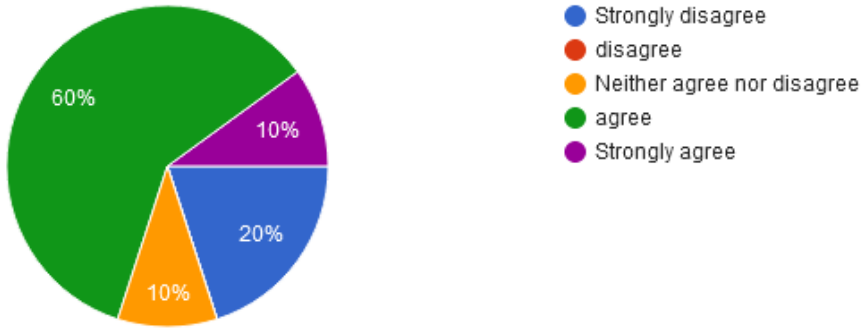
Q10:To what extent do the fourth and fifth industrial revolutions interfere with warehouse systems?

10 responses



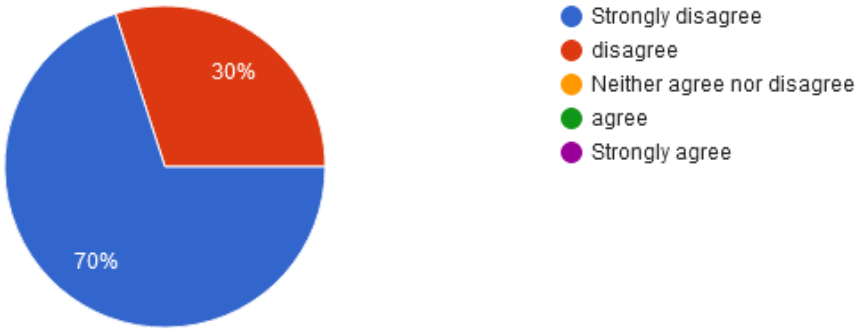
Q11:Having the ability to switch to fully automatic systems in the company's warehouse?

10 responses



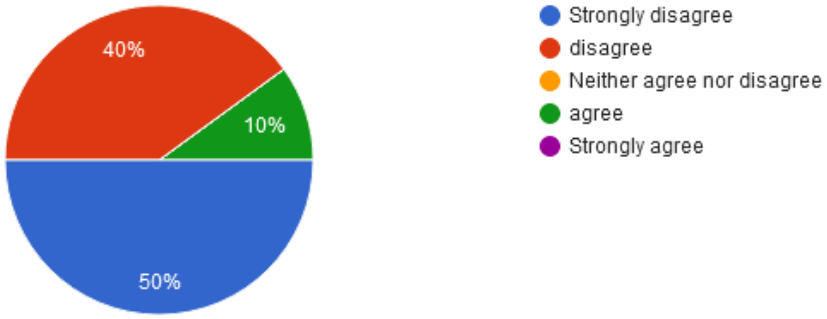
Q12:Having the financial ability by the company to switch to the use of the robot?

10 responses



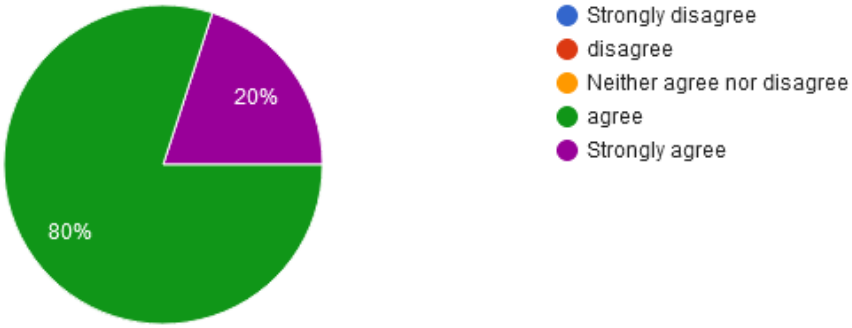
Q13:Is there enough space in the warehouse to use the robot in handling operations?

10 responses



Q14:Does the infrastructure allow for the use of AI in warehouses?

10 responses



Q15:Is the existing human labor capable of dealing with AI?

10 responses