



Investigating The Impact Of 4th Industrial Revolution Technologies On The Performance Of Warehouses

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Abstract

Supply Chain Management is a group of operations in a company that controls the management of the supply respecting goods or services, information, and the storage of goods through planning, coordination, and control of activities in a warehouse. The warehousing process to achieve a profit for the companies by maintaining the storage of goods, This research focuses on studying the impact of the techniques of the fourth industrial revolution on the performance of warehouses in Oman. Knowledge of the role of the fourth industrial revolution of technology in developing the future of warehouses and their impact on the organization, employees and associated work procedures will be discussed in detail. The study is going to help business improvements in warehouses in Oman in different ways through the application of the fourth industrial revolution. Data will be collected from two types of sources, primary and secondary sources. Through the studies and findings demonstrated by the Fourth Industrial Revolution, company must implement the technology in their work functions which may be in form of artificial intelligence, robots, blockchain, the Internet of things, and other advanced technologies that in turn enhance and improve the management and performance of

warehouses. The Fourth Industrial Revolution increases efficiency and increases productivity in addition to reducing errors. Before applying any of the techniques of the fourth industrial revolution, the company must plan the correct and optimal planning for choosing which of these technologies is appropriate for the company to obtain the desired results

1. Introduction

The Logistics Department is one of the critical departments for any country and institution, because of the extreme importance of raising the level of the economy and facing the challenges that occur. Many departments follow the logistic management, the most important of which are, first, Supply Chain Management is a group of operations in a company that controls the management of the supply respecting goods or services, information, and the storage of goods through planning, coordination, and control of activities [8]. Secondly, the Warehouse its space designated for companies such as storage space for equipment or additional goods. Homeowners also allocate storage rooms or through spare rooms or garages. Therefore, the warehousing process to achieve a profit for the companies by maintaining the storage of goods. thirdly, Fourth industrial revolution because of the significant development completed by the third industrial with its unlimited potentials that

relied heavily on new technology, then the fourth industrial wealth will emerge that uses the industrial intelligence that will increase productivity and thus achieve an increase in the economy, on the other hand in this industrial may lead to the disappearance of many jobs Which depends on human resource due to dependence on robots and artificial intelligence [5].

This study is going to help business improvements in different ways such as to know how the application of the techniques of the fourth industrial revolution in the warehouse is useful or not, to see if automation of robots occurred to speed up warehouse operations, reduce errors, and to increase warehouse outputs. In this part of the study, I think by using robots in all warehouse operations, the company will reduce the number of production expenses and at the same time have more and best products, which attracts consumers, and compete in the local and international markets due to robot speed and accuracy.

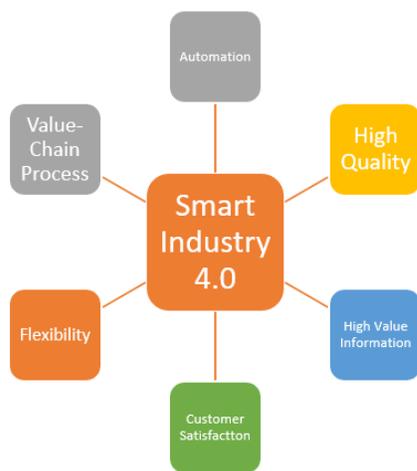


Figure 1: Smart Industry 4.0 Revolution Concept

As we know that warehouse operations are complicated with many different steps and precautions must be taken to ensure high efficiency and effectiveness to reduce waste. The project also aims to study the techniques recommended in the Fourth Industrial Revolution if they would positively and effectively minimize waste such as movement, time, defects, and excessive production. Also, I will evaluate warehouse services in Oman to reach compatibility and mutual understanding based on the information extracted to represent the results discovered.

This study will assist the researcher in determining the real problem with the belongings of the fourth

revolution technologies. On the other hand, this research will contribute to finding appropriate solutions for the warehouses of various organizations in Oman concerning the Fourth Industrial Revolution. In the future, this matter will encourage the researcher to raise the level of scientific studies in the logistical sector in various ways. Finally, when knowing all the standards and understanding of the labor markets of developed countries with logistical work and how to apply them in institutions in simple and accessible ways. This proposal will approve the active role of knowing the application of the techniques of the fourth industrial revolution in the warehouse.

2. Problem Statement

The technology is ever-changing. In the context of logistics and supply chain management, technological changes are happening more nowadays. These technological changes have a profound impact on the functioning of supply chain management and warehousing activities in particular. Therefore, in this study, the researcher wants to investigate the effects of fourth revolution technologies on the performances of warehousing activities in general and in particular to investigate that organizations in Oman have faced many operational problems, such as spending long hours in warehouse operations, unexpected errors, and limitation of outputs. By using robots, the company wants to speed up warehouse operations, reduce errors, and increase warehouse outputs. Also, as it is known that warehouse operations are complicated with many different steps and precautions must be taken to ensure high efficiency and effectiveness to reduce waste. The organizations are now using old techniques, so the researcher wants to investigate what the methods are recommended in the Fourth Industrial Revolution to minimize waste such as movement, time, defects, and excessive production.

3. Literature Review

Xu and David researched on opportunities and challenges present for the fourth industrial revolution. The scope of the revolution was acceptable in the area of warehouse and logistics. The important information from the research was the lives of people which was changed with the application of new technology. The paper provided information about the industrial revolution which was built around different business concepts. The paper also stated that the 4th industrial revolution effects cannot be ignored by business and knowledge. Many of the warehouse

and logistics companies have modified the business stream to make a pace with production line and revolution designs. This concept shows how technology can be used for the additional benefit for the company. The research also outlined some of the opportunities present for the industrial revolution. It included the base of civilization as well as job replacement. Many of the areas were linked with goods and the supply of essential services. The update in technology not only brought creativity but included knowledge in the management process. The research carried out by Xu and David also outlined some of the challenges in industrial revolutions. This based on a change of storage technology and long-term gains in efficiency [9]

4th industrial revolution had a great impact on warehouse performance. Krishnan and Wahab researched a case study for smart warehouse and it had a connection with the 4th industrial revolution. The study was qualitative, and it explored an important phase for technology in Malaysia. The preference was given to people with technological backgrounds. The findings of the research also added smart warehouse approaches were derived from government support and external pressure. Geographical locations were also identified as an important replacement for warehouses. The case study used Malaysia as an important example. The volatility of the market can be analyzed in research because examples of e-commerce were also analyzed in the research. The example of the Malaysian government and the 4th industrial revolution was a good example that provided information smart warehousing techniques used in the logistics and inventory department [3].

Barreto and Amaral researched logistics and provide useful information about the fourth industrial revolution. It was stated in the paper that the last decade has provided information about ICT technologies. This was the case where IOT provided new challenges for the industry. One of the important challenges was the technological changes that can arise owing to the visibility of the supply chain. For small and Medium Corporation, the control on products and cost remain a considerable area for research. The transformation achieved from the fourth revolution has created issues for the environment. Now companies need new initiatives towards industry, and it can provide an important focus towards human and computer interaction. In order to look for the profound changes, the sense of sensibility can be gained from the logistics and supply chain department. This area shows that improvement in technology has allowed a change for

business and products. The research study provided information about industry and changes observed from the digital ecosystem. The Internet of things was also used to warehouse cycles. In this way companies got the facility to track and monitor the progress for their business. It can be stated that with the revolution in technology, changes are observed in demands. Now organizations are more connected to the logistics system. This shows that the fourth industrial revolution has impacted business processes [1].

4. Methodology

In this research, an exploratory research method was used that helped to process data and analyze it after it has been collected from various sources. For example, if there is a problem in the warehouses and warehouse system, it is natural for employees to explore the problem directly, in addition to the search method. The exploratory gives the researcher the ability to look at the reality of the work directly, which gives him ideas and perspectives on the source of the problem and infer possible solutions. For data collection, questionnaire were sent to 55 employees who work in warehouse department. The questionnaire contains many questions related to studying the effect of the techniques of the fourth industrial revolution on warehouse performance. Quantitative data is data that consists of a group of numbers that are added to the study in the form of graphs or mathematical equations [10]. This data can be used to make decisions based on mathematical equations and mathematical results. In addition to the personal data that can be stored in the systems of companies, and that each employee is distinguished by a number of his own that is not owned by others. For example, examples of quantitative data that can be used in research are phone numbers, age, number of years of experience, and the amount of salary that an employee gets. For example, in the field of warehouse management, stored product data such as product serial number, production date and expiry date, as well as the warehouse access date and many others are saved. [4].

The information that will be collected to write the research, the simple random technique will be used to collect many answers and different and random information, and this technique is the best so that it is not in line with a specific party, but rather to enquire information on the largest number of different employees and therefore the researcher will not know the type of answer that he will get because The information he will receive is random.

5. Result Analysis

Qualitative analysis was carried for warehouse operations. Study was carried out for companies to measure the impact of the 4th industrial revolution on warehouse practice. It can be said that the 4th industrial revolution has a direct impact on warehouse and logistic operations. Most of the employees are in favor of advancement and change in traditional business practices. Moreover, the addition of this revolution technology would resolve some of the challenges associated with logistics and inventory [2]. Quantitative and Qualitative data analysis was carried for assessing the impact of the 4th industrial revolution on Companies in Oman. There were demographic profiles related concerns as the impact of the revolution on warehouse projects. The research objectives were to study the impact of the 4th industrial revolution and investigate the impact on warehouse operations. It also included the effectiveness of using technology in operation and provide a detailed analysis of the benefits present for the company [7].

For the survey question “Standardization of various processes and procedures is essential for the 4th industrial revolution technologies implementation?” descriptive analysis was conducted. The mean was 3.64 which denotes that most answers were either “somewhat agree” or “agree”. The value of mode for this question is 4 which is “agree” value in the questionnaire. The answers to this question signifies that the organization needs to standardize various procedures and methods when in order to implement the 4th industrial revolution technique at the warehouse. The organization needs to follow certain steps and procedures to attain the perfect results.

Standardization of various processes and procedures is essential for the 4th industrial revolution technologies implementation?	
Mean	3.636363636
Standard Error	0.138203082
Median	4
Mode	4
Standard Deviation	1.024941486
Sample Variance	1.050505051
Kurtosis	0.649511877
Skewness	-0.811579482
Range	4
Minimum	1
Maximum	5
Sum	200
Count	55

Figure 2: Descriptive Analysis

From the set, two questions (a. Benefits of the 4th industrial revolution technologies outweigh the associated costs? And b.) Vital constraints need to be addressed before implementing a form of 4th industrial revolution technologies in the company) were analyzed in respect of finding the correlation between them.

Table 1: Correlation Analysis

	Benefits	Constraints
Benefits	1	
Constraints	0.461891335	1

The two questions are positively correlated with each other as the value is +0.462. This means that the benefits associated with 4th industrial revolution technologies is positively related to the constraints that needs to be looked when the revolution technology would be implemented in the company. This signifies that the employees do know that there would be issues awaiting the management needs to take care of, but as there are more benefits in comparison, the technology should be brought into the warehouse departments.

It was found that the industrial revolution would bring a positive impact on the company and would remove any issue present in warehouse and logistics. The use of IT technology will eliminate manual issues and provide a boost to performance. The research findings show that any change or industrial revolution would affect warehouse operation because it includes technology as the supporting tool. The results indicated that robots are the technology that

can speed up the warehouse processes. Figure 3 shows the response of candidates.

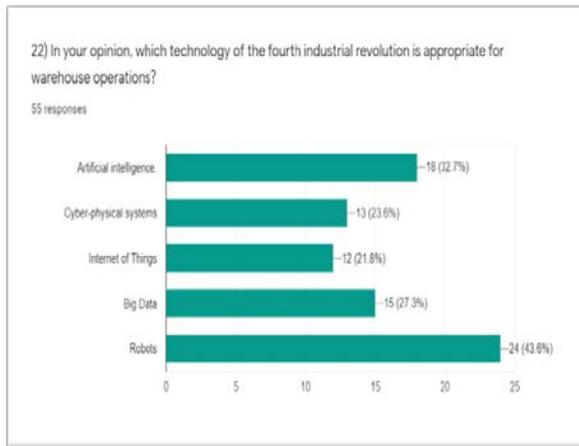


Figure 3: Robots for warehousing operations

In the questionnaire, people were asked to Likert scale “4th industrial revolution technologies can have a positive impact on the profitability of the company?”. 25 people responded with “agree” answer to this question, strongly agree has 21 selections whereas 4 people selected “disagree” and “somewhat” agree option respectively. Only one respondent strongly disagrees that 4th industrial revolution technologies would not be a productive and beneficial outcome for the organization. The majority approx. 46 people out of 55 have strong hopes that the system will bring a positive impact for the employees, organization, provided services etc. Thus, should be implemented by the management.

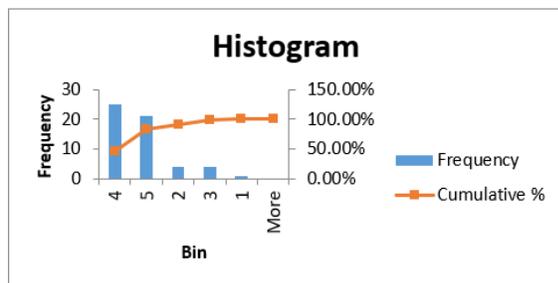


Figure 4: Histogram Analysis

The findings from data analysis would help companies to build an efficiency base of warehouse and inventory. All the processes would be subjected to technology and any issues in management would be an improvement from the findings of the study. Moreover, the research also provided a clear layout for information. It helps to provide information regarding warehouse operations and bring a new set of recommendations for the improvement in warehouse and logistics division. It would help to

increase profits for the company coupled with customer satisfaction.

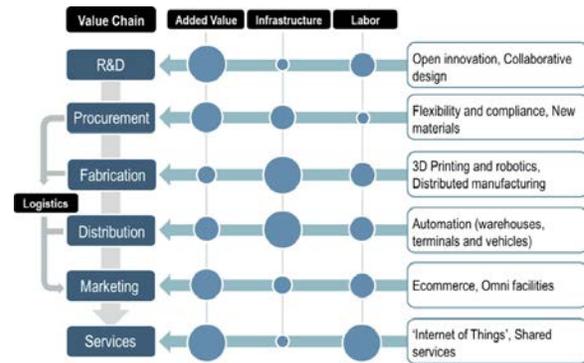


Figure 5: Application of 4.0 in Warehouse logistics

6. Conclusion and Future Research

The warehouse and logistics of the company can predict the improvement in business. The primary objective of the research was to understand the technology and its relevance to warehouse functions. Data collection was carried out with the help of qualitative and quantitative analysis. It was found from the research findings that the 4th industrial revolution improved warehouse operations and provided improvement in the logistics sector. It also helps the company to improve the performance of employees [6]. The study also showed that the majority of the employees adopted new trends in warehouse technology. The results from the study also provided evidence for company benefit. It can be stated for the study that the companies in Oman has adopted the positive effects of the 4th industrial revolution. The change can be identified from the company policy and working procedures. The research objectives of the study provided effectiveness for the warehouse department and the findings of the research study were used to develop key recommendations. It can be concluded for this research study that warehouse, inventory, and logistics are three main concerns for the company. To improve their reputation, organizations have employed best practices in the industry which lead to complete customer satisfaction.

Future research can be carried out on new information systems. The company warehousing policy can be analyzed on the base of variables like record and bookkeeping services. Moreover, warehouse performance can also be analyzed on the base of key indicators that lack tracking and management of orders and shipments. Moreover, the company can focus its communication strategy on industrial revolutions. The effect of industrial

technologies can be compared to the company's present condition of a business. Another important area of research is the logistics operations and the impact of oil prices. The fourth industrial revolutions tend to provide important information regarding IT practices and their implementation of business. Overall this research would be a good practice for warehouse and logistic sector and provide a key direction towards business research. The best element is based on understanding the services regarding operations.

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