Artificial Intelligence Case Study

Name

Institutional Affiliation

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Executive Summary

The most recent technological advancements and the ever-increasing demand from shippers have forced many businesses to explore artificial intelligence seeking to know the solutions it can offer to the logistical team. Typically, artificial intelligence is the development of machines exhibit human intelligence and they mimic, replicate, approximate, automate, and improve human reasoning. In this report, the key thing that has been investigated is artificial intelligence and how it is being applied in the logistics industry. From the findings of the investigations, there are five main applications that have been discussed that are widely used in the transport, mining, warehouse, and manufacturing industries. These applications include machine learning for warehouse management, autonomous vehicles for logistics and shipping, artificial intelligence in Australia's digital mine, automation and internet of things in the manufacturing industry, and traffic management operations. The report also proposes three applications of Artificial Intelligence for XYZ Logistics Company and the proposed applications are the use of autonomous vehicles, the use of Blockchain and the use of data analytics. The recommendations are based on the latter three applications and one recommendation applicable to all is the need to have a regulatory environment that will guide their application.

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Introduction

XYZ Logistics is an Australian logistics company headquartered in Sydney. The company was established in September 1998 and has been operating for the past 20 years. XYZ offers end to end logistics solutions to companies like manufacturing, mining, and warehousing in different parts of Australia and other Oceania countries. As part of a five year expansion plan, XYZ considers to offer services that are based on artificial intelligence. This calls for the need to explore technologies and types of applications that can be utilised to offer services to the warehousing, mining, and manufacturing companies. In order to achieve this, information will be retrieved from secondary sources mostly scholarly articles that are related to the topic of artificial intelligence. In the field of logistics, there is a natural framework for the implementation of artificial intelligence that is supported by the network-based nature of the industry. Its implementation means an amplification of the human components of highly organized global supply chains. Besides, organisations that dismiss the idea of adopting artificial intelligence run the risk of obsolescence in the long term, seeing that rivals take hold of and successfully use artificial intelligence in their current business operations. The report starts by discussing the applications of artificial intelligence in the logistics industry. The other section will entail the proposed artificial intelligence applications in XYZ Logistics Company, followed by advantages and disadvantages of artificial intelligence application, and finally recommendations based on the different applications discussed.

Artificial Intelligence Based Applications in the field of logistics

Machine Learning for Warehouse Management

Success in the domain of supply chain planning is significantly assisted by proper warehouse and inventory based management. Any retailer or consumer based business irrespective of demand forecast is adversely affected by supply flaws may it be under-stocking or over-stocking. There is an endless forecasting loop which is provided by machine learning, which has a self-improving output. Such capabilities have the capacity to reshape warehouse management. On top of this, artificial intelligence is making the warehouse more advanced in other different ways such as the use of robots. For instance, different e-Commerce companies are making use of robots in activities such as sorting and packaging of products. Typically, robots are programmed in such a way that they sort and pack products on the basis of delivery requirements (Büsch, Nissen & Wünscher, 2016).

Autonomous Vehicles for Logistics and Shipping

The most recent advancements in technology have led to the development of autonomous vehicles and this has been considered to be the next revolution in the transport sector and mobility (Van Meldert & De Boeck, 2016, p1). In the past few years, intelligence in logistics and shipping has been a core subject within supply chain management. Transportation expenses, as well as lead times, are significantly reduced by more accurate and faster shipping. Also, it cuts down the cost of labor and brings in operations that are environmentally friendly. Finally, it widens the gap between rivals. Artificial intelligence is proving to be helpful in the delivery of goods by helping to locate shorter and quickest routes. As the saying goes that necessity is the mother of invention, in the logistics field, travelling salesman problem is the necessity and it triggers the need to find out the quickest and shortest possible course to navigate the different locations that fall in the line of work (Tuna & Duru, 2013).

Viewing it from different perspectives, delivery of items can be done differently using different techniques. All in all, information ought to be scrutinised related to the task of completing deliveries considering things like real-time traffic and delivery schedules. Making the appropriate business decisions has become hard nowadays due to an increase in demand for consumer needs. This can be eased by having a supply chain cost that is well-defined. Take for instance the last mile delivery which is about creating an experience for the customer which is more personalized. It begins by placing an order, the executive goes through it and process it and finally offer ETA for the delivery based on dynamic data. Managing all this data is tedious. In such cases, artificial intelligence offers its expertise considering that it can manage complex dataset more accurately and quickly. Through artificial intelligence, a person can leverage data platforms and through the creation of datasets be in a position to regulate anomalies and patterns.

Typically, almost in every level of logistics, artificial intelligence comes in handy. In the warehouse sector, there is the use of artificial intelligence to interconnect and automate the different internal processes. For optimum performance, location intelligence and geocoding are being utilized. Artificial based systems are being used in business to business and business to customer sectors to choose the most optimized routes as well as the allocation of vehicles. The contemporary world is leaving a mark in almost every activity and serves as a stepping stone for machine learning (Tuna & Duru, 2013).

Artificial Intelligence in Australia's Digital mine

Artificial intelligence, as well as machine learning, is essential in that they help mining companies to find minerals that need to be extracted. In Canada, IBM Watson and Goldcorp Discoveries Incorporation have joined hands to make sure that they transform gold mining from being an art to being a science through the use of machines learning. The two companies have

collaborated for several years now and they use artificial intelligence o try and discover new gold drilling locations. Through the use of machine learning, in this case, assists the mining industry to generate more profits (McHugh, 2017).

A few years ago, digital mining was a future prospect. However, it is no longer a future prospect; instead, it is part and parcel of the developed countries' mining sector. All the operators that are related to this sector whether large or small, service industries and front-end mining companies play a crucial role in the industries supply chain. For instance, automation, autonomous vehicles, digital twinning, and wearable technologies are now used in the mining sector. According to () the most notable development in this sector as a result of technological improvement include gas detection devices, personnel tracking, underground telecommunication, and radar sensors that alert operators in case there is a person or another vehicle nearby (The Mining Association of Canada, 2012, p141). For instance, robotic devices that are powered by artificial intelligence are now being used to can a wide range of mining operations including mapping, excavation, dozing, surveying and haulage (Marshall et al., 2016, p1).

Automation and Internet of Things in the Manufacturing Industry

Not long ago, artificial intelligence was thought to be a thing of the future. However, the fast-growing technology has seen the adoption of artificial intelligence quite fast. Considering that almost every industry is making use of this new development, the manufacturing industry has not been left behind. This is an industry that has always been keen when it comes to new technologies and it has always adopted anything that comes its way. For instance, drones and industrial robots have been used in the manufacturing industry for years and by the year 1980 many were in development and testing stages (fox, n.d. p305). Putting that aside, today's companies want to keep inventories lean and cut down cost. The manufacturing sector is with the

use of artificial intelligence integrates the supply chain, quality control, production line, and design team into an intelligent engine that offers actionable insights. Automation is assisting the manufacturing sector to improve accuracy and productivity by a huge margin compared to human production. It managed to improve production considering that it can work in extremely dangerous environments that are complicated and tedious for human beings.

According to Mendes, Osaki & Da Costa (2017 p14), Internet of Things is another development that has significantly been felt by almost every individual. People are making use of smart sensors and together with other connected devices are playing a huge role and will continue to play this same role in the manufacturing industry. What it does is that it tracks analyses production quotas and aggregate control rooms. The technology is also assisting in the development of models for effective predictive maintenance. The modern robots that are being used have an increased intelligence and they are threatening human labour in factories. It is almost every stage of manufacturing that is being monitored by smart sensors and data is being shared by artificial intelligence and analytics software.

Traffic management operations

Apart from autonomous vehicles, artificial intelligence is being used to manage traffic. Artificial intelligence is being used in different applications such as detection and prediction of traffic accidents. It converts traffic sensors into intelligent agents through the use of cameras (Bharadwaj, 2018).

Artificial Intelligence Applications in XYZ Logistics Company

Technological advancement has led to big data issues within XYZ Logistics Company. Some of the major big data issues include breach of privacy, and analytics not being 100%

accurate. Also, big data is facing several challenges, especially in data validation, securing big data, and generating insights in a timely manner. Two of the three proposed artificial intelligence applications will be based on data management while the other proposed artificial intelligence application will be based on delivery of goods using autonomous vehicles.

Data Analytics & Artificial Intelligence

The ever-growing digital technology has assisted companies to collect a massive amount of data, but then there is the need to have a powerful approach through which the collected data can be used efficiently. Typically, operating a business in the contemporary world is becoming tougher each day. There is disruption from unexpected rivals; industry changes are happening in a very short cycle, regulations are set in everyday especially on data protection, and marketing time is shrinking on a daily basis. All in all, data analytics and artificial intelligence have come to the rescue of many people and groups as it is making it possible to link data and gain insight on customers, optimise the speed and quality of logistics, and above all grow the business. With data analytics, there is an improvement in customer experience and operational efficiency, greater inventory visibility and management, and improved predictive maintenance. The analysis of customer data has the capacity to generate useful insights on the pricing, placement, operational risk management, improved delivery, and cost and labor optimisation. As organisations embark on increased adoption of technologies, there is the need to mind their ethical background. For instance, regarding the application of data analytics, it is necessary for the organisation to make sure that the adoption of the technology is ethical. In order to make this happen, there is the need to consider a wider implication of activities including context (there should be clear intentions of how the data will be used), consent and choice (the affected party should be aware of what is happening and have a choice to decide whether to continue or

decline), and reasonable (the data collected should be reasonable to its intended application) (IBM, 2014). Also, in relation to big data, Blockchain is a new filing system or distributed ledger purposed for digital information and its primary function is to store data in an encrypted and nigh immutable format. Typically, considering that data is encrypted and distributed across many different computers, Blockchain allows the development of tamper-proof which is a highly robust database that can only be operated by an authorised person (Swan, 2015). This means that it can only be read and operated by a person who has the authority to do so.

Autonomous vehicles

In the field of logistics, autonomous vehicles are already working and they have already taken a huge part of the logistical work process. Although there are no autonomous trucks that are transporting goods ob open road, they are already doing it in warehouses. They load, offload, and transport of goods in the warehouse. They use a conveyor belt that connects to one another. However, the future of logistics is headed to where large autonomous trucks will deliver goods. In a few years time, autonomous vehicles will have a significant role to play in the automation of the logistics process. Also, the roles that the autonomous vehicles will be playing include warehousing operations, outdoor logistics operations, line-haul transportation, and last-mile delivery (Kückelhaus, 2018).

Advantages and Disadvantages of Artificial Intelligence Based Applications

According to Chowdhury & Sadek (2012, p6), artificial intelligence applications are used to simulate human intelligence for either solving a problem or making a decision. Artificial intelligence has changed the way operations are carried out in almost every sector. For instance, the Robotic Industries Association of the United States of America has companies operating

from all over the world that carries a heavy workforce operating in this sector. Through automation, there is increased accuracy since there is no paperwork involved. Management of big data has been enabled by the use of Blockchain and other data analytics techniques. Cases of error have been significantly reduced. With the arrival of autonomous vehicles, Tipping & Kauschke (2016) asserts that there has been an increased efficiency in the delivery of goods and services.

Chowdhury & Sadek (2012) further points out some of the disadvantages associated with artificial intelligence stating that artificial intelligence applications have led to a reduction in most tasks that are carried out by human beings. Typically, robots have taken over human tasks and it is clear that the loss of a job leads to both social and ethical implications whereby individuals can be compelled to steal as well as other unethical activities all in the name of making money. High usage of artificial intelligence is harmful to the environment. Also, increased consumption of energy by the different machines might lead to environmental pollution as well.

Conclusion

From what have been discussed in this report, the most recent technological advancements and the ever-increasing demand from shippers have forced many businesses to explore artificial intelligence seeking to know the solutions it can offer to the logistical team. From its definition, artificial intelligence is the development of machines exhibit human intelligence and they mimic, replicate, approximate, automate, and improve human reasoning. Therefore, the report is an investigation of the different applications of artificial intelligence within the Logistics industry for the purpose of providing better services to customers. From the

findings, different applications of artificial intelligence have different impacts on the business. For instance, the use of autonomous vehicles reduces the human workforce and increases the efficiency of delivery of goods. Automation and use of robotics as well as reduce human workforce, efficiency in delivery and warehousing, and reduction in cost. Use of data analytics improves customer experience and enhances inventory management. Use of Blockchain reduces cases of fraud, reduces errors, and increases the efficiency of data processing and storage. For effective delivery of services to the customers, the report proposes three artificial intelligence applications that XYZ Logistics Company can consider towards the proper handling of customer's big data as well as smooth delivery of goods. Data analytics and Blockchain mostly deals with data and anonymous vehicles deals with delivery of goods. However, regarding autonomous vehicles, there is the need to have a regulatory environment that governs its application. Also, there is the need for more research to determine the ethicality of using artificial intelligence in place of human beings.

Recommendations

In order to have control over big data, it is necessary for XYZ to consider artificial intelligence based applications that will help in data management. As seen from the proposed artificial applications section earlier in the report, the company should consider using data analytics and Blockchain as the most effective in data management. Blockchain stores data in an encrypted and nigh immutable format. Regarding the application of Blockchain, there is the need to have increased research and development in order to have a clear understanding of the trustworthiness of Blockchain. On the other hand, business analytics link data and gain insight into customers. The analysis of customer data has the capacity to generate useful insights on the

pricing, placement, operational risk management, improved delivery, and cost and labour optimisation. The final recommendation is the need for autonomous vehicles. Typically, the future of autonomous vehicles look promising and the major roles it will play include warehousing operations; outdoor logistics operations, line-haul transportation, and last-mile delivery.

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