



Possible Impact of Robotics and Artificial Intelligence on Oman's Logistics Sector: A Review

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Changing times require industries to adopt ever-changing technologies in order to stay afloat and compete at the global stage. The logistics industry is experiencing a global boom due to progress in the e-commerce sector and ever-increasing consumer needs of the modern world. Oman's long-term vision includes logistic sector as one the main contributors to the country's GDP. Sea Ports such as Sohar and Al Duqm are another indication of the Sultanate's ambitions to diversify the economy for the post-oil era. The logistics sector in Oman needs to adopt technology that not only helps it with improving its operations but helps reshape the industry standards in Oman. Robot adoption is the latest trend in the global logistics industry and Oman's leading logistics companies need to adopt it too. The combination of logistic robots and right artificial intelligent programming can do wonders for a company. Artificial intelligence complements robotics to achieve their tasks more efficiently and helps with better robot maintenance. Oman's logistics sector can benefit greatly from the introduction of logistic robots on both practical fronts as well as the marketing front. A research was conducted based on one of Oman's leading and most prominent logistics company to identify the level of robotics and artificial intelligence in use. The descriptive approach of research was applied to attain the required data through both quantitative and qualitative means. Interviews and surveys were conducted in order to justify the requirement of the proposed research. The aim of the study was to build a case for implementation of robotics in conjunction with artificial intelligence in Oman's logistics sector in order for Oman's logistics sector to fulfil its potential and compete at global stage.

Introduction

As modern technology continues to revolutionize almost every major aspect of human life, it has become part and parcel of modern businesses as well. Almost no business can effectively function without the integration of some sort of technology. Logistics sector has been positively affected by this wave of technological advancements as well

The English definition of the term Robot is "A machine capable of carrying out a complex series of actions automatically, especially one programmable by a computer" (Lexico, 2019) A logistic robot on the other hand can be defined as "A robot with one or more grippers to pick up and move items within a logistics operation such as a warehouse, sorting centre or last-mile" (DHL, 2016). The logistical robot industry has gone through an astounding growth since robots were introduced into logistical workflow. 69,000 logistics robots were installed in 2017 alone, thereby recording a growth rate of 162% over the previous year 2016 (Ria, 2017).

Amazon Inc's acquisition of the logistic robot maker Kiva Systems in 2012 for 775 million USD proved to be a huge leap forward in the process of mainstreaming the process of using robotics in logistics sector (The New York Times, 2012). A report published by ABI research predicted that over 4 million commercial robots will be installed in over 50,000 warehouses (Locus Robotics, 2019). As per the International Data Corporation report released in 2016, 45% of the global E-



commerce and omni-channel companies were expected to have deployed and integrated robots into their warehouses in one way or another. The same report also goes on to state that by 2020, 40% of commercial robots will be connected to a mesh network of robots, which, in turn, could enhance the efficiency of robots by over 200% (IDC, 2016). A mesh network would enable robots to be connected together while being controlled by a single software hence using artificial intelligence to fulfil the very potential of any given robot. Artificial intelligence can be defined as “the designing and building of intelligent agents that receive precepts from the environment and take actions that affect that environment” (Recode, 2016).

Oman’s logistic sector is on the rise, likewise is the case with logistics sector in most countries of the world. The logistics sector in Oman is expected to contribute upwards of Omani Rials 2 Billion to the country’s GDP by the year 2020 (Oman Observer, 2017)

Moving forward into post-oil economy era, Logistics sector is expected to be a key player for Oman’s economy, the country aims to be region’s logistic hub and among top 10 countries for logistics globally (Times of Oman, 2017). Achieving the aforementioned feat would require Oman’s logistic sector to have offered world-class facilities, robotics being one of them. One major beneficiary of the introduction of robotics in Oman’s logistic sector would be the E-commerce industry as it will allow for faster order processing, packaging and shipping.

There’s a limit as to how far efficiency of a company’s logistics operations can be pushed using manual labor and lack of advanced technology. Logistics firms, supply chain and distribution personnel across the world have been hard at work exploring new ways to boost their operations and maximize profit while providing a great customer experience (Clear, 2018)

According to Echelmeyer, Lilienthal, and Bonini, (2011) the implementation of robotics provides any given company or the logistics sector as whole a competitive edge over the other companies or countries dealing in the same area. The automation of different warehouse functions through robotics has changed the way how modern warehouses operate and has increased the efficiency and time management by a large margin. Robots can work 24/7 without requiring any break or showing any signs of fatigue.

Current scenario

Robots perform variety of functions in a warehouse. There are several robotic companies producing different kinds of logistic robots designed to carry out specific tasks in a warehouse. The current available crop of logistics robots can carry out functions such as sorting, picking, loading, unloading, storage, packaging and delivery (IndustryWeek, 2018)

Currently, Oman’s logistic industry continues to carry out all the warehouse operations through human labor. As other countries across the region also continue to work on their logistical ambitions, Oman’s logistic sector needs to be a step ahead of the competition and introduce robots to the warehouse operations. It would provide Oman’s logistic sector with competitive edge at both operational and marketing front.

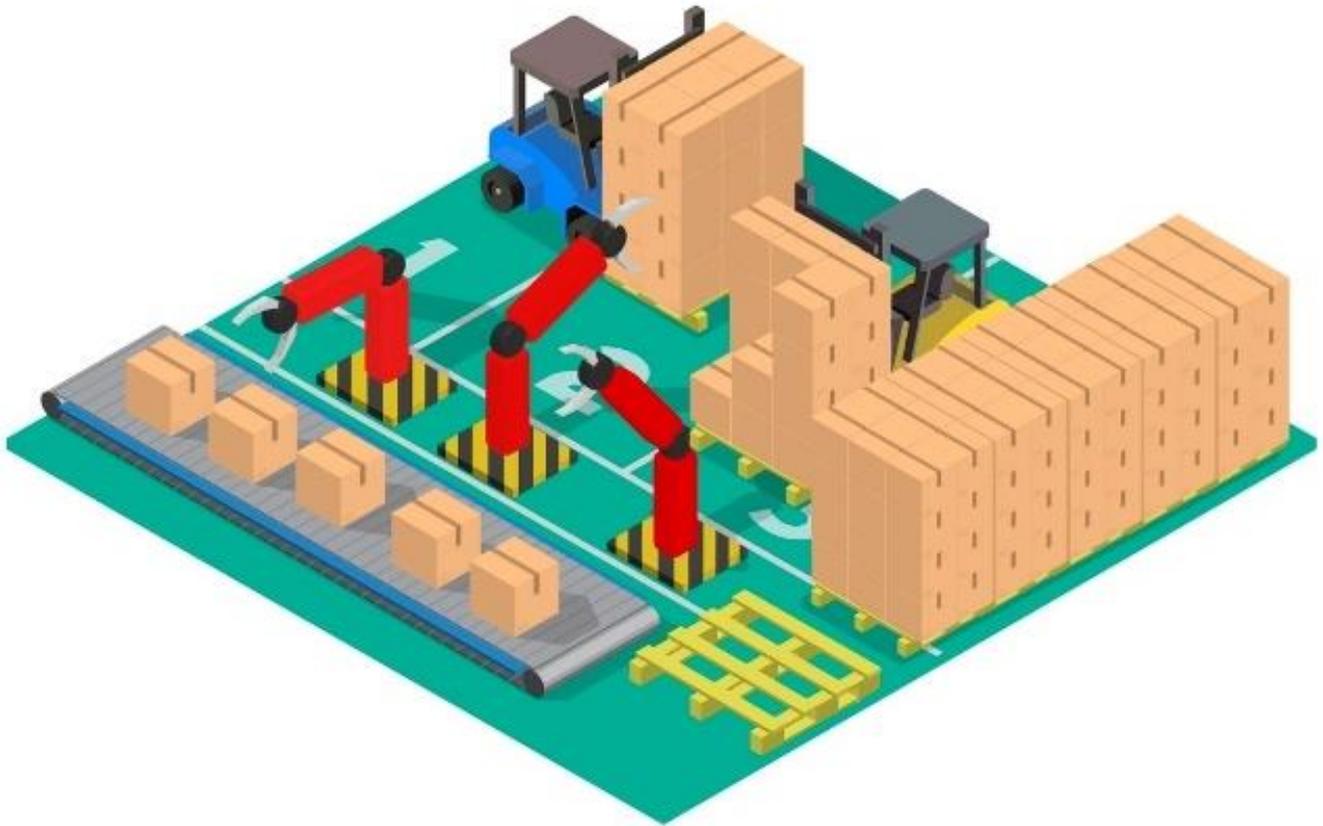


Figure 1. A sample graphic depicting an automated warehouse.

The deployment phase of robots in a warehouse is not as difficult as assumed. Special robot only zones can be created in fulfilment centers or warehouses with frequently outbound items, the robots then carry entire racks towards a given point. This helps speed up the movement within the warehouse, saves time and saves the need for additional human workforce during peak seasons. The increased demand in logistical robots is mainly led by upsurge in the e-commerce sector across the world. As the time progresses and so does the e-commerce industry, the expectations of consumers have touched new heights pertaining to order fulfilment and faster delivery (Ghaffarzadeh & Jiao, 2019). Initiatives such as same-day delivery or next-day delivery by many e-commerce conglomerates has also proved to be a catalyst in increased customer demands and expectations.

Methodology

For the purpose of this research study, and to get a better idea of the ground realities, a survey was conducted at a prominent logistics company in Oman. The primary aim of the survey was to find out where things stand pertaining to any possible near future introduction of robotics in Oman's logistics sector and to get employees perspectives on this move. The survey was designed in a way to get most out of the employees about robots in logistics, as their sentiments would most likely reflect those of other employees working at logistics companies of similar stature in Oman. Most of the questions asked were company specific, the responses, however, were assumed to reflect the sentiments of a larger crowd.



Results

When asked how they would rate the technology currently in use at the logistics company, 61% of the employees deemed it advanced, 6.5% thought of it to be very advanced whereas 29% thought it was basic and 3% rated it as outdated. 29% of the employees thinking of the technology as basic and 61% thinking of it as not 'very advanced' shows that the employees do feel the technology is not cutting edge or of global standards.

3-How would you rate technology currently in use at your company?

34 responses

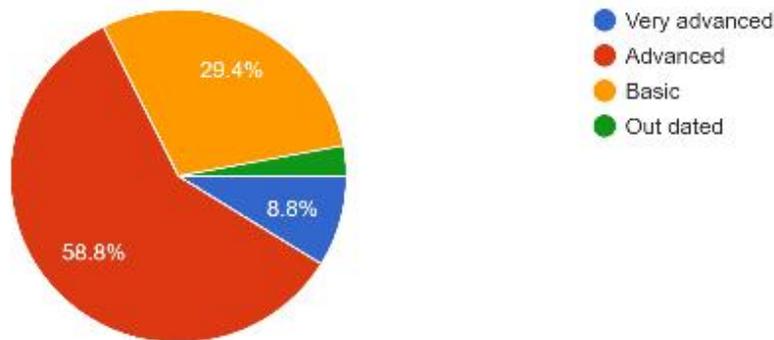


Figure 2. Technology rating in a company

When asked if they agreed with the notion that new technology needed to be introduced to assist with logistic handling, 67.7% of the employees agreed and 29% strongly agreed whereas only 3.2% of the employees disagreed. This goes on to show that while a healthy majority of the employees are satisfied with the current technology in use or rate it as advanced as per the last question, they still approve of and want new technological solutions.

Figure 3. A pie chart from the survey.

In the next question, the employees were asked whether they would welcome the idea of working alongside robots. This question was the first one in the survey to use the word robot and asked the employees whether they would welcome the idea of working alongside robots in the warehouses. In response, 63.3% of the employees said 'yes', 16.7% said 'no'; whereas 20% were undecided and said they might and would welcome this idea. Only 16.7% employees outright negating the idea. The results show that the conditions are totally favorable to introduce robots into warehouses without any significant resistance from the environment.

Furthermore, when asked if they agreed with the idea that working alongside robots would enhance their productivity, a narrowed down question looking for employees opinions on direct impact of robotics on the productive environment of the company, 64.5% of the employees agreed with the notion that working alongside robots would enhance productivity of the employees. In addition to that, 25.8% of the employees strongly agreed with this idea, whereas 6.5% employees disagreed and only 3.2% strongly disagreed with the idea of working alongside robots enhancing their productivity.

The next question deals with the practical implementation stages of logistic robots at warehouses.



For robots to be an effective part of the workflow and enhance the productivity and efficiency of employees, the employees need to be trained as to how to interact with robots and how to utilize the maximum potential of these robots. 71% of the employees expressed their willingness to be trained in order with robots in an efficient way. 16% of the employees were not sure whether they're willing to be trained to be interact with robots in better way, whereas only 13% of the employees showed unwillingness towards this idea of training. This goes on to show employees are more than open to this change and are willing to be trained so that they can adapt to this change in a better manner.

The employees were then asked whether they felt threatened towards their jobs because of potential introduction of robots. 56.7% of the employees responded with a "yes" whereas 43.3% felt like robots didn't signal any threat to their jobs. This question holds significance because of a general public perspective towards robots in general. A logistic robot is unlike the one shown in science fiction movies; neither does it function like a human being. A logistic robot can just perform a specific set of functions depending on its physical structure. Since logistics robot aren't available in Oman, people have not had first-hand experience with them. Therefore, the employee's reaction to this question is somewhat understandable.

Figure 4. *Effects on job*

The final question focuses on the bigger picture and asks the employees whether they think Oman logistics sector as a whole needs to adopt latest technologies like robotics and AI in order to compete with global and regional logistic market and gain an edge over them. The most surprising aspect about this question is that none of the respondents disagreed with the notion that technologies like robotics and AI needed to be adopted by Oman logistic sector as 63% agreed, 26% strongly agreed and 10% of the respondents somewhat agreed with the aforementioned idea.

Figure 5. *Necessity to adopt AI in logistics*

Discussion

A very common misconception is that deploying robots at large scale industries in general or at logistic industry in particular would affect the country's economy in a negative manner as it would reduce human jobs. This common misconception was further made apparent in the survey as over

Figure 6. *A visual description of robotics arms in action, pick up boxes from a conveyor belt.*

50% of the employees said they felt threatened towards their jobs because of the notion of logistic robots working alongside them. All this however is contrary to reality, according to World

Economic Forum (WEF) Robots and AI will create 58 million more jobs by 2022 (BBC, 2018). This goes on to show that contrary to popular misconception, Robots and AI instead help with creation of more jobs rather than taking away human jobs.

After analyzing all the data and information gathered for the purpose of this study, it can be deduced that the only way forward for the logistic industry in Oman is to adopt latest technologies like robots in conjunction with artificial intelligence. It may sound a bit complex at first, but it is not, most of the companies, manufacturing logistic robots, provide easy setup solutions, some robots take as much as few hours to setup and then they are ready to work.



According to Ghaffarzadeh and Jiao (2019), automated guided vehicles that are currently in use and have long been in use across warehouses globally may go down the path of obsolescence in coming decades and their market will shrink by an estimated 50% by 2030 as compared to that of 2019.

Another question that might be posed is whether the hefty investment to automate the warehouse using robots is worth it or not. The investment in robots is proven to be worth the money. Most of the robots repay the amount invested in them within few years of use. According to 'Fetch', one of the leading logistic robot manufacturing company, their robots repaid the invested amount within 6-12 months of use (Fetch robotics, 2019)

The robot introduction and implementation phase at any given prominent logistic company in Oman would require a team of experts to look into the warehouse and decide accordingly which areas are the most suitable one for initial implementation. The company can also choose to test operate the robotics setup at a smaller scale such as a part of warehouse that contains items that are required to be moved almost on daily bases, before launching a full-fledged automation drive.

Conclusion

In a world with ever changing technological dynamics, it is important for any business sector to keep an eye on evolving technologies. Logistic sector experienced a large-scale technological assistance for the first time through the adoption of computers and thereafter by using appropriate inventory management software. We are now living in an industrial era wherein smart machines are as much part of industry as much as software are. Logistic robots have experienced immense growth in the last decade. The recent success of logistic robots can also be ascribed to the growing use of artificial intelligence in robots. A robot that is initially programmed to perform a certain task but learns and improves over time through the use of artificial intelligence. For Oman's logistics companies to adopt this modern technology that has already been adopted by the likes of Amazon and DHL globally would provide them with competitive edge over make a name for the company across the region as well. All in all, while logistic robot setup may not come inexpensive, yet it does cover for its cost through increased efficiency, productivity, precision and speed.

Acknowledgements

The authors would first and foremost, like to thank God the Almighty for providing us with courage and understanding to successfully complete this work of research. Then, sincere thanks to all the family members and friends for their immense support and words of encouragement. Last but not the least, special thanks from the bottom of our heart to the staff and management at Middle East College for their support.

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