

# Ethical Questions Behind Automated Warehouses

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## Introduction

With the development of emerging technologies, a higher level of automation is now dominating the warehouse scene. By combining several different kinds of robots together, online retailers (or e-tailers) can make the distribution process within their warehouses more effective and efficient. For example, several of the more dominant e-tailers, like Amazon or JD, show a tendency to use robots to replace human workers in physical distribution processes or daily tasks in warehouses. Granted, substituting humans with robots speeds up an e-tailer's delivery services, making it possible for its warehouses to handle more goods and packages per day, but at the same time, this practice has the potential to raise a series of ethical concerns.

JD.com, Inc., also known as Jingdong, is a Chinese e-commerce company headquartered in Beijing with over 234 warehouses in China. The company was founded by Richard Liu in July 1998 and its B2C platform went online in 2004.<sup>1</sup> It is now one of the two largest B2C online retailers in China by transaction volume and revenue, a member of the Fortune Global 500, and a major competitor to Alibaba-run T-mall.<sup>2</sup> As leaders in their industry they currently employ 122,405 employees which include warehouse workers, business managers, software engineers, and couriers among others. Their capital assets include 55 million square feet of facilities nationally that allow it to handle 4.4 million packages per day. In 2016, JD's net revenue was \$37.5 Billion (USD) with a 260.2 Billion (CNY) operating profit. As of September 2017, the platform had 266.3 million active users.<sup>3</sup>

At JD's recent Discovery/Data Conference in (Nov. 2017), CEO Richard Liu was asked about his attitude toward emerging technologies-- especially those in his new fully-automatic warehouse. He said that every time there was a huge innovation, it brought a change to human life. He also mentioned that there were not any huge technology breakthroughs that had led human beings to a deadly disaster. When asked about whether artificial intelligence will take the place of human workers, Liu said "AI will not result in current worker layoffs, but to the contrary, will lead them to better jobs which means transferring those workers who are currently working on heavy, dangerous or even insalubrious tasks to harm-free and relaxing tasks." The application of emerging technologies should not be at the cost of humanistic care," he stated at the end of his presentation.

It is interesting to see how his attitude changed over time. At the Lenovo TechWord Conference held in Sept. 2017, he stated that AI will give technology companies the capacity to reduce the cost of logistics dramatically. According to his estimation, in the future the total number of JD employees will stay at about 80,000, a puzzling statement since JD current employs 120,000 people. This 40,000 person gap, speculated as future layoffs, will

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<sup>1</sup> "jd.com Site Info". Alexa Internet. Retrieved 2017-08-06

<sup>2</sup> "Selling on JD.com in China". Sampi. 14 October 2015. Retrieved 20 March 2016.

<sup>3</sup> JD.com Announces Fourth Quarter and Full Year 2017 Results.JD.com

most likely be those workers whose jobs can be easily replaced by robots or other emerging technologies. In this brief we examine worker related issues associated with the influx of robotics into the workplace.

### **What is an automated warehouse?**

Logistics automation, or warehouse automation, is the application of computer software and/or automated machinery to improve the efficiency of logistics operations.<sup>4</sup> So far, the application includes helping workers with some basic tasks. Those daily tasks include loading/unloading goods, organizing goods within the warehouses, checking packages, and so on. The main feature of the tasks that robots can help with is repeatability. Those tasks require a repeating procedure and thus do not require human creativity.

It is hard to trace back to the date when the first automated warehouse was found, but it is known that automated warehouse technologies were adopted by several industries at the same time. Even as robots were invading industries at the same time, various types of robots were invented separately and for separate purposes. For example, drones were applied in military warehouses initially to track and monitor inventory in order to reduce problems with shrinkage that the military was experiencing<sup>5</sup>. But as drone technologies have evolved, they are now available for non-governmental applications and are used to monitor commercial warehouses.<sup>6</sup> Other robots such as automatic scanners and conveyors were originally used in heavy machine industries to monitor and transmit components and parts, but now are utilized in distribution centers to help workers sort packages. Many large technology intensive companies including Google, Sony, JD and Amazon, are making huge investments in developing automation systems, either for their own use or to sell to others.<sup>7</sup> What was originally a fragmented industry comprised of many distinct types of robots are now converging into integrated systems for automating warehouses. Both JD and Amazon, for example, have developed their own automation warehouses using their innovation expertise. JD has established the world's first large-scale fully-automatic Business-to-consumer (B2C) warehouse. It has the capacity to handle about one million orders per day without being interrupted. There are no human workers in the warehouse and all the orders are taken by robots using artificial intelligence software.

These full scale automation systems support the entire workflow within the warehouse, including volume determination, visual inspection, stereoscopic storage assist, repository storage, and automatic packaging. There are several kinds of mobile robots such as supply robots, sorting robots, and transporting robots working together to make the whole process even more smooth.

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<sup>4</sup> Yam, K. L., "Encyclopedia of Packaging Technology", John Wiley & Sons, 2009, ISBN 978-0-470-08704-6

<sup>5</sup> SupplyChain 247, Walmart Testing Warehouse Drones to Catalog and Manage Inventory, [www.supplychain247.com](http://www.supplychain247.com), June 3, 2016

<sup>6</sup> "In China, an e-commerce giant builds the world's biggest delivery drone. Popular Science.

<sup>7</sup> "Alibaba, JD.com commit nearly US\$330m to beef up parcel delivery efficiency". South China Morning Post.

## **What is this technology?**

Some of the tasks that could previously only be accomplished by human workers are now handled by robots; for example, scanning packages once they arrive or moving goods within warehouses. Given the increasing sophistication of robots as science and engineering march onward, it is no surprise that they are becoming more pervasive in the workplace and are taking the place of human workers in simple and repetitive tasks, forcing those workers to focus on other more complex tasks in order to maintain their workloads. For some reason, this trend satisfies some people's needs while annoying others. When these robots fully replace human workers in the near future, those related workers will have to move to other job positions or even face the challenges of potential layoffs. This automation trend will likely merge all of the steps in the logistic industry together, resulting in a fully integrated supply chain in e-commerce industries.

## **Ethical dilemmas Tesla is facing**

Tesla is a technology company and is famous for its self-driving related technology. But recently analysts argued that Tesla is overusing automation in the assembly of its self-driving car, Model 3<sup>8</sup>. According to their report, this ambition with automation not only makes it unable to scale fast enough but also causes reduction in the number of workers dedicated to the assembly line. In addition to automating stamping, paint and welding, Tesla is also trying to automate the final assembly process, which entails the actual placement of parts into the cars. By automating 50 percent of the tasks in final assembly, it would cut out about five hours of human labor. But at the same time it needs to hire a skilled engineer to manage, program and maintain robots for \$100 an hour. This means by developing automation in its factory, Tesla is reducing the total number of job positions in its factory as well as requiring a higher level of skill ability for its existing workers.

## **Ethical questions behind it**

### **General Questions**

1. Anticipation:
  - a. Does the company fully understand the development path of this technology?
  - b. Does the company have a clear plan for developing the technology?
  - c. What are some of the potential social and ethical consequences of deploying this technology?
  - d. How well can company handle the potential applications of this technology?
2. Reflexivity: How well can this technology reflect current ethical awareness?
3. Inclusion: How many different types of participants does this technology include?
  - a. How many types of participants can contribute to understand the ethical implications behind this technology?
4. Receptiveness: How receptive the stakeholders (and other perspectives) are to this technology.
  - a. public; experts; industries; stakeholders?

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<sup>8</sup> Megan Dickey. Tesla is overusing automation in Model 3 final assembly, analysts say. TechCrunch, 2018.

## **Specific Questions**

### **Potential layoffs**

1. What happens when higher levels of automation within warehouses cause layoffs?
2. If so, are groups of workers replaced unfairly?
  - a. Basic workers, experienced workers?
3. Will automation in warehouses cause holes in the workforce while causing layoffs?

### **Working safety**

1. If robotic systems cause accidents, who should be blamed, the producer of the system or the user
2. Robots liability?