DIGITALIZATION BUSINESS BRIEF

WAREHOUSING 4.0: THE AGE OF THE SMART DC

DHL Supply Chain

By Lisa Harrington, president lharrington group LLC and senior research fellow, Robert H. Smith School of Business, University of Maryland
WAREHOUSING 4.0: THE AGE OF THE SMART DC

Traditional warehouses – or distribution centers (DCs) – are fast undergoing a transformation, thanks to two driving trends.

The first is a shift in the nature of fulfillment and distribution, driven by a revolution in customer expectations, order characteristics and service requirements. This trend is fueling a new kind of warehouse that is highly agile, extensible, responsive, and optimizes the capabilities of man and machine in a newly symbiotic relationship.

Secondly, warehousing is riding the wave of technology innovation, particularly in the physical/mechanical realm. Collaborative robotics, augmented reality, autonomous vehicles, sensor technology, and the Internet of Things are converging to give birth to something new: the smart warehouse.

Welcome to Warehousing 4.0.

Warehousing 4.0 – the age of the smart warehouse – is an offshoot of a broader business trend called “Industry 4.0.” What does this mean?

In 2011, Industry 4.0 was officially born, the brainchild of a German government research project that examined the future of manufacturing. The term, simply put, refers to the fourth industrial revolution (Figure 1).

**FIGURE 1:** THE FOUR INDUSTRIAL REVOLUTIONS

1st
Mechanization, water power, steam power

2nd
Mass production, assembly line, electricity

3rd
Computer and automation

4th
Cyber Physical Systems

1 Source: http://www.allaboutlean.com/industry-4-0-potentials/
Industry 4.0 introduces a concept called the “smart factory.” It capitalizes on the next phase of digitalization in manufacturing, driven by four disruptions: “the astonishing rise in data volumes, computational power, and connectivity; the emergence of analytics and business-intelligence capabilities; new forms of human-machine interaction; and improvements in transferring digital instructions to the physical world (e.g., advanced robotics and 3D printing).”

The smart warehouse, like its manufacturing counterpart, integrates new physical and analytical technologies to reduce costs, transform operations, create strategic advantage, and optimize the most precious resource of all: people.

Certainly, automation in the warehouse is not new. DCs have used high-speed sortation systems, automated guided vehicles, and mechanized picking systems for decades.

But these forms of automation have limitations. They traditionally required high levels of standardization in product shape and handling processes. Additionally, robots and automated systems were typically kept separate and cordoned off from human workers due to safety concerns, thereby limiting the ways in which these tools could augment people and adapt to change.

All of this is changing, with the increasing introduction of new smart mechanical technologies developed with flexibility at their core.

WHAT’S IN THE SMART BOX?

Given this background, what exactly is inside the Warehousing 4.0 “box”? What specific physical technologies do companies expect to implement? And what benefits do they anticipate realizing from their investments?

According to a cross-industry survey undertaken by Zebra Technologies, managers have big plans to outfit their workforces with smart warehouse technology. Seventy-three percent of study participants intend to increase the amount of technology with which they equip warehouse employees by 2020, while 53 percent plan to expand the level of mechanization in their facilities so as to automate or streamline processes.  

These same companies have specific goals in mind for their investments. They want to improve performance in the areas they ranked as among the most “difficult” (Figure 2).  

FIGURE 2: BIGGEST PICKING AND FULFILLMENT PROBLEM AREAS

<table>
<thead>
<tr>
<th>Problem Area</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor performance/productivity</td>
<td>50%</td>
</tr>
<tr>
<td>Order accuracy</td>
<td>47%</td>
</tr>
<tr>
<td>Order turnaround time</td>
<td>38%</td>
</tr>
<tr>
<td>Staff turnover</td>
<td>27%</td>
</tr>
<tr>
<td>Traceability</td>
<td>22%</td>
</tr>
</tbody>
</table>

Source: Zebra Technologies, 2016

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5 Ibid.
What types of physical digitalization technologies are companies deploying? Next-generation robotics is the number one pick. Thirty-nine percent of respondents in a new DHL Supply Chain global survey think robotics will be the mechanical technology most important to their supply chain over the next three years (Figure 3).

![Figure 3: Single Most Important New Physical Warehouse Technology – Next Three Years](image)

Thirty-nine percent of respondents in a new DHL Supply Chain global survey think robotics will be the mechanical technology most important to their supply chain over the next three years.

Source: DHL Supply Chain, 2017

Most companies are still in the initial stages of deploying the newer physical warehouse technologies. According to the DHL research, 51 percent are either in the “developing” or “early” phase of this process. This means they’re conducting proof-of-concept testing or have one or more initiatives under way.
However, this will change – rapidly.

A recent study by Deloitte and the Material Handling Institute (MHI) predicts that adoption of key mechanical warehousing technologies will rise quickly over the next six years, with robotics and wearable/mobile devices seeing the fastest growth (52 and 43 percent respectively) (Figure 4).

FIGURE 4: PLANNED ADOPTION RATES FOR WAREHOUSE TECHNOLOGIES

![Diagram showing planned adoption rates for warehouse technologies.](image)

- Robotics and automation
- Wearable and mobile technology
- 3D printing
- Driverless vehicles and drones

Source: Deloitte, Material Handling Institute, 2017

Warehouse robotics will see the fastest development with an expected market value of about $4.4 billion by 2022. E-commerce is a key driver of this growth worldwide.5

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BEYOND COST CUTTING

Organizations invest in smart warehouse technology to reduce costs. But they also expect these innovations to deliver something else – competitive advantage.

In 2015 and 2017, the Deloitte-MHI study asked participants to rate each smart warehouse technology in terms of being a source of either competitive disruption or strategic advantage. In each case, companies said the competitive impact increased in 2017, in some cases by as much as 25 points.

Breaking down the benefits further, the DHL research shows that:

- 82 percent expect to reduce costs and/or improve profitability
- 72 percent expect to improve customer service
- 70 percent expect to improve supply chain agility
- 62 percent expect to improve resource and asset utilization – people, facility and materials

And when asked to choose the single greatest benefit these technologies will generate, DHL respondents overwhelmingly selected “reduced costs/improved profitability”.

Finally, where a company is on the smart warehouse technology adoption curve makes a difference in benefits achieved, particularly in cost reduction. The range spans from a low of 10 percent for companies at a basic level of maturity, all the way to 50 percent for “visionary” firms. Those are powerful benefits by any measure.

A MAKEOVER WORTH MAKING

The age of the smart warehouse, while still in its infancy, is here to stay. Its underpinning technologies enable companies to do far more with less: more productivity, greater efficiency, faster throughput, greater employee job satisfaction, less space – to name just a few benefits.

Many of the warehousing 4.0 technologies are still under development, so it will be several years before these innovations settle into their optimal state. Along the way, though, they will support companies’ ability to adapt to the realities of the new norm – the agile, adapt-on-the-fly supply chain.

CHANGING THE WAY PEOPLE WORK

Smart warehouse technologies are changing the way people work in the warehouse. A 2017 DHL Supply Chain survey on the global talent shortage asked respondents to rank whether various technologies would have a measurable impact on the way people perform their jobs. Here’s a snapshot of the findings (Figure 5).

FIGURE 5: LEVEL OF IMPACT TECHNOLOGIES WILL HAVE ON HOW EMPLOYEES WORK

<table>
<thead>
<tr>
<th>Technology</th>
<th>Level of Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented reality</td>
<td>31</td>
</tr>
<tr>
<td>Additive manufacturing – 3D printing</td>
<td>33</td>
</tr>
<tr>
<td>Robotics</td>
<td>42</td>
</tr>
<tr>
<td>Digital labor platforms and tools</td>
<td>61</td>
</tr>
<tr>
<td>Automation</td>
<td>66</td>
</tr>
</tbody>
</table>

Source: DHL Supply Chain, 2017
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and resources at
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