THE DISRUPTORS SERIES: ROBOTS AS STORE ASSOCIATES

The world of RETAILING is COLLIDING WITH the world of TECHNOLOGY
EXECUTIVE SUMMARY

Recent developments in robotics are slowly finding ways to substitute human workers in stores. The focus of these robots is not just quick service but also to create a more human-like interaction between shopper and machine.

Historically, robots were expected to perform jobs that were the three Ds: dull, dangerous or dirty. Robots have already either replaced human labor or work alongside people in several industries such as mining, manufacturing, healthcare and defence. The current global spending on robotics, across all sectors, is estimated to be $26.9 billion this year, and this is expected to grow to $66.9 billion by 2025.

Technological advances in recent times have developed robots capable of performing tasks that are beyond the three Ds. These are machines with soft skills and cognitive functions that make them behave more like a human being. In this report, we examine some robots that were developed to work in stores, alongside their human counterparts. We look at SoftBank’s Pepper, Toshiba’s Aiko Chihira, Lowe’s OSHbot, and Hointer’s robots.

Pepper is an interactive robot developed by Japanese company Softbank Corp and French firm Aldebaran Robotics. It is currently being used by some Carrefour, Nestle and Softbank stores, can analyze facial expressions and behavior, and operate in 19 different languages. A high-end department store in Tokyo, Mitsukoshi, trialed Toshiba’s robot Aiko Chihira a few months ago, by making it greet customers and guide them around the store.

American firm Lowe’s developed its own retail robot last year, called the OSHbot. This robot greets visitors on their arrival and guides them to the products they are looking for in store. Fashion brand Hointer has deployed robots in stores to provide faster service in terms of getting the products from store-room to customer, through the use of a smartphone app and robot-operated stockrooms.

Customers expect to complete their shopping journeys quickly and efficiently. Human staff may not be prepared to address every query a customer might have, so in these instances, robots or kiosks that have the information on hand would be able to deliver more effectively.

In terms of inventory checking and monitoring, robots would potentially be able to do much faster compared to a human worker. Greeter robots at click-and-collect stations, which can fetch orders faster than human staff, could be another potential area of their application in retail.

Though robots currently seem like a novelty used to attract more customers and drive footfall, their use in store-fronts may not be too far ahead, considering the pace at which robotic technology is evolving.
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Japanese technology giant, Toshiba, recently developed two androids that are quite reminiscent of a gentle, female version of The Terminator. Androids are robots with a human appearance, and at first glance, with their eerie lifelike appearance and soft voice, it could be difficult to recognize them as mere machines.

In FBIC’s first report in The Disruptor Series, we discussed some of the technologies disrupting retail. In this second report of the series, we examine recent developments in robotics that are set to disrupt the retail industry.

Robots have already either replaced human labor or work alongside people in several industries such as mining, manufacturing, healthcare and defence. The current global spending on robotics is estimated to be $26.9 billion this year, and this is expected to grow by nearly 149% to $66.9 billion by 2025.

“...”
Figure 2 McKinsey’s Projections For The Economic Impact of Advanced Robotics

Sized applications of advanced robotics could have direct economic impact of $1.7 trillion to $4.5 trillion per year in 2025

<table>
<thead>
<tr>
<th>Sized applications</th>
<th>Potential economic impact of sized applications in 2025 ($ trillion, annually)</th>
<th>Estimated scope in 2025</th>
<th>Estimated potential reach in 2025</th>
<th>Potential productivity or value gains in 2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robotic human augmentation</td>
<td>0.6–2.0</td>
<td>50 million amputees and people with impaired mobility in advanced economies</td>
<td>5–10% of amputees and people with impaired mobility in advanced economies</td>
<td>$240,000–390,000 per person for extended/improved quality of life1</td>
</tr>
<tr>
<td>Industrial robots</td>
<td>0.6–1.2</td>
<td>355 million applicable industrial workers</td>
<td>30–60 million FTEs of work potentially automatable across key job types</td>
<td>75% potential improvement in productivity per unit of work automated</td>
</tr>
<tr>
<td>Surgical robots</td>
<td>0.2–0.6</td>
<td>200 million major surgeries in countries with developed health care</td>
<td>5–15% of major surgeries in countries with developed healthcare systems</td>
<td></td>
</tr>
<tr>
<td>Personal and home robots</td>
<td>0.2–0.5</td>
<td>90–115 billion hours spent on tasks such as cleaning and lawn care per year in advanced economies</td>
<td>25–50% of households in advanced economies</td>
<td>20–50 billion hours saved per year</td>
</tr>
<tr>
<td>Commercial service robots</td>
<td>0.1–0.2</td>
<td>130 million applicable service workers</td>
<td>10–15 million FTEs of work potentially automatable across key job types</td>
<td>35–55% potential improvement in productivity per unit of work automated</td>
</tr>
<tr>
<td>Other potential applications (not sized)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum of sized potential economic impacts</td>
<td>1.7–4.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: McKinsey Global Institute Analysis

The above table shows the various applications of robotics and their potential economic impact in 2025, according to McKinsey’s research. We have highlighted commercial service robots to depict the area where robots in retail might fit in. McKinsey predicts that there could be around 130 million applicable service workers in 2025, of which around 10–15 million full time roles could be taken over by robots.

**Should A Robot Replace A Human Worker?**

Historically, robots were expected to perform jobs that were the three Ds: dull, dangerous or dirty. Much of the automation in factories is due to the repetitive actions involved in a process, which could lead to boredom, and thus an increased possibility of errors and high attrition rates among workers. In such scenarios, the use of robots represents great cost savings as they can produce higher output with complete accuracy.
A Day In The Life Of A Store Associate

Emerging technology has gone much further by making robots capable of performing tasks that are beyond the three Ds. Several companies are mulling the idea of using robots at the store-front or as other store associates, whose roles entail a variety of tasks.

Some of the tasks store associates will be expected to do are:

- Greet and direct customers to the relevant department
- Stock products on shelves
- Check inventory in the store-room
- Answer queries related to the products and their availability
- Pick up items from the store-room for the customer
- Process payments, fold and/or bag the purchases at checkout tills
- Keeping the area clean or washing trays/crates that hold fresh produce
- Perform other ad-hoc tasks as a need arises

Smaller stores may have one or a few staff performing multiple tasks, but in larger stores, there could be dedicated staff for specific tasks, and typically they will need to be on their feet for the most part. Some of these tasks are repetitive and time-consuming, and can probably be performed faster and more efficiently through automation.

In the next section, we examine some robots that were developed to work in stores, alongside their human counterparts. We will look at SoftBank’s Pepper, Toshiba’s Aiko Chihira, Lowe’s OSHbot, and Hointer’s robots.

**SoftBank’s Pepper**

Pepper is an interactive robot developed by Japanese company Softbank Corp and French firm Aldebaran Robotics. It can analyze facial expressions and behavior, and operate in 19 different languages. Currently being used by some Carrefour, Nestle and Softbank stores, Pepper enquires what customers are looking for that day, customers can reply by speaking to it as they would to a person, and after assessing their query, it conveys information accordingly.

At Carrefour’s supermarkets, Pepper also tracks customers’ satisfaction by asking them a series of questions and entertains shoppers with fun activities.
Toshiba’s Aiko Chihira

A high-end department store in Tokyo, Mitsukoshi, was the first to trial Aiko Chihira a few months ago. Aiko, the kimono-clad humanoid robot “has the appearance of a friendly young woman,” as Toshiba—its developer—described it in its press release. It mimics lifelike movements and expressions, has a soft voice with a polite disposition, and can communicate in Japanese and sign-language.

Aiko Chihira greets customers who visit the shop, informs them about events happening in-store and guides them to the departments they would like to go to. Though the robot may appear very lifelike, it is not yet interactive like the friendly, social robot Pepper.

The android was developed jointly by Toshiba and Hiroshi Ishiguro, research director at Osaka University. Ishiguro is pioneering the Symbiotic Human-Robot Interaction Project, where he aims to further develop such androids to make them more human-like.

Junko Chihira, the successor to Aiko, was developed with advanced speech synthesis and the ability to communicate in three languages. This robot debuted on October 23, 2015, at a commercial complex in Tokyo. It was on a two-week trial to greet visitors and provide information on the complex. The robot is expected to guide foreign tourists during the 2020 Tokyo Olympics.
Lowe’s OSHbot

American firm Lowe’s Companies Inc., which operates a chain of retail home improvement and appliance stores in North America, developed its own retail robot last year. The OSHbot, created by Lowe’s Innovation Labs, was first trialed in the Orchard Supply Hardware store, a subsidiary of Lowe’s in San Jose, USA.

These robots greet visitors when they come into the shop and guide them to the items they are looking for in store. The robot’s 3D scanning ability allows shoppers to place the item they are looking for before the droid to help it recognize the product. It is capable of understanding English and Spanish, so customers can speak to it and let it know what their query is.

OSHbot’s autonomous navigation and inventory management capabilities allow it perform functions similar to those used in a warehouse or distribution center. The robot combines the tasks of two human workers—a greeter and a stock-keeper—into one, and could potentially lead to economizing on staff.

“The OSHbot combines the tasks of two human workers—a greeter and a stock-keeper—into one, and could potentially lead to economizing on staff.”

Hointer’s Robots

Fashion brand Hointer has deployed robots in stores to provide faster service in terms of getting the products from store-room to customer. Shoppers can browse clothes at a store, scan the tag on an item and select their size through a smartphone app. The selected item is then dropped through a chute into the fitting room, from a robot-manned stockroom.

Source: Lowes
Others Dabbling In Retail Robots

Earlier this year, a robotic grocery store was trialed in Iowa, which operated like a large vending machine. This store model was developed by Eat Greater Des Moines, a nonprofit group that works to provide access to healthy food in central Iowa, and Oasis24seven, a provider of retailing equipment. Customers can walk or drive up to it, select products from a screen, insert their card or cash to checkout, and robotic arms pick the items from shelves and deliver them through a shaft.

Suitable Technologies opened a store in Palo Alto to sell robots, by robots! The store contains telepresence robots with a screen through which staff can interact remotely with customers who visit. These droids, which look like iPads held up by two posts on a wheeled base, are meant to sell their peer robots lined up in store.

Best Buy has been testing a customer service robot called Chloe at a store in New York, and Target announced very recently that it is to
open a concept store very soon, which will include robotic equipment.

A “robot supermarket” is said to be in the works in the Chinese city of Foshan. Makers and developers can use this space to exhibit, market, and sell their products, and research and develop their creations for the country’s indigenous robotic industry, once the complex is ready.

**How Can Robotics Add Value to Retail**

If these robots are refined further and synchronized with other technologies, with clearly outlined store associate-tasks, they can prove to be valuable assets to the company and justify their high investment costs. A whitepaper from TATA Consultancy Services (TCS) has explored the business model of Robotics-as-a-service (Raas) in retail, and found some practical uses of robots in specific areas of retail. This is, of course, with the view that the current level of robotics will evolve to have additional functions in the future, other than those described in the previous section; and that the cost will come down tremendously, as they have been since robots were first developed.

**Customer Assistance**

Robotic shopping carts can enable customers to find the right aisle for products on their shopping list. They can also do an auto-checkout once the customer has finished shopping. Robotic carts can also track a customer’s shopping habits and serve as a medium to collect data.

Robots can serve as shopping assistants in a clothing store and can be developed to understand a customer’s preferences through non-verbal cues, purchase habits and physical attributes of the shopper. It is almost like a combination of Pepper, a fitting app and other data analytics software, where the advice given out has been personalized and programmed by experienced staff.

**Employee Assistance**

With click-and-collect becoming an attractive option for customers, companies are always looking to minimize shoppers’ wait time with the use of apps and text-messages to notify them. Greeter robots at click-and-collect stations, which notify stock-room robots to fetch orders from inventory, can possibly work faster than human staff.

**Compliance Audits and Routine Checks**

- Robots will be better able to keep track of items that are depleted on shelves but in-stock in the inventory room or items misplaced elsewhere in the store, and replenish them quicker than human staff. Robots that can scan RFID tags to count stock as they move through the aisles, such as Catalyst’s RFID Robot, can be refined further to perform more sophisticated inventory functions.

- Planograms are visual representations of a store’s products which define the location and quantity of stock-keeping units
(SKUs) on a shelf. A shelf is said to be compliant when all merchandise is set according to the planogram: all items are at the right locations, in correct quantities, and with shelf tags displaying accurate product and price information. Robots can enable proper planogram compliance, and collect data of aisles and shelves to formulate effective visual merchandize strategies.

- Robots can also aid security staff, and help minimize theft and damages to products. Gamma 2 Robotics, has developed security robots with mobile surveillance functions, to work in high-end retail stores, warehouses and other large properties. It claims to offer better security functions than existing stationary technology, as it can perform more functions with its mobile capability.

**Robotics, Analytics, Cloud (RAC)**

TCS also noted how robotics needs to work with analytics and cloud storage for Raas to work practically. Robots deployed in a store are able to collect various forms and large quantities of customer and product data. These can be stored and shared through a cloud to the warehouse and distribution center, the company analytics team or a service provider, and other appropriate teams within the company.

Robots may collect information such as the number of purchases or inventory levels of different products, and transmit it to an online storage space. This is downloaded through data centers and circulated to various departments in the company, such as warehouses, the buying team or the marketing team, who will use that data in ways suitable to them. The below charts show how RAC can be applied to retail.

**Figure 3 Robotics, Analytics And Cloud Integrating The Retail Side With The Supply Chain**

“Robots could function as potential data collection points and increase the breadth of store analytics.”

Source: TCS.com
So Will Robots Replace Humans As Store Associates?

Customers expect to complete their shopping journey quickly and efficiently. More often than not, technology facilitates an efficient shopping journey and contributes toward a shopper’s pleasant purchase experience.

Human staff may not be prepared to address every query a customer might have, in these instances, robots or kiosks that have the information on hand are able to deliver more effectively. In terms of inventory checking and monitoring, robots would potentially be able to do this faster and more economically, compared to a human worker. Robots at click-and-collect stations may be able to serve customers quicker and better than human staff, thus minimizing waiting time for shoppers.

For many, however, the visit to a retail store is about the human interaction and social experience. Large format stores where finding an assistant is difficult can definitely benefit from the use of robotic staff, but in medium-sized stores customers may find speaking with people to be more engaging.

We think all stores may not adopt robotic technology immediately, and those that do will have people working alongside. Though robots like Pepper and Aiko in stores seem like a novelty used to attract more customers and drive footfall, their mainstream use in retail may not be too far ahead, considering the pace at which robotic technology is evolving.

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