Welcome to the robotic supply chain

Alan Earls looks at whether robots are about to take over the running of the supply chain and what benefits that could bring

by Alan Earls

Off the coast of the US state of New Jersey, there's an unusual buzz. It's not insects, nor is it voluble tourists: it's delivery drones flying from ship to shore in an effort by Dr. Timothy Amukele, assistant professor of pathology at Johns Hopkins University School of Medicine, and independent drone delivery service Flirtey to show the feasibility of using unmanned aircraft to provide life-saving aid to victims natural disasters, such as a hurricanes or earthquakes.

Robots have long been a staple of science fiction. And, for a generation, they have been an integral part of many manufacturing operations. But the supply chain, at least, was still mostly populated by humans; until recently. Now, the likes of Dr. Amukele and a host of other entrepreneurs and visionaries are taking automation in the supply chain to new heights.

Indeed, some of the most advanced companies in the business world (think Amazon) are already deploying robots and robotic technologies worth billions of dollars. According to Regenia Sanders, a vice president of New York City-based management consulting firm SSA & Company, Amazon's success came from investing more than $775m in acquiring Kiva Systems (now Amazon Robotics), which supplies Amazon with robots that can locate stock and bring it to human workers for final selection and picking.

"This allows for a much more streamlined workforce and higher productivity," she notes. However, she adds, the majority of companies have not implemented anything comparable.

Expect the stampede to begin soon.

Some, like drone supplier Flirtey, are focusing on the proverbial "final mile" to the customer. Some 86% of all packages weigh under 5.5lbs and approximately half of these are currently delivered within 10 miles of a warehouse, notes CEO Matt Sweeny. That makes them prime candidates for drone delivery, in his estimation.

However, the changes will be more pervasive than just showy new delivery methods. Robotic Process Automation (RPA) is quickly redefining the procurement space and automating a lot of the traditional manual and process-intensive functions, noted Bill Huber, managing director with independent outsourcing firm, Alsbridge.

"It enables companies to gain efficiencies, improve accuracy and reduce costs. As a result, procurement professionals are freed up to focus on more strategic, value-added activities," he says.

Michael Hu, principal at management consulting firm A.T. Kearney, sees a complicated picture when he consults his crystal ball. Robotics and smart automation technologies are increasingly disrupting supply chains, he agrees. But he sees the changes manifesting in two distinct waves. The first, wave will create localised disruption, he believes.

"In the next three to seven years, supply chain functions such as planning or warehousing or delivery will be transformed by innovative applications of smart automation," he says. For example, according to Hu, DHL recently tested augmented reality wearables in its warehouses to improve picking productivity and accuracy. Smart automation enables supply chain functions to break free of the traditional cost vs. quality vs. service trade-off, says Hu.

"Consequently, supply chains will become simultaneously lower cost and more agile," he suggests.

Over the longer-term, the supply chain will experience a second wave of less predictable and more transformative patterns of disruption, believes Hu. This will fundamentally redefine today's supply chain structures.

There are two drivers for this, Hu notes. First, as underlying advances in artificial intelligence, sensors, 3D printing and miniaturization accelerate, they will combine and converge in unexpected ways to unlock more transformative smart automation.

For example, an artificial intelligence (AI) powered beauty adviser app on a consumer's phone could trigger an order to a beauty manufacturer's 3D printing facility to produce a batch of cosmetics tailored to a particular skin chemistry profile. Second, as supply chain functions become more digitized, they will increasingly exhibit and benefit from digital platform characteristics.

"Platforms will reorganise supply chain functions to become horizontal "plug and play" stacks that cut across organsations," he says. Companies will then build and coordinate their supply chain functions on top of these shared supply chain stacks.

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“Future retailers and consumer packaged goods companies can shed their internal operations and unlock massive transportation synergies by adopting an ‘Uber-sharing’ of line haul trucks,” Hu suggests.

The platform owner could offer a flexible fleet of autonomous driving trucks coordinated for maximum efficiency via connected sensors and a cloud based AI engine that manages route optimisation, cross-firm scheduling, and even preventative maintenance sensing. This “rise of digitised supply chain platforms” will create significant challenges and opportunities for companies as they redefine today’s supply chain paradigm, Hu adds.

View from Within

However, Shane McCarthy, senior vice president, supply chain at Chicago-based Lawson Products, says, `not so fast.’ Robots and technology have their place, but supply chain professionals should keep things in perspective.

Lawson is a leading industrial distributor of consumable maintenance, repair and operation (MRO) supplies, with five distribution centres in the US and Canada. The Chicago distribution centre has up-to-date IT, with technology ranging from Numina’s Warehouse Control System to Cubiscan automated order cubing.

“Achieving success for any distribution business comes down to finding the appropriate mix of technology and automation, given the unique services you provide,” he says.

Low-cost robotics can easily be used in areas of repetitive tasks - printing and applying packing lists and shipping labels - anything that is consistent and requires little variation.

“The more customer-specific requirements you have, the less you want to automate and the more you may focus on lean processes,” he says.

McCarthy’s approach helped Lawson’s Chicago facility increase order completion rates by 60% and reduce back orders by more than 80%, taking backorders from 5,000/day to less than 1,000/day.

“Our new distribution centre is built to scale, and we’ll continue to evaluate the use of robotics and technology innovations as appropriate,” says McCarthy. “But technology is not a replacement for designing lean processes, carried out by reliable team members, and continuous measurement and evaluation to inform strategy. That’s the foundation for growth and success.”

Still, combining robotic process automation (RPA) with another emerging technology - cognitive computing (which provides sophisticated human-like capabilities) - will have a profound impact on the procurement function, according to Huber.

“Significant changes – some not yet apparent – are on the horizon and in the near future many current strategic sourcing functions will increasingly be performed by cognitive tools,” he says.

In particular, Huber believes the ability of these intelligent cognitive computing software tools to search disparate data sources to identify patterns, assign probabilities and in effect replicate the activities of sourcing professionals will drive the automation of traditionally time-intensive sourcing functions, such as spend analysis and vendor identification and matching, delivering further efficiencies and adding more value.

Furthermore, notes Rodger Howell, a principal at PwC, the RPA wave will integrate with a more sophisticated back-office.

“Many companies are moving beyond traditional ERP, to next-generation, cloud enabled systems. Now companies are starting to think about the whole supply chain and they are looking at what data can be gathered along its whole length to optimise spending on logistics and inventory. They want the information and they want it in real time, if possible," he says.

Scale and pervasiveness are also part of that equation. The Internet of Things (IoT) has enabled “extreme industrial innovation” while predictive maintenance services and smart logistics are the next two concepts that are at the forefront of IoT adoption, according to Sean Riley, global supply chain, manufacturing & logistics industry leader at Software AG. Already, he notes, there has been a clear increase in the number of companies adopting smart sensors in their production, logistics and service operations.

Automation goes hand-in-hand with the IoT; as sensors lie on top of the automated processes and equipment enabling visibility throughout the entire manufacturing process and after. However, it isn’t just automation but “digital transformation” – the potential to create entirely new business modes -that will drive the bottom line and alter value chains.

For instance, IoT will drive a shift in business models, says Riley. Manufacturers will begin focusing on providing pricing models for equipment and products based on controllable outcomes. As an example, Riley predicts that industrial equipment manufacturers will provide pricing based on yield, quality availability and up-time as they will be able to monitor equipment performance and dynamically predict remaining useful life of equipment and components to ensure assets are effectively maintained and utilised without failures or unplanned maintenance interruptions. They may reduce the shipping of product and increase revenues that are service based.

Money, specifically return on investment, will be the ultimate driver of transformation, says Rich Sherman, senior fellow, Supply Chain Centre of Excellence at Tata Consultancy Services. “The cost of automation, control systems, and robotics is coming down dramatically; costs no longer represent a big risk,” he says. Remember, most of these systems are based on digital technology, which follows the curve of Moore’s Law; RFID was expensive at first but came down rapidly in price and most of these technologies will do the same,” he notes.

“Robotics and automation is a necessity in the supply chain and those that do not embrace this technology will be quickly buried by competition,” adds David Gore assistant Professor in the Engineering Technology area at Middle Tennessee State University.

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