TECHNOLOGY & AUTOMATION

Enhancing Supply Chain Management Using RFID

An RFID-based supply chain can help companies continuously monitor all the data and products in their operations.

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Supply chains today are very fragmented, with each link operating as an individual entity. Absence of real-time data leads to poor visibility that can slow down the decision-making process. With radio frequency identification (RFID) technology, manufacturers and retailers can go beyond traditional barcode identification, fortifying visibility with better data granularity and more timely updates. This article will explore the advantages of an RFID-based supply chain that can help in continuous monitoring, thus improving the whole system by using all the available data.

RFID has been around since World War II, when it helped identify friendly aircraft in battlefield locations. Since then, it has come a long way. As IT solutions gained usage in industry and helped create new business models based on IT (e.g., modern retailing), it was possible to scale businesses without worrying about increases in transaction volumes. Today, scale is what differentiates successful businesses. The ability to scale has also led to globalization of supply chains.

Almost all businesses operate global supply chains — sourcing raw material and components from the most cost-effective locations, adding value and assembling them in the most cost-effective locations, and finally selling them in markets which have maximum sustained demand and profitability. Scalability has also led to increased efficiencies in supply chain processes, such as identification, storage, inventory control, transportation, distribution and accounting.

introduced first in Wrigley chewing gum in 1973, partially automated the identification of items through scanning barcodes printed in the wrapper, although they stopped at the batch level.

Around 1997 to 1998, large retailers such as Wal-Mart realized that the manual scanning of barcodes of large volumes of items was becoming a bottleneck and a source of errors. With a view to fully automate the identification process of items, they zeroed in on RFID as the appropriate technology. At that time, the RFID tags were expensive — roughly $1.50 to $2.00 per tag. So, the industry set up a project at MIT (Massachusetts Institute of Technology) to explore the possibility of reducing the price of RFID tags and labels to five cents or less. This project was called the Auto-ID project and ran for more than three years. It subsequently helped bring down the price to about 10 cents. Beyond that, it was felt that industry-level standardization was required to bring down the price further.

Eventually, the project was transferred to EPC Global (Electronic Product Code) and GS1, which were new standards bodies comprising UCC (uniform commercial code), EAN (European article numbering), barcodes, RFID and standardization. Cost reductions and efforts by EPC Global and industry giants such as Wal-Mart are causing the supply chain industry to shift towards broad adoption of RFID technology, based on emerging standards. These standards also allow organizations to move faster, provide richer information sources and increase the efficiency of trading networks.

Connecting the Last Mile

The landscape of supply chains today can be characterized with the following attributes — global; fragmented; partly automated, partly manual; multi-modal; multiple product versions co-existing; obsolete inventory; excess inventory in various stages; innovation-led, fast-paced new product introduction; different products for different markets; pilferage and loss; waste; and so on.

When we analyze these attributes to identify a common thread, we can conclude there is a lack of real-time supply chain data for operational analytics. The SCM systems of today depend on either scanned barcode data or manually entered data, both of which are

As an electronic identification technique, RFID offers a potential solution to the item/object transparency problems that have plagued supply chains in the past. RFID can address the challenge of real-time supply chain data by connecting the last mile between the physical object/item and the computer, thus enabling automatic physical identification of data and populating of the database.

Compared to discrete barcode scanning stations, which can provide data only for those stations, an RFID-enabled warehouse can provide continuous data on the entire length of the supply chain. A real-time SCM system will enable faster decision-making regarding stock tracking and replenishments, new product introduction, discontinuation of obsolete products and so on, thus providing a powerful lever to reduce inventory and the associated costs. To illustrate, a study conducted by the University of Arkansas on RFID-enabled Wal-Mart stores concluded that there was a 13% improvement in inventory management in the RFID-enabled stores as opposed to non-RFID ones.

RFID has the potential to create a truly adaptive supply chain, enabling all aspects of the business cycle (production, storage, distribution, retail and returns) to be monitored in real time, optimizing for present conditions and making predictive changes based on expected demands (See chart, “How RFID Works,” on p.24).

Real-Time Visibility

The biggest impact of IT on economic activity has been the separation of information and operation. Before IT's deployment in economic activity, the information about an operation or activity was always an afterthought. Thus, information was only available to the accountants. Operation-specific information was usually isolated and not available to all. The deployment of IT changed all that.

Today, information is available at all times. For instance, even today, there are three types of activities: first, where the information lags the operation (e.g., newspaper publishing); second, where information leads the operation (e.g., weather forecasts); and third, where information and operation go hand in hand (e.g,. sports commentary). It is the third scenario that provides critical business value as it can improve utilization of assets and inventory and also help reduce waste and costs.

location of the activity, and the collector of information had physical visibility of the activity in its location. Today, most organizations employ ERP and SCM systems used by people sitting far away from the place of action. As a result, they have poor physical visibility of the actual activity or operation, along with possible data mismatch between the system and physical inventory, which results in a lack of trust in system data. RFID serves as the last-mile connector between the physical object and the IT system and provides the crucial real-time physical visibility of all the operations to a distant manager, enabling him or her to make informed decisions in a timely manner.

The Way Forward

The adoption of any technology is gradual. Of course, compared to the transition from manual to automation, the transition from one automated system to the next generation is definitely faster. Thus, while the adoption of RFID in replacing barcodes might be faster compared to the introduction of barcodes, there are many challenges that face RFID at present, not the least of which is the cost of a tag for item-level tagging.

Global adoption of RFID product code, readers and tags, along with mandates from regulators, will drive faster adoption, benefiting supply chain managers globally. Reduction of waste is aligned with green environment objectives.

Efficiencies obtained through real-time visibility will benefit customers at large through on-demand/real-time availability of goods and services at lower prices. There are some privacy concerns, which can be easily addressed through proper solution design. Similarly, there are some physics-related issues (e.g., liquid and metal barriers for RFID data reads), which can also be solved through a combination of technologies.

Unlike other IT solutions, RFID has found enormous favor from business users because they are able to directly relate to the benefits it provides. IT solution providers find that requests for RFID solutions are coming directly from the CEO instead of the CIO. As markets become more global and competition intensifies, IT has a key role to play in supporting supply chain competition. Consequently, the most effective supply chain networks are dynamic in nature, distributed in architecture and leverage sophisticated, real-time analytics.

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Intelligent Robotics: What to Expect in the Post-COVID-19 Era

The COVID crisis is prompting companies to invest in automation and robotics to better manage operations, despite facing revenue declines resulting from the pandemic.

Jordan K. Speer

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The coronavirus has dealt a stunning blow to supply chains, logistics and fulfillment, shutting businesses and economies down and revealing many of the vulnerabilities they contain. Like other epidemics and pandemics, but unlike most other disasters we commonly encounter (earthquakes, floods, tsunamis, fires, political unrest) that involve physical destruction of buildings and infrastructure, COVID-19 has wreaked havoc on supply chains because it has knocked people out of the game. Factories, warehouses, fulfillment centers, vehicles and roads are not under water or caved in on themselves. They are withstanding COVID-19 just fine.

Meanwhile, hundreds of thousands of people are falling ill globally, social distancing is the rule of the day and most non-essential businesses are temporarily (or permanently) closing their doors. Not surprisingly, consumers, sheltering in place, have quickly ramped up their online shopping. According to a consumer survey conducted by IDC from March 23-31, online shopping is up by 47%, with 35.4% expecting to spend more on retail, whether in store or online, because of COVID-19 concerns. Moreover, fears of scarcity as

expect to load up on bulk quantities of goods. The increase in e-commerce is putting extra pressure on supply chains already strained to the max, requiring as it does more individual picking, packing and shipping of goods, and increased last-mile delivery.

As business executives begin to map out immediate, near- and long-term strategies to improve fulfillment, many of them are looking to increase automation and robotics in warehouses and DCs. This will eliminate some of the risk of slowdowns or shutdowns that arise when workforces are partly or entirely knocked out of the picture.

But even before COVID-19 reared its ugly spikes, the adoption of robotics, automated material handling equipment, artificial intelligence (AI), voice, and other advanced technologies into warehouses and distribution centers (DCs) was on the rise, driven by the need to manage high-velocity operations with limited—and increasingly expensive—labor resources while meeting the ever-changing demands generated by digital commerce.

High competition for labor and talent has been a challenge for organizations across most industries for at least a decade, with businesses struggling to find and retain delivery drivers, warehouse workers, factory workers, mechanics, and retail sales associates, to name just a few of the job roles that are in constant need of people to fill them. Literally hundreds of thousands of jobs remain open in these fields. Some workers recently left unemployed by the pandemic may fill some roles in the near-term but the problem is likely to persist.

Moreover, as technology has advanced and some companies have made significant steps to automate and digitally transform their enterprises, some of the skills those new systems require are more advanced and more difficult to find or recruit. Industries that are typically regarded as less “sexy,” such as manufacturing and retail, often struggle to draw talent in technical expertise. Many of the people highly skilled in areas such as AI and analytics, automation and robotics gravitate toward Silicon Valley companies such as Facebook and Google. According to the IDC Manufacturing Insights April 2019 Industrial Talent Management Survey, industrial organizations reported that they are experiencing issues with supply chain talent and that more than 50% of the employees in this area lack skills needed to perform as required.

declines that will result from the pandemic.

In the supply chain, automation, digital connection and edge technologies such as artificial intelligence and robotics, to name a few, all integrated and working together, are critical to achieve the speed, efficiency and resiliency needed to meet both the demands of today's complex markets and to keep the lines of supply moving and open both in times of normalcy and time of crisis, such as what we are experiencing now with COVID-19. Nearly 28% of respondents to IDC's 2020 Supply Chain Survey ranked "improving supply chain resiliency/responsiveness" as a top concern driving strategic change in their supply chains.

Among the changes coming to today's supply chains, expect to see an acceleration of automation and robotics into warehouses. That will likely include more operations converting to "dark warehouses," those that operate 100% autonomously, but the greater changes will come not in eliminating humans from distribution centers altogether but in replacing non-value-added movement with automation and robotics that can speed processes and make them more efficient.

Today's intelligent robots are particularly well suited to the complex demands of omni-channel supply chains. Autonomous mobile robots (AMRs) are built with more agile navigational abilities, able to move about anywhere in a warehouse by navigating with built-in sensor and laser scanners, retrieving goods and bringing them to people. As they move, AMRs can maneuver around obstacles in their path, including people, but also can work in collaboration with people, unlike more traditional automated guided vehicles (AGVs). That's significant, because it means that AMRs can adjust to new layouts and patterns. They are not fixed.

Given the "eaches" nature of e-commerce and the variability of SKUs and orders that characterize them, this class of robots offers businesses the ability to flex and scale as needed without major infrastructure changes. This is true, too, for intelligent robot arms that are getting better at assessing a wide variety of objects in front of them and grasping with the correct force and grip. They can be used to quickly sort items into appropriate bins or packages for shipping. These two developments are particularly significant when

We are not going to wake up tomorrow and find that robots have replaced humans in the warehouse. But we are going to see robots improve the fulfillment process by eliminating labor that is redundant, physically taxing and non-value-added, and by doing it faster and more efficiently. A full 72.8% of respondents to IDC's 2020 Supply Chain Survey say that robotics will be important or very important to their organization in three years. Intelligent robotics will speed and improve the flow of goods through the warehouse and DC while freeing humans to focus on other tasks that involve human strengths such as creativity, critical thinking, fine-motor coordination and customer engagement.

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