



Improving the Manufacturing Supply Chain Efficiency Using IoT



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INTRODUCTION

The Internet of Things (IoT) is expanding at a fast pace and is now a key driver of Industry 4.0. Billions of new devices are being connected to the IoT ecosystem every day. Gartner estimates that more than half of new business systems and processes will incorporate IoT in some form or the other, by 2020. IDC estimates global IoT spending to touch \$1.3 trillion by 2019, a big jump from \$698.6 billion in 2015. McKinsey estimates the IoT to have a total economic impact of anywhere from \$3.9 trillion to \$11.1 trillion a year, by 2025.



The growth of IoT is underpinned by the recent technological advances, especially in sensor technology. The sensors of today are far smaller than before, and also cost considerably less compared to earlier versions. Broadband and 4G has evolved considerably to offer reliable connectivity. These developments make it viable to place sensors to virtually anything, to drive any process. Hitherto the high costs of sensors and poor connectivity issues inhibited the widespread adoption of sensors, even when there was a viable business case to deploy them.

All the crucial elements of the supply chain, from oil pipelines to factory floors, and from automated warehouses to shipping containers, can now be IoT enabled. It is also viable to place sensors, controllers and other IoT-enabling devices on individual products, crates, and shipping containers. Such an IoT enabled supply chain offers unlimited potential.

01 THE CHALLENGE OF VISIBILITY

Visibility into the supply chain is a big stumbling block toward organizational efficiency. IoT contributes to integrating the information flow in an enterprise, thereby improving supply chain visibility.

IoT sensors emit telemetric data, offering real-time end-to-end visibility on everything connected with the supply chain. For instance, sensors embedded ships, trucks and other vehicles enable easy and accurate tracking of the asset. Such data is

translated to the cloud-based servers, where it is subject to analytics. The resultant insights make the supply chain much more predictable and cost-effective. Manufacturers can use such insights to predict product arrival times and potential delays, reorder inventory automatically, and react instantly to changes in demand. It also enables supply chain managers and stakeholders to make the right interventions at the right time, ensuring the all-round efficiency of the supply chain.

ACTION-PLANS

1. *Integrate the supply chain data with the ERP: Integration of supply chain data with ERP harmonizes the master data of the enterprise. Such an approach facilitates strong, transparent relationships with manufacturers, suppliers, delivery teams, and other stakeholders.*
2. *Deploy Inventory Optimization Techniques: Smart manufacturers now leverage multi-item and multi-echelon inventory optimization techniques to estimate their supply in advance, paving the way to minimize investment in inventory, without impacting operations or service.*



02 THE CHALLENGE OF SLOW-MOVING SUPPLY CHAINS

As the adage goes, time is money. Very often, the shop floor comes to a grinding halt, or works under capacity, as the supply chain cannot match up with the pace of production, or key components are not available on time, owing to supply chain issues.

IoT accelerates supply chain movements and facilitates smart and dynamic prioritization. The improved insights enable enterprises to come close to the Just-in-Time and lean inventory models, reducing inventory count drastically, and in the process, cut costs.

Decathlon, the global sports retailer, uses RFID from Checkpoint Systems to automate inventory flow. The products are delivered to vendors with 100% accuracy every time. The system also ensures the items arrive shelf-ready, sparing store employees the hassle of manually checking each delivery.

ACTION-PLANS

1. *Create digital endpoints: Place IoT sensors across each element of the supply chain, to create digital endpoints. These endpoints offer rich data on product inventories, shipment locations, ambient temperatures, retail purchase rates and several other variables. Such insights help to identify and overcome pain-points and bottlenecks in the supply chain.*
2. *Devise an Inventory Processing Strategy: The efficacy of the supply chain depends on the extent to which it can meet special needs or exigencies. Devise a model where the most needed inventory parts are delivered upfront.*

03 THE CHALLENGE OF CONTROL AND FLEXIBILITY

Most supply chains are an ecosystem of disparate systems, in the hands of different partners. The manufacturer often has inadequate or even no control over supply chain movements critical to keep the shop floor running.

The specifics of enforcing greater control over the supply chain may be illustrated with the example of an electronics supply chain. The supply chain of any standard electronic goods firm is invariably complex. The mined raw materials travel to component manufacturers through pipeline, trucks, train, or any other model, often through isolated and dangerous environments. The finished parts or

products travel from component manufacturers to system assembly sites. The finished items then travel to wholesale and retail outlets, from where they travel to the end user. Each journey is entirely different, and in the control of different partners.

With an IoT enabled supply chain, the stakeholders get an accurate view of the location and stage of completion of a component or finished product, at any given point of time, and at any stage of the journey. The relevant stakeholders may make the necessary interventions to ensure operations are not held up owing to the delayed arrival of raw materials or parts, and to accelerate the delivery of a delayed product.



ACTION-PLANS

1. *Institute an automated system: An automated system may route the shipment through the best option, in terms of time and speed, once the raw material reaches a particular point, infusing flexibility into the supply chain mechanism.*
2. *Deploy sensors: Placing sensors to track movement enforces great visibility and flexibility to the process. The best approach is to deploy miniature MEMS sensors and deploy sensor fusion technology to collate information from hundreds of such multiple sensors to get comprehensive, context-based insights regarding all facets of the supply chain.*

04 THE CHALLENGE OF MAINTAINING QUALITY

Often manufacturing is affected not because of any issues in the shop-floor but because of underlying issues in the supply chain, which result in poor raw materials, delays due to non-availability of input materials, and other reasons.

IoT enabled supply chain ensures consistency in the quality of manufactured goods. Consider the case of a production machine which vibrates when

it shouldn't be doing so, and in the process adversely affects product quality. An IoT enabled digital platform, powered by advanced algorithms, could instantly communicate the deviation to all relevant stakeholders for prompt action. It could also compute the magnitude of impact, the probable quality and other losses, and the resultant shortage of supply.



ACTION-PLANS

1. *Institute Live Monitoring: Sensors, backed by live connected videos, allow managers to verify and ensure that the parts used in assembly are genuine, and the shop floor sticks to the approved methods. Connected devices and sensors, likewise, make it possible to ensure proper handling of goods, confirm if goods are stored as per specifications, and more.*

2. *Deploy a Digital Platform: A solid digital platform, such as Microsoft's Azure, enables communication between a broad range of devices and facilitates robust correlation models across the many supply chain sub-systems.*

05 THE CHALLENGE OF ENFORCING QUALITY

Cargo theft has always been a major pain-point in the logistics space.

Deploying IoT sensors to monitor and track cargo not only saves billions of dollars' worth of cargo, but also prevents hold up of the business process owing to unavailability of the required material. Manufacturers are also spared of duplication of efforts to replace the lost cargo, insurers save money they would have to spend to compensate

for the loss, and overall, the wasteful and non-productive paperwork related to lost cargo is eliminated.

The enterprise also needs to be wary of malware and other attacks on its supply chain networks. A case in point is the massive DDoS attack on Dynamic Network Services in October 2016, caused by 100,000 hijacked IoT devices.

ACTION-PLANS

1. *Invest in the Latest Security Approaches: With greater connectivity enabled by IoT, the security threats also become greater. Invest in state-of-the-art networking monitoring and anti-malware suits.*
2. *Institute an Integrated IoT Enabled Platform: Supply chains often span thousands of miles across the globe. Very often, integration issues, as the new system seeks to co-opt these diverse and disparate systems mar IoT implementations in the enterprise. IoT implementers need to invest in integration skills and technologies, to ensure successful implementation. A well-integrated system is robust, and leaves no loopholes or chances of vulnerabilities.*



CONCLUSION

IDC predicts digitally connected processes to drive 15% productivity improvements for manufacturing supply chains by the end of 2018. However, realizing such gains depends on the extent to which the underlying challenges are tackled head-on. Over and above the above-listed challenges, there are invariably integration issues, security vulnerabilities and other hurdles at each step. The IoT implementation itself involves many players, ranging from device and sensor suppliers to network operators, and from cloud service providers to application vendors, and others. It requires a competent partner who has wide exposure in the industry, to blend such multifaceted ecosystems and complexities, and roll out a robust platform which meets the objectives.

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