ITC INFOTECH

Business-friendly Solutions

Industry 4.0 technologies for enabling Autonomous and Green Warehouse

Introduction

Warehousing continues to be a key component in the overall Supply Chain Landscape as it is the interface area for Production lines, suppliers, consumers, market, and business environment.

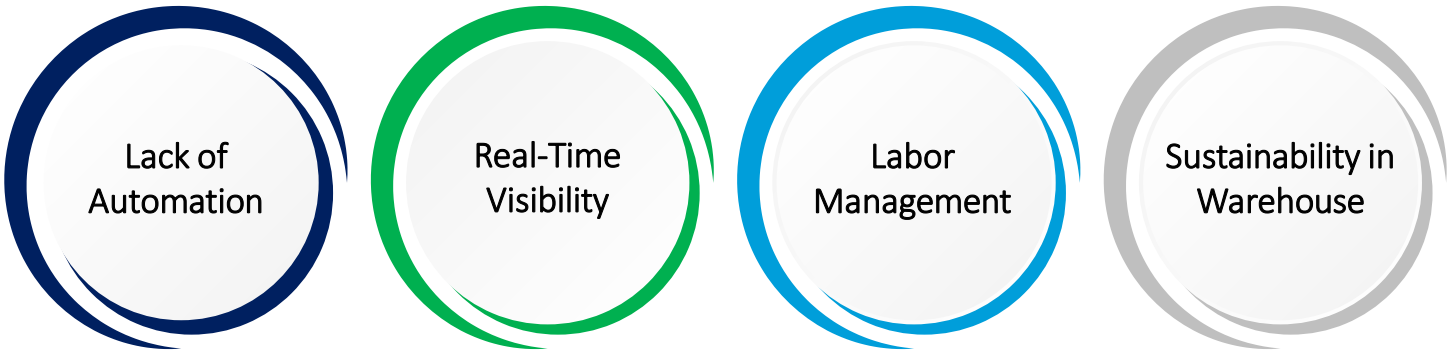
Hence, the application of Industry 4.0 technologies in the domain of Supply Chain Management in general and Warehouse Management in particular attains significant importance.

Based on the statistics given by McKinsey[1], businesses now spend approximately $350bn a year on warehousing.

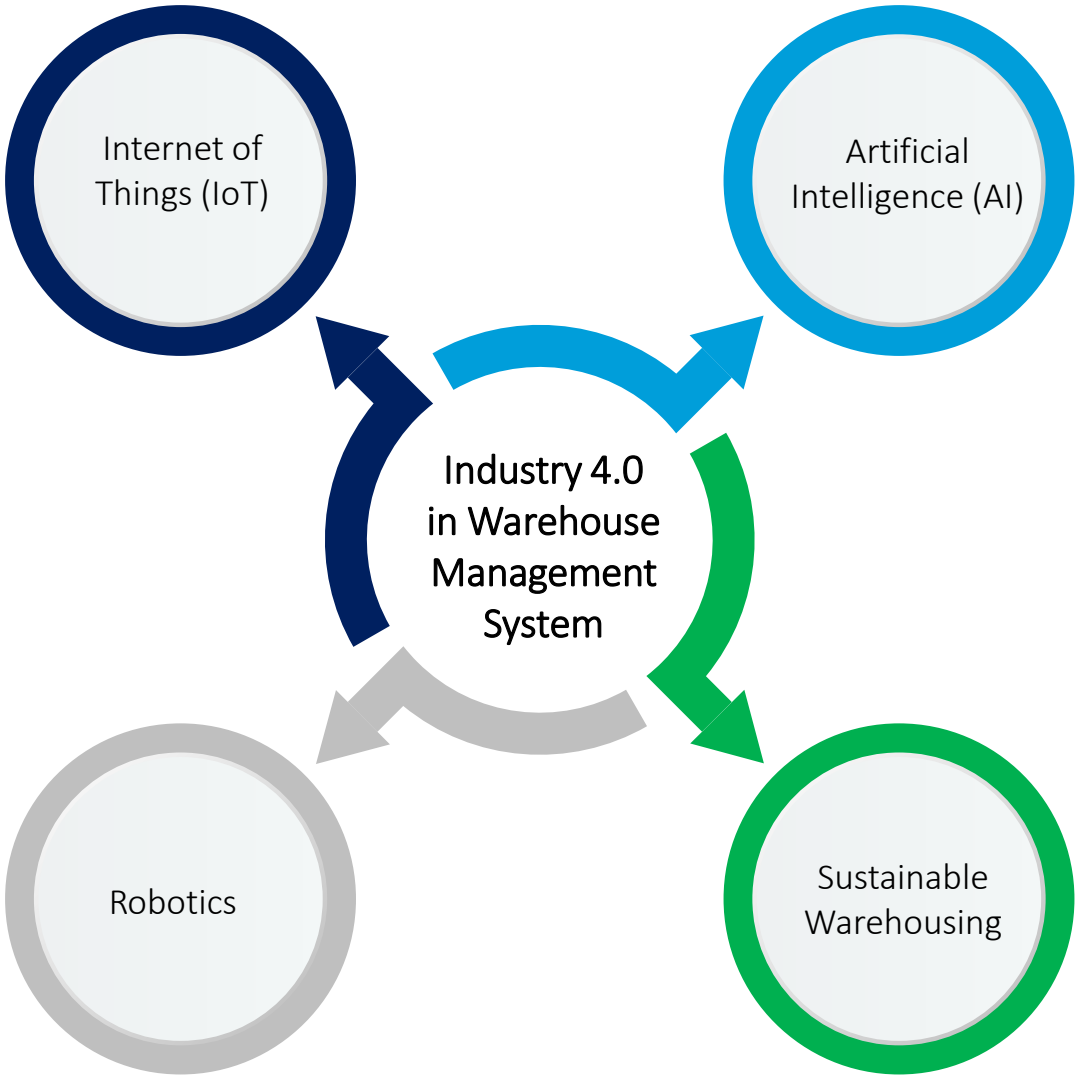
Therefore, given the quantum of investments incurred on warehousing and end objectives to optimize the Supply Chain, it is imperative that the implementation of Warehouse 4.0 to solve the existing challenges in the warehousing industry will not only improve the Ease of Doing Business and accrue economic benefits but also elevate the overall customer satisfaction levels in the long run.

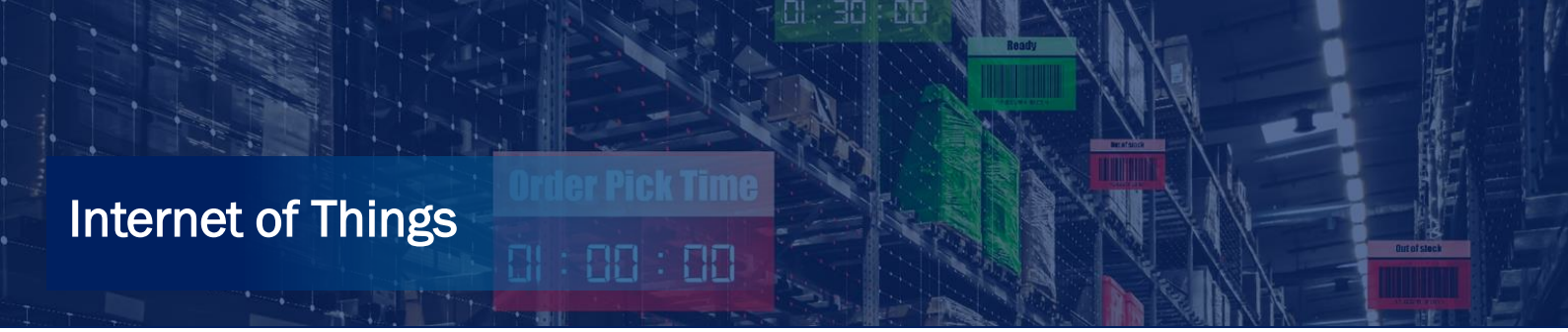
CHALLENGES

This white paper focuses on the industry's problem areas, which can be addressed through Warehouse 4.0, helping Businesses move further towards Supply Chain optimization. Some of these challenges are:



The Solutions with Industry 4.0





Internet of Things

IoT solutions in warehouse management are one of the latest trends to control and optimize warehouse processes through the network of interconnectedness.

As such, the use of IoT provides real-time visibility into the supply chain from the time the product was ordered till the last-mile delivery to the end customer.

It further helps in the intelligent automation of key processes within Inbound and Outbound Warehouse operations through the network of Drones, Sensors, Wearable Scanners, Collaborative bots, AGVs (Automated Guided Vehicles), and AMRs (Autonomous Mobile Robots).

IoT sensors can be leveraged for precise location monitoring of the items as well as Predictive Maintenance. Further, it can monitor and manage vehicles in the warehouse for Real-time process monitoring and improving safety standards.

Through the usage of Drones, complex tasks within inventory management such as Inventory audit, Cycle counting, Item Search, Buffer stock maintenance, and Stock taking can be performed, thus eliminating labor-related challenges.

Vision Picking with Smart Glasses and intuitive interfaces can help efficiently pick items and transport them to appropriate zones within the warehouse.

Overall, the application of IoT can boost the operational efficiency of businesses and result in Inventory Optimization through data-backed decision-making.

Robotics

The integration of Robotics into Warehouse Management Systems2 with more advanced sensors and powerful processing capabilities will result in Logistics Automation within the warehouse.

Automated Guided Vehicles (AGVs) are used to move supplies and inventory across the warehouse, and Autonomous Mobile Robots (AMRs) with sophisticated sensors, onboard computers, and maps to traverse dynamic warehouse conditions independently. These robots observe their environment, plan routes, and modify them in the event of any roadblocks encountered. These robots observe their environment, plan routes, and modify them in the event of any roadblocks encountered.

Cobots interact with humans in a collaborative workspace and can increase warehouse efficiency by performing recurring tasks. For instance, they can also shorten the trip time of the pickers who collaborate with them.

Artificial Intelligence

Artificial Intelligence can add necessary value addition to warehouse automation through the combination of various technologies such as AI Robots for Logistics Automation, Smart AI wearables for end-to-end item tracking, Natural language processing for voice picking, Cloud Computing to deliver computing resources over the network, Machine Learning using complex algorithms to trigger faster replenishments, shorter travel sequence, and optimal inventory positioning.

Sustainable Warehousing

In line with the ideals of UN Sustainable Development Goals, the concept of Sustainable Warehousing and Green Logistics can help in the reduction of overall carbon footprint and energy demand.

In this regard, transitioning into energy efficient design with the installation of solar panels, Motion Sensor lights, paper use reduction by automating processes like counting, receiving, picking, monitoring, and dispatching, eco-friendly Material Handling equipment, and Electric Vehicles in Transportation are some measures.

Some of the key performance indicators are:

- GHG emissions per year
- Packaging and transport materials
- Reduce, Reuse, Recycle
- Daylight Usage and Temperature control
- Utilization of Renewable Energy Sources

A comparison of the Business Process optimizations between Smart Warehouse (A), having Industry 4.0 technologies versus Traditional Warehouse (B) will highlight an increased productivity and efficiency in the processes of receiving, storing, and distributing items in the former. For instance,

Traditional Warehouse (B) suffers from the issues of manual processes, lack of real-time visibility and traceability, labor intensiveness, and unsustainable energy usage that renders it obsolete in the present age of Smart Automation.

On the other hand, Smart Warehouse (A) will provide the company with competitive advantage through the infusion of a network of Internet of Things, Artificial Intelligence, Robotics Process Automation, Cloud computing, and Green technologies. Further, the usage of the Cloud will provide adequate Data Security, Scalability, and flexibility with the ability to run Enterprise Apps anywhere.

Though the substantial initial investment, availability of new skills and expertise, and maintenance costs for sophisticated systems will be a challenge for Warehouse (A) vis-à-vis Warehouse (B), however, Warehouse (A) will have the economies of scale and achieve the twin objectives of efficiency and costs from a long-term perspective.

Way Forward

Warehouse 4.0-powered solutions are at the core of the Supply Chains of the 21st century, helping businesses to increase their operational efficiency and better address growing customer demands. Smart warehouses today have much higher throughput, better precision, and maintain better control over warehouse resource usage, optimize the use of space, and inbuild basic green practices.

Further, impressive ROI provided by automation will result in reduced labor cost, higher performance, optimized handling, and storage cost, minimized inventory errors, eliminated risks of mishandling and product loss, and seamless business operations, thus reducing overall operating costs and increasing the turnover globally.