Applying Internet of Things for Enhanced Efficiency in Supply Chain Management: A Case Study of Nestlé

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1 Introduction

Supply chains are growing more complex across globalized operations and interconnected partner networks. Managing the flow of inventory, information, and funds between myriad entities has also become extremely challenging. The Internet of Things (IoT) has become a game changer for various industries, including supply chain management (SCM) by dramatically improving real-time visibility and coordination. By embedding IoT devices into assets such as products, vehicles, and warehouses, organizations can gain real-time visibility into their operations, optimize resource utilization, and enhance overall efficiency. This paper delves into the application of IoT in SCM, highlighting its transformative potential by presenting a detailed case study of Nestlé, a global leader in the food and beverage industry, which has successfully implemented IoT solutions to revolutionize its supply chain operations.

2 Case Study: Nestle's IoT Transformation

In recent years, Nestlé, a prominent figure in the food and beverage industry, has orchestrated a paradigm shift in its supply chain management (SCM) methodologies through the strategic adoption of Internet of Things (IoT) technology. By judiciously integrating IoT sensors and data analytics, Nestlé has ushered in real-time operational insights, yielding marked enhancements in efficiency, waste reduction, and customer satisfaction.

2.1 Preserving Product Integrity through Real-Time Temperature Monitoring

The critical imperative of safeguarding the integrity and safety of perishable goods has prompted Nestlé to deploy IoT sensors within refrigeration units and transport vehicles. These sensors continually capture real-time temperature data, furnishing Nestlé with comprehensive visibility into the environmental conditions enveloping its products during transit and storage. This proactive approach empowers Nestlé to promptly identify and address potential temperature anomalies, preventing spoilage and ensuring the delivery of fresh, high-quality products that align with stringent safety standards. Nestlé's adoption of technology has not only improved the quality of its products but has also strengthened its image as a trusted provider of safe and dependable food and beverage offerings. (Press, 2016)

2.2 Optimising Inventory Management for Enhanced Efficiency and Cost Reduction

Nestlé successfully addressed issues, with stock shortages and excess inventory by incorporating sensors to achieve real-time transparency into its inventory

levels. By continuously monitoring stock levels across its warehouses and distribution centres, Nestlé can refine its replenishment strategies, ensuring optimal stock levels to fulfill customer demand without incurring excess inventory storage costs. (Press, 2016) This data-driven approach has streamlined Nestlé's inventory management processes, culminating in reduced costs associated with stockouts, overstocking, and surplus inventory handling and storage. Furthermore, the enhanced visibility into inventory levels has facilitated seamless coordination across various supply chain stages, fostering smoother operations and heightened overall efficiency.

2.3 Elevating Customer Service through Real-Time Tracking: Cultivating Customer Loyalty and Confidence

IoT technology has emerged as a pivotal enabler in augmenting Nestlé's customer service operations. By harnessing real-time data gleaned from IoT sensors, Nestlé can meticulously track the whereabouts of products throughout the supply chain, affording customers accurate delivery estimates. This augmented visibility has substantially bolstered customer satisfaction by keeping them abreast of their order progress and mitigating uncertainties about delivery timelines. Nestlé's unwavering commitment to transparent and proactive communication with customers has engendered stronger relationships and cultivated customer loyalty. Customers value the capacity to track their orders and receive punctual updates, underscoring the company's dedication to delivering exceptional customer service experiences.
Overall, Nestlé's astute integration of IoT technology has reshaped its supply chain dynamics, ushering in a new era of operational agility, cost efficiency, and unwavering customer focus.

3 Benefits Derived by Nestlé as a Result of IoT-Enabled Supply Chain

With its expansive global footprint spanning 190+ countries and an extensive product portfolio of over 2000 brands, Nestlé has cemented its position as a dominant player in the FMCG industry. As a company built around "Good Food, Good Life", quality, safety, and sustainability serve as strategic pillars - with IoT playing a pivotal role. By interconnecting its complex, multi-tier supply chain using sensors, connectivity, blockchains, predictive analytics and more, Nestlé has reaped multifaceted benefits:

3.1 Operational Efficiency

IoT integrates procurement, manufacturing, logistics as well as finance functions through real-time data sharing, minimizing delays and driving productivity gains.

A fast and efficient ordering and stock-keeping inventory system that enables the availability of raw materials in time.

3.2 Traceability

Blockchain-based distributed records using IoT data from farms to warehouses help comply with food safety norms by tracing ingredients (Press, 2016).

Heightened food quality, safety, and regulatory adherence monitoring abilities along with remote monitoring of food during transport and the ability to control its surrounding conditions result in Trust and brand reputation protection (TheCodeWork Team, 2023).

3.3 Inventory Optimization

Sensors providing live production and inventory snapshots coupled with demand forecasting minimize overstocks, shortages, and waste (Damini, 2023).

3.4 Proactive Planning

Machine learning-based analysis on equipment sensor data predicts failures, automatically schedules preventative maintenance to reduce downtime.

3.5 Sustainability

IoT-enabled energy metering discovers wastage opportunities while asset tracking reduces fuel consumption, ensuring green supply practices.

By pursuing an IoT vision that transforms stock visibility, coordination, compliance, and adaptability, Nestlé continues to redefine industry benchmarks around operational resilience and responsibility - all while delighting consumers worldwide with products matching its premium positioning. The results speak volumes about the power of connected supply chains.

3.6 Customer Satisfaction

With all the IoT technology Nestle is employing ranging from cloud platforms to sensors enabling real time tracking, it allows them to be more connected with their customers allowing them to directly notify customers if weather conditions may temporarily impact the freshness or packaging integrity before delivery. Moreover, IoT data could provide insights into which production sites, warehouses, and transport routes maintain optimal conditions for different Nestlé products and their demand patterns allowing them to make informed decisions.

4 Critique and Further Applications of IoT in SCM

Nestlé has made significant strides in using Internet of Things (IoT) technology to enhance their supply chain operations. However, as with any major business transformation, there are always opportunities for growth. As a global leader, Nestlé is in a unique position to address scalability challenges, promote industry standards, and pioneer innovative applications that consider both profits and people.

4.1 Scalability Obstacles for Small Businesses

Nestlé's implementation of IoT in its global supply chain has been commendable, but the potential scalability challenges for small and medium-sized enterprises (SMEs) cannot be ignored. The upfront costs for technology, infrastructure, and training can be a significant barrier. Nestlé can proactively address this issue by developing tailored IoT solutions that are modular and flexible. Customized packages with essential features at each stage of digitization could enable smaller firms to adopt IoT progressively without compromising on security. Furthermore, Nestlé can foster partnerships with tech startups, creating an ecosystem that supports ongoing innovation and lowers entry barriers for smaller players.

4.2 Data Protection in the Face of Emerging Threats

The integration of IoT brings about a massive influx of data, including sensitive customer information, posing a risk of hacking and data leaks. Nestlé needs robust mechanisms to counter these threats and maintain consumer trust. Incorporating blockchain technology could be a strategic move, ensuring secure data encryption and traceability of access permissions. Despite the complexity, early investment in decentralized data storage and transfer can act as a preventative measure against cyber attacks. Nestlé, being an industry leader, has the opportunity to not only secure its own data but also lead the narrative in convincing partners and consumers that data protection is a core element of every IoT solution.

4.3 Interconnectivity Barriers Hindering End-to-End Visibility

As Nestlé expands its network of third-party vendors and distributors, the potential for interoperability issues in IoT platforms becomes a concern. Nestlé's influence positions it well to drive the establishment of industry-wide standards for IoT integration frameworks. Advocating for common device protocols and architectures aligned with Nestlé's technology roadmap can mitigate the risks associated with disjointed systems. By doing so, Nestlé can contribute to a seamless supply chain, reducing delays and minimizing forecasting errors.

4.4 Innovation in IoT-Enabled Sustainable Packaging

While Nestlé has focused on improving supply chain efficiency through IoT, there's an opportunity to make strides in sustainability directly through packaging innovation. Introducing smart packaging with integrated sensors can provide consumers with real-time information on food freshness, safety, and waste reduction. By closing the loop with usage data, Nestlé can not only enhance consumer awareness but also make significant progress toward achieving corporate sustainability goals. This bold step can position Nestlé as a pioneer in sustainable practices within the food and beverage industry.

4.5 Preparing the Workforce to Adopt IoT Collaboratively

Recognizing the potential of IoT to enhance, rather than replace, human decision-making in supply chain roles is crucial. Nestlé can take a proactive stance in change management by implementing upskilling programs. These programs would ensure that personnel across departments view technology as an integrated tool, enhancing their existing expertise. User-centric AI interfaces can empower various roles within Nestlé, from load planning analysts to warehouse managers, enabling them to make informed decisions based on real-time data. By championing strategic adoption of IoT, Nestlé can demonstrate that it liberates the human workforce, making them more responsive and impactful in their roles.

5 Applications of IoT Concepts to Other Business Functions

5.1 Predictive Maintenance in Manufacturing

Similar to supply chain visibility, embedding sensors in production equipment can provide critical operational data to enable predictive maintenance. This allows issues to be addressed proactively before downtime occurs. Nestlé could implement this across its manufacturing plants, reducing costs and improving productivity.

5.2 Enhanced In-Store Experiences in Retail

IoT technology can be leveraged to transform brick-and-mortar retail, providing personalized promotions based on customer data and movements in store. Digital shelf labels and RFID product tags enable dynamic pricing, inventory management and enhanced shopping convenience. Nestlé has an opportunity to partner with retailers to pioneer experiential stores embedded with IoT connectivity.

5.3 Usage-Based Insurance Products

The data insights from IoT devices can allow insurance providers to offer policies priced specifically according to asset usage rather than estimates. For transportation companies that Nestlé depends on, having IoT integrated vehicles can qualify them for significant discounts. Nestlé could collaborate with insurers to advocate such products to its supply chain partners.

In conclusion, Nestlé is pioneering IoT in supply chain, but smart manufacturing, dynamic retail and innovative insurance present more areas ripe for transformation. With Nestlé's scale, it can drive change across multiple functions and industries, accelerating ROI.

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