

Impact Of Apparel Supply Chain Optimization On E-Commerce

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I. Introduction

E-commerce extends beyond online trading and shopping; it represents a transformative shift toward operational efficiency across all levels of business. Apparel manufacturing companies face immense pressure to remain competitive, particularly as labor costs continue to rise. In Bangladesh, for example, a government mandate requires a wage increase for garment workers every five years, with the most recent update imposing a 51% increase. While this mandate is essential for worker welfare, it exacerbates manufacturing costs without providing industry-specific support to offset these increases. Although there are options for reducing overhead, such as more affordable power supply alternatives or potential tax reductions for investors, apparel manufacturers still face significant operational costs, particularly due to inconsistent access to electricity and natural gas from the national grid.

Consequently, manufacturers often invest heavily in alternative energy sources to maintain production consistency, which is both costly and unsustainable in the long term. To address these challenges, manufacturers are increasingly focusing on cost reduction through supply chain optimization. Inefficient supply chains, often due to inadequate information flow, lead to higher costs, such as expensive air freight for urgent shipments. To enhance visibility and streamline processes, integrating e-commerce into the apparel supply chain has become a crucial strategy. By digitizing information flows, e-commerce can facilitate better supply chain management, reducing lead times and minimizing logistical costs.

II. Literature Review

Optimizing the apparel supply chain in Bangladesh presents unique challenges, largely due to political and bureaucratic issues that increase operational costs. Effective supply chain management (SCM) is essential for coordinating procurement, production, inventory, and delivery schedules, all of which are critical to the e-commerce sector. SCM is often regarded as the backbone of e-commerce, serving as a crucial component for achieving business agility and responsiveness.

According to Ganeshan and Harrison [1], SCM functions as a network of facilities and distribution channels, handling material procurement, production, and the distribution of finished products to end customers. Lee & Corey [2] further elaborate that SCM integrates activities across facilities, from raw material procurement to transforming them into final products and distributing them to consumers through established networks. Christopher [3] defines SCM as a network linking upstream and downstream organizations involved in processes that add value through the transformation of products and services, ultimately reaching the end customer.

Effective SCM extends beyond organizational boundaries, requiring the strategic alignment of business functions within individual firms and across entire supply chains to enhance both short- and long-term performance [4]. Best value supply chains, which prioritize strategic SCM, excel in critical dimensions like speed, quality, cost, and flexibility [5]. Despite its value, there is limited understanding of how certain theories distinguish these chains, making them exceptionally successful.

SCM has evolved significantly since its inception over a decade ago, reflecting changing business priorities. In the 1970s, companies focused on manufacturing costs; the 1980s emphasized quality and delivery time; the early 1990s shifted to customer service; and by the late 1990s, environmental compatibility became a

focus. Now, the SCM emphasis extends beyond individual firms to encompass the entire supply chain, facilitating efficient collaboration in today's knowledge-based economy [6,7,8].

In the fast-paced modern business environment, adaptability is crucial. For e-business, agility is essential in software infrastructure, as changes in the business landscape require swift adjustments. Zhang Shensheng highlights that their e-business solutions, which include the HuiQing Agile Supply Management System, are built on a foundation of agile methodologies designed to keep pace with dynamic business needs [9]. The impact of e-commerce on the supply chain is greatly obtained and proved in the apparel manufacturing organization [10]. It has some other effects on the supply chain [11].

III. Results And Discussion

E-commerce offers a streamlined experience for buyers through enhanced product visibility and simplified purchasing processes. When a buyer navigates an e-commerce website, they can browse product options, access detailed specifications, and view pricing and categorization information, allowing them to make informed purchasing decisions. Once a customer selects a product, the system provides a summary and initiates the checkout process. Upon confirming the purchase and providing shipping and billing details, the buyer receives an invoice confirming their order.

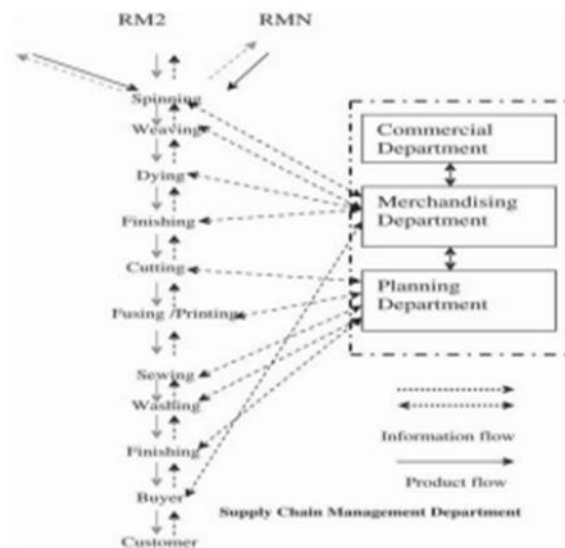


Figure 1: Garments Supply Chain



Figure 2: Centralized Database System



Figure 3: Database System For Retailer

Figure 4: Database System For Supplier

Figure 5: Database System For Manufacturer

ID	Buyer					Supplier					Manufacturer				
	Buyer Name	Buyer Address	Buyer Contact	Buyer Email	Buyer Phone	Supplier Name	Supplier Address	Supplier Contact	Supplier Email	Supplier Phone	Manufacturer Name	Manufacturer Address	Manufacturer Contact	Manufacturer Email	Manufacturer Phone
1															
2															
3															
4															
5															

Figure 6: CDS

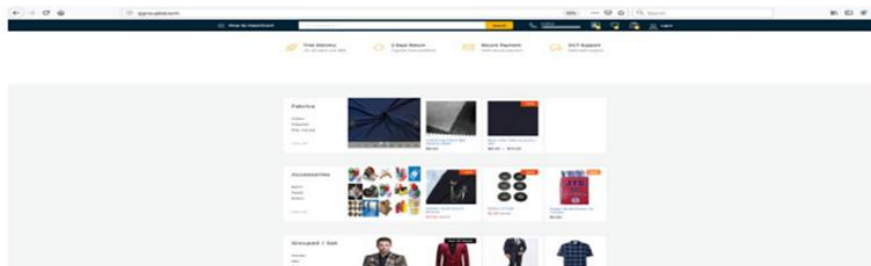


Figure 7: E-Commerce Website

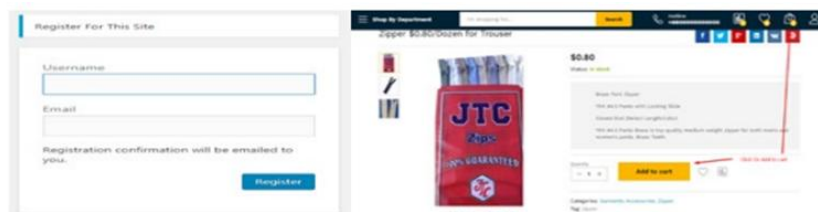


Figure 8: User Login And Product Selection



Figure 9: Adding Into Cart And Billing Address

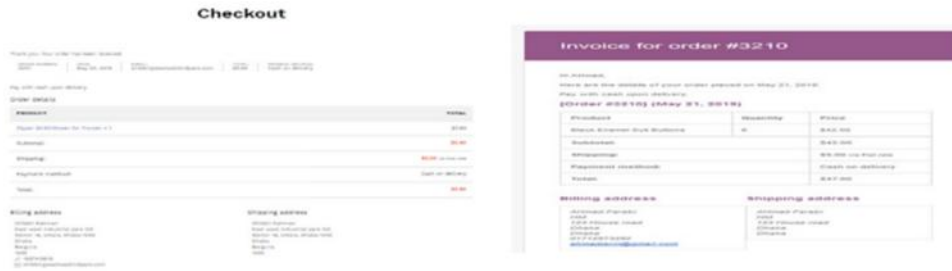


Figure 10: Check And Invoice For Orders

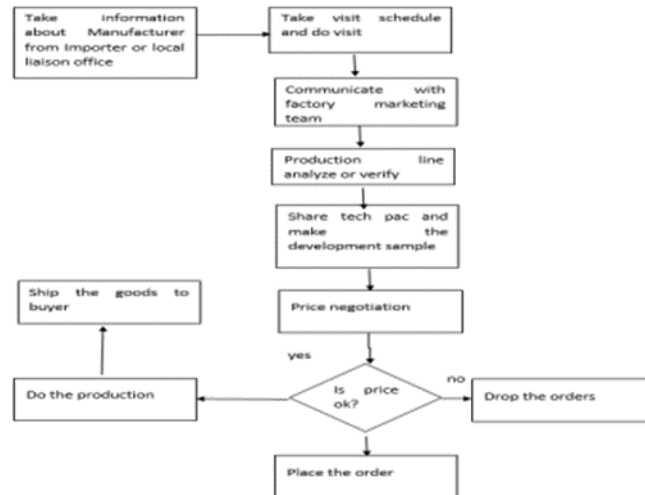


Figure 11 : Current Flow Diagram Of Order Placing Method



Figure 12: Proposed Flow Diagram Of Order Placing Method

The current order-placing system, compared to the proposed e-commerce-enhanced system, demonstrates marked differences in efficiency. Traditional ordering often relies on manual email confirmations, causing delays. The proposed centralized database system (CDS) addresses this by allowing all supply chain stakeholders—manufacturers, suppliers, and retailers—access to a shared online ordering platform. By adopting this approach, order placements can be confirmed faster, reducing lead times and improving the overall responsiveness of the supply chain. This improvement is visualized through Figures 11 and 12, which compare the existing and proposed ordering methods, highlighting the benefits of a digital, e-commerce-based approach.

IV. Conclusions And Recommendations

The study underscores the potential of a centralized database system for optimizing the apparel supply chain, particularly when developed through platforms such as WordPress. Figures 2 and 3 illustrate how the CDS will streamline order processing, enabling customers to place orders directly through an online portal. Unlike traditional email-based confirmations, the CDS provides real-time updates and stores detailed records of all orders in a centralized database, accessible to all supply chain participants.

By creating an online ordering system integrated into the CDS, the apparel industry can achieve a smoother and more transparent supply chain. This digital transformation allows both manufacturers and suppliers to input and access essential data, improving information visibility and reducing delays. The adoption of an online, e-commerce-based platform is a critical recommendation for apparel manufacturing organizations aiming to enhance efficiency in their supply chain operations. Through a more agile, responsive system, the industry can address the challenges of rising costs and stay competitive in the global market.

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