

Digital Transformation in Supply Chain Management
of
Tiger IT Bangladesh Limited

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A report submitted to the BRAC Institute of Governance &
Development in partial fulfillment of the requirements for the
degree of Masters in Procurement & Supply Management

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I affirm the honesty and integrity of this work and take responsibility for its originality and adherence to academic standards.

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LETTER OF TESTIMONIAL

To,
Dr. Amitabha Chakrabarty
Professor
Department of Computer Science & Engineering
BRAC University

Subject: Submission of the Report on ‘Digital Transformation in Supply Chain Management of Tiger IT Bangladesh Limited

Dear Sir,

This is my pleasure to display my report on “Digital Transformation in Supply chain Management of Tiger IT Bangladesh Limited” which I was appointed by your Direction.

I’ve made every effort to complete the report with the required information and proposed recommendations in a concise and thorough manner to the best of my ability.

Sincerely Yours

MD.KAMRUL ISLAM
ID: 22382029
BRAC UNIVERSITY

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to Almighty Allah for granting me the resiliency and guidance to successfully done this report within the specified time frame.

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Furthermore, I am grateful to the entire United Group for providing me with the opportunity to collaborate with them. Thank you for offering valuable information and insights that were essential for the completion of this report. Your cooperation has been pivotal in enriching the content and ensuring its relevance and accuracy.

Sincerely

MD.KAMRUL ISLAM

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Executive Summary

This report focuses on Total digitization of supply chain management of Tiger IT Bangladesh limited. Tiger IT Bangladesh Limited is a software product-based company.

Tiger IT Mainly sales solution based technical hardware and software to government and Privet companies in Bangladesh and Abroad. Therefore, to ensure the right quality at right time is very crucial for Tiger IT Bangladesh Limited. But Tiger IT is practicing the regular process of supply chain management system.

The report is mainly focuses on Digital Transformation in Supply Chain Management of Tiger IT Bangladesh Limited. The report will then take a deep dive into modern information technologies and how they have affected the way supply chains are managed and run. This will allow us to consider both the positive and negative impacts of what they have brought to an organization and the various strategies used to implement these technologies. We feel this is important as it is highly likely that an organization will change its strategies to fit with modern IT due to the high rate of competitiveness in the industry.

The report will provide a complete diagnosis of the current and future state of the organization's supply chain. In addition, it will provide insight into what supply chain management actually is and the impact and importance it holds in the organization. This will be done in correlation with the software-based company and the effects on its business, marketplace, and customers.

Keywords: IT Based, ERP, RFID Technology, Digital SCM, SCORE, SWOT.

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List of Acronyms

API: Application Programming Interface

B2B: Business to Business

CAD: Computer-Aided Design

CIS: Customer Information System

CPFR: Collaborative Planning, Forecasting, and Replenishment

CRM: Customer Relationship Management

CTI: Computer Telephony Integration

DBMS: Database Management System

EPC: Electronic Product Code

EPS: Electronic Product Code: EPC global Network

ERP: Enterprise Resource Planning

FIFO: First In First Out

GDT: Global Data Synchronization

GTIN: Global Trade Identification Number

ID: Identification

ICT: Information and Communication Technology

IOU: Internal Order Unit IT: Information Technology

KPI: Key Performance Indicator

MEIS: Marketing Expenditure Incentive Scheme

OOP: Object-Oriented Programming

OTIF: On Time In Full

SCM: Supply Chain Management

Chapter 1

Introduction

The purpose of the report is to reveal the present scenario of supply chain in Tiger IT Bangladesh Limited and to showcase how digital transformation can make it competitive in today's world. Also, to fathom the current situation of digitalization in the business world in Bangladesh. Digital supply chain will be a new concept in Bangladesh and there are very few organizations working on it so far. The report centers its focus on supply chain management aspects and does not talk about management of other core functional areas in Tiger IT. This report will also help us to compare the way the supply chain activities are being done now and how better they could be done in a digitized system.

The report will begin by trying to set out a clear definition of what the virtual supply chain actually is, using examples to illustrate key points. It will then consider some of the problems inherent in coordinating the movement of goods in a virtual environment, specifically in relation to work already done on coordination in physical environments[1]. Finally, the report will attempt to draw together the ideas discussed and suggest some possible avenues for future research in this area.

1.1 Overview of Tiger IT Bangladesh Limited

Tiger IT Bangladesh Limited was established in 2000 and it is a reliable and efficient private limited software company. It is renowned for developing integrated and intelligent enterprise solutions which are considered to be suitable for Bangladesh business perspective. It has specialized in utilizing emerging and cutting-edge technology to deliver sustainable products and services in local and global markets. Some of the unique characteristics of Tiger IT Limited are innovation, dedication to sustainable development, and cost-effective solutions.

As an ITES provider, Tiger IT is working to provide services in various sectors at home and abroad. These sectors include health, education, finance, government, and primary industries. Health, education, and government will be the sectors through which modernization will be brought to Bangladesh[18].

Chapter 2

Overview of Supply Chain Management

Supply Chain Management (SCM) plays a significant role in organizations today. There has been a developing interest in the area as companies look to further develop the processes involved in their supply chain.

The supply chain has taken a number of definitions over the years, by both scholars and practitioners. Most commonly, it is defined as the management of a network of interconnected businesses involved in the provision of product and service packages required by end customers (Harland,1996) [1]. These processes will be guided by the organization whose product is being moved and will look to maximize value for the consumer as well as competitive advantage for itself (Christopher, 1998) [2].

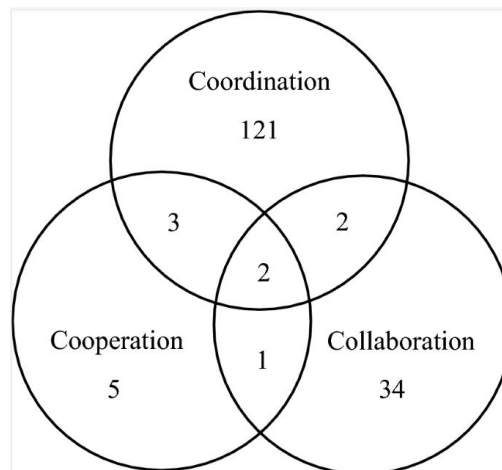


Figure 2. 0: Supply Chain 4C Model [1][2][11]

2.1 Overview of Procurement and Supply Chain Management in the IT Sector of Bangladesh

The supply chain is all the activities associated with moving goods from the manufacturing stage to the end user (i.e. the customer). This includes procuring raw materials, production, distribution, and after-sales service. In today’s global economy, supply chain and purchasing professionals are being called upon to play a broader strategic role to help drive increased value for their companies. Although the sector was smaller than that of India, its growth was second to none. The industry plays a key role in economic growth and poverty reduction in Bangladesh [3].

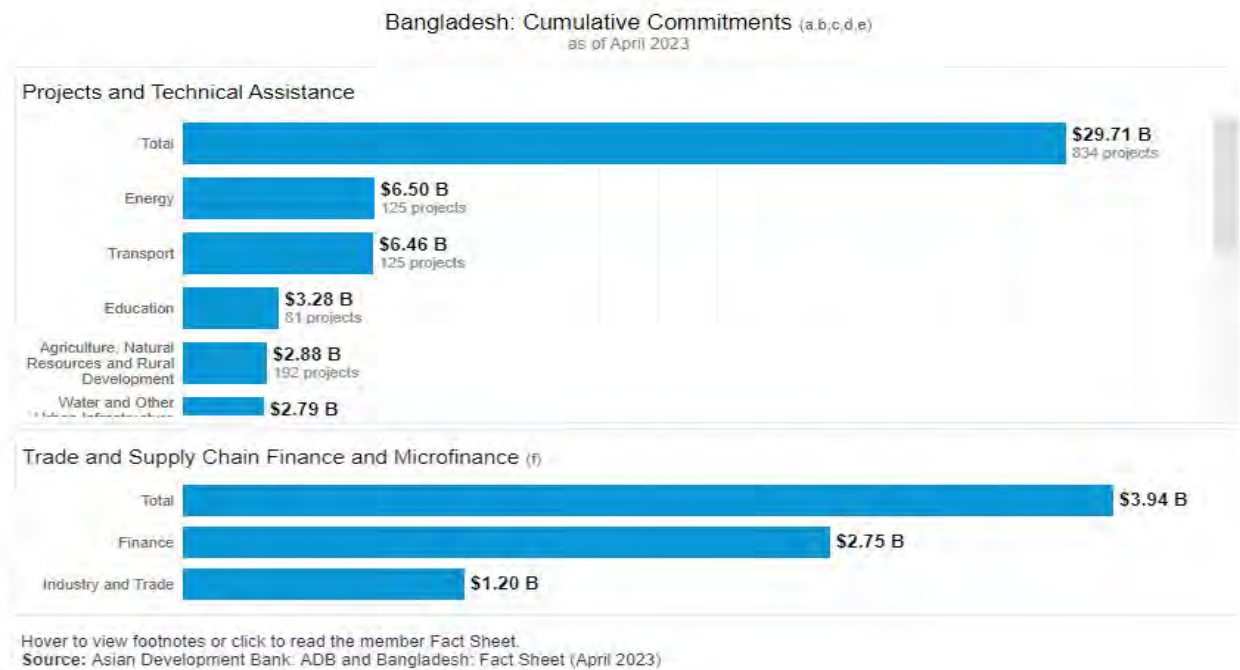


Figure 2. 1: Overview of Procurement and Supply Chain Management in the IT Sector of Bangladesh [2][3][6][16]

Companies in Bangladesh deal with procurement and supply chain activities at an operational level and do not consider strategic procurement a key to achieving a competitive advantage. One of the constraints to strategic procurement is the inability to understand the difference between strategic and operational procurement. Hence, for IT companies in Bangladesh, cost avoidance is more important than cost reduction.

2.2 Global Trends and Best Practices of Procurement and Supply Management in IT

Instead of idealizing traditional methods and stakeholder configurations at dubious incremental savings, globally competitive IT vendors must contemplate how to cooperate coherently and hand in hand in their purchasing strategies, and tackle existing roadblocks and bet on radical revolutionary changes. Purchasing specialists will be on the rise across the world and will comprise future generations of supplier leaders. The trends in regard to the buying of commodities and services are a rapidly changing area, which is more so when it comes to cross-border operations[2].

Global trends and best practices of procurement and supply management in IT. Despite adversity and negative economic knock-on effects arising from the business environment in 2010, some IT suppliers reported sales growth. The global IT industry generated successful sales of surplus to \$3.4 trillion last year[10]. The world's largest retail chains for the year 2010 have achieved annual sales of goods and services estimated at \$4.3 trillion[7]. Global procurement trends are changing at an alarming rate as supply stakeholders are forced to reconsider their present procurement operations, should they wish to remain competitive in the future across global and regional markets[3].

Countries	CAGR through 2034
Australia	12.20%
Japan	9.90%
China	9.20%
Germany	8.10%
The United States	5.50%

Table 2.2: Global scenario of Procurement and Supply Management in IT [16][3][6][12]

2.3 Digital Transformation in Supply Chain Management

Digital transformation is defined as the process of using digital technologies to create new, often modifying existing or ceasing outdated business processes and customer experiences to meet changing business and market requirements. This re-creation of business models and processes is a response to the digital era, in order to best engage with customers and meet their needs, as they are now the driving force in today's markets. It can also mean changing the way the product is marketed, looking into the whole customer interaction process, and it can even alter the manner in which value is captured by the customer [5]. The goal of digital

transformation is to find new ways to create value for customers, and adopting technology often seems like the best means to do it.

2.4 Benefits of Digital Transformation in Supply Chain Management

A vital method of sharing information is through the automation of processes between supply chain partners. This can take various forms such as automated data capture using RFID technology, Electronic Data Interchange, or the use of decision support systems to automate managerial decisions. RFID technology has provided a means of capturing supply chain events in real time. This can lead to great improvements in supply chain visibility as demonstrated in a study by Kumar [6]. EDM solution providers such as web methods or TIBCO provide platforms for the integration, assembly and deployment of SOA based applications and a Business Process Management platform, whilst various ERP software provide integration platforms and middleware to develop customized solutions. The SOA platform replaces the previous solution of building specific interfaces to link Lancelot's ERP with TIGER's own application[13]. This proved to be costly and inflexible due to the constantly changing nature of ERP systems. By making use of the middleware and customized development, Lancelot has greater ability to adapt to changes in their business process using TIGER's application, and also to develop more innovative solutions. Ultimately this will improve the speed and reliability of information exchange between the two companies.

Chapter 3

Role of Digital Transformation in Tiger IT Bangladesh Limited

The aim of digital transformation in any organization is to reduce human intervention, increase the quality of product or service, and increase productivity, thereby increasing profitability in the long run. The same is also true for Tiger IT Bangladesh Limited. Tiger IT is the developer of TORUS, a product for supply chain. Tiger IT has its own supply chain, which is used for in-house purchases and sales, and has a separate warehouse for all activities related to the supply chain. They procure goods as and when necessary and expect the supplier to provide the goods within a fixed duration of time, usually with a verbal agreement. If the supplier does not deliver, they would cancel the order and procure the goods from someone else. This method of supply chain requires analysis in each activity and a way to match it with the most efficient method.

3.1 Current Supply Chain Management Practices at Tiger IT

Tiger IT Bangladesh Limited follows a traditional supply chain system with no advanced technology, which results in misallocation of products, poor inventory management, and stockist's ability to return unsold products. Products at different stages of the supply chain are not properly documented, resulting in poor tracking ability. High error & High cost occurrence often results in stockist returns of wrong products. There is high paper flow, and this accumulates to high hidden indirect costs. Tiger IT supply chain management system is a major underpinning of its sales and demand prediction systems. There is no independent forecast of sales, and products are indiscriminately pushed to the next higher-level stage in the supply chain. All these problems result in high product return from the stockist to the company. Due to the misallocation of products, there are also stockout situations of products resulting in revenue loss. At present, there are no performance benchmarks of supply chain cost and time. This makes it difficult to quantify and realize the benefits of suggested changes to the supply chain system.

3.2 Opportunities for Digital Transformation in Tiger IT

There are a number of technologies that are new to the field and have provided supply chain improvements. One technology is tracking systems that employ RFID and GPS technology to track goods throughout the supply chain. RFID tags replace barcodes in that they store a unique serial number and can be encoded with other information about the product. GPS tracking can be used to track the location of trucks and provide an accurate estimated time of arrival. Both RFID and GPS technologies can reduce the degree of stockouts and can lower overall inventory costs. Another technology that has widespread implications on the supply chain is the internet. Tiger IT is always trying to build different kinds of software, and with a digital library, tasks can be understood and completed more effectively.

3.3 Implementation Challenges and Risks

Simulation and modeling techniques can virtually create the supply chain in its entirety. This means that changes and risks can be assessed in a safe environment. The disparate nature of digital supply chain systems can also make it easier to isolate supply chain areas and model specific processes [17].

At the most basic level, hardware and system failures can bring a supply chain to its knees. If a company is reliant on a single system, this could be catastrophic, and the cost of sufficient backup systems can be very high.

Creating competitive advantage is also difficult in a digital supply chain because the technology is often available to everyone. In effect, industry standard supply chain packages could make all supply chains using them look very similar. The only sustainable competitive advantage may be through accumulating and leveraging valuable data.



Figure 3. 3: Supply Chain Risk Management [1][4][12]

The implementation process of a digital supply chain is fraught with risks, some of which are unique to IT companies and require careful risk management and mitigation [7]. One of the challenges of moving away from a physical supply chain is that it can be difficult to quantify the benefits of a digital system. Return on investment may take longer than expected because initial implementation costs can be high, and there can be hidden costs in terms of process changes, business model changes, and new system costs [17].

Chapter 4

Implementing Digital Transformation in Supply Chain Management at Tiger IT Bangladesh Limited

The second step in implementing digital change is to develop a digital transformation strategy. An article by Matt Hopkins (2018) suggests that there are three major approaches to this: the brand-led approach, the operational improvement approach, and the better business approach[11]. Evident in our case study, the operational approach is the most appropriate strategy for supply chain digital change because Tiger IT Ltd is seeking to automate and improve supply chain processes, in order to increase efficiency and visibility of goods, bridging the gap between supply chain stakeholders.

Operations Reference model (SCOR) provides a unique framework that links business processes, performance metrics, practices, and people skills into a unified structure. Because the SCOR model is widely accepted as a standard tool, it can help the organization understand complex supply chain processes, compare these processes with other companies, and align the internal and external communications.

SCOR Level 1 Process Definitions		
SCOR Process	Definitions	Customer Orders
Plan	Processes that balance aggregate demand and supply to develop a course of action which best meets sourcing, production and delivery requirements	Plan Supply Chain – P1 Plan Source – P2 Plan Make – P3 Plan Deliver – P4 Plan Return – P5
Source	Processes that procure goods and services to meet planned or actual demand.	Stocked Product – S1 Make to Order – S2 Engineer to Order – S3
Make	Processes that transform product to a finished state to meet planned or actual demand	Stocked Product – M1 Make to Order – M2 Engineer to Order – M3
Deliver	Processes that provide finished goods and services to meet planned or actual demand, typically including order management, transportation management, and distribution management	Stocked Product – D1 Make to Order – D2 Engineer to Order – D3 Retail Product – D4
Return	Processes associated with returning or receiving returned products for any reason. These processes extend into post-delivery customer support.	Return Defective Product – DR/SR1 Return MRO Product – DR/SR2 Return Excess Product – DR/SR3

Table 4.0: SCORE Model [15][1][7][13]

4.1. Assessing the Current State of the Supply Chain

Analysis should be broken into both quantitative and qualitative assessments to gain an understanding of how the supply chain is performing and why. Qualitatively, it would be useful to have discussions with supply chain partners to get their opinions on what needs improvement and to also discuss the causes and effects of supply chain problems to gain a clear understanding.

The first step in improving anything is to assess or audit the current situation. It is easy to jump to solutions without a full understanding of what is being solved. This may waste resources by solving the wrong problems. Problems within a supply chain that are typically targeted for improvement are: long lead times, high inventory levels, stockouts affecting production, poor communication/collaboration with partners, incompatibility between information systems, and repeating occurrences of the bullwhip effect due to a lack of understanding the effect of changes in supply and demand (King, 2009)[8].

4.2. Developing a Digital Transformation Strategy

In a few cases, companies seem to be carrying out Information Systems strategies for no apparent reasons. Corporate planning of IS is essential in order to make decisions on what IS needs to be carried out. The majority of business today is IT-based. For many firms, IS is what helps them to accomplish the work which is through electronic means. Business strategy has become inseparable from IT strategy. Electronic procurement and supply chain integration represent a purchase of goods from an external supplier or contract services by using the internet. This can be direct purchases or indirect purchases [8]. Direct purchases involve goods that are production-related or involve services such as MRO (maintenance, repairs, operating supplies, or inventory). Indirect purchases involve purchases of goods and services not related to production, usually bought by administrative personnel. In the case of Tiger Ltd, electronic procurement would save an enormous amount of time for the company due to the procurement automation where the use of approved suppliers can be encoded. This would subsequently lead to supply chain integration.

4.3. Overcoming Implementation Challenges

Organizations often fail to consider the cultural and mindset shift that employees will need to go through to use new technology effectively. Data from a 2018 Bain & Company survey suggested that culture is an area of neglect in digital transformations [9], with culture-related obstacles cited as a top challenge by only one-third of respondents. Yet, a clearly defined culture and change management strategy is essential to ensure there is strong leadership and an engaged workforce throughout the process, and it will prevent implementation problems being purely attributed to employee resistance.

Implementing new technologies involves change, and change can be difficult within an organization. A 2019 survey reported only 24 percent of digitization efforts as successful.

Success rates were particularly low for digital manufacturing (11 percent) and digital supply chain (less than 20 percent)[13].

4.4 Improved Efficiency and Cost Reduction

Another example would be the usage of RFID (Radio Frequency Identification). RFID systems consist of a small chip and an antenna. The chip, also known as a tag, contains specific data about the item. The antenna is used to transmit the RFID signal to a reader[7]. The reader then converts the signal to a digital format and the data can be used by a computer. It is viewed as a possible alternative to bar codes (though it can be used in conjunction with bar codes). However, RFID has the ability to hold more information than a bar code and the information can be updated. Unlike a bar code, the tag does not have to be in the line of sight of the reader and information can be read from up to 100 feet away. This enables automation of various processes such as goods in and out, picking, and inventory management. Tags are available in two forms: those which can be written once and read many (WORM) and those which are reusable and re programmable [10]. The cost of RFID is continuously falling and Renault has put it to use on the tagging of returnable packaging. This has decreased their annual logistics costs by 10-15%[13]. Lastly, Renault has examined an automatic supply replenishment system with RFID between one of its factories and a parts supplier. This has the potential to greatly increase efficiency, but the system is not yet fully developed. These technologies are just a few in a long line of systems that CSC Industry has been employed or investigated to help improve supply chain efficiency for its clients[3].



Figure 4. 4: RFID-CAMCOD [2][3][4]

Improved Efficiency and Cost Reduction Efficiency is key to any business. An organization's success is often dependent on minimizing costs and saving time without sacrificing quality. The major benefit seen from digital transformation in the supply chain is the increase in efficiency, which leads to reduced costs. By switching from traditional methods such as phone calls, faxes, and emails to electronic data interchange (EDI), organizations can dramatically reduce the cost and time required to process orders. EDI is the transfer of data from one computer to another in a structured format[3]. Usually, this is done through a

network and eliminates the need for human intervention in the keying in of data. They were able to integrate their partners with the system and reduced the order cycle time to 4 days, thus reducing inventory and inventory costs[9].

4.5 Streamlined Collaboration and Communication

Transmission of data between companies eases as it is a part of automating a supply chain process and taking an outsourcing job to provide IT services, both processes which have a very high demand. This increase in data transmission and other various IT related projects between the companies translates to more work and hence an increased market for supply chain IT solutions [11]. This will benefit TigerIT as the higher demand for IT services in the supply chain will mean that solutions developed for an individual company may be used as a prototype to solve similar problems in other supply chains hence generating a more abundant and precise solution.

Facilitation of collaborative work can be seen from TigerIT's work with other IT systems solution providers for the government such as Crimson Logic and PSA. Digital transformation has increased the marketplace and competitions between supply chains and Agarwal and his partner companies realize that development is the only way to maintain or increase their market share in the industry[18].

Streamlining Supply Chain and Logistics Processes

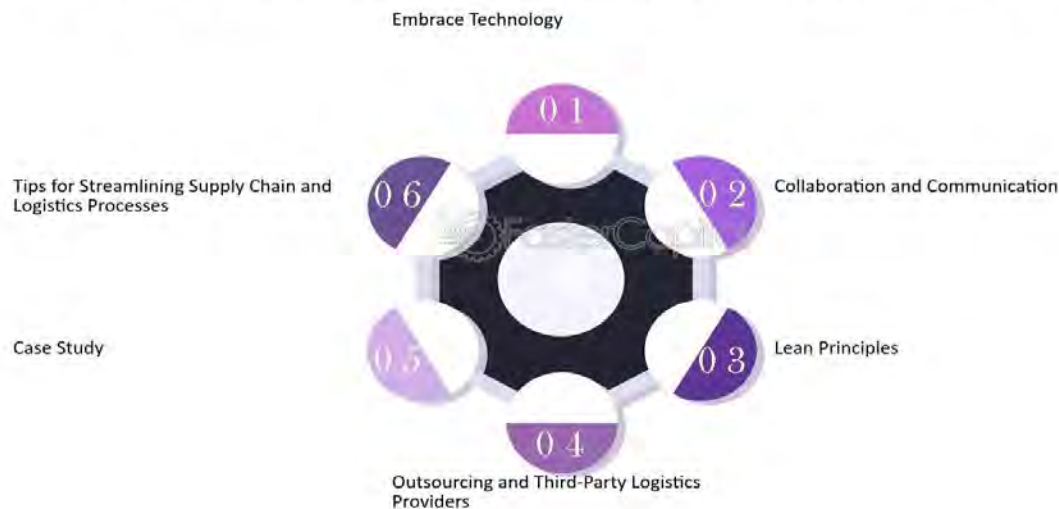


Figure 4. 5: Streamlining Supply Chain Logistic Process [7][8][9]

Benefits in faster and more reliable information transmission can be seen through implementation of technology for the clearance of shipment between regulatory authorities and providing import or export related information between the stakeholders and clients of Tiger IT. An example in the former case can be seen from the work done between Tiger IT and the SRA. The SRA is a Singapore government agency that develops and regulates the import, export and transshipment of goods [12]. Tiger IT has developed and implemented an electronic single window system which provides a common platform for the exchange of information between traders and the SRA.

Building Trust and Collaboration within the Group



Figure 4.5: Building Trust and Collaboration within the group [11][12][15]

In supply chain management, communication is extremely vital for the success of all aspects of the supply chain. It is the glue that holds everything together. Information today is flowing faster to various partners and consumers and is a determinant of the success or failure of a firm because it directly affects the ability to generate continuous improvement in customer satisfaction, the competitiveness of services to consumers and supply chain partners, and value added to the firm and its shareholders [13].

Chapter 5

Conclusion

Tiger IT, being one of the fastest growing IT companies in Bangladesh, can benefit significantly by implementing the digital transformation strategy according to the findings on the supply chain operations. Some of the key findings from the interview and the survey respondents are the major problems that take place in the organization, which are typically due to the lack of communication between the departments and no unified system to handle the supply chain operations. The findings from the interviews and the survey results suggest that none of the departments is aligned with each other in terms of their supply chain operations, which often leads to complications and failures to deliver. Finally, the lack of a system to handle the supply chain operations and various products suggest that it's time to change quite a bit. From these findings, it is evident that a change to the supply chain operations should be taken into consideration and evaluated to improve the management of the supply chain and overall increase the business efficacy.

5.1 Summary of Findings

Every successful research work needs to come up with useful information which comparatively adds new knowledge to existing knowledge. So, this research paper also presents a comparative information that how traditional supply chain can be evolved to a digital supply chain. This research work also presents the culprits of the traditional supply chain which is helpful to determine the exact reason why an organization should go for a digital supply chain considering all the risk factors and mitigations. Furthermore, the benefits of the digital supply chain give a strong indication about the success of a digital supply chain, which helps an organization to measure their expected success. This report part gives a comprehensive idea about the real-life scenario of a successful implementation. And in this case study, this paper also presents a SWOT analysis of a digital supply chain compared to the traditional one for a clear and easy understanding about the comparative success and failures [14]. This report paper also gives some clear-cut recommendations for the case study organization to follow.

SWOT	Helpful	Harmful
Internal	<p>Strengths</p> <ul style="list-style-type: none"> • Our workers are well-educated students who love books • The space is attractive and inviting • Long-term lease is at low rate • Customers are supportive of small bookstores • Popular café makes it easy for customers to linger and find something to buy 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Space is tight • Bank gave us a limited line of credit • Health insurance costs are rising • Business is slower during summer vacation • Inventory system needs to be upgraded • High staff turnover due to students graduating
External	<p>Opportunities</p> <ul style="list-style-type: none"> • We can have local authors give lectures and book signings • We can make personalized recommendations to long-term customers • We can deliver the same-day to mobility-impaired customers • We can feature things that appeal to summer tourists • We can start a frequent buyer program 	<p>Threats</p> <ul style="list-style-type: none"> • Large chains have more buying power • E-books and e-book readers eliminate need for physical books • Younger generations don't read as much • Nearby public library reopened after 2-year remodel

Figure 5. 1: SWOT analysis [10][12][14].

These recommendations are derived upon the core problems and their risk factors which are presented before. These recommendations will surely help an organization to step forward for a clear and successful implementation. And finally, after the completion of core work, this research paper concludes with a final thought of the overall success [17].

5.2 Recommendations for Tiger IT Bangladesh Limited

By improving the inventory management system, success can be achieved in bringing down the overall inventory. Usually, the production and import of IT products in the EU is locked down on specific dates. So, it is necessary to store the products in excess quantity to meet tight deadlines. If a safety stock can be stored properly in ERP and forecasting can be done, there will be no necessity to store excess quantity of products.

The internal supply chain can be improved considerably. If the company can produce the same quantity of raw materials and packaging materials and store them in excess quantity, they can prevent situations of stock out in case of any kind of unforeseen events. Usually, the suppliers of these materials are located near to the industry. In that case, they can employ the cross-docking strategy to pick and deliver the materials at a certain time when both parties are ready. Usually, the materials remain idle for several days, so they can even use the third-party logistics service to transfer and store these materials and deliver them whenever necessary.

Tiger IT can implement and adequately utilize supply chain management software that is specially designed for pharmaceutical industries. They can either modify the currently used software or implement a new software for this purpose.

In accordance with the problems that have been diagnosed, the following recommendations are made for improvement of the supply chain management of Tiger IT Bangladesh Limited.

5.3 Conclusion and Final Thoughts

This dissertation has portrayed a digital transformation of supply chain management at Tiger IT Bangladesh Limited. The author has utilized an action research methodology. The particular company is an appropriate launching pad for research and learning, as it has defined its mission to lead the government, corporate and citizens towards e-governance and total automation. The company is young and aggressive and willing to go Microsoft Dynamics Sure Step Methodology to ensure the success of their business re-engineering. Phase one of this research investigated the 'As-Is' of the company's supply chain management process of REDACTED. The current process is very loosely knitted, with much of it in working memory. Sales orders arrive through email, fax, and telephone call. Pricing and inventory availability checks are done through a distributor's website or the goods are already en-route. All of this is made into a quotation and key customers are informed. The research is beyond the scope of the author. He has established a platform at Tiger IT Bangladesh Limited to build an understanding of ERP methodology and a new generation of business process modeling. This will no doubt take the company to greater heights in the next few years. He foresees himself revisiting the company at a later stage to see how much had been incorporated in its system, i.e., a repeat of the action research cycle.

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