Report On

Product Allocation and Forecasting Process in Supply Chain Management at Transcom Electronics Ltd.

By

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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

BRAC Institute of Governance and Development (BIGD)

BRAC University

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It is hereby declared that-

1. This report is an authentic piece of work completed during my Master's degree program at BRAC University.
2. The content of this report doesn't include any material published before or written by any third party, without where proper citation and referencing have been applied to acknowledge the original source accurately.
3. The report does not include any content that has been approved or is currently under consideration for another academic degree or diploma at any university or educational institution.
4. I have appropriately acknowledged all significant sources of assistance and support throughout the completion of this report.

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

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Non-Disclosure Agreement

This non-disclosure agreement made and entered into by and between MD. Ariful Islam, Assistant General Manager- Transcom Electronics Ltd. with BRAC University, located at Kha-208, 1 Bir Uttam Rafiqul Islam Ave, Merul Badda, Dhaka 1212, Bangladesh. The purpose of this agreement is to prevent the unauthorized disclosure of any confidential information, as outlined below.

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DISCLOSING PARTY	**RECEIVING PARTY**
MD. Ariful Islam	Anick Nath Pranta
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Letter of Transmittal

To
Prof. Amitabha Chakrabarty
Department of Computer Science and Engineering
BRAC University
Kha-208, 1 Bir Uttam Rafiqul Islam Ave, Dhaka 1212

Subject: Submission of the Report on 'Product Allocation and Forecasting Process in Supply Chain Management at Transcom Electronics Ltd.'.

Dear Sir,
This is my pleasure to display my report on '**Product Allocation and Forecasting Process in Supply Chain Management at Transcom Electronics Ltd.'** Which I was appointed by your direction.

I have 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,

……..
Anick Nath Pranta
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BRAC Institute of Governance & Development,
BRAC University
Date: April, 2024

ACKNOWLEDGEMENT

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

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His expertise and willingness to share knowledge have been instrumental in shaping the content.

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Executive Summary

Transcom Electronics Ltd, a pioneer of electrical and electronics product manufacturer and supplier in Bangladesh, has diversified its product allocation to various levels, aiming products at consumers on specific levels of society. This requires a solid forecasting demand and a good forecasting will benefit a good product allocation.

This paper aims to identify an effective product allocation and forecasting process for Transcom Electronics Ltd, taking into account product proliferation, volatility, customer demand, and stock out/overstock situations. A mock simulation and analysis will determine the effectiveness of the suggested approach.

The report touches upon several facets of possible product allocation and forecasting, pointing to some of the challenges and best practices. The paper outlines optimization problems and simulation approaches and emphasizes the importance of forecasting for those in charge of supply chain management. In terms of key findings, the authors note that “forecasting should be structured and based on statistical and mathematical methods. This is related to the notion that ‘Transcom Electronics is now in a strong position to allocate products in a better way” due to the availability of more reliable demand data and the lack of any issues with inventory.

As to improvements that could be made, it appears that better collaboration with the marketing department is needed to ensure that there is wider access to some kinds of customer data. At the same time, it may be beneficial to establish a forecast department and pay more attention to the quality of the control over the availability of historical data. Most importantly, the given paper shows that some systems could be used to make the process of forecasting as successful as possible when managing product allocation in connection to demand and supply chains.

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List of Acronyms

TEL	Transcom Electronics Ltd
TD	Transcom Digital
SNOP	sales and operation plan
SKU	Stock keeping unit
MRPII	Manufacturing Resource Planning II
ODBC	Open Database Connectivity
OLS	Ordinary least squares
MIS	Management Information Systems
MAG	Main Article Group
RAC	Residential Air Conditioner
MFG	Manufacturing

COMPANY OVERVIEW

Transcom Electronics Limited (TEL) is an existing company within the Transcom Group, which is operated by a group of dynamic businessmen in our country. It was named as Philips Bangladesh Limited. It was founded in our country in the East Pakistsan period in 1962 and used to market the products of Bangladesh Lamps Ltd. two different manufacturing companies. Bangladesh Lamps Ltd.(BLL) and Bangladesh Electronics Industries Ltd. (BEIL) Both were set up, as far is the year 1962 under the companies Act 1962 [1]. There was a joint agreement with NV-Philips Holland and a local partnership ratio of 60% Philips and 40%. But Philips Holland's company sold all of its assets to Transcom Group on 4 March 1993. In 1993 [3], Transcom Electronics Ltd.(TEL) started operating in Bangladesh by taking over PHILIPS electronics and lighting. Today, the company is one of the country's leading electronics and electrical firms, marketing and distribution of industrial lighting, consumer electronics, home appliances and professional lighting goods from renowned brands through its wide distribution [4]. Upon acquiring Philips, BLL and BEIL, the group changed Philips Bangladesh Limited's name to Transcom Electronics Limited and became authorized producing and marketing company. The TEL has been allowed to use Philips brand name as royalty basis [3].

Transcom Digital is the outlet started in the early 2005 through which TEL is retailing products directly to end consumers in the metro and urban cities. In 2008, the company re-introduced itself as “Transcom Digital” as a multi brand, multi-category retailer catering for all Electronics, Appliances and IT products. Today Transcom Digital becomes the original outlet of TEL responsible for sales and providing all TEL electronic/IT products to their valued customers [4]. Currently it is successfully running with 68 outlets throughout the country and expects to increase the total outlet number eventually. Moreover TEL has a strong Corporate Sales Team under Transcom Digital for direct sales to the corporate clients. Through the Electronics & Appliances Distribution Consumer Electronics, Home & Domestic Appliances from global brands such as Samsung, Whirlpool, Hitachi, Daikin, Panasonic, Midea, Philips, Black & Decker and home brand Transtec are sold throughout the country via a nationwide dealer network [2].

Chapter – 1: Introduction

Product allocation and forecasting process itself become a crucial part of a supply chain management. Forecasting is the prediction of the demand of a product, it will subsequently affect allocation done in the specific product. It can be classified into two types: qualitative and quantitative. Transcom Electronics Ltd is the pioneer of electrical and electronics product manufacturer and supplier in Bangladesh. The company with a very strong point out on their marketing strategy that helps them capture the market [3]. In the initial period where the company would have no full systematic marketing then they only capture the market on the natural basis which the product was being employed to consume. By that time, they usually produce products in home appliances to capture the mid and high-class societies [4]. But as of this currently things have changed where it has generated a planned marketing strategy. With this, the employee is left to deal as the market leader through the purchase of goods across the market and then allocate goods to different levels. This forces products managers, are responsible for allocating goods across a network of distribution facilities, to specify a level of service they provide to different customer segments and then translate that into operational decision variables directly affecting inventory. This will need a good forecasting demand, and it will be achieved through a good forecasting.

Chapter – 2: Literature Review

Product allocation is an important subject of supply chain management. Supply chain management is the assignment of allocating the right type and the right amount of goods from the place where they are made (manufactured) to the place where they are consumed (end user or customer) [13]. It is the management of the flow of goods and services and involves movement and storage of raw materials, work-in-process inventory, and finished goods from point of origin to point of consumption. Supply chain management also means managing the inventory in such a way that production continues and goods are delivered to the customer's satisfaction. The product allocation in supply chain managers has to take into account the local market demand and the inventory levels of their facilities [10]. We consider an organization operating a multi-echelon supply chain, where echelon is a level in the chain consisting of location of inventory and production (e.g. plant, warehouse or distribution center). Set location is the stock keeping unit (SKU) and the amount of product. Product allocation is an optimization problem, which is based on satisfying a certain objective and a set of constraints. The objective can be to maximize profit, revenue or customer service and the constraints are usually resource limitations [12]. For this paper, we look at a product allocation problem where the objective is to maximize profit and the constraints involve capacity at the warehouse and transportation of the goods from one location to another. This is a combinatorial optimization problem. Typically, product allocation is considered once a demand forecast has been made for the products. Simulation is a popular method of product allocation, as it is easy to develop, flexible, and provides a better understanding of the products and is based on forecasted demands.

2.1. Importance of Product Allocation and Forecasting

The most basic drivers of overall supply chain efficiency level include the demand forecast and the product allocation optimization followed by the potential reduction in the costs related to inventory and stock-out. Due to the absence of a formal demand forecast process that could be used to either drive the product allocation or estimate the stockout of the anticipated product, it is challenging to allocate the proper amounts of products without good forecasting [7]. “Most of the forecasts are basically non-existent or reliable and are done by a gut feel or rough estimation. It is also always overruled by short-term occurrences rather than long term

occurrence and can hardly be revised when required. It is also hard to estimate future sales, especially for the new products or product introduction, and even if possible, it is a pretty rough figure. Most importantly, there is no understanding of the product demand at an individual SKU level that results in either high or low stock level and decisions based on either changing the flow of the products. This imbalance is not felt immediately since it traverses from one provost to another and only felt weeks or months later when members and days later when the customers cannot access the product. Two issues have been liquidated at Transcom regarding the product allocation and forecasting, and it is a high-volume product characterized by excess inventory and low-volume product characterized by high stock-out costs. The product level is determined by pushing the product to the next level in fear of it not being available and a fear that it might be lost when the supplier does not believe that the product is enough . In the case of the distributors, the product availability causes Transcom to hold extra stock so that it is available to meet their desired service level. While a high level of product makes the product to be seen by the customer and causes the high sales, it also causes the high level of the product stock-in level to be high too. This is the same case as a high volume that causes the product to be seen and will lead to high product inventory. However, for low volume, the fear of the product allocation cost caused the firm to avoid pushing the product to be available. Stock-out costs are an opportunity cost of a lost sale that is not well measured at Transcom but known to be quite significant. If stock out and inventory cost is the opposite of the other while the product allocation can save the cost by having a high stock in one, the cost of the product high sales boost is highly minimal [3], [4], [14].”

2.2. Product Allocation in Supply Chain Management

The analysis of allocation problems of products into different markets is common in marketing research and has been studied by a number of researchers in the context of Supply Chain Management. A competitive environment where several firms are selling similar products into the same market has been addressed by DeSarbo et al. and Fader et al [6]. They model the choice of customer and product market as a game where the firms are attempting to maximize their own market share given the sizes of the markets.

Product allocation is an important element of supply chain management. This is due to the complexities surrounding allocation: many companies deal with multiple products that may be sourced from different points and then shipped to the same location. Each product may have differing goals and constraints. Goals may range from profit maximization to market share to establishing a strong brand identity. Constraints can be financial, such as a budget on marketing or transportation, or a constraint may be to enhance the public image of the company by shipping environmentally friendly products. Production and distribution decisions must also be integrated. In some cases companies may be producing the product as it is being shipped to the location, while in other situations a product is being shipped from a central location that it was produced or stored at [5].

2.3. Forecasting Methods in Supply Chain Management

The practice of forecasting within the environment of supply chain management is a well-entrenched and widely accepted business activity that directly affects an organization's ability to satisfy their customer demand [5]. Forecasting has a major impact on the supply chain process as a whole as it affects the manner in which a company will make both short-term and long-term decisions. For example, if a company forecasts high demand for a particular product, then their production of this product will increase, thus leading to increased inventory levels, increased inventory holding costs, and increased lead times on the product. Similarly, forecasting high levels of demand has significant implications on the allocation of products to different market segments. Forecasting is the basis for estimating future sales and determining the appropriate allocation of products. The allocation of a product refers to the decision of how much of a product should be available at different points in the supply chain. These decisions are critical to the financial success of a product and to the customer service provided. High levels of product availability increase the level of customer service by providing a wider product range and reducing stockouts [11]. However, they significantly increase the cost of holding the product in terms of inventory. Predictions of low product availability are often viewed as a strategy to reduce inventory costs, although the risk of this strategy is to decrease customer service levels and lose potential sales if customers cannot find the product that they want.

Chapter – 3: Factors Affecting Product Allocation and Forecasting

If the product line's situation in the market and the distribution of resources to that product are failing to achieve the desired outcomes, a company faces a need for market support or market repositioning. Significant changes to resources allocated may require a large undertaking with substantial spending to attempt shifting customer perceptions, or it could necessitate recruiting improved sales representatives to supplement the present sales force [5].

At Transcom Electronics Ltd., products are assigned to specific market areas at varying levels of availability. Generally, corporate sales increase in proportion to exertion spent promoting a product. Hence, a company can elevate a product's sales by redistributing sales personnel from underperforming products to better-performing products. Alternatively, sales boosts may derive from modifying sales agent compensation plans. With limited time for exploration and likely costs, greater potential exists to heighten the effectiveness of current sales agents' duties or investments in that product.

3.1. Historical Sales Data

Forecasting accuracy is reliant upon quality data. Combining forecaster judgment and diverse quantitative models applied to one's data repository can generate the most precise forecasts. At Transcom, typically forecaster opinions stem primarily from perceived sales patterns in history. Hence, higher quality historical data implies more reliable forecasts. Quality depends on purpose and experience; characteristics of good quality include relevance over time, cleanliness from outliers and gaps, and sufficient samples to model patterns amid vast product diversity. This historical sales data from MRPII resides on file but requires easy access in a central location for all forecasters [9]. A simple relational database housing past figures may suffice. Then, an automatic tool like SAP/IFS could link to extract and scrutinize data, saving manual labor while streamlining the process amid Transcom's complex operations. Meanwhile, certain series contained irregular spikes warranting deeper investigation before inclusion to avoid skewed projections. Overall, optimized data management promotes optimized forecasting to enhance strategic decision making for this sprawling enterprise.

3.2. Market Trends

In general, as the overall standard of living improves, people tend to rely less on manual labor and more heavily on electronics convenience. This shift is clearly moving in the direction of greater technology dependence. Major metropolitan areas will likely experience worsening traffic issues due to increased vehicle use. Therefore, home life may become more commonplace, as households own and utilize more electronic appliances, spending additional time within their dwellings [10]. These are foreseeable societal changes for Bangladesh. (D1) With dual-income families and more time spent at home, standards of living should rise overall. Electronics will become a preferred necessity rather than an unnecessary luxury. Households may transition typical appliances like televisions and refrigerators to microwaves and air conditioners. (D2) Simultaneously, industrial growth and innovative software or technologies could expedite product obsolescence. For instance, radios evolved into cassette players and then CD players or MP3 players. (D3) This shortened lifespan will boost sales within established product classes. Anticipating shifts allows more strategic allocation and forecasts. Favorable conditions now exist for implementation of improved distribution and prediction strategies [11].

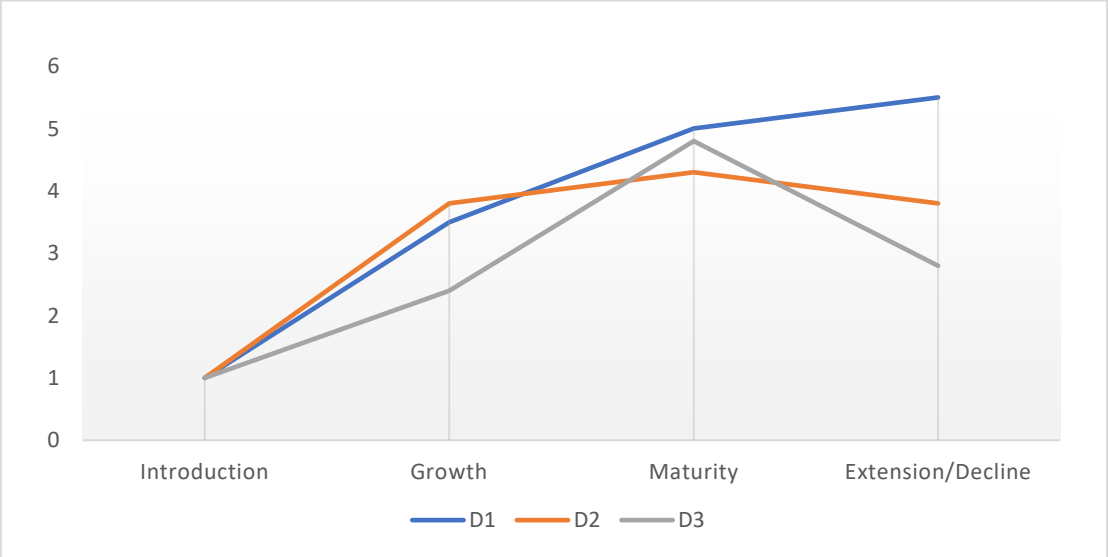


Figure 1. Product Life Cycle as per Market Demand [10]

In this chart: (Figure: 1)

D1 (Increased Time at Home): Represents the trend of people spending more time at home due to improved living standards and dual-income families.

D2 (Obsolescence of Electronic Products): Represents the trend of electronic products becoming obsolete as new software and technology emerge.

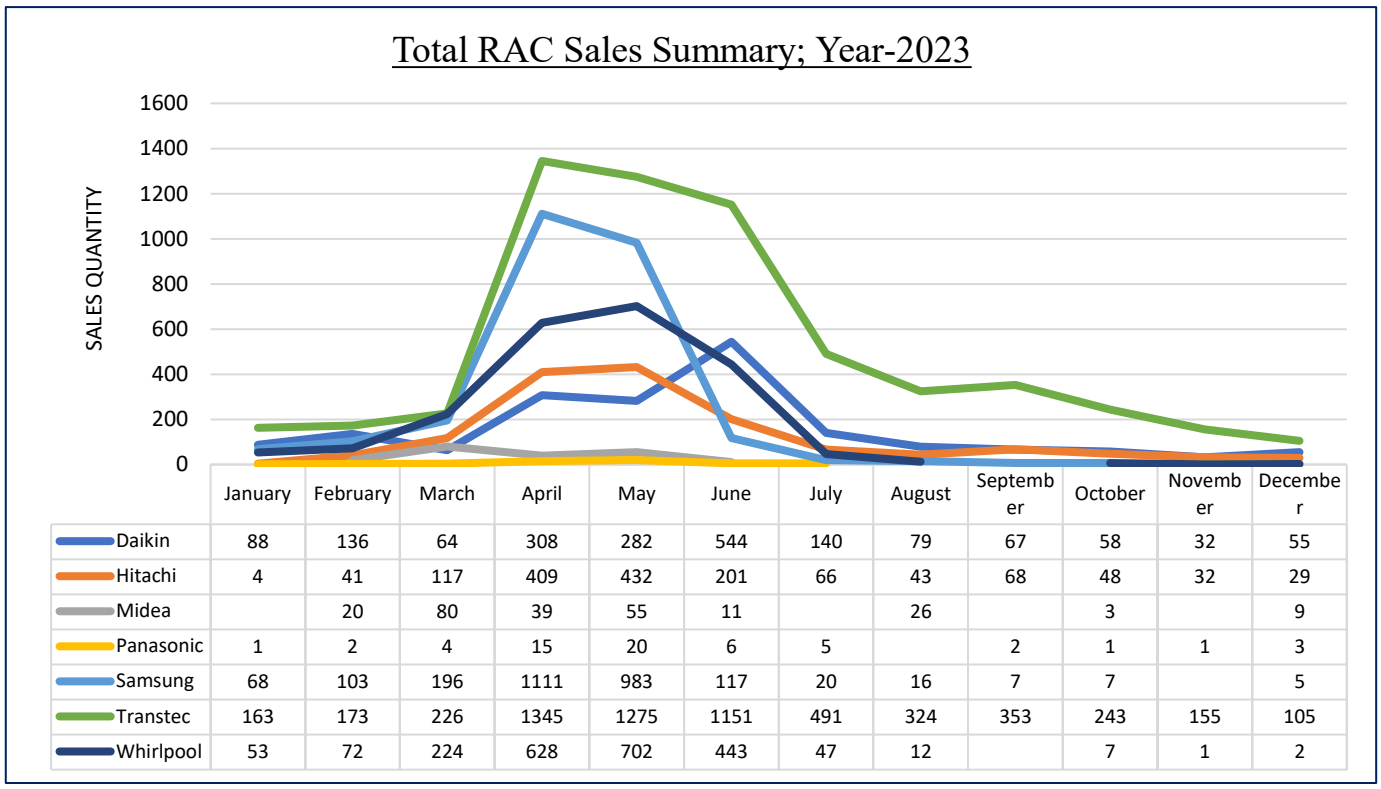
D3 (Shorter Product Life Cycle): Represents the trend of shorter product life cycles and increased sales within the same product category.

3.3. Seasonality

Seasonal variations pose challenges for forecasting demand across diverse product lines. Apparel sees upticks in spring and fall, whereas summer brings peaks for air conditioners. Home heating fuels feel winter's effects most acutely. Accounting for seasonality greatly impacts accuracy.

Forecasting techniques bifurcate into qualitative and quantitative domains. When no sales history exists for new offerings, qualitative methods like the Delphi technique prove insightful. This expert consensus approach anonymously polls panelists through iterative questionnaires. Feedback informs subsequent rounds until consensus emerges [10].

Market research and consumer surveys offer a more objective qualitative path. By polling intended customers, insights surface on purchasing propensities. Another such method aggregates sales personnel projections at the customer and product levels into a composite view, as described by (Jacobs et al., 2018). Direct sales forecasts result for nascent goods. Judicious consideration of a product's life cycle stage optimizes approach. Declining items with few remaining factors warrant simpler techniques, since complexity yields diminishing returns. Yet seasonal offerings still cycle between distinct forecasting models tracking individual seasons' ebbs and flows [12].



	January	February	March	April	May	June	July	August	September	October	November	December
Daikin	88	136	64	308	282	544	140	79	67	58	32	55
Hitachi	4	41	117	409	432	201	66	43	68	48	32	29
Midea		20	80	39	55	11		26		3		9
Panasonic	1	2	4	15	20	6	5		2	1	1	3
Samsung	68	103	196	1111	983	117	20	16	7	7		5
Transtec	163	173	226	1345	1275	1151	491	324	353	243	155	105
Whirlpool	53	72	224	628	702	443	47	12		7	1	2

Figure 2. Seasonal Demands of RAC [14]

In this chart (Figure: 2) defines the demand of Residential Air Conditioner (RAC) is totally vary on seasonal basis. The summer bring peaks during March to June so forecasting should aligned as per seasonal demand otherwise TEL might be face the same situation with Daikin, Midea or Panasonic brand RAC during 2023, where the demand was in peak but the goods ware not allotted as per seasonal forecasting [14].

3.4. External Factors

The primary factors affecting Transcom Electronics Ltd's product allocation and forecasting are fluctuations in exchange rates and inflation. In recent years, many nations experienced drastic changes to their local currencies. For example, the Euro was widely adopted but conversion rates remain unpredictable. Exchange rate variability directly impacts a country's relative product and service costs. A stronger domestic exchange rate increases goods' prices abroad in foreign currency terms, hampering overseas and domestic sales.

As an electronics importer of multiple foreign brands, the company monitors variations between the Taka and currencies since it impacts procurement expenses. Should the Taka weaken against foreign monies, import costs will rise forcing price hikes, quality changes, and revamped marketing. To effectively increase prices, allocated volume must transfer from lower margin nations yielding extra imports [14]. This reapportioning profits more through a formerly less lucrative item. A similar process governs domestic imported good sales. Any sales declines, regardless of item, may prompt weaker following year demand forecasts.

The company faced this with Pioneer electronics previously. Allocating fewer Pioneer items and decreased anticipated sales spurred compensating mainly through equal profitability but inferior products. Adjustments continue balancing exchange impacts on costs and sales while meeting demand.

Chapter – 4: Product Allocation and Forecasting Process at "Transcom Electronics Ltd."

Supply chain allocation is becoming more and more attractive for companies to adopt, as companies both realize that making one product is too much and a wasteful exercise. An item that is over forecasted, made, and shipped too much of will tie up more working capital, possibly than necessary, and eventually be sold at a discount because it has to go in several newer models. An item with too much stock will also damage product value in the retailer's eyes or the end customer, as it will become common and no longer a "special buy." However, too little stock or product availability will also damage potential sales and the long-term value in the eyes of the end consumer . The perfect balance must have the right amount of product channels of sale without overloading [12].

4.1. Current Process Overview

The demand forecasting and product allocation at Transcom are not fairly dissimilar from its conventional way. These people are the task of the sales team, depending on targets from the general management. The MIS Department hands the sales team an excel tool that produces a record of the product's market in a month. It is then for these sellers to create a plain graph in a picture program, say, Paint, as these want how the following year's market direction to be on selling the product. It is very time-consuming, and if the target adjusts later on, it can need a lot of rectification [14]. This paper deals with essentially the first factor in supply chain management. To begin with, is demand forecasting and product allocation. The next section of demand forecasting is the process of determining the products' volume, which consumers will distinguish in the future. It also predominates in the time-phased product prerequisite. Foretelling illogical to do not caution whether they think . The product allocation decision produces or validates a product's conditions with the need. It really defines how much a factory can create, why a presenter can purchase, and how people can market all these products cast by cast throughout various times.

4.2. Challenges in Product Allocation and Forecasting

In the article written by (Gunasekaran et al., 2004) and published in the international journal, the author talks about how assigning great importance to product allocation and forecasting in supply chains [7], Transcom Electronics emphasizes on the importance of knowing how much of a product is required where, before it can be produced and delivered. The demand for different products will not always remain constant throughout the year, and this is especially true for Transcom Electronics as they offer a wide range of products in the local market. Seasonal trends, promotion of products, and competitive pricing between similar products can all lead to shifts in demand. The company has experienced this situation where some products had an unexpectedly large demand in the market but were not available because they were already discontinued or their production had been reduced. This led to customer dissatisfaction and market loss due to lost sales, as explained in the article by Srinivasan and Swink (2018), and published in journal [8]. The same article details how uncertainty in demand is another common issue in supply chains, which occurs for various reasons such as random events in the market, new technologies, changes in regulations, and natural disasters, all of which can greatly affect the demand of certain products. In respect to these issues, Transcom Electronics is quite familiar with product unavailability and is very interested in finding ways to ensure that its products are always available when and where they are needed.

4.3. Improvement Strategies

At this stage, the next step is to simulate a proxy allocation using the forecasted sales figures in the game of Supply Chain Management. It identifies an identification of how the products will flow from the factories to the markets and a schedule of inventory levels at all stages in the supply chain. For each run of the game, the sales figures will be input into the SCM game system and then redial until the figures match the actual results. Any discrepancies can be ironed out with changes in the product mix or sending products to different markets . When a high level of correlation between predicted and desired results is reached, they will have the plan that can be used for the action. The first step is to build up a formalized demand forecasting process: all markets will give an estimate for their sales figures in the form of a probability distribution [11]. At this stage, TEL will take into consideration their supply constraints and they will determine the amount of products available for the forecasted sales period. With PDT,

to determine this quantity involves getting the probabilities from the probability distribution and then, considering the risk costs from understock, they get the optimal stocking quantity, which reflects min of the total cost from understock and overstock. Instead of improving their forecasting technique, Transcom Electronics Ltd. has to build up the demand planning and allocation process. At this time, the markets still give a rough forecast of sales figures in each market Then a decision allocation is made with subjective judgments from the sales team in TEL and is frequently changed throughout the sales season depending on feedback from the markets. Hopefully, the objective is to move to a more scientific method.

Chapter -5: Conclusion

As a part of our practical-oriented project in our MPSM program, we have tried to have a clear understanding of the present supply chain process in Bangladesh. After a clear understanding of the present process, we have evaluated the future trend of forecasting and product allocation process in the supply chain [13]. We have developed a clear understanding of this process with a project in Transcom Electronics Ltd. We have given a brief of the existing process of the supply chain at Transcom Electronics Ltd and looked into the forecasting and product allocation process. We have collected data, analyzed and evaluated the data to get an overall detailed understanding of the forecasting and product allocation process at Transcom Electronics Ltd. We have looked into the ways through which Transcom Electronics Ltd can increase their forecast accuracy. We have identified the factors that affect the forecast accuracy and have made an in-depth study of these factors to get a clear understanding regarding the forecast accuracy. After getting a clear understanding of the factors affecting the forecast accuracy, we came to a decision that Transcom Electronics Ltd can increase their forecast accuracy by implementing a new forecasting system by software selection and will get better forecast accuracy by using the causal method of forecasting. In the product allocation process, we have seen the existing process of product allocation at Transcom Electronics Ltd. We have seen the overall product allocation process compared to the product allocation of air conditioners. We have seen the inventory problem and the extra expenses paid due to the transfer of allocation.

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