



**Majors: SCM**

**Major/No: BBA26**

**Impact Of Inventory Management Practices on Supply Chain Efficiency: A case of  
Mehboob Flour Mill**



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**Fall-2025**

**FINAL PROJECT APPROVAL SHEET**

**Open Defense Examination**

Open Defense Date 13 / 01 / 2026

**Topic of Research: Impact of Inventory Management Practices on Supply Chain  
Efficiency: A case of Mehboob Flour Mill**

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# I. ABSTRACT

This project examined the operational structure and supply chain challenges of Mehboob Flour Mills, a wheat-based food processing company in Pakistan. The mill produces chakki atta, maida, sooji, and bran for domestic and commercial markets. Four key challenges were identified: poor demand forecasting, improper storage leading to spoilage, weak supplier collaboration, and frequent electricity disruptions. These issues are intensified by external factors such as wheat price fluctuations, seasonal availability, high humidity in Islamabad, and unreliable power supply, as well as internal limitations including manual processes, lack of an inventory system, limited storage space, and rented facilities. The study proposed low-cost, practical solutions including basic digital forecasting and inventory tools, improved grain protection methods, better supplier coordination, and small-scale backup power systems to enhance efficiency, reduce spoilage, and strengthen supply chain responsiveness for small- and medium-sized flour mills in Pakistan.

## **II. ACKNOWLEDGEMENT**

First and foremost, we thank Allah Almighty for granting us the knowledge, skills, and perseverance to complete this project.

We are deeply grateful to our supervisor, Ms. Javeria Aftab, for her invaluable guidance and support throughout our research. Her expertise and encouragement have been essential to our work on this innovative topic.

We appreciate the contributions of our colleagues, batchmates, friends, and respected teachers, whose support and encouragement have motivated us throughout this project. Their help has been instrumental in our success.

Finally, we extend our gratitude to Bahria University, Islamabad Campus, for providing us with the platform to publish our work. We are thankful for the opportunity and support from our esteemed institution.

### **III. DEDICATION**

This project is dedicated to our families, with special gratitude to our parents, whose unwavering support and tireless efforts have been pivotal in our academic and career achievements. Their hard work and steadfast dedication have been the foundation of our success, enabling us to reach this milestone and complete this project.

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# CHAPTER 1: INTRODUCTION

## 1) Overview

Mehboob Flour Mills is an independent flour miller in Pakistan started by Tariq Farooq Sethi in 2001 producing high-quality wheat flour products and grain-based goods for the domestic market. Mehboob Flour Mills provides an essential service to all sectors of Pakistan by providing a healthy and affordable source of wheat flour because wheat is the most widely consumed staple food in Pakistan. Mehboob Flour Mills is an established reliable flour supplier to the consumer/residential sector and the commercial baking/grocery/foodservice and distribution sectors. In addition to the basic function of wheat processing, Mehboob Flour Mills generates significant value for the food security and local employment and economic growth of its operational region. The increasing population of Pakistan and its urbanization create Mehboob Flour Mills as an important flour provider that addresses national food security requirements.

## 2) Project Objectives

This Project is focused on identifying key challenges that negatively affect the Efficiency of Mehboob Flour Mills' Supply Chain and Operations as a Pakistani Flour Milling Company located in Islamabad; specifically the negative effects from Mehboob Flour Mills' poor forecasted demand which has a direct effect on the procurement of Raw Materials, Mehboob Flour Mills' inefficient use of Storage facilities leading to the spoilage of Inventory and Waste in the Supply Chain, Mehboob Flour Mills' weak Supply Chain Alignment resulting in delayed delivery of raw materials to the production line and inefficiencies in inventory management, and frequent Energy Supply Disruptions negatively affecting the processing efficiency at Mehboob Flour Mills. This project will investigate each of these problems in detail including their Nature, causes (both internal and external factors) and operational and financial impacts related to Mehboob Flour Mills' environment. Furthermore, this project will develop and propose Phased and Practical Solutions and Implementations tailored to Mehboob Flour Mills' specific constraints that can be achieved with minimal resources including utilizing basic tools (Google Sheets) to track and forecast inventory levels, increasing the use of storage covers, establishing regular communication with suppliers through WhatsApp, and developing an Integrated Power Outage Strategy to increase the overall efficiency of Mehboob Flour Mills' Supply Chain, decrease waste and ensure business sustainability.

### **3) Scope of the Study**

This research focuses exclusively on Mehboob Flour Mills, a flour mill located in Islamabad, Pakistan; focusing specifically on internal company processes, supply chain issues, and the process of creating products for this mill. The study will focus on the analysis of four key problems that affect Mehboob Flour Mills' operations: poor demand forecasting, inadequate storage methods, weak supply coordination, and disruptions to the energy supply to the mill; based on the history of the mill, how it produces its products, ensures quality control, its product line, the departments within the company, the different types of stakeholders, the organizational hierarchy of the mill, SWOT analysis, and PESTLE analysis. The scope of this study will include providing detailed information about potential implementations for solutions to these problems (such as daily inventory logs, better storage, a database of suppliers, and power outage mitigation plans) along with the constraints that are associated with implementing those potential solutions (e.g., rented facilities, limited space to store items, use of manual processes). This study is limited to wheat purchasing and processing, storing, producing and distributing by Mehboob Flour Mills and does not include comparison of all other flour mills in the industry.

### **4) Industry Background**

The wheat milling industry is an important agricultural-based industry in Pakistan. Wheat is the primary crop grown by farmers in Pakistan, due to each household in the country relying upon wheat flour for preparing bread (naan), roti, etc. As such, there exists a constant and high level of demand for wheat flour products, causing mills to operate at optimal levels and provide precise quality and consistency of product. Mehboob Flour Mills competes with numerous other flour mills of different size and scale within the same competitive market, providing Mehboob Flour Mills with the opportunity to expand its production capacity and reduce its operational costs, which will allow it to develop long-term business plans and make the appropriate strategic decisions regarding investment and expansion and development. Government regulations and guidelines and food safety regulations and guidelines and guidelines related to wheat procurement are subject to change and therefore, Mehboob Flour Mills must be able to adapt to these changes.

## **5) Production Process**

At Mehboob Flour Mills the organization utilizes a blend of modern technology and age-old methods in order to efficiently manage their production operation. To initiate the Mehboob Flour Mills' production process the organization purchases high-quality wheat seed from trusted suppliers. Wheat seed is then cleaned several times using an assortment of mechanical tools which remove dust, rocks and seeds as well as other impurities. Due to this cleaning process the end product (flour) will be cleaner and a better source for consumption than if the original wheat had not been cleaned properly.

Prior to the actual milling process, wheat is prepared by adjusting the moisture content in order to provide the best possible results when ground. The mill process is completed utilizing precision-controlled machinery to separate the wheat into various flour grades. Regular maintenance on the machinery provides a consistent product texture and purity as well as maintains the overall nutritional value of the product.

After the mill process, the flour is run through multiple layers of mesh strainers to ensure it meets the organizations quality control requirements. The Mehboob Flour Mills production process is concluded by the utilization of automatic packaging machinery that preserves the cleanliness of the product as well as ensures the freshness of the product once packaged. The combination of utilizing new technologies along with the expertise of people operating those technologies has enabled Mehboob Flour Mills to produce products that meet all quality control measures.

## **6) Product Range**

Mehboob Flour Mills expanded its product selection throughout the years to fulfill different customer requirements. The company produces three main products which include:

**Fine Wheat Flour (Chakki Atta):** The flour serves as a standard ingredient for preparing traditional bread and household cooking.

**Refined Flour (Maida):** The flour serves as a key ingredient for bakeries and restaurants to create naan bread and pastries and cakes and confectionery items.

**Semolina (Sooji):** The product serves multiple purposes in breakfast preparation and dessert making and specific bakery applications.

Bran: The milling process produces this byproduct which serves as a nutritious feed for livestock.

Mehboob Flour Mills serves different customer segments through its wide range of products which include home consumers and industrial food processing businesses.

## **7) Departments of Mehboob Flour Mills**

### **7.1) Administration Department**

This Administration Department is responsible for managing all aspects of the office on a day-to-day basis to keep the overall company in order and operational.

In this respect, it will be accountable for managing office supplies, staff support, security, meeting rooms, government documentation i.e. tax returns and licenses etc.

### **7.2) Production Department**

The Production Department will manage the process of converting wheat into finished flour products. The Production Department will be accountable for operating the machinery involved in the milling process, the upkeep/maintenance of the machinery and the packaging of the final product while ensuring smooth and consistent production.

### **7.3) Quality Control (QC) Department**

The Quality Control (QC) Department will be responsible for ensuring that the wheat and flour produced by the mills meets the required standards for quality and safety. The QC Department will test both the raw materials (wheat) and the finished products for factors including moisture content, protein content and contaminants to ensure that only the highest quality and safest flour products are sold.

### **7.4) Procurement (Purchasing) Department**

The Procurement (Purchasing) Department will be responsible for purchasing wheat, packaging materials and spares that are used during the manufacturing process. The Procurement Department will work closely with its suppliers to purchase the best quality products at the lowest possible price and to ensure an uninterrupted supply of goods.

## **7.5) Finance and Accounts Department**

The Finance Department will be responsible for the preparation of budgets, payment of wages and salaries, management of financial records, monitoring of expenditure and the reporting of financial information. The Finance Department will also be accountable for ensuring that all expenditures are properly justified to allow for business continuity and growth.

## **8) Stakeholders of Mehboob Flour Mills**

### **8.1) Customers**

Mehboob Flour Mills' entire business model is dependent on the customer. Customer represents all the basis of every production activity of the mill. Mehboob Flour Mills is an integrated operation, producing flour products for multiple customer groups; from residential consumers through to commercial entities (such as supermarkets and bakeries and restaurants and food processors). Mehboob Flour Mills' flour products need to meet the customer requirements in terms of quality, packaging, delivery time, price and other factors. Based on customer requirements Mehboob Flour Mills produces Chakki Atta, Maida and Sooji products. Mehboob Flour Mills receives information from customers to determine if there are operational areas that negatively affect the characteristics of their products (i.e., texture, taste, availability and packaging strength). The success of Mehboob Flour Mills in building its brand reputation and expanding into new markets and ultimately sustaining its business will be determined by the level of satisfaction customers experience with Mehboob Flour Mills' products. Mehboob Flour Mills follows trends in the market and the needs of its customers in order to improve its product manufacturing processes and customer service delivery.

### **8.2) Vendors (Suppliers)**

The operational success of Mehboob Flour Mills depends heavily on its vendors who supply essential materials to the business. The company depends on wheat traders, local farmers, grain broker, packaging suppliers and machinery part suppliers for its operations. The quality of wheat materials supplied by vendors determines the final product quality of flour. The company needs vendors to deliver wheat grains and polypropylene bags and machine parts and lubricants and fuel and operational supplies. The procurement team works with suppliers to evaluate wheat quality through measurements of moisture levels and grain hardness and color and impurity amounts. The mill needs to establish vendor relationships based on mutual trust and equitable pricing and extended business partnerships. The mill maintains a reliable supply

chain through its strong vendor relationships which enables cost control and production stability.

## **9) Hierarchy Structure of Mehboob Flour Mills:**

### **9.1) Owner / Managing Director**

The Owner or Managing Director stands at the highest position in the organizational structure because they control all business activities. The owner makes essential business choices about machinery acquisition and supplier selection and financial management and major expense authorization and company direction. The owner maintains active involvement in both strategic planning and operational management because smaller mills require direct leadership from their owners.

### **9.2) General Manager / Mill Manager**

The General Manager (GM) or Mill Manager holds the position of second importance in the organizational structure. The mill operates with a person who fulfills this essential role although they might not hold this title officially. The person in charge of daily operations at the mill directs departmental coordination and monitors production targets and staff performance and maintains quality and safety standards. The owner receives direct reports from this person who ensures the mill operates at maximum efficiency.

### **9.3) Department Supervisors**

The organization of Mehboob Flour Mills creates departmental sections through which supervisors and senior employees take charge of their respective areas. The General Manager receives reports from supervisors who hold either formal or informal positions. The following positions serve as essential supervisory roles:

Production Supervisor

Quality Control Supervisor

Procurement / Purchase Supervisor

Sales & Distribution Supervisor

Maintenance Supervisor

## 9.4) Skilled Workers / Operators

Operators and technical personnel in a manufacturing environment are the key for effective production. They rely on supervisory oversight and have primary functions as follows:

Milling Machine Operations:

check grinding efficiency of the grind.

clean equipment and perform routine maintenance on all equipment.

maintain operational consistency of production.

operate packaging machinery.

daily production at the mill is produced with these workers.

## 9.5) Unskilled Workers / Labor Staff

The mill has laborers that perform entry-level tasks which include: moving bags of wheat around the production area; cleaning floors of the production area and assisting operators with operation of machines and providing assistance for packaging and maintaining warehouse space. Labor is responsible for completing their assigned tasks by the direction of the supervisor or the technical workers/operators.



Figure 1: Mehboob Flour Mill Hierarchy

Source: Author

## **10) Problem Identification**

### **10.1) Material procurement is impacted by poor forecasting of demand**

Reason: Flour mill forecasts are made difficult by unstable price of wheat and changing supplies that are seasonal in nature. The impact on mill performance is the potential of being overstocked (too many raw materials) and/or under stocked (not enough raw materials). This will increase cost and reduce efficiency.

### **10.2) Spoilage of inventory and waste within the supply chain due to suboptimal storage practices**

Reason: Due to poor storage conditions and high humidity, wheat and flour can be spoiled due to excessive moisture and pest damage; resulting in loss of inventory and an urgency to place costly emergency orders for replacement items.

### **10.3) Frequency of weaker alignment between supply and demand causes delays and inventory inefficiencies**

Reason: Lack of coordination with supplier results in delayed shipments and inconsistent inventory levels. This may lead to reduced processing capacity, lower buffer stock and less efficient operations.

### **10.4) Frequent interruptions to energy supply affects the productivity of the process**

Reason: Power failures can occur frequently in the operation of milling and storing processes. Power failures can damage quality of products, increase spoilage and increase costs due to the use of generators during those periods.

## CHAPTER 2: LITERATURE REVIEW

### **Demand Forecasting Inaccuracies and Their Impact on Procurement and Supply Chain Responsiveness**

One of the fundamental operational functions of Supply Chain management is demand forecasting. This is primarily because it determines all phases of procurement planning, inventory control, production scheduling and logistics coordination.

Supported by research, it is clearly elucidated that wrong demand predictions lead to network-wide operational problems which can proliferate through supply systems, further illustrated by their effect to agri-food chains that experience high level of uncertainty and seasonal changes (Ivanov, 2023). Furthermore, recently conducted research has also illustrated that the flour-milling industry is subject to high forecasting risks, primarily owing to the year-round demand of wheat by customers while following a seasonal pattern of production (Cariappa, Acharya, Adhav, Sendhil, & Ramasundaram. (2022).

Moreover, modern research has also highlighted climate changes and market price instability and government regulations as the main contributing factor which makes it difficult for agriculture Supply chains operating in developing nations to produce accurate forecasting (FAO. 2022). The Food and Agriculture Organization also highlighted the challenges faced by developing nations pertaining to cereal supply chains, owing primarily to restricted access to market data, ineffective demand-sensing systems and inadequate linkages between farmers and food-processing businesses (FAO, 2023). In case of Pakistan's procurement system, the World Bank has elucidated, with evidence, that the system in place operates through government-enforced prices and quantity limits and restrictions which can cause market distortions, creating hindrances in forecasting systems (World Bank, 2024).

The Research has also illustrated that forecasting errors can directly impact procurement proficiency in a detrimental way. False Demand estimates can lead to excessive wheat procurement which can result in higher storage expenses, increased food waste and reduced operational performance which can be detrimental for any business (Trollman, 2021).

On the contrary, underestimating market requirements can lead to businesses being out-of-stock and leads to businesses purchasing at higher costs while detrimentally interrupting their production operations (Ali. et al., 2023).

Furthermore, the bullwhip effect has been investigated and presented in various studies which has been focused on agri-food supply chain systems. Ivanov and Dolgui (2022) is an example that illustrates that supply chain tier experience increased demand variability due to the fact that forecasting precision is limited and information travels with hindrances. Pakistan's supply chain pertaining to wheat procurement has bouts of volatility and unreliable inventory levels, primarily due to wholesalers and retailers lack of cohesive forecasting platforms.

Furthermore, the current technology standard induces further challenges which leads to inaccurate weather prediction models. The implementation of agri-processors in Pakistani is mainly derived from historical sales information and past experiences of managers instead of relying on modern analytical tools for forecasting (Asian Development Bank, 2022). Relying on historical data hinders an organization's ability to predict future demand increments arising from religious holidays, when there is a price hike and when supply chains experience disturbances. Supply chain responsiveness is especially hindered due to inadequate forecasting ability since it inhibits the organization's ability to make swift changes to their procurement and production planning operations.

### **Suboptimal Storage Practices and Their Impact on Inventory Spoilage and Supply Chain Waste**

The efficacy of storage operations is a great indicator of inventory performance in agri-food supply chain operations. As highlighted in research studies, post-harvest storage losses induce major operational difficulties for economies that are still in the developing phase since they unsettle supply chain operations and threaten food security markers. South Asia in particular, is subject to major cereal losses primarily due to the storage facilities not incorporating basic requirements for moisture management, ventilation and pest control as per (FAO,2023).

Wheat and flour products can be rendered highly sensitive to their surroundings if affected by environmental conditions of humidity, temperature changes and pest attacks. The study conducted by Rahman et al (2022) is a clear illustration of the idea that products will spoil quicker in storage facilities that lack proper which lack moisture control and proper ventilation systems. This whole situation is made even more hazardous through the addition of monsoon season, particularly experienced in Islamabad. This hazardous situation is especially aided by the fact that Flour mills in Islamabad store their product in open Godowns instead of utilizing proper sealed silos or climate-controlled storage facilities. Moreover, research furthers aides the principle that poor storage methods create a chain of operational problems which

inadvertently affects the complete supply chain system in a negative manner. A demonstration of inventory spoilage leading to immediate product wastage while forcing Companies to stock on emergency supplies as well as causing manufacturing delays and increased transportation expenses can be seen in the research conducted by (Khan et al. 2023). Adding to it, the flour industry in Pakistan is affected by hindrances due to spoiled wheat leading to mills being forced to buy wheat at higher market spot prices which leads to higher financial risks and the supply chain strategies.

The World Bank conducts analyses which has elucidated economics problems deriving from food waste resulting from storage operations which can render all previous expenses pertaining to transportation, handling and energy usage vain (World Bank, 2023). Three major problems are faced by the urban supply chain of Islamabad due to poor storage methods which result in unhappy customers, delayed deliveries of flour and price differences in specific areas. Furthermore, various operational complications force the supply chain system to deal with damaged relationships between the entire pool of supply chain stakeholders including but not limited to retailers who have to face the reality of unpredictable product availability and ever-changing product quality. The research on sustainability conducted over the past few years has been eye opening regarding the negative impact of inadequate storage facilities on the environment. Moreover, excessive greenhouse gas production and the wastage of available resources through the process of food waste disposal have also been a point of contention in various research studies (FAO, 2023). The long-term effect on waste reduction and increased supply chain reliability through investments in modern storage infrastructure has been highlighted in various research studies as an affordable solution that can be undertaken by various organizations (OECD, 2021). On the contrary, poor storage methods leading to substantial operational and strategic barriers affecting flour distribution procedures throughout Pakistan has been backed by current evidence.

### **Weak Supply Chain Alignment and Its Effects on Delays and Inventory Inefficiency**

Harmonized information flows, material movement and decision-making processes maintained by all Supply chain participants is one of the key requirements to align the Supply chain. One of the key necessities that reinforce the idea of maintaining supply chain alignment is the ability to handle unexpected events and disruptions, as highlighted in modern day research (Ivanov, 2023). The independent operation of the suppliers, use of unstructured contracts and the lack

of coordination between the systems through the utilization of digital technology is one of the key factors contributing to the lack of alignment in Agri-food supply chain sector.

Furthermore, as highlighted in various modern research conducted in South Asia, the coordination problems suffered by farmers, transporters and processors is one of the key factors that prevent deliveries being conducted on a timely basis and proper inventory control systems throughout the region. The unstable transport network utilized by suppliers acting independently leading to regular supply disruptions faced by Pakistani agri-processors is one of the key issues highlighted in the research (Ali et al. 2023). Three major problems pertaining to traffic congestion, disagreements on payment amounts and official obstacles all add up to contribute to the delayed wheat deliveries faced by Mills based in Islamabad when requiring wheat deliveries from Punjab

The limited incorporation of digital supply chain platforms restricting real-time information travel within the Agri-Food sector based in Pakistan is further highlighted with the evidence (Asian Development Bank, 2022). Utilizing elevated safety stock levels to negate the risk of running out of stock has been a common response, and while it mitigates the risk of reduced service continuity, can lead to increased inventory holding costs and spoilage risks as elucidated by various literature.

Various factors have been highlighted in the research conducted pertaining to governance systems that can prevent organizations from achieving alignment. As illustrated in Khan and Abbas (2023), business lacking strong contractual protection and relying on unregulated supplier networks will always be subject to reduced trust between parties which can inevitably lead to suppliers taking advantage of their partners thus creating barriers that prevent businesses from establishing and building upon sustainable relationships since it prevents them from matching their procurement choices with the needs required for manufacturing as well as the requirements imposed by the Islamabad Urban Market.

**The disruption of energy supply systems creates problems which affect both inventory storage methods and production operational speed.**

Furthermore, another element of risk that has undergone substantial research in modern supply chain management for businesses is the reliability of energy supply systems, especially concerning businesses that require large amounts of energy to process their agricultural products. Developing nations are subject to major problems faced due to unstable electricity supply which leads to disruptions in manufacturing activities and the ability to store inventory

(International Energy Agency ,2023). Continuous flow of energy is an essential requirement of the flour milling process, since running grinding equipment and maintaining the proper functioning of ventilation systems requires a consistent flow of electricity.

Numerous power disruptions have been a major contributing factor to the rise of operational expenses and financial losses faced by the Manufacturing businesses based in Pakistan. Moreover, the use of diesel generators to negate the power disruptions has been a major contributing factor for the higher operational expense while also contributing to environmental degradation as well as power outages leading to reduced industrial operation efficiency has been elucidated by the World Bank (The World Bank, 2024). Finally, it is also common that milling operations are halted in Islamabad due to power outages while storage facilities are subject to increased damage leading to faster product spoilage.

Adding to the above factors, the research conducted by Mukhtar et al. (2022) also highlights the idea that power outages can induce inventory susceptibility to increased damage, primarily due to the prevention of temperature management and the inability of air circulation systems from operating. The lengthened disruption in power creates an ideal scenario for pest infestation and deteriorating of the overall quality of the flour since the lack of backup systems can subject facilities to vulnerability for such factors. Moreover, research on resilience conducted over the previous years have illustrated the increased severity of existing supply chain problems, owing to the unreliable power grid system creating an extrinsic disturbance that can add to the plethora of existing challenges (Ivanov, 2023). Production operations are also subject to various challenges induced due to power outages, since they can create forced delays in schedules leading to increased delivery times and reduce the overall ability of a company to provide reliable and trustworthy services. Furthermore, the flour supply chain in Islamabad experiences downward disruptions owing to the above events, leading to volatile prices and decreased market trust. Research studies have highlighted chain wide volatility caused by power outages, which can lead to detrimentally affecting stock control operations, manufacturing speed, leading to the entire supply chain network being vulnerable to further disruptions (Kumar, 2022).

## **CHAPTER 3: CHALLENGES & SOLUTIONS**

This chapter is an extensive evaluation of four key supply chain and operational problems that have been identified at Mehboob Flour Mills. The challenges include; inaccurate demand forecasting for its wheat procurement and flour production processes, inefficient storage methods, poor alignment with suppliers, and frequent energy interruptions. Each challenge will be described in terms of what the problem is, why it occurs, and how each issue has an impact on the operation and financially of Mehboob Flour Mills.

### **11) Challenges**

#### **11.1) Poor Demand Forecasting Affecting Raw Material Procurement**

##### **11.1.1) Nature of the Problem**

Demand forecasting is the basis for many managerial decisions in the supply chain such as demand planning and order fulfillment. Though demand forecasting for Mehboob Flour Mills is currently unreliable for its primary processes of wheat procurement and flour production. The Mill does not utilize an effective method or formalized system for predicting future wheat needs. Therefore, all procurement decisions are being made in either a reactive manner, or through a grossly simplified estimate based upon limited data. This inconsistent pattern produces two expensive outcomes:

**Over-procurement:** Excessive purchase of wheat, results in high inventory levels which hold large amounts of cash and are subject to spoiling, directly resulting in economic losses.

**Under-procurement:** Purchase of insufficient quantities of wheat, creates a shortage of raw materials and results in production shutdowns, utilization of less-than-optimal capacity, potential delays of orders to customers, etc. In other words, Mehboob Flour Mill's supply chain is a "guess-and-go" type of supply chain, not a reliable forecasting-based supply chain.

##### **11.1.2) Why and How It Occurs**

The reason for the ineffectiveness of demand forecasting is due to the combined result of several internal and external factors.

##### **Internal Factors:**

**Lack of Structured Planning:** Mehboob Flour Mills does not use any structured process to develop forecasts of future wheat needs, nor does it have any formalized inventory

management systems, nor do they use any specific software tools designed for developing demand plans.

**No Use of Data Analysis:** All purchases are made without first reviewing past sales trends, or any future commitments to purchase products.

**Manually Recorded Data:** Most data related to wheat consumption and flour sales are manually recorded (frequently on paper), and reviewed as needed, therefore creating difficulty in projecting trends.

**Limited Employee Training in Forecasting Techniques:** Employees of Mehboob Flour Mills do not receive training in the development of formal forecasting techniques; therefore, employees rely solely on their own experience and observations of current events.

### **External Factors:**

**Volatility of Wheat Prices and Seasonal Availability:** Fluctuations in wheat prices and varying availability of wheat throughout the year create substantial uncertainty regarding the amount of wheat to be purchased. For example, a surplus of wheat immediately after harvest often leads to excessive purchasing of wheat, only to become costly when wheat prices and/or availability decrease.

**Uncertainty of Government Regulations:** Changes in regulations affecting wheat availability and price, e.g., sudden releases of state-held wheat supplies or changes in quota restrictions, can quickly disrupt market equilibrium and invalidate any previously developed (informal) predictions of future wheat availability and pricing.

The combined effects of no internal forecasting mechanisms and an unpredictable external environment guarantee Mehboob Flour Mills' ability to continuously make inaccurate demand predictions.

### **11.1.3) Operational and Financial Impact**

The results of poor forecasting have numerous adverse effects on both the operational performance of Mehboob Flour Mills, and the overall financial health of Mehboob Flour Mills.

Poor forecasting creates a cycle of inefficiencies and increased costs. Over-purchasing of wheat, represents the waste of money for inventory that generates no revenue. Under-purchasing of wheat results in lost sales and higher costs of producing goods (as well as the

cost of emergency procurement). Ultimately, these poor planning efforts reduce Mehboob Flour Mills' profit margins and reliability.

## **11.2) Suboptimal Storage Practices Causing Inventory Spoilage and Supply Chain Waste**

### **11.2.1) Nature of the Problem**

To minimize the tension between inventory and customer service levels supply chain managers must consider the appropriate level of safety stock to be maintained. Maintaining additional inventory will increase product availability but with an increase in inventory holding cost. Mehboob Flour Mills stores its wheat poorly due to inappropriate and inefficient storage practices, and thus, loses considerable amounts of inventory, including spoiled wheat and/or damaged raw materials. Due to its very limited storage capacity (approximately five (5) days' worth of stock), the company uses an open yard to store all of its wheat, and covers this yard with plastic sheets (not providing any structural support for a warehouse). Consequently, its raw materials are exposed to weather conditions (such as rain and humidity), and pests. Examples of observed damage include; mold, dampness, insects (grain weevils, etc.), and rodents (rodent damage). Since the storage does not adequately protect the raw materials, Mehboob Flour Mills loses raw materials prior to processing.

### **11.2.2) Why and How It Occurs**

Both the physical infrastructure, and internal procedures contribute to the development of this issue.

#### **Internal Factors:**

**Infrastructural Limitations:** Mehboob Flour Mills currently operates out of an old, rented building and as a result, the company's management has been unable to invest in long term storage solutions (such as concrete silos or large shed type buildings). Therefore, they have used an open yard to store their wheat at a lower cost (a temporary, makeshift solution).

**Failures of Preservative Practices:** Many preservation techniques are either ignored or not performed properly by the employees of Mehboob Flour Mills, such as lifting the bags of wheat off the ground using pallets (to prevent moisture absorption); performing regular fumigant treatments to eliminate pests; and strictly adhering to the First-In, First-Out (FIFO) principle.

**Small Capacity:** The small capacity of the yard limits the amount of space available to stack wheat. Stacking creates crowding, and this prevents the required air circulation between the stacks, allowing moisture to collect and create "pockets" where mold will develop.

**External Factors:**

**Monsoon Seasonal Weather:** The monsoon seasonal weather in Islamabad has extremely high levels of humidity and rain fall. As a result, storing wheat outdoors in an uncovered area is extremely risky since moisture is the primary enemy of grain preservation.

**Pest Pressure: Rodents, Beetles, Grain Weevil:** Rodents, beetles, and grain weevils are common in Islamabad, and therefore, the outdoor unsecured yard provides an attractive and easily accessible place for these pests.

**Economic Constraints: Economical Costs vs. Benefits:** Historically, management of Mehboob Flour Mills has likely chosen to spend money on cheaper alternatives (tarps) instead of spending money on a more costly and permanent solution for storing wheat. Although, the decision to save money initially appears to be a good idea, the longer-term consequences of this decision will result in a false economy.

**11.2.3) Operational and Financial Impact**

Poor storage results in the loss of raw material, which is a financial loss, and reduces the mill's profit margins.

**Losses related to Poor Quality Raw Material:**

**Direct Cost Increase:** When 5-10% of a mill's wheat stock spoils, the mill must pay more for usable raw material because the cost of spoiled material increases by the same percentage.

**Delayed Production:** When a mill discovers a spoiled batch of wheat, the mill must immediately order additional wheat to replace the spoiled wheat. This is usually more expensive than ordering new wheat when the current stock was still viable and it also delays the scheduled production of flour.

**Equipment Damage/Risk:** Damaged or wet wheat can cause problems with the mill's equipment, including clogging, damage, and contamination. These problems require more frequent and more expensive repairs/maintenance and also reduce the availability of the equipment.

Quality and Brand Protection: When a mill uses wheat of questionable quality to make flour, the quality of the flour produced may be unacceptable to some customers. These customers may file complaints about the quality of the flour, and this could harm the mill's brand name and potentially result in contractual disputes with customers who conduct quality inspections/audits.

In summary, poor storage practices increase waste and operating costs and expose the mill to a higher degree of quality risk in the final product.

### **11.3) Weaker Supply Alignment causing Delays and Inventory Inefficiency**

#### **11.3.1) Nature of the Problem**

Most manufacturing enterprises are organized as networks of manufacturing and distribution sites that procure raw materials, transform them into intermediate and finished products, and distribute the finished products to customers. Although weak supplier alignment reflects low level of coordination and synchronization that exists between Mehboob Flour Mills and its wheat suppliers. There is no predictability in terms of when and how much wheat will be delivered, thus there are irregularities in terms of the supply chain; whether it is too little (gaps), or too much (glut). The Mill has experienced both delays (i.e. a delivery was supposed to arrive by 9:00 am but did not show up until the next day) and simultaneous deliveries after a prolonged period of low or no rainfall. The inability to predict these inconsistencies in the supply chain leads to varying levels of inventory regardless of the short-term planning of the Mill.

#### **11.3.2) Why and How It Occurs**

There is a lack of integration between internal planning of the Mill and external logistical uncertainties, which causes this issue.

#### **Internal Factors:**

**Lack of Integrated Planning:** Orders are placed by the Mill on an as-needed basis, without providing the suppliers with the Mill's future production forecasts or schedules. This limits the ability of suppliers to coordinate and prepare their logistical activities to meet those needs.

**Informal Relationships:** Suppliers operate without the pressure of formal contracts or established delivery timelines. As such, they do not feel accountable to the Mill if deliveries are delayed.

Minimal Buffer Stock: Because the Mill has minimal warehouse space, any delay in deliveries, however brief, immediately affects production.

**External Factors:**

Supplier Constraints: Many suppliers are small traders who will hold back shipments until they can fill a truckload or until the price of wheat is favorable in the market.

Transportation Challenges: Logistical challenges from the major wheat-producing areas (Punjab) to Islamabad are affected by external factors, such as traffic congestion, road closures, and fluctuations in fuel prices, all of which impact the promised delivery times.

Market Structure: The local grain trade typically uses spot trading with unorganized logistics. Therefore, the uncertainty is built-into the market structure.

**11.3.3) Operational and Financial Impact**

The supply chain misalignment produces stop-and-go production operations at a cost to the Mill.

Production Halted: When deliveries are late, the Mill immediately stops the production lines due to idle paid employees and equipment (costly non-value-added time).

Inventory Issues: When clumps of deliveries exceed the Mill's limited storage space, the Mill is forced to stack the product quickly and with less-than-safe practices, thereby increasing the risk of spoilage and exacerbating the issue.

Increased Costs: The Mill often must procure wheat at emergency prices through alternative brokerages or pay additional transportation charges to compensate for shortages.

Lost Sales and Reputation: The Mill cannot meet timely fulfillment obligations to its customers due to the frequent supply chain problems and, therefore, damages its reputation for reliability and potentially loses sales to competitors.

The net result is the chronic inefficiencies, increased average wheat costs, and difficulties in effective production planning

**11.4) Energy Supply Interruptions Affecting Processing Efficiency**

**11.4.1) Nature of the Problem**

Mill experiences numerous and frequent disruptions in its energy supply. These disruptions include both planned load reductions and unplanned shutdowns of power. As a result of these

disruptions, the mill's processing equipment, augers, and supporting equipment will stop running, resulting in at least some portion of the plant being taken off-line or being unable to produce product. Although a diesel generator does exist, the current configuration is unlikely to provide enough power to run all of the mill's equipment. In addition to decreasing productivity levels, the mill also experiences problems with inventory preservation because power loss prevents adequate ventilation and humidity control (when available).

#### **11.4.2) Why and How It Occurs**

The primary reason why this occurs is the unstable nature of the external power grid; however, the mill has inadequate mitigation strategies in place.

##### **Internal Factors:**

**Limited Capacity for Emergency Generation:** The mill currently does not have sufficient generation capability through UPS, solar or other forms of emergency power generation to continue to run the entire operation during an outage.

**High Degree of Dependency on Electricity:** Flour milling operations require electricity to function and do not have a viable method of manually continuing to produce flour once power is lost.

**Site Based Limitations:** The mill is located on an older site that is leased, which limits the mills' ability to implement major capital improvements such as large-scale industrial generators or solar arrays without obtaining permission from the landlord.

##### **External Factors:**

**Instability In the External Electric Power Grid:** The electric power grid in Pakistan is subject to frequent outages and shortfalls, resulting in predictable periods of load reduction and unpredictable periods of power failure.

**Increasing Costs of Diesel Fuel:** As the price of diesel fuel continues to rise, the use of the generator becomes economically unfeasible, and the mill may be forced to shut down during outages rather than generate power using the generator.

**Weather Related Disturbances to The Power Grid:** Severe weather can stress the power grid, resulting in increased frequency of power outages.

### **11.4.3) Operational and Financial Impact**

Power outages directly reduce the number of production minutes the mill is able to operate each day, resulting in underutilized capacity and idle time for employees who are being paid to work.

#### **Consequences Of Outages:**

**Lost Revenue from Wasted Material:** If a batch of flour is interrupted during a key stage of production (i.e., grinding or sifting), the entire batch may need to be discarded, resulting in wasted raw materials and requiring costly cleaning or reworking.

**Increased Maintenance Requirements:** Sudden changes in voltage and current caused by outages and subsequent restorations can shorten the lifespan of electrical components, motors, etc., thereby increasing the amount of money spent on repairs and maintenance.

**Higher Operating Expenses:** The cost of running the generator to provide backup power during outages is extremely high and adds significantly to the cost of producing each unit of flour.

**Opportunity Cost:** Not running the generator during an outage means that the mill loses the opportunity to sell additional units of flour that could have been produced.

**Decreased Customer Satisfaction:** Failure to meet customer delivery deadlines due to outages results in delayed deliveries to customers and potentially results in fines or penalties, as well as decreased confidence from customers to purchase flour from the mill.

Overall, energy related disruptions create a high degree of uncertainty regarding the mill's ability to produce a given quantity of flour, create opportunities for waste, and increase the mill's operating expense. Therefore, the mill's ability to grow and become more reliable is limited due to these disruptions.

## **12) Solutions**

### **12.1) Solution for Poor Demand Forecasting Affecting Raw Material Procurement**

The Mill will begin to develop an accurate forecasting of demand by first developing a basic forecasting process with easy-to-use tools, and then improving it with inventory controls. In order to achieve the objective of accurately forecasting future demand the Mill will capture data, create simple forecasts and develop a visual system of managing stock. This will allow the Mill to be able to anticipate their future wheat needs, and plan for the purchases accordingly, which will help the Mill avoid both overstocking and understocking.

Develop a Daily Inventory Log and Rolling Forecast (Immediately, 1 month): First the Mill will need to document the amount of product produced each day along with the amount of product available for production at the beginning of each day. Create a spreadsheet called "Daily Inventory & Sales Log", and fill in all relevant information every day. The spreadsheet should contain the following categories: Beginning Raw Materials Inventory (Units Available to Produce at Start of Day), Raw Materials Purchased (That Day), Raw Materials Consumed in Production, Units of Finished Goods Produced, Units of Finished Goods Sold/Delivered, Ending Raw Materials Inventory, and Any Notes (ie. weather related delays, etc.). Having the ability to track the present demand and usage of materials will be useful. Once you have this information, you will be able to use it to develop a rolling 7-day average of the raw materials consumed (which is a good short-term indicator of demand), and a 30-day average (to show seasonal trends). Both are easily calculated in a spreadsheet. For example, each day you can take the last 7 days of "Raw Materials Used" and divide them by seven, and the result is a prediction of what the "raw materials used tomorrow" will be. Using this method, the Mill will be able to determine about how many units of raw materials they will need for the coming week. Second, establish a Reorder Point (ROP) formula:  $ROP = \text{Average Daily Use} \times \text{Supplier Lead Time (in Days)} + \text{Safety Stock Buffer}$ . A common way to estimate the safety stock is to add two days' worth of additional usage or some percentage increase when there is potential delay. Once closing inventory falls to the ROP level, the procurement team should place a new order so that new raw materials arrive prior to the inventory running out.

## **12.2) Solution for Suboptimal Storage Practices Causing Inventory Spoilage and Supply Chain Waste**

Objective here is to lower the amount of wheat spoiled and lower the rate of wheat quality degradation through better storing methods and improved conditions; yet under the constraints (cannot build anything permanent without permission and there is no more land). Strategy is to start with low-cost improvements to current storage, and then eventually move to semi-permanent improvements for long-term.

Covering Improvements (Short Term): Evaluate all of the existing plastic tarps and covering materials. If any of the existing tarps and covers are broken or have holes in them replace them with new heavy-duty tarpaulin. Use rope or sand bags/bricks to secure the new tarps and covers properly so they don't blow away in the wind.

Arrange the shade to be sloped -- use a simple bamboo or metal frame to create a tent-like slope over the stack to allow rain water to drain to the side. Ensure the bottom edge of the tarp does not catch water; keep the bottom of the tarp at least short of the ground or the farthest portion of the stack to prevent rain water from flowing underneath. These modifications will greatly reduce rain entry into the stored wheat.

Storage Zone Identification and First-In-First-Out (FIFO) Implementation (Long Term): Identify different zones within the storage area by using markers or boards: one zone for the newly arriving wheat, one zone for the older wheat to be milled next. This will aid in rotating the stock as well as isolating any potentially problematic batches and use the oldest wheat first in production. In order to enforce this, identify the arrival date clearly on each batch or stack. An example would be to hang a tag with the date the stack arrived on each section. Train employees to take wheat from the oldest stack when they go to mill. This prevents any batch of wheat from being milled before its time.

## **12.3) Solution for Weaker Supply Alignment causing Delays and Inventory Inefficiency**

To enhance supplier alignment the mill needs to focus on improved communications, and develop a better relationship based on formalized expectations between the mill and its supply partners. The objective is to have a more stable and dependable inbound supply chain through better proactive information exchange and having a baseline agreement without being too bureaucratic. These solutions build upon the strong working relationships the mill already has

with its suppliers; however, they provide a structured approach to creating consistency among those relationships. Additionally, the mill needs to develop contingency strategies (i.e., back-up suppliers or a small buffer stock) to help mitigate any residual variability.

Establish a Supplier Database and Communication Process (Short-Term):

Start by establishing a brief directory of all current wheat suppliers the mill currently purchases from. Include the mill's procurement department, their name(s), their address(es), and other contact information, along with some of their typical performance metrics, such as:

Lead time (average number of days between when the mill orders from them and when they deliver).

Capacity (the maximum amount of wheat they can deliver to the mill per order).

Reliability (e.g., a simple numerical rating or descriptive comments, such as "typically runs behind in the afternoons" or "only delivers during weekdays").

The above helps to determine which suppliers are the most important or reliable. Once the database is established, the mill should then develop a routine process of communication with these same suppliers. A suitable platform for this may include creating a WhatsApp group (which includes both the mill's procurement team and the primary sales representatives of the top suppliers). On a recurring basis, the Procurement Supervisor can then send updates via this group to communicate the mill's future needs, such as; "We are looking to purchase 300 bags of wheat for next week, we need it delivered no later than Monday and Wednesday in two separate shipments - who can commit to what?" Suppliers can then respond to the update with how much they are able to supply. This type of pre-notification and increased transparency, encourages suppliers to prepare in advance, while also signaling to them that the mill is actively planning for their needs - thereby making it more likely for them to take their responsibilities seriously. The group can also be used to notify suppliers of any potential delays ("truck stuck in traffic and now due to arrive tonight") to ensure that the mill is not surprised. If some of the suppliers do not have access to smartphones or are less familiar with using apps like WhatsApp, an alternative would be to schedule weekly telephone conversations with each supplier to discuss future purchasing needs. However, since WhatsApp is commonly used in the region, and very user friendly, it provides the best solution for the mill.

## **12.4) Solution for Energy Supply Interruptions Affecting Processing Efficiency**

A combination of immediate operational adjustments in processes and incremental investment into back-up power is suggested to reduce the negative impacts of power outages on the operation of the mill.

The goal of this approach is to enable continued operation of the critical operations in the event of a power outage and ultimately to decrease reliance on the grid by including alternative methods of generating power.

Flour Mill Integrated Power Outage Strategy (Short-Term): The solution presented below proposes a complete and integrated short-term strategy to enhance the flour mills' ability to withstand the effects of power outages through the integration of energy saving techniques with critical load management and process modifications.

Firstly, conduct an initial electrical audit to identify and prioritize critical equipment which includes milling machinery and aeration fans; secondly, establish basic backup power circuits for these essential equipment items; thirdly, optimize production scheduling so that the highest energy consuming activities occur during stable grid time frames (i.e., nights or mornings in Pakistan); and lastly, develop a 2–3 day supply of finished flour as a buffer to provide for customer delivery requirements.

Additionally, promote long-term efficiency practices including the replacement of traditional light bulbs with LED lighting, the service of motors using capacitors or soft starters to assist in managing the voltage fluctuations, and the encouragement of employee practices such as turning off all non-essential equipment and lighting during idle times or power outages.

Solar Panels (Long-Term): Solar energy has become increasingly attractive as the cost of electricity increases. Due to issues associated with structural changes, consider installing small solar panel systems that do not require large-scale construction, such as mounting a few panels on a frame or on existing roofs using ballast (weights) rather than penetrating the roof (the landlord may permit as it is non-destructive).

A 10–20 kW solar system with batteries will greatly reduce the mill's dependency on the grid during the daylight hours and ensure that most critical equipment operates when the grid is down as well as during daylight hours. Alternatively, one or two smaller panels charged to a battery may be able to continue to operate the lights and fans — a modular approach.

## CHAPTER 4: DESIGN & IMPLEMENTATION

### 13) Implementation

#### 13.1) Implementation of Poor Demand Forecasting Affecting Raw Material Procurement.

In order to resolve issues related to inconsistent management of wheat inventory at MFM Pvt. Ltd., the first step was implementing a robust Rolling Forecast and a new Daily Inventory Log that would be operational within one month using simple Google Sheets for tracking purposes. The “Daily Inventory Log” sheet, (as shown in the Annexure 1), is used to collect essential information on a daily basis with fields for Date, Opening Stock (bags or kg), Received (+), Used (-), Closing Stock, Flour Produced, Flour Sold, 7-Day Average (the rolling average of wheat usage for the previous week to act as a short-term demand indicator), Status (for example, “OK,” for optimal levels; “ORDER NOW,” for critical shortages flagged in red with a warning triangle), and Notes (to document anomalous events such as “power outage” or “late delivery”). The log also facilitates an accurate calculation of the closing stock via the equation:  $\text{Closing Stock} = \text{Opening Stock} + \text{Received} - \text{Used}$ . Additionally, the 7-Day Average serves as a dynamic forecasting tool to help determine wheat needs and eliminate guessing in anticipation of weekly requirements. For example, if the 7-Day Average of usage is approximately 100 bags/day, the mill will know in advance when to schedule resupply. To complement this, the “Dashboard Settings” sheet (displayed in the Annexure 2) includes parameters that define the key settings of the system including: Supplier Lead Time (set to 4 days for normal deliveries); Safety Stock Buffer (5 days for emergency situations, but may be adjusted to 20% above normal inventory levels during monsoon seasons for possible weather-related delays); Current 7-Day Average Usage (automatically populated from the log); Reorder Point (calculated as  $\text{ROP} = (\text{Average Daily Usage} \times \text{Supplier Lead Time}) + \text{Safety Stock Buffer}$ , set to 20 bags to initiate orders); and System Status (identified as “OPTIMAL,” in green when inventory levels are adequate). Through consistent use of the Google Sheet-based log and rolling forecast, procurement errors and inventory stockouts should decrease by 50–70% within three months, resulting in freed-up capital from reduced excess inventory and a reduction in raw material costs by 5–8% due to timely purchasing. In addition, production stoppages caused by shortages will be minimized and daily operations will become stabilized, allowing for

increased monthly profitability through the avoidance of losses due to spoilage and over-buying.

**Annexure 1:**

	A	B	C	D	E	F	G	H	I	J	K	L
1	Date	Opening Stock	Received (+)	Used (-)	Closing Stock	Flour Produced	Flour Sold	7-Day Avg	Status	Notes		
2	12/1/2025	500	150	100	550			100	OK	System Start		
3	12/2/2025	550	0	40	510			70	OK	Optimal		
4	12/3/2025	510	0	100	410			80	OK	Optimal		
5	12/4/2025	410	300	500	210			185	OK	Optimal		
6	12/5/2025	210	0	800	-590			308	⚠ ORDER NOW	Critical		
7	12/6/2025	-590	150	180	-620			286.666667	⚠ ORDER NOW	Critical		
8	12/7/2025	-620	600	150	-170			287.142857	⚠ ORDER NOW	Critical		
9	12/8/2025	-170	300	100	30			105.7142857	OK	Optimal		
10	12/9/2025	30	300	120	210			104.4285714	OK	Optimal		
11	12/10/2025	210	200	100	310			101.8333333	OK	Optimal		
12	12/11/2025	310	100	120	290			102.2	OK			
13	12/12/2025	290	88	73	305			97.75	OK			
14	12/13/2025	305	200	106	399			106	OK			
15	12/14/2025	399	58	121	336			106	OK			
16	12/15/2025	336	64	91	309			91	OK			
17		309			309			#DIV/0!	OK			
18		309			309			#DIV/0!	OK			

Figure 2: Daily Inventory Log Sheet

Source: Google Sheet

**Annexure 2:**

	A	B	C	D	E	F	G	H	I
1	PARAMETER	VALUE	DESCRIPTION						
2	Supplier Lead Time (Days)	4	Days to arrive after ordering						
3	Safety Stock Buffer (Days)	5	Emergency buffer (e.g. for Monsoon)						
4	Current 7-Day Avg Usage	0	Auto-calculated from Log						
5	CURRENT REORDER POINT	20	If stock falls below this, ORDER.						
6	SYSTEM STATUS	<input checked="" type="checkbox"/> OPTIMAL	Quick health check						
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									

Figure 3: Dashboard Setting Sheet

Source: Google Sheet

### **13.2) Implementation of Suboptimal Storage Practices Causing Inventory Spoilage and Supply Chain Waste**

Replacing worn plastic covers (Annexure 3) on all temporary wheat storage units with a durable green tarpaulin (Annexure 4), set up like a sloping tent using wood or bamboo frames to allow for water to run off, and securing with sand bags or brick to hold down the tarp and prevent water and wind from blowing the tarp into contact with the grain will greatly limit the amount of rain that enters the grain sack and reduce the exposure of the grain to moisture and pests and preserve the quality of the grain.

A more durable and scalable option would be to install a metal framed shade unit (sketched in Annexure 5). The shade unit would have a galvanized steel frame that reaches approximately 10-12 feet in height at its highest point, and cross beams for additional support. A tarpaulin roof would be placed on top of the frame, providing an affordable way to provide coverage to the grain, and a replacement tarp would be able to fit easily into place when needed. Approximately 1-2 feet above the floor will provide air flow between the grain sacks and the ground and will help keep the area underneath dry and will allow for pest control. Sacks of grain would be arranged in neat rows below the level of the raised platform.

The use of a sloping green tarpaulin short term and a metal framed shade unit long term will reduce the annual spoilage of wheat from 8-12%, to less than 3%. The use of these types of structures will save PKR 500,000 – 800,000 annually in raw materials alone. Additionally, the daily process of re-ordering grain will be less frequent due to a reduction in the number of contaminated grain batches, and there will be less equipment damaged due to moisture in the grain, and the quality of flour produced will remain consistent; resulting in more efficient production and better overall operation.

### Annexure 3: Raw Wheat in Open Air with Plastic Coverings only



Figure 4: Raw Wheat in plastic covers

Source: Author

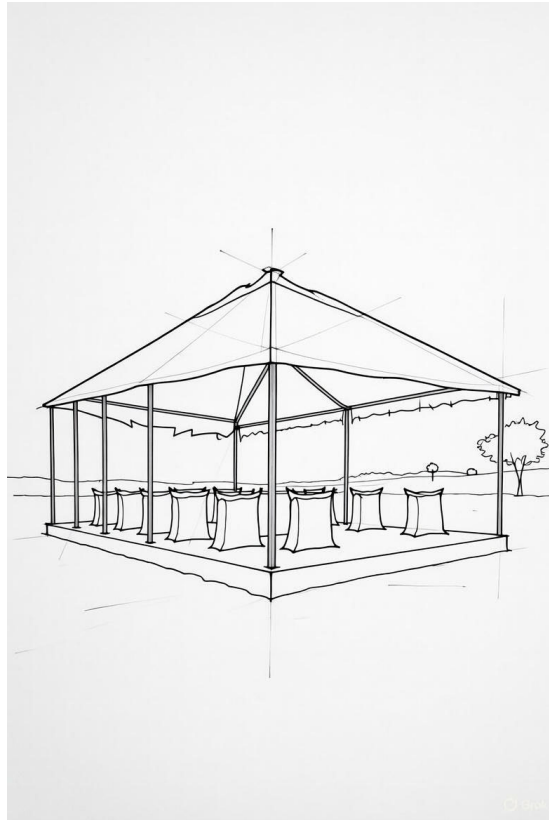
### Annexure 4: Suggested Similar Covering

The screenshot shows the website interface for 'HABIB TARPAL'. At the top, there are navigation links: 'About HABIB TARPAL', 'Feedbacks & Suggestions', 'Contact Us', 'FAQs', 'Policies', 'My Account', 'Log In', 'Create Account', and 'PKR'. The main header includes 'HABIB TARPAL', 'HOME', 'PRODUCTS', and a search bar. The breadcrumb trail reads: 'Home / Canvas Tarpal / Heavy Duty Canvas Tarpal.100% Waterproof-Heat-resistance with loops on all sides with every 3 feet distance,All sides double stitched.' The product image shows a green tarpaulin with '17' printed on it. Below the image are icons for 'Waterproof', 'Sun-Block', 'Dust-proof', and 'Wind-proof'. The product title is 'Heavy Duty Tarpaulin.100% Waterproof+Heat-resistance with loops on all sides with every 3 feet distance,All sides double stitched.' Below the title is a review section with five stars and the text 'Be the first to write a review.' The product features listed are '100% WATERPROOF..', 'DURABLE', 'UV RESISTANCE', and 'HEAT CONTROL'. The product code is 'hbt 188', brand is 'HABIB TARPAL', warranty is 'NO WARRANTY', and availability is 'In Stock'. The price is 'Rs. 17,500' and the size is '20 FEET X 20 FEET'. There is an 'Ordered Quantity' button and a 'WhatsApp Chat' button at the bottom left.

Figure 5: Tarpaulin Covering Suggested

Source: Google

## Annexure 5: Design for a Framed Structure



*Figure 6: Metal Frame Design*

*Source: Author*

### **13.3) Implementation of Weaker Supply Alignment causing Delays and Inventory Inefficiency**

To improve supplier management at MFM Pvt. Ltd. (a Pakistani flour mill), we have devised an immediate solution of creating a Supplier Database and Communication Routine. This solution includes creating a centralized source of supplier information to aid in making informed decisions and establishing a real-time communication process to help minimize delays. In doing so, we have leveraged Google Sheets as our data base tool and WhatsApp for our group collaboration tool. As more manufacturers become interested and involved in forming supplier partnerships, a guide is needed to help these manufacturers in selecting potential partners and in developing and implementing the partnership. Furthermore, we expect to implement this solution over the course of one month, with the majority of that time focused on compiling data, tracking performance and conducting regular reviews. Below you will find

the detailed steps for implementation, which are illustrated using the attached images for examples of the tools being utilized.

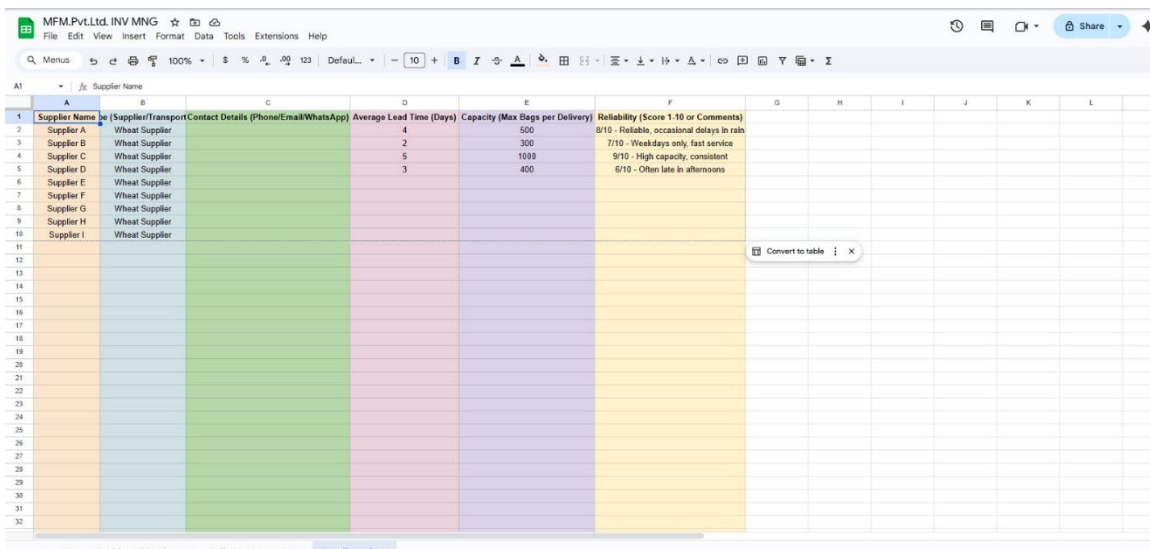
### Compile the Supplier Database (Week 1)

The initial step was to develop a specific “Supplier Information” tab within the already existing Google Sheets inventory workbook (Annexure 6). These columns were developed to track: Supplier Name; Type (Wheat Supplier / Transporter); Contact Information (Phone / Email / WhatsApp); Average Lead Time (Days); Capacity (Maximum Bags per Delivery); and Reliability (Score 1 – 10 or Comments: Example, “8/10 – Reliability, occasional delays during rainy periods.”)

Next, we compiled data from procurement records. Develop a list of current suppliers and transporters (Example, Supplier A with a 4-day lead time and 500-bag capacity). Begin with 4-6 major ones, and expand as necessary. Historical invoices or logs can be used to establish average values (Example, lead time from past deliveries).

Finally, assign the Procurement Supervisor to regularly review and update the sheet each week, and ensure that the reliability ratings are evaluated based on their most recent performance (Example, adjust for Monsoon delays prevalent in Pakistan).

### Annexure 6: Inventory Workbook Sheet



Supplier Name	Type	Contact Details (Phone/Email/WhatsApp)	Average Lead Time (Days)	Capacity (Max Bags per Delivery)	Reliability (Score 1-10 or Comments)
Supplier A	Wheat Supplier		4	500	8/10 - Reliable, occasional delays in rain
Supplier B	Wheat Supplier		2	300	7/10 - Weekdays only, fast service
Supplier C	Wheat Supplier		5	1000	9/10 - High capacity, consistent
Supplier D	Wheat Supplier		3	400	6/10 - Often late in afternoons
Supplier E	Wheat Supplier				
Supplier F	Wheat Supplier				
Supplier G	Wheat Supplier				
Supplier H	Wheat Supplier				
Supplier I	Wheat Supplier				

Figure 7: Inventory Workbook Sheet

Source: Google Sheet

### Develop a Communications Routine (Weeks 2 – 3)

Create a WhatsApp group or channel for major suppliers, transporters and the procurement team at Mehboob Flour Mills. Create a public channel entitled "Mehboob Flour Mill Suppliers" (Urdu: "سپلائرز مل فلور محبوب") as shown in the second and third screen shots, with a picture of a flour bag for easy recognition. (Annexure 7)

Add members to the group: Only include sales representatives from the suppliers you have listed in your database, and limit to 5-10 to allow for a focused approach. Send the link to the channel to your existing contacts to invite them to join the channel.

Outline rules for how you want the group to be used: Use for short communications such as confirming orders, notifying suppliers of delays, checking on availability (Example, "Need 300 bags delivered by tomorrow – confirmed?"). Post daily/weekly summaries from the inventory log to keep everyone aligned with future requirements. Do not post non-business-related messages to maintain a professional environment.

### Annexure 7: WhatsApp Channel established

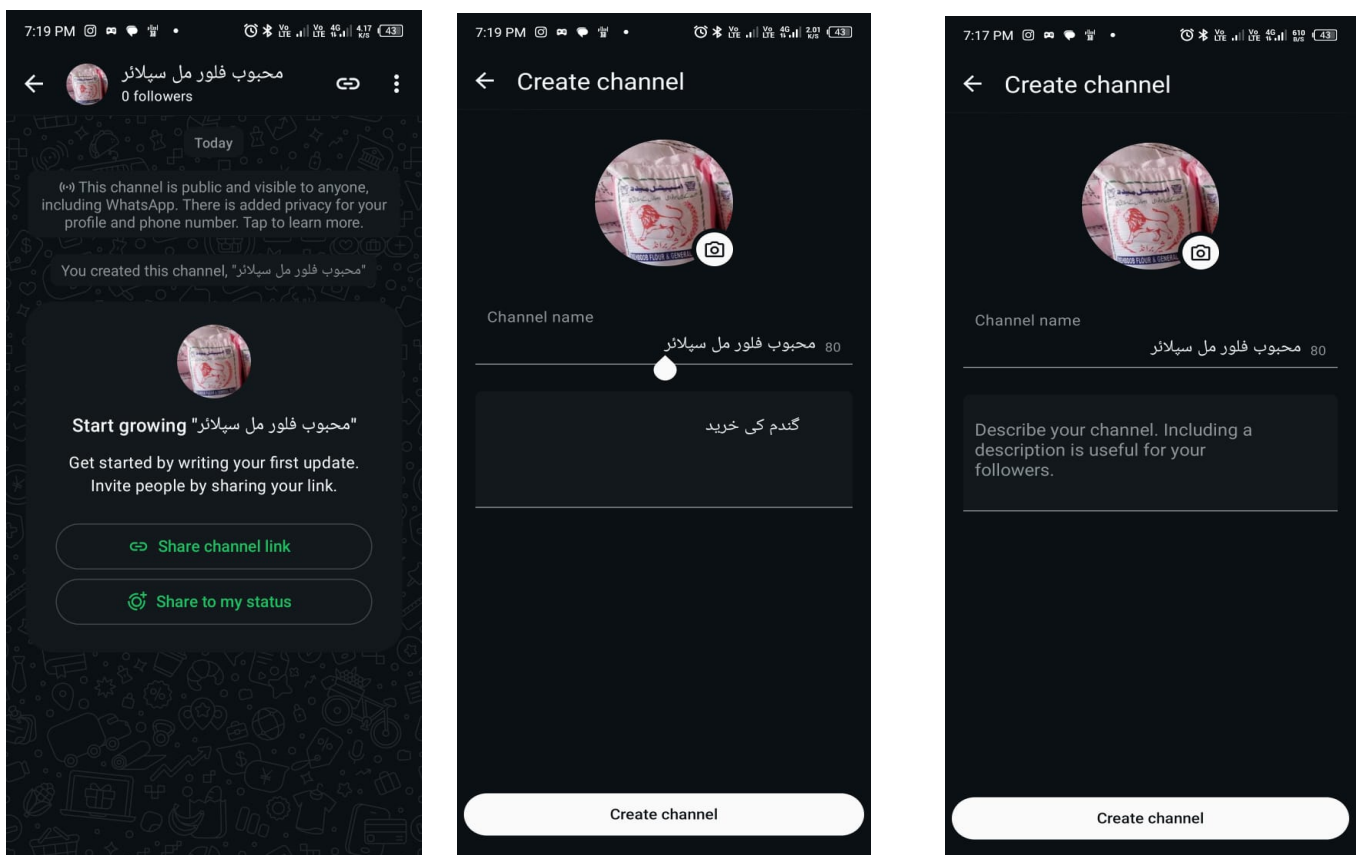


Figure 8: Whatsapp Channel

Source: WhatsApp

### Monitoring and Review (Ongoing)

Weekly evaluations: The Procurement Supervisor evaluates the database to determine if there are any changes (Example, revise reliability rating if a supplier has been consistently late) and monitors the WhatsApp group for response times.

Measuring success: Measure the decrease in the variance of lead time and number of stock outs. If problems occur (Example, problem with transporters), add the new entry to the database.

Using the database and WhatsApp group on a consistent basis will result in an estimated 20-30% reduction in delays in receiving shipments. This equates to approximately 5-10 additional business days per month, allowing for more effective pricing negotiations. The benefits of having reliable and predictable inbound logistics, reducing emergency purchases, decreasing warehouse storage space needs, and building strong relationships between suppliers and the mill will result in an increase in gross margin of 3-5% due to reduced costs associated with the increased frequency of disruptions and more efficient operations.

### **13.4) Implementation of Energy Supply Interruptions Affecting Processing Efficiency**

This solution strategy is designed to provide an effective operational resilience system to protect against the ongoing power failures caused by load-shedding that are prevalent throughout Pakistan. It has two main objectives: first, to save energy; second, to protect critical processing and minimize operational disruption to maintain production continuity, customer satisfaction and cost savings.

A step-by-step phased approach to implementation is proposed to implement the core elements of the solution namely energy auditing, critical load priority and process efficiency improvements into the normal day-to-day work-flow over time.

#### Phase 1: Preparation and Audit (Weeks 1–2)

To establish a base-line from which to begin the project through the completion of an electrical audit and development of an "outage game-plan" to identify the most vulnerable areas to protect and the best way to respond to these vulnerabilities both in accordance with the overall objective of protecting critical loads and establishing an energy baseline.

Conduct a rapid electrical audit to list all equipment and categorize it as either critical (e.g. milling machinery, grain conveyor systems, aeration fans) or non-critical (e.g. packaging machines, interior lighting); estimate the power usage of each category; develop an "outage game plan" outlining steps for safely shutting down non-essential equipment to prevent power surges, secure in-process material (such as partially milled flour in storage bins), prioritize generator circuits for critical operation; conduct preliminary efficiency evaluations to quickly determine areas for improvement (e.g. replace 20–30% of existing incandescent lighting with energy efficient LED lighting; check motors for routine maintenance and apply capacitors where unstable voltage consistently results in tripped motors).

#### Phase 2: Setup and Training (Weeks 3–6)

To transition the planning phase into actual practice through the installation of necessary technology and education of employees to support the goal of integrating back-up systems, optimizing scheduling and developing long-term energy conservation habits.

Connect critical circuits to the existing generators or inverters via a simple sub-panel or quick switch system utilizing a local electrician to complete the wiring and setup of the back-up integration system approximately 50–70% of critical loads initially; adjust production schedules to move energy-intensive milling activity to off-peak periods (i.e. night and/or early morning) when power supply stability is greater; schedule low energy activity (i.e. packaging, cleaning and/or manual labor) during the afternoon; keep a 2–3 day inventory of finished flour to manage short term power outages; hold 2–3 training sessions to educate employees regarding the outage game plan, promote energy conservation practices (i.e. turn-off unnecessary equipment during downtime) and inform employees of their roles in the event of a power failure including performing non-electric activities (i.e. inventory management).

These planned phases to evaluate loads, schedule changes, and upgrade options (i.e. LED lighting) will decrease power outage lost time by 50–70%; save 15–25% on fuel used for back-ups; prevent batch spoilage; and make daily operations more reliable, have more machines running at optimal levels, fewer reworks, consistent orders fulfilled, and save PKR 400,000 – 700,000 annually by reducing energy waste and maintenance costs.

## 14)SWOT Analysis of Mehboob Flour Mill

SWOT analysis is an effective framework for analyzing the Strengths, Weaknesses, Opportunities, and Threats of an organization (or a project) that helps to address the effectiveness of a project planning and implementation. The acronym comes from an old term

S	<p><b>Internal Capabilities</b></p> <ul style="list-style-type: none"> <li>◦ Reliable Procurement Network</li> <li>◦ Cost-Efficient Logistics Setup</li> <li>◦ Stringent Quality Control Practices</li> <li>◦ Effective Waste Minimization System</li> </ul>
W	<p><b>Internal Shortcomings</b></p> <ul style="list-style-type: none"> <li>◦ Weak Demand Forecasting</li> <li>◦ Suboptimal Storage Conditions</li> <li>◦ Frequent Energy Interruptions</li> <li>◦ Manual, Labor-Intensive Operations</li> <li>◦ Facility and Land Limitations</li> </ul>
O	<p><b>External Conditions</b></p> <ul style="list-style-type: none"> <li>◦ Using Digital Tools</li> <li>◦ Access to Affordable Automation</li> <li>◦ Low-Cost Storage Upgrades</li> <li>◦ Increasing Market Preference</li> </ul>
T	<p><b>External Risks</b></p> <ul style="list-style-type: none"> <li>◦ Wheat Price Volatility</li> <li>◦ Uncertain Supply from Punjab</li> <li>◦ Environmental Damage</li> <li>◦ Rising Energy Costs</li> </ul>

Figure 9: SWOT Analysis of Mehboob Flour Mill

Source: Author

from the strategic planning field that is concerned with the content and the objectives of the project, and with identifying the right things to do.

### **14.1) Strengths (Internal Factors)**

#### Reliable Procurement Network

Millers have a history of working with trusted old vendors and just a few reliable brokers; these connections allow for steady shipments of wheat. Even in urgent situations, brokers can provide immediate delivery of wheat with no need for extended negotiations and potentially at higher price than usual. This allows the miller a safety net if there will be a delay in deliveries or fluctuations in pricing.

#### Cost-Efficient Logistics Setup

Since the suppliers bring wheat into the mill and the dealers take flour away from the mill, the mill pays nothing to get products to it. The mill only spends money on grinding products. This greatly lowers operational costs, simplifies logistics, and lessens the financial burden on the miller.

#### Rigorous Quality Control Practices

As soon as wheat arrives at the mill, samples are taken for quality control testing, generally 50-70 bags. Wheat that does not pass this inspection is refused to be unloaded. By doing this, the miller minimizes the chances of receiving bad quality raw materials that may cause waste and processing problems down the line.

#### Effective Waste Minimization System

Waste is virtually non-existent at the mill. Any flour that is rejected or spills during production is packaged and sold as "waste atta" to local farmers for use as animal feed. Not only does the mill save on lost product, they generate an additional source of income. Overall, the mill's operations are highly efficient.

### **14.2) Weaknesses (Internal Factors)**

#### Weak Demand Forecasting and Lack of Inventory System (Problems 1 & 3)

The mill has no formal planning or forecasting mechanism for purchasing wheat; therefore, it frequently purchases either too much wheat, which results in waste/spoilage, or not enough wheat, which results in stopping production. A lack of inventory tracking makes this problem

even worse because the mill does not know what is available in stock nor when to make additional purchases in order to maintain a consistent supply of raw materials.

#### Suboptimal Storage Conditions and Limited Capacity (Problem 2)

Due to limited space and high cost to add more, the mill can only store about 10 days of wheat. The wheat is stored outside covered by plastic sheets (Annexure 3). Due to the elements, the wheat is extremely susceptible to moisture/humidity issues and frequent rain storms that result in the wheat spoiling and thus, directly increasing the mills' operating costs and further complicating their inventory/storing issues.

#### Frequent Energy Interruptions Impact Processing (Problem 4)

Mid-production power loss causes machinery to be stopped mid-cycle and causes spoilage of wheat and in-process flour. Frequent and unpredictable power outages cause delays in production, reduces mill output, increases operational costs, creates uncertainty in the mill's supply chain.

#### Facility and Land Limitations

The mill operates within an outdated leased facility. Since the mill does not own the land, the mill's landlord will not allow them to build additional storage facilities, increase production capacity, or implement solar panels until such time as a lease renewal agreement is negotiated and approved. This limits the mill's ability to develop long-term solutions to address its storing and energy challenges.

### **14.3) Opportunities (External Factors)**

#### Using Digital Tools for Forecasting and Inventory (Problems 1 & 3)

Millers can use simple digital tools such as Google Sheets, WhatsApp Groups, etc., which are available for free, to monitor daily consumption of wheat, future order commitments, and inventory requirements. This will enable the miller to purchase the appropriate quantities of wheat at the correct times and therefore minimize stockouts and wastage.

#### Access to Affordable Automation Equipment

Digital weighing equipment and low-cost computerized systems are readily available and can replace the manual methods of calculation. The benefits of using this type of equipment

include; improved accuracy, increased productivity, reduced human error in the areas of procurement, inventory control, and aligning with supplier delivery schedules.

#### Low-Cost Storage and Renewable Energy Upgrades (Problems 2 & 4)

A simple and low cost covered shed or second-hand silos can be installed by the mill to protect the wheat from rain and dampness and prevent spoilage. Small scale renewable energy systems, which incorporate battery backup, are now relatively inexpensive and can greatly reduce the effect of power outages on production and inventory.

#### Increasing Market Preference for Compliance and Cleanliness

Government bodies and large buyers are gradually shifting toward demanding cleaner, safer, and more compliant mills. Mills that upgrade their storage, hygiene, and safety standards early will have a competitive advantage and attract more customers.

### **14.4) Threats (External Factors)**

External threats that could increase the mill's already present supply chain problems.

#### Wheat Price Volatility

Due to fluctuations in wheat prices on a daily basis, it is extremely difficult for the mill to determine when it would be best to purchase wheat. The volatility makes it very difficult for the mill to accurately forecast their customer's demand for wheat, thereby increasing the financial risk associated with each decision made regarding wheat purchases.

#### Uncertain Supply from Punjab

The roads into Punjab where supplies come from are frequently blocked by traffic and/or have raised the cost of fuel. All of these factors will contribute to the amount of time that the mill has to produce and deliver its products which will increase the time it takes to get products delivered to the consumer.

#### Environmental Damage from Weather Exposure

The humidity and rain in Islamabad create an ongoing threat to the outdoor storage of wheat at the mill. A slight change in the weather can result in the spoilage of a large quantity of wheat since the mill stores all of its wheat in the open air.

## Rising Energy Costs and Power Outages

Energy costs are escalating, while power blackouts are becoming more prevalent. The dual pressure of increasing energy costs and frequent power blackouts will increase the number of times that the mill will experience a halt in production and will increase the total cost of operating the mill.

## Competition from Modern Mills

Since new mill operations have purchased newer equipment and developed modern storage facilities that have been certified, they are able to lure away dealers and customers of older mills.

## 15) PESTLE Analysis of Mehboob Flour Mill

This analysis expands upon some of the many external factors that are affecting the mill's supply chain and operational issues.

P	E	S	T	E	L
<b>Government Influence</b> <ul style="list-style-type: none"> <li>○ Market price volatility</li> <li>○ Government price controls</li> <li>○ Regulatory enforcement fluctuations</li> </ul>	<b>Cost Pressures</b> <ul style="list-style-type: none"> <li>○ Rising operational expenses</li> <li>○ Input price changes</li> <li>○ Energy interruptions</li> </ul>	<b>Public Perception</b> <ul style="list-style-type: none"> <li>○ Increasing public concern</li> <li>○ Hygiene and safety concerns</li> <li>○ Reputation fragility</li> <li>○ Labor welfare issues</li> </ul>	<b>Modernization Needed</b> <ul style="list-style-type: none"> <li>○ Untapped technology opportunities</li> </ul>	<b>Sustainability Concerns</b> <ul style="list-style-type: none"> <li>○ Weather-related spoilage risks</li> <li>○ Pollution and worker health</li> </ul>	<b>Compliance Risks</b> <ul style="list-style-type: none"> <li>○ Non-compliance with laws</li> <li>○ Risk of sudden enforcement</li> </ul>

Figure 10: PESTLE Analysis of Mehboob Flour Mill

Source: Author

PESTLE is a strategic planning tool used to evaluate the impact of political, economic, social, technological, environmental and legal factors might have on a project. It involves an organization considering the external environment before starting a project. It is a good way of ensuring one has captured all potential risks and issues. PESTLE Analysis is an analytical tool

for strategic business planning. PESTLE is a strategic framework for understanding external influences on a business or on any project.

### **15.1) P: Political Factors**

#### Government Price Controls and Wheat Release Policies

The government has established minimum price supports for wheat and occasionally releases wheat from its Strategic Reserves. The impact is direct; therefore, the government has the ability to control wheat prices. As a result, procurement planning becomes unpredictable and adds volatility to demand forecasting (Problem 1).

#### Risk from Regulatory Enforcement Fluctuations

Regulations governing food quality and safety are laxly enforced due to local corruption and bribery. However, if the government were to suddenly tighten enforcement of regulations regarding food safety and quality, the mill would likely have difficulty because of the current lack of adequate hygiene practices and outdated storage and non-compliant equipment (Problem 2)

### **15.2) E: Economic Factors**

#### Frequent Input Price Changes

Weekly fluctuations in wheat prices create uncertainty and increase difficulties for procurement planning; therefore, demand forecasting becomes inaccurate.

#### Rising Operational Costs

Increases in electricity and fuel costs throughout Pakistan are being passed along by wheat suppliers in the form of higher wheat prices (Problem 1).

#### Financial Losses from Energy Interruptions (Problem 4)

Long duration power cuts not only consume all electrical power used to run the mill but also spoil the wheat and flour produced, which results in lost production and lost profit margins.

### **15.3) S: Social Factors**

#### Increasing Public Concern for Hygiene and Safety

Consumers, particularly larger consumers are starting to become more aware of food safety and cleanliness. Therefore, mills that appear to be unsanitary and unsafe will lose their customers' trust and ultimately, business.

#### Reputation Fragility

Photos or videos of pests or unsafe working conditions posted online will severely damage customer confidence (Problem 2)

#### Labor Welfare Issues

Labor welfare issues include no formal training provided to employees, no employee attendance system, and employees being confined to the interior of the factory like they are in an old-style operation. These types of labor practices decrease morale and efficiency.

### **15.4) T: Technological Factors**

#### Untapped Opportunities for Simple Technology

The mill operates much like it has for decades. It uses paper-based record keeping and manually monitors inventory. Both of these limit efficiency and accuracy. Technologies that could assist the mill in reducing errors, improving forecasting, enhancing storage safety, and managing energy-related problems include mobile apps for tracking orders, basic stock management software, solar power, automatic weight measuring devices, and CCTV cameras (Problems 1, 2, 4).

### **15.5) L: Legal Factors**

#### Non-Compliance with Safety and Labor Laws

Significant gaps exist between what is required for employee safety and what the mill provides in terms of protective gear, employee contracts, and fire safety compliance. This places the mill at risk of potential lawsuits at any time.

#### Risk of Sudden Enforcement

If the mill is the subject of an unannounced inspection by labor or food safety authorities, the mill could be subject to fines, penalties, or even be shut down as a result of its poor infrastructure and substandard storage facilities (Problem 2).

### **15.6) E: Environmental Factors**

#### Weather-Related Spoilage Risks

Rain and high humidity levels in Islamabad create a threat to wheat stored outside. Once moisture is present, it quickly causes mold and degrades the quality of the wheat, further complicating the storage issue (Problem 2).

#### Pollution and Worker Health Issues

Older machinery produces excessive amounts of dust and noise. In addition, plastic bags are prone to leaking when it rains, resulting in both material loss and health risks for employees.

## **CHAPTER 5: LIMITATIONS & CONCLUSION**

### **16) Limitations of the Study**

In addition to being students working on the final year project we experienced many other limitations that affected how deep or wide our research could be. We were reliant on the given information (the company background and related data) of Mehboob Flour Mills; therefore, we did not have the opportunity to collect primary data through means such as site visits, interviews with employees/stakeholders, and/or observation of operational processes in real time. Constraints of time associated with a student project limited our capability to test/pilot the proposed solutions to validate the suggestions theoretically implemented versus empirically validated. In addition to these time constraints, resource constraints (lack of funding for tools/consultants etc.) prohibited us from proposing more expensive or customized solutions for example, advanced customized software systems. Also, the analysis was only focused on the four identified problems; which may have resulted in missing interconnected issues because of lack of detailed financial data and/or long-term market trend data.

### **17) Recommendations**

The outlined challenges and proposed solutions have guided our recommendations that we suggest Mehboob Flour Mills should take to enhance its supply chain and increase its operational efficiency.

**Create demand forecasting & inventory management:** Mehboob Flour Mills may use Google Sheets to create a daily inventory log to track the quantity of wheat used each day and sales volume; to also develop a rolling forecast system based upon 7-day and 30-day average usage to determine what the need is and how much safety stock to hold. This approach will help reduce the costs of over purchasing, stockouts, and the associated costs of inventory obsolescence.

**Improve storage practices:** Mehboob Flour Mills can immediately improve temporary coverings for wheat stored outdoors by using heavy-duty tarps in a sloping setup with frames to prevent water from entering into the piles during rainfall; they can also improve the quality of their wheat piles by implementing first-in, first-out (FIFO) zoning with dated tags on all stacks to ensure the older grain is rotated out before it spoils. A longer-term solution would be

to construct a shaded metal framed structure with a raised platform to improve air flow and control pests and rodents.

Increase alignment with suppliers: Mehboob Flour Mills can compile a list of its suppliers in Google Sheets including information such as lead time, capacity, and reliability; they can also establish a WhatsApp group to communicate proactively with suppliers regarding upcoming delivery needs and any delays. This will help Mehboob Flour Mills receive consistent deliveries, minimize production disruptions, and build on the strong relationship they currently have with their dealers and brokers.

Reduce energy interruptions: Mehboob Flour Mills can begin developing a comprehensive plan to address power outages by conducting an electrical audit to identify the most important loads to keep running during power outages, replacing incandescent bulbs with LED bulbs and performing routine maintenance on motors; they can also move high energy activities to stable grid hours and store a 2-3 days' worth of finished flour in case of future power outages. In addition to these short-term plans, Mehboob Flour Mills can consider installing small-scale solar panels with battery back-up systems on non-destructive mounts to further reduce their reliance on the grid.

Transition towards automation: Mehboob Flour Mills can transition towards automation in phases by introducing new technologies to replace the heavily manual processes that currently exist. They can start by utilizing cost-effective technology such as digital weighing scales, automatic weighing devices, and basic software programs for ordering and inventory management to improve accuracy and consistency in processes such as procurement, inventory management, and milling. The ultimate goal is to increase efficiency and competitiveness.

## **18) Conclusion**

This research has shown how Mehboob Flour Mills plays an important role within Pakistan's flour mill industry, producing necessary wheat flour products (chakki atta, maida, sooji, bran) to meet the increasing demands of food security as a result of the rising population and urbanization of the country. The study was conducted by analyzing the operation of Mehboob Flour Mills, specifically; production, quality control, departments involved in the operation, and interaction between the stakeholders of Mehboob Flour Mills. Four major challenges that impede the operation of Mehboob Flour Mills were found in the course of the study. These include poor demand forecasting that results in inefficient procurement, improper storage

procedures that lead to the disposal of spoiled goods, the lack of synchronization between the suppliers and Mehboob Flour Mills that leads to delayed delivery of raw materials, and interrupted electricity supply to the mills that affects the processing capabilities of the mills. The SWOT analysis indicated that Mehboob Flour Mills have several internal strengths (reliable procurement and reduction in waste) but also several internal weaknesses (limited storage capacity and unreliable electricity supply). In addition, it is believed that there are many opportunities available to Mehboob Flour Mills (digital tools), and several external threats (price volatility) that may affect the future of Mehboob Flour Mills.

In order to provide potential solutions to the problems outlined above, three proposed solutions were developed: daily logs for forecasting, improved covering and first-in-first-out (FIFO) inventory management systems to prevent storage losses due to expired or spoiled goods, supplier databases and use of WhatsApp routines to synchronize with suppliers, and a power audit with solar panel upgrades to improve reliability of the electricity supply to the mills. These proposed solutions will be implemented in phases and with the assistance of accessible tools such as Google Sheets.

By implementing the proposed solutions outlined above, Mehboob Flour Mills can reduce their operational expenses, decrease the amount of waste they generate, increase the stability of their supply chains, and increase their market share. This will contribute to higher levels of customer satisfaction, increased profitability of Mehboob Flour Mills, and long-term sustainability of Mehboob Flour Mills in a highly competitive market environment.

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## ANNEXURES

### 1. General Products, Sales and Volume

- Are your products packaged in a standard weight of kilograms and if so what size?
- Average monthly production, and variance?
- Sales channel and marketing strategy: B2B/B2C, Advertising.
- What becomes of waste generated in the production process or materials that fail quality testing?

### 2. Supply Chain and Purchasing

- Where do you source your wheat from, and how do you identify potential suppliers or brokers?
- Process of purchasing raw materials: Quantity, Pricing, Frequency.
- Favored brokers for acquiring emergency/Safety Stock?
- Size of Buffer Stock held and how frequently does it turn over?
- KPIs (if any) to evaluate supplier performance?
- Coping strategies to prevent production downtime due to Material Shortages?

### 3. Manufacturing Process and Quality Control

- Walk me through the manufacturing process (Tempering included).
- Quality inspection and approval of incoming raw materials?
- Systems for recording weights and tracking of good received?
- How is the control room manned and monitored (Shifts, Personnel)?
- Who is responsible for the cost associated with inbound/outbound logistics?
- How do employees communicate with each other during production?
- How do you monitor employee time (Third party contractors)?

### 4. Storage Capacity and Inventory Management

- Maximum storage capacity at the facility and average length of backup supply?
- Storage of Raw Materials: Protection from weather/pests?
- Inventory management challenges experienced: Turnover, Automation?
- Facility design and how it affects storage and truck movement?

#### 5. Safety, Sanitation and Regulatory Compliance

- Sanitation and safety practices implemented?
- Training programs for employees to follow Standard Operating Procedures (SOPs) and utilize safety equipment?
- Potential Hazards (Noise, Congestion, Structural) present and methods for mitigating them?
- Policies and procedures for on-site worker accommodations and time reporting?

#### 6. Factory and Site

- Description of the factory's age, layout, and any planned expansion or upgrades?
- Any project delays such as: New Construction, Solar Installation, etc.
- Methods employed to reduce electricity consumption and audit compliance. Have you considered Solar Power?
- Influence of Land Ownership on Improvement Decisions?

#### 7. Challenges and Automation

- Largest operational challenges currently faced?
- Level of automation in processes (Bookkeeping, Bag Filling, Monitoring)?
- Demand Forecasting and Order Variance Strategies?
- Fixed Buyer Relationships and their effect on Logistics and Operations?



## Mehboob Flour Mills

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