Thesis Report

On

Supply Chain Resilience and Risk Management in Bangladesh's Elevator Industry

Submitted by:

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ID: MSCM2302029001

Program: MBA in Supply Chain Management (MSCM)
Major: Supply Chain Management
Department of Business Administration
Sonargaon University (SU)

Submitted to:

Department of Business Administration
Faculty of Business
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Submitted for the partial fulfillment of the degree of
MBA in Supply Chain Management (MSCM)



Sonargaon University (SU)

147/I, Green Road, Panthapath, Tejgaon, Dhaka

Date of Submission: April 28th, 2025

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147/I, Green Road, Panthapath, Tejgaon, Dhaka

Date of Submission: April 28th, 2025

Letter of Transmittal

April 28th , 2025

Mst. Marium Akter
Lecturer
Department of Business Administration
Faculty of Business
Sonargaon University (SU)

Subject**:** Submission of Thesis Report Titled **"Supply Chain Resilience and Risk Management in Bangladesh's Elevator Industry"**.

Dear Madam,

I am pleased to submit my thesis report titled **"Supply Chain Resilience and Risk Management in Bangladesh's Elevator Industry"**. This thesis fulfills a requirement for the MBA program and was conducted under your kind supervision. The report presents insights from academic literature and industry-based analysis, particularly focusing on Creative Engineers Ltd. (CEL). I have made every effort to maintain quality, relevance, and academic rigor.

I sincerely appreciate your valuable guidance and support throughout the research. Should you require any further information or clarification, I would be happy to provide it.

Thank you once again.

Yours Sincerely,

Xami Ibn Jafry

ID: MSCM2302029001

Program: Master of Business Administration (MBA)

Major: Supply Chain

Sonargaon Universit

Student's Declaration

This is to notify you that the thesis paper titled **"Supply Chain Resilience and Risk Management in Bangladesh's Elevator Industry"** has been prepared as part of my dissertation formalities. It is an obligatory component of my RMBA program to submit a thesis paper. Moreover, my supervisor **Mst. Marium Akter, Lecturer**, Sonargaon University (SU), inspired and instructed me throughout this research. I further declare that I have not submitted this report anywhere for the award of any degree or certificate.

Yours Sincerely,

Xami Ibn Jafry

ID: MSCM2302029001

Program: Master of Business Administration (MBA)

Major: Supply Chain

Sonargaon University (SU)

Letter of Authorization

I hereby confirm that the thesis report titled **"Supply Chain Resilience and Risk Management in Bangladesh's Elevator Industry"** is a genuine effort by **Xami Ibn Jafry**. The research was conducted under my guidance. I also confirm that, to the best of my knowledge, the content presented in this report has not been included in any other project report or dissertation that led to the award of a degree to any candidate earlier, whether in the same context or a different one.

Mst. Marium Akter
Lecturer
Department of Business Administration
Faculty of Business
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Acknowledgement

First and foremost, I would like to express my deepest gratitude to the Almighty for granting me the strength, wisdom, and perseverance to successfully complete this research work and thesis.

I am sincerely grateful to my honorable supervisor, **Mst. Marium Akter**, Lecturer, Department of Business Administration, Faculty of Business, Sonargaon University (SU), whose expertise, encouragement, and insightful guidance have been instrumental throughout this research journey. Her patience, critical evaluation, and constructive suggestions helped me enhance the depth and quality of this study.

I am also thankful to the faculty members and administrative staff of the Department of Business Administration, Sonargaon University, for providing academic support and inspiration during my MBA program. Their dedication to teaching and mentorship created a motivating academic environment.

I would like to extend my heartfelt appreciation to the management and staff of **Creative Engineers Ltd. (CEL)** for allowing me access to valuable data and organizational insights. Their cooperation and openness made it possible to gain a real-world perspective and conduct a meaningful case study on the elevator industry in Bangladesh. The interviews, observations, and shared documentation added significant value to my analysis of supply chain resilience and risk management.

I am especially thankful to my classmates and peers, whose camaraderie and feedback enriched my academic experience. The sharing of ideas, knowledge, and motivation from my friends helped me stay focused and determined during challenging phases of the research.

Finally, I owe a profound debt of gratitude to my beloved family for their unwavering moral support, encouragement, and understanding. Their sacrifices and faith in my abilities have been a constant source of strength throughout my academic journey.

This work reflects the collective support and contributions from all the individuals mentioned above, to whom I remain sincerely thankful.

Executive Summary

This thesis explores supply chain resilience and risk management within Bangladesh's elevator industry, focusing on **Creative Engineers Ltd. (CEL)**. With growing urbanization driving elevator demand, the study assesses how supply chain strategies affect operational continuity, risk mitigation, and customer satisfaction in an import-reliant sector.

Grounded in theories like the Resource-Based View (RBV) and Contingency Theory, the research adopts a qualitative case study approach, using interviews with CEL's supply chain leaders and supporting data from company documents and industry reports.

The study finds CEL agile in-service delivery but vulnerable due to reliance on single-source foreign suppliers, a weak local sourcing ecosystem, and lack of integrated digital systems resulting in delays and risk management challenges.

Key improvement areas include diversifying suppliers, building local partnerships, implementing digital supply chain tools, and establishing formal risk frameworks. These measures would strengthen resilience, visibility, and responsiveness to disruptions.

The thesis offers actionable insights for CEL and similar firms, contributing to a deeper understanding of supply chain risks in Bangladesh's specialized industries and outlining a path toward greater resilience and sustainability.

List of Acronyms

CEL	Creative Engineers Limited
SCR	Supply Chain Resilience
SCM	Supply Chain Management
RM	Risk Management
JIT	Just-In-Time
EOQ	Economic Order Quantity
ERP	Enterprise Resource Planning
IoT	Internet of Things
AI	Artificial Intelligence
R&D	Research and Development
KPI	Key Performance Indicator
AMC	Annual Maintenance Contract
VCB	Vacuum Circuit Breaker
RMU	Ring Main Unit
BUET	Bangladesh University of Engineering and Technology
ISO	International Organization for Standardization
EN	European Norm (Standard)
COVID-19	Coronavirus Disease 2019
SU	Sonargaon University

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Chapter 1

Introduction

1.1 Introduction

The lift industry in Bangladesh has seen expansion of rapid urbanization **b1**, expansion of high growing constructions and expansion of commercial infrastructure. Cities such as Dhaka and Chattogram are vertical, demand for lifts and escalators has increased, making the supply chain flexibility a crucial factor for the stability of the industry. Among the local players in this emerging area, CEL **(Creative Engineers Limited)** has established itself as a major player in lift distributor of Schindler and installation **CEL2025**.

This industry, development of which is necessary to keep up in this industry, particularly in developing country such as Bangladesh, where infrastructure boundary, import dependence and logistic disability degrade business operation periodically. The intent of this research is to evaluate supply chain flexibility and strategies of risk management (SRM) for CEL, with the purpose of identifying the gaps, and making recommendations to ensure continuous operation and customer satisfaction.

Furthermore, it is a heavy user of experienced engineering and the installation of CEL heavy local components. The weakness of the current SUPPLY CHAIN and STRATEGIC RISK MANAGEMENT of this study is an evaluation at FLASH evaluation of the flexibility of the CEL supply chain to increase corporate continuity and customers' satisfaction.

1.2 Origin of the Report

This research paper is a result of analyzing the supply chain flexibility and risk management from the strategic perspective in Bangladesh's developing lift industry. Study focuses on CEL. The supply chain weakness and mitigation strategies are assessed by a major domestic player in lift construction and installation.

The motivation behind this research lies in the critical role that supply chain stability plays in industrial growth, particularly in in emerging economies such as Bangladesh, where infrastructure limitations, imports of imports, and logistical inefficiencies often interrupt operations. This report attempts to analyze defects in Cel's supply chain structure and find gaps and risks in operational practices to come up with practical action plans aimed at boosting resilience in the supply chain.

The findings of this study contribute to both academic and industrial discourse by offering a structured approach to the supply chain optimization in import-dependent areas. Moreover, recommendations offered might prove useful to other local distributers facing similar problems in Bangladesh as well as in similar markets.

1.3 Scope of the Study

The study focuses on the **supply chain operation of What is needed is just the sensing of man's capital and creative engineers limited (CEL)** especially in Bangladesh's lift distributing sector. Further, it analyzes upstream and downstream supply chain elements focusing on sourcing, procurement, logistics, inventory management and distribution. Based on outlet risk factors, flexibility practices, and strategic reactions for the supply disruption of the series, the study is carried out. First and foremost, it is a case study of CEL, but the conclusion from the study can also provide a more general insight in applying to other local distributors in Bangladesh.

1.4 Background of Study

Bangladesh's elevator industry has experienced steady growth in recent years, driven by the construction boom in urban areas **b2**. Although the industry is experiencing several constraints, including the huge reliance on imported parts and equipment; regulatory bottlenecks; port loads; and underdevelopment of transport infrastructure. These factors are a very high level of risk, high level of vulnerability to the supply chain, with respect to their disorder.

Locally grown company Sale has been successful in this challenging environment by combining local expertise with international cooperation. It is essential to understand how and to which degree a company like CEL manages its supply chain risks and develops flexibility for both academic and industry benchmarking purposes. This study has conducted to identify these particulars with detail and indicates ways of augmentation of the strength of CEL and similar companies in Bangladesh.

1.5 Objectives of the Study

- **Broad Objective:** To evaluate and analyze the supply chain of Creative Engineers Limited (CEL) in the lift distributing industry in Bangladesh.
- **Specific Objectives:**
  - To identify key risks faced by CEL's supply chain operations.
  - To assess current risk management and flexibility in order to evaluate the effectiveness of existing strategies.
  - To detect the role of technology and local sourcing in enhancing supply chain flexibility.
  - To recommend practical strategies for improving CEL's supply chain robustness.
  - To contribute to educational and industry understanding of supply chain flexibility in Bangladesh.

1.6 Research Methodology

This study applies a mixed methods research approach using qualitative as well as quantitative techniques to examine comprehensively supply chain flexibility and risk management practices within CEL. The structure of our work is to provide methods of method and remain practical industry applicable.

- **Primary Data Collection:**
  - **Structured Interview:** In-depth interview with CEL's key operating personnel including the Supply Chain Manager, Procurement Officer, Logistics and Distribution Coordinator, and Senior Management Officer. Focus areas include risk assessment strategies, supplier relationships, inventory management, and disruption response mechanisms.
  - **Field Observation:** Visits to CEL construction facilities and project sites to observe production workflows, supply chain logistics, and quality control procedures.
  - **Targeted Survey:** Structured questionnaire distributed to middle-level managers and technical staff focusing on supply chain bottlenecks, risk mitigation effectiveness, and customer satisfaction matrix.
- **Secondary Data Collection:**
  - **Corporate Documentation:** CEL's annual report, internal process manual, and corporate publications (Source: http://cel.com.bd/).
  - **Industry Benchmarking:** Review of global and local lift market reports and comparative case studies of supply chain models in similar industries.
  - **Educational and Regulatory Sources:** Scholars' articles on supply chain flexibility structure.
- **Data Analysis Framework:**
  - **Qualitative Analysis:** Interview tape and thematic coding of observation notes to identify recurring challenges and best practices.
  - **Quantitative Analysis:** Descriptive figures for measuring key performance indicators in supply chain operations.
  - **Triangulation:** Cross-satisfaction of conclusions in primary and secondary sources to ensure validity.

1.7 Limitations of the Study

Despite careful design and execution, this study encountered several limitations that may have affected the scope, depth, and generalizability of its findings:

- **Restricted Access to Internal Data:** Due to confidentiality agreements and organizational policies, full access to Creative Engineers Ltd.'s (CEL) internal documents, operational databases, and financial records was not granted. This restricted the researcher's ability to conduct an in-depth analysis of certain risk mitigation mechanisms and supply chain processes.

- **Time Constraints:** As the research was conducted within a limited academic calendar, there was insufficient time for prolonged field engagement, extended interviews, or iterative data collection rounds. These constraints may have influenced the richness of insights obtained, particularly from industry experts and supply chain partners.

- **Limited Scope and Generalizability:** This research is based on a solitary case study approach focusing on one elevator manufacturing company in Bangladesh. While this provides a deep understanding of CEL's resilience strategies, the findings may not be entirely.

  generalizable to the broader lift or engineering manufacturing sectors in Bangladesh or other developing countries.

- **Potential for Response Bias:** Most of the data was collected through interviews and surveys, which inherently rely on participant's perceptions and honesty. There is a possibility of subjective bias, social desirability bias, or selective memory affecting the accuracy and objectivity of the information provided.

- **Dynamic Business Environment:** The business environment in Bangladesh, especially in the construction and manufacturing sectors, is continuously evolving. Policy shifts, economic factors, or global supply disruptions occurring after the data collection phase may have altered the applicability of some insights at the time of publication.

Chapter 2

Literature Review

2.1 Introduction

The concept of Supply Chain Resilience (SCR) has emerged as a major area of research in operations and supply chain management, especially in view of global disruptions such as the COVID-19 pandemic, geopolitical conflicts, and climate-related shocks. For developing economies like Bangladesh, where infrastructural, logistic and import dependence deficiencies add vulnerabilities to supply chain, SCR is even more indispensable to sustain the industrial growth.

This chapter synthesizes global and local literature on their applications in supply chain resilience (SCR), risk management, and elevator manufacturing of Schindler, with a focus on Creative Engineers Limited (CEL). The structure of the review is based on the following key topics.

- Theoretical foundation of supply chain resilience
- Supply a series of types of risk.
- Strategies to increase resilience.
- Global and local approach to lift distributing supply chain.
- Bangladesh-specific supply chain challenges
- Theoretical outlines guiding resilience strategies.

By integrating empirical studies, industry reports, and educational principles, this review establishes a sturdy foundation to analyze CEL's supply chain resilience and risk management practices.

2.2 Supply Chain Resilience: Concept and Evolution

SCR refers to the capacity of a supply chain to recover from disruptions, optimize operations, and maintain continuity and customer satisfaction throughout turbulent conditions [1]. It encompasses several key dimensions:

- **Active risk mitigation** — such as supplier diversification, inventory buffers
- **Reactive adaptability** — such as dynamic reevaluation and flexible production systems
- **Long-term learning** — for example, improving processes after disruptions.

Christopher and Peck (2004) define resilience as a strategic capability that enables firms to endure and recover from rapid disruptions more effectively than competitors [2]. Sheff and Rice (2005) further argue that resilience is not only about recovery but also development — supply chains should learn from disruptions and become stronger as a result [3].

2.3 Key Components of Resilience

Several frameworks identify critical dimensions of supply chain resilience (SCR), each addressing various aspects of a firm's ability to respond to disruptions:

- **Agility** — the ability to respond quickly to changes such as demand peaks or supplier failures **Tang2006**.
- **Redundancy** — building strategic overcapacity through safety stock, backup suppliers, or extra production capabilities **Blackhurst2011**.
- **Collaboration** — maintaining strong relationships with suppliers and partners to coordinate risk management efforts **Brusset2017**.
- **Visibility** — having real-time tracking of inventory, shipments, and demand signals to anticipate disruptions and respond effectively **Ivanov2021**.

However, these dimensions are especially critical for the market of elevator sole distributors like Creative Engineers Limited (CEL) because the sector has large amount of customization demands, are dependent on imported components and require after sales service support.

2.4 Supply Chain Risks: Typology and Impact

- **Categorization of Risks:** Jüttner et al. (2003) classified supply chain risks into five major categories:
  - **Supply Risks** — such as material scarcity or supplier bankruptcy.
  - **Demand Risks** — including demand volatility and forecasting errors.
  - **Operational Risks** — for example, equipment breakdowns or labor strikes
  - **Environmental Risks** — such as natural disasters or political instability
  - **Financial Risks** — including currency fluctuations and inflation **juttner2003**

- **Bangladesh-Specific Risks:** Elevator distributors in Bangladesh also face several localized challenges:
  - Port congestion — the Port of Chittagong manages 90% of trade but suffers from chronic delays [4].
  - Import dependence — about 80% of elevator components are imported, from China **karmaker2020**.
  - Infrastructure gaps — including poor road networks and unstable energy supply [5].

These risks highlight the strategic importance of building supply chain resilience for companies like CEL.

2.5 Elevator Industry Supply Chains: Global vs. Local Perspectives

- **Global Best Practices:** Karmaker et al. (2020) studied elevator supply chains and highlighted several key factors:
  - Just-in-Time (JIT) challenges due to import delays.
  - Customization pressures require flexible distribution.
  - After-sales service as a critical differentiator.
- **Bangladesh's Elevator Industry Challenges:**
  - Limited local suppliers for precision components.
  - High import duties increasing costs.
  - Skilled labor shortages in installation and maintenance **Uddin2021**.

CEL has responded with selective local sourcing and buffer inventory strategies. However, their systems still lack robust digital implementation, limiting end-to-end visibility and agility.

2.6 Theoretical Frameworks for SCR Analysis

- **Theoretical Framework:**
  - **Resource-Based View (RBV):** Resilience stems from a firm's unique internal capabilities such as flexible production systems and a skilled workforce [6].
  - **Contingency Theory:** Supply chain resilience (SCR) must adapt to external uncertainties like geopolitical risks and infrastructure challenges [7].
- **Application to CEL:**

  Based on the above frameworks, CEL's organizational resilience depends on:
  - Internal strengths — e.g., in-house fabrication capabilities.
  - External adaptations — e.g., use of alternative logistics routes.

2.7 Case Study: Supply Chain Resilience at Creative Engineers Limited (CEL)

The elevator distribution sector of Bangladesh where Creative Engineers Limited operates encounters intricate supply chain problems that match those documented throughout the literature on developing economy supply chains (Ponomarov & Holcomb, 2009 Karmaker et al.'s 2020) research shows that elevator distributing companies should understand risks from importing 80 percent of their production materials. The operation was seriously impacted due to the COVID-19 pandemic which led to 8–12-week component delivery delays from China after supply chains created operational challenges

because of single-source supplier dependencies (Jüttner et al. 2003) define as vital supply chain risk elements.

The general infrastructure constraints which Bangladesh exhibits according to World Bank (2023) documentation of its logistics performance indicators. Customs clearance procedures at Chattogram Port extend for approximately 7-10 additional days than those observed at nearby ports of its competitors. Christopher & Peck (2004) force us to understand the environmental risks which have become especially severe in developing markets through these depicted bottlenecks. According to Tang (2006) the 15% jump in currency-induced costs during 2023 demonstrates financial uncertainties that Global Supply Chain managers need to understand regarding import-driven operations.

2.8 Risk Categories in distributing Supply Chains

According to Chopra and Sodhi (2004), risks in supply chains can be categorized as follows:

Table 2.1: Supply Chain Risk Categories in Elevator distribution

Risk Category	**Examples of Elevator Distribution**
Supply Risks	Component shortages, supplier bankruptcy
Demand Risks	Market unpredictability, changing specifications
Process Risks	Machine breakdown, skilled labor shortage
Control Risks	Poor monitoring systems, manual errors
Environmental Risks	Natural disasters, political instability, pandemics
Financial Risks	Currency fluctuation, tax policy shifts

Major elevator components such as motors, controllers and safety systems that distributed in Bangladesh need to use are imported from outside the country. The situation exposes the company to major supply chain vulnerabilities because of dysfunctional ports combined with currency exchange rate fluctuations. To fight these business risks effectively CEL needs to expand its distribution activities across various sources and locations.

2.9 Summary and Research Gaps

This review highlights:

- SCR is critical for Bangladesh's import-dependent industries.
- CEL faces unique risks (port delays, forex fluctuations).
- Digital SCM and local supplier development are key opportunities.

Very few academic investigations have targeted distributing sectors including elevators within the Bangladesh context. This research establishes a gap which my study aims to address by studying SCR practices at CEL. The research completes the existing knowledge gap through an investigation of CEL's supply chain relationship management.

Chapter 3

Organizational Overview

3.1 Company Overview

Creative Engineers LTD. (CEL) is a private limited engineering firm with over 42 years of history as the leading provider of escalators and elevators in Bangladesh. We are committed to shaping national infrastructures with experts and state-of-the-art technology, making significant contributions to the national urban development of the country. We started our journey by developing the elevator market in Bangladesh with the renowned brand Haushahn GmbH and later on acquired the exclusive distributorship rights for the products and services of the global elevator giant, Schindler Group, operating as their representative for the Bangladesh National Market.

Over the years CEL has expanded its range of products & services, adding divisions, skilled engineers & technicians, and global collaborations to its name. CEL dedicatedly pursues, the vision of its leaders of empowering the national technology framework, by contributing sophisticated technology and expertise to the fields of electrical, aeronautical, mechanical, & naval engineering in Bangladesh.

CEL has been an active participant in the maritime sector since the 90s, beginning its journey with the successful re-engineering of a highly sophisticated Bangladesh Navy vessel, eventually leading to one marine project after another. CEL also has a powerful 'Pump Division', which deals with irrigation pumps, sewage pumps, municipal pumps, etc. Adding to CEL's record of contributions and achievements, is the securing of the 'Well Field Construction Project of Dhaka WASA', for Hyundai Rotem. We are also the first company in the country, to successfully supply, install & commission several Microwave Radio Links & OMNI-SKIP MUX for the Bangladesh Telephone & Telegraph Board (BTTB).

CEL is an established brand supplying hi-tech, safe, durable performance-based technologies, since its inception to the tallest buildings, skyscrapers, national infrastructures, and more in Bangladesh, continually adding to its list of large-scale projects. We continue to carry on our legacy of complying with the highest global standards of quality and safety in providing our products and services to our customers.

3.2 Vision:

To actively contribute to sustainable urban infrastructure development in Bangladesh and advance lives by introducing innovative technologies across multiple sectors. CEL aims to contribute global standards of sustainable, safe, and durable cutting-edge technology products and services, to the national urban framework of Bangladesh, through skilled expertise and strong communities of global networking and business partnerships.

3.3 Mission:

To be Bangladesh's most trusted engineering provider, delivering eco-friendly, globally certified solutions through strong partnerships, R&D, and a focus on workforce excellence. The following are the key points:

- **Promote Sustainable Urban Development:** Drive the growth of eco-friendly and sustainable urban infrastructure in Bangladesh through innovative solutions.
- **Introduce Cutting-Edge Technologies:** Utilize advanced technologies to improve infrastructure and enhance the quality of life across multiple sectors in Bangladesh.
- **Commit to Global Standards:** Ensure all projects meet the highest international safety, quality, and performance standards, fostering trust and reliability.
- **Foster Strategic Partnerships:** Build strong, long-term business alliances with global partners to leverage expertise and deliver top-tier engineering solutions.
- **Invest in Research & Development:** Continuously invest in R&D to innovate and improve engineering solutions that address the evolving needs of urban infrastructure.
- **Develop Workforce Excellence:** Focus on training and development to create a highly skilled and knowledgeable workforce capable of delivering superior results.
- **Deliver Eco-Friendly Solutions:** Promote and implement technologies that reduce environmental impact and support the development of green, sustainable cities.
- **Be the Trusted Provider of Engineering Solutions:** Strive to be Bangladesh's most trusted and dependable provider of engineering solutions, known for quality, safety, and performance.

3.4 Exclusive Partnership with Schindler Group

One such distinguishing feature of CEL is its sole distribution deal with Schindler Group, a globally renowned, multinational elevator and escalator company from Switzerland. With this strategic partnership, CEL has come out with cutting edge vertical mobility solutions according to international safety and performance standards. Schindler in Bangladesh is distributed through CEL, the sole distributor of Schindler products, that provide local availability of globally certified technologies, services, and products.



Figure 3.1: Collaboration Schindler with CEL

3.5 Scope of Products and Services

Under the umbrella of Schindler, CEL provides a wide spectrum of portfolios:

- Passenger Elevators
- Freight Elevators
- Escalators and Moving Walkways
- Residential, Commercial, and Industrial Customized Lift Solutions

3.6 Core Values

CEL is grounded in a strong foundation of values that embody its culture, ethical principles, and strategic vision.

Table 3.1: Core Values of CEL

Core Value	Explanation
Safety	100% compliance with global testing standards, training, and strict inspection.
Integrity & Honesty	Zero tolerance for corruption; transparent business ethics.
Performance	Global standard engineering excellence with accountability.
Teamwork & Partnerships	Collaboration across departments, clients, and partners.
Passion for Innovation	Commitment to modern, research-backed technologies and urban development.

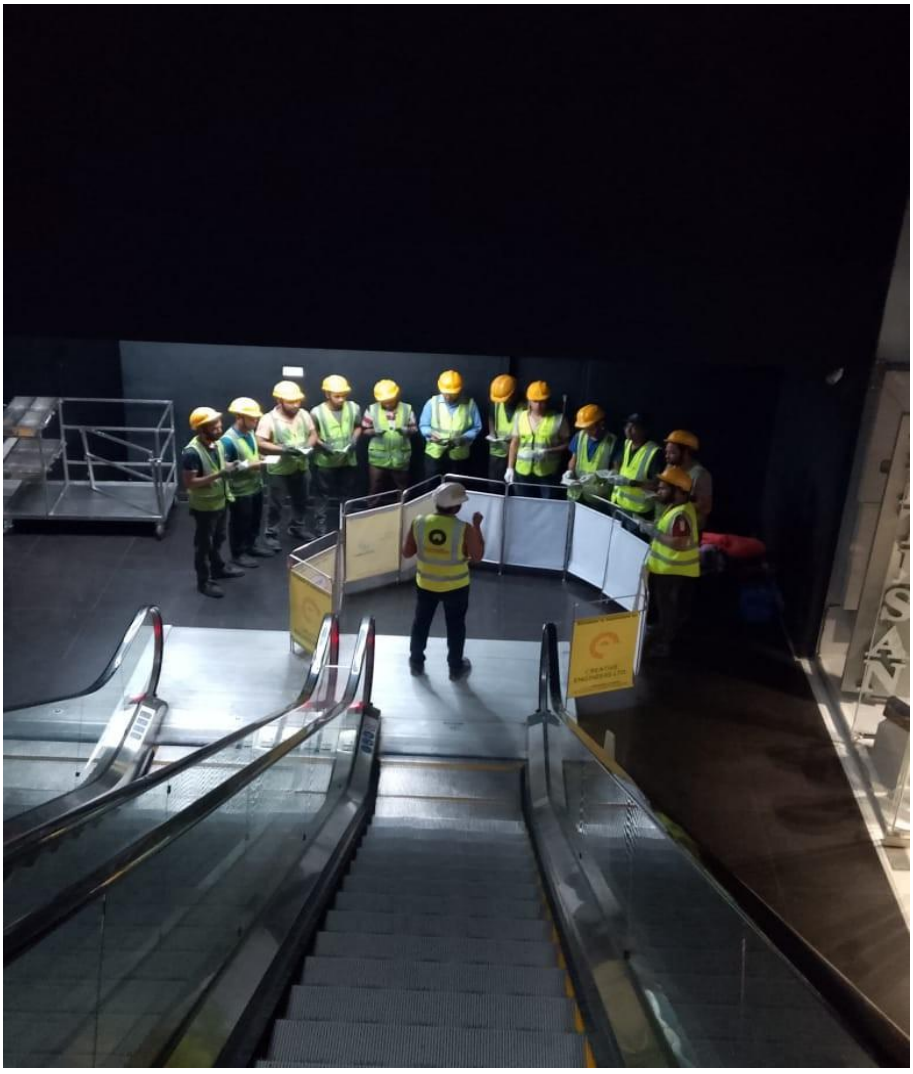


Figure 3.2: Safety Training to maintain the core value.

3.7 Organizational Structure

Creative Engineers Ltd. (CEL) follows a structured and hierarchical organizational framework designed to manage its diverse technical, sales, and administrative operations efficiently. This structure promotes accountability, efficient communication, and specialization, enabling CEL to remain a competitive and innovative player in the elevator and electrical systems industry in Bangladesh.

- **Organogram Overview:** The organizational hierarchy of Creative Engineers Ltd. (CEL) is depicted in Figure 3.3. This structure outlines the chain of command, role segmentation, and functional responsibilities across departments.

- **Organizational Structure Diagram:**

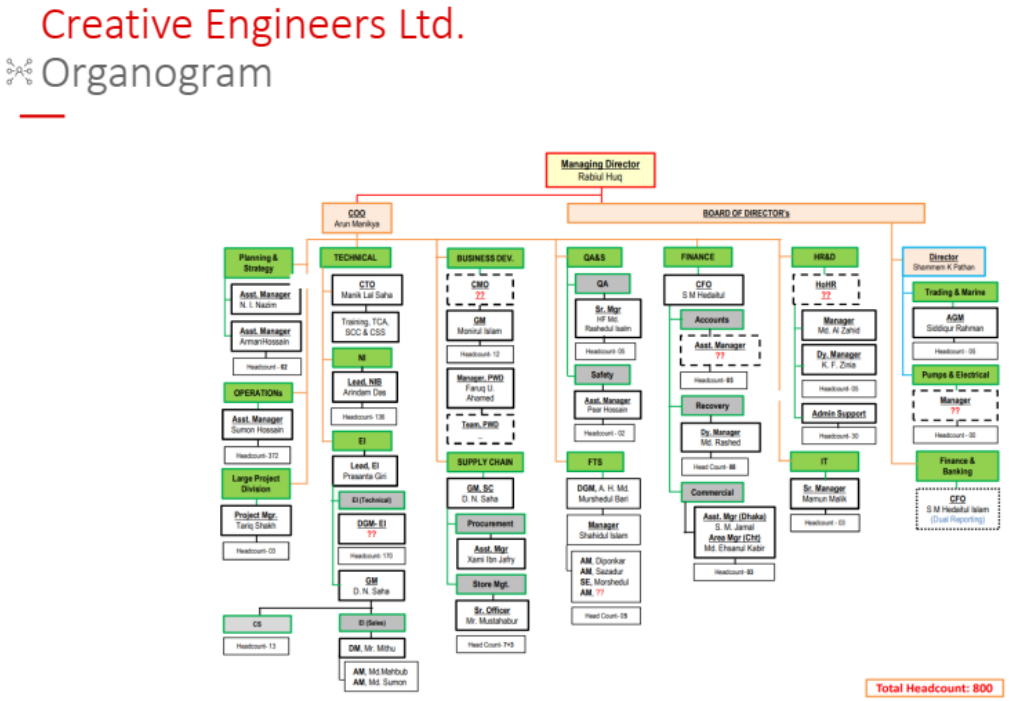


Figure 3.3: Organizational Structure of Creative Engineers Ltd.

- **Explanation of Organizational Roles:**

  - **Top-Level Management**

    * **Managing Director (MD):** Strategic leadership and corporate governance.
    * **Chief Executive Officer (CEO):** Business plan execution and operational alignment.
    * **Chief Financial Officer (CFO):** Financial management and reporting.
    * **Chief Technology Officer (CTO):** Technological innovation and R&D oversight.
    * **Director:** Advisory support for executive functions.

- **Mid-Level Management**
  - **GM – Business Development:** Business growth and sales team supervision.
  - **Head of New Installation:** Oversees elevator and escalator deployment.
    - **Group Leaders:** Supervise site teams and coordination.
    - **Engineers:** Execute installation and system testing.
  - **Head of Existing Installation (Technical):** Manages maintenance and service response.
    - **Call Center:** Manages customer inquiries and service calls.
    - **Engineers and Technicians:** Conduct repairs and preventive maintenance.
  - **Head of Existing Installation (Sales):** Oversees AMC sales and customer engagement.
    - **Salesperson:** Manage contracts and client relations.
- **Support Departments**
  - **IT:** Manages digital infrastructure, cybersecurity, and internal systems.
  - **HR & Admin:** Staff recruitment, services, and regulatory compliance.
  - **Quality Assurance:** Ensures service and product compliance.
  - **Safety:** Enforces worksite safety and legal compliance.
  - **Supply Chain:** Procurement, inventory, and logistics management.
  - **Accounts & Finance:** Oversees billing, audits, and cash flow.

- **Summary:** CEL's organizational model promotes streamlined operations while preserving flexibility. Alignment between technical and support departments under skilled leadership supports sustainable growth and adherence to global standards.

3.8 CEL-Schindler Operational Overview

- **Gearless Drive System:**
  - The Schindler 3300 is an energy-efficient, lightweight elevator that is free of hazardous substances and designed for sustainability.
  - It maintains consistent operational efficiency over time and is almost entirely recyclable.
  - **Figure 3.4** illustrates its green mobility features.

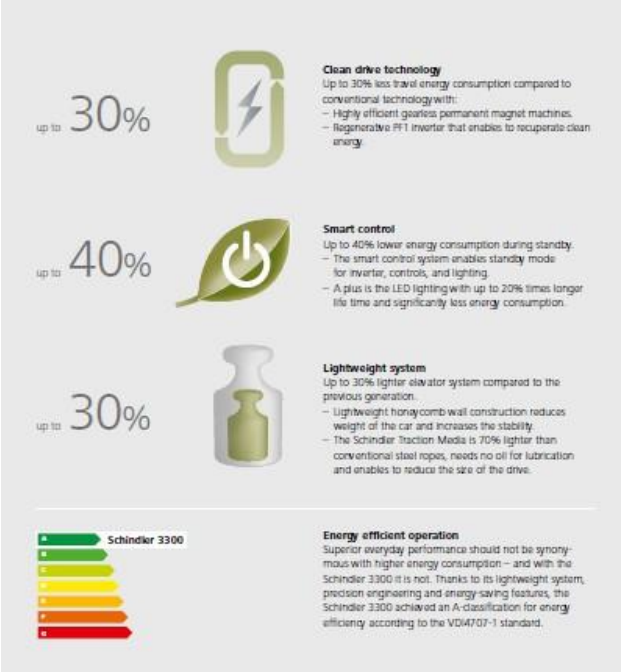


Figure 3.4: Green mobility

- **Space Efficiency:**
  - The system is designed to minimize space requirements by integrating the drive within the shaft and placing the control cabinet in the landing door frame.
  - **Figure 3.5** shows how space is optimized.

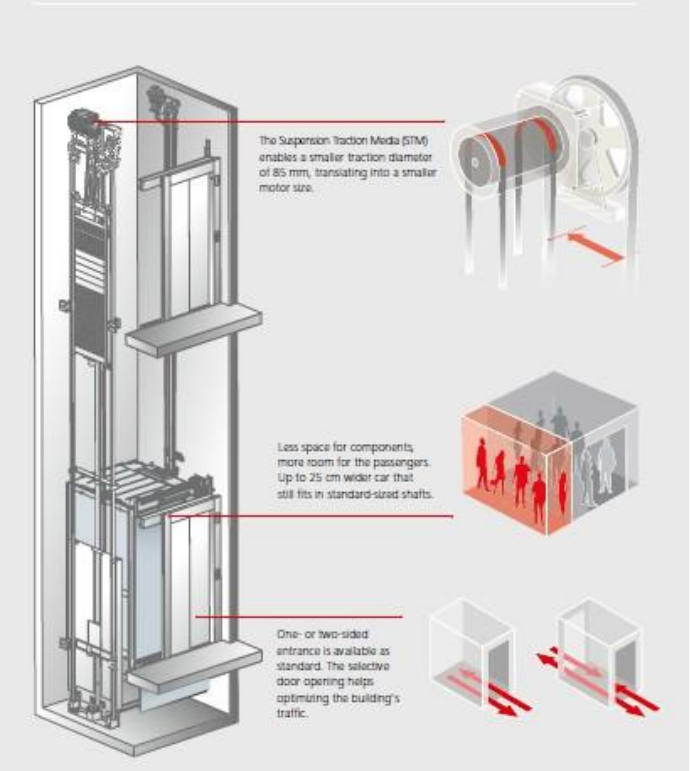


Figure 3.5: Space efficiency

- **Decor Options:**
  - The Schindler 3300 blends functionality and design to ensure safety and comfort.
  - It offers three design lines with varied color and style combinations to suit different buildings.
  - **Figure 3.6** displays decor customization options.

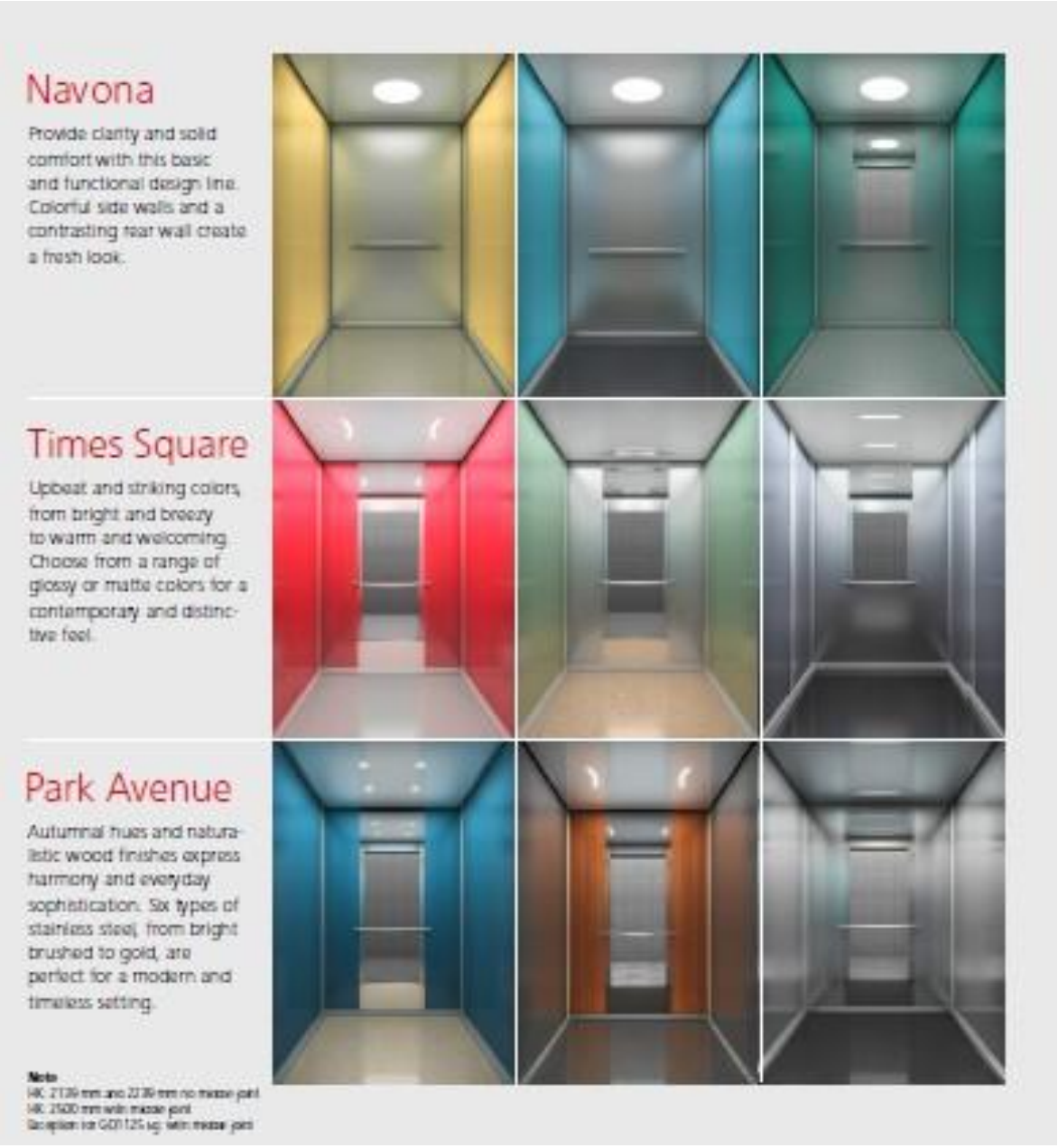


Figure 3.6: Decor Options

- **Current Projects & Installations:**
  - **Shanta Pinnacle:** LEED Platinum Pre-Certified 40-story tower in Dhaka with 8 elevators (up to 1600 kg capacity, 4 M/s speed).



Figure 3.7: Shanta Pinnacle

– **Shanta Forum:** Bangladesh's first 25-story twin towers with 10 elevators featuring Schindler Port Technology.



Figure 3.8: Shanta Forum

– **Grameen Telecom Trust Bhaban:** A corporate campus with 8 elevators of varied capacities supporting SMEs and large enterprises.



Figure 3.9: Grameen Telecom Trust Bhaban

3.9 Key Milestones

Table 3.2: Historical Milestones of CEL

Year	Milestone
1980s	Company founded and began elevator market development in Bangladesh.
1990s	Expanded into Bangladesh Navy engineering and maritime projects.
2000s	Became exclusive distributor for Schindler Group in Bangladesh.
2010s	Launched Pump & Telecom Divisions; scaled up engineering workforce.
2020s	Embraced digitalization, local fabrication, and smart infrastructure roles.

3.10 Clientele and Project Reach

CEL has completed installations and technical deployments for Bangladesh's most prestigious institutions, including:

- **Government:** Bangladesh Army, Navy, Police, Coast Guard, WASA, REB, BTTB
- **Corporates:** Coca-Cola, Nestlé, Beximco Pharma, Square Pharmaceuticals, Orion
- **Developers:** Shanta Holdings, Bashundhara Group, Jamuna Group
- **Education:** BUET, Daffodil University, East West University
- **Hospitality:** Radisson, Westin Hotels & Resorts

3.11 SWOT Analysis of Creative Engineers Ltd. (CEL)



Figure 3.10: SWOT of CEL

Strength:

- **Exclusive Partnership with Schindler Group:** CEL is the exclusive distributor of Schindler elevators in Bangladesh, providing access to world-class vertical transportation technology and comprehensive training programs. This partnership promotes CEL's competitive edge in the market.
- **Diversified Engineering Portfolio:** CEL has a wide range of engineering applications in the fields of advanced systems for elevators, marine applications, pump technology, vacuum circuit breakers, Ring Main Units (RMUs), and transformers. This diversification offers anti-fragility across multiple sectors.
- **Strong Reputation and Industry Experience:** With close to 43 years of service, CEL has built an enviable reputation by providing vital services to high-profile public and private sector clients. The company's vast industry knowledge has earned it a position as a trusted leader.
- **National Infrastructure Reach:** CEL has played a major role in national infrastructure projects such as Dhaka WASA, BTTB, and Armed Forces. The company is recognized as a key partner

for infrastructure development projects across the nation.

- **Skilled Technical Workforce:** CEL employs a team of highly trained and certified engineers and technicians, committed to providing high-quality service and operational excellence. This skilled workforce is equipped for complex installations and maintenance operations.

Weaknesses:

- **High Dependency on Imported Components:** CEL depends heavily on imported critical elevator parts and electrical equipment, exposing it to risks such as foreign currency fluctuations, shipping delays, and customs bottlenecks, which can impact operational timelines and costs.
- **Limited Local Supplier Base:** The absence of certified local suppliers for high-precision components such as valves reduces flexibility in sourcing. This dependence on foreign suppliers can hinder operational resilience, especially during supply chain disruptions.
- **Manual or Basic Digital Systems:** CEL lacks a fully integrated ERP system or advanced supply chain management tools, limiting its ability to make real-time, data-driven decisions and affecting overall operational efficiency.
- **Informal Risk Management Practices:** CEL does not have formal processes for proactively identifying, assessing, and mitigating risks, which leaves the company vulnerable to unforeseen operational risks.

Opportunities:

- **Rising Urbanization and High-Rise Construction:** The increasing urbanization in Bangladesh creates greater demand for modern vertical mobility solutions and power systems, opening new opportunities for CEL to expand its market share in the urban infrastructure sector.
- **Local Sourcing and Vendor Development:** CEL has the potential to cultivate a local supplier ecosystem, reducing dependence on imported components, shortening lead times, and improving supply chain resilience.
- **Government Support for Infrastructure & Energy:** The government's focus on renewable energy, urban mobility, and smart infrastructure presents opportunities for CEL to obtain public sector contracts and support national development priorities.
- **Digital Transformation:** The adoption of advanced technologies such as ERP, IoT integration, and predictive maintenance systems will enhance operational efficiency, reduce downtime, and improve service quality.

Threats:

- **Global Supply Chain Disruptions:** CEL's supply chain is vulnerable to international shipping delays, geopolitical tensions, and global pandemics, which can disrupt operations and affect project timelines, costs, and client expectations.
- **Intense Competition:** Aggressive pricing strategies from both local and international competitors are increasing, creating a highly competitive environment. If CEL does not innovate and manage costs effectively, it may face pressure to lower prices and lose its competitive edge.
- **Regulatory Delays and Bureaucracy:** Customs delays, licensing problems, changing import policies, and other bureaucratic challenges can impede progress, raise operating costs, and reduce CEL's ability to execute projects on time.
- **Workforce Drain or Skills Shortage:** A potential loss of skilled technicians or a shortage of qualified personnel could lead to customer dissatisfaction and damage CEL's reputation due to an inability to maintain high service standards.

Chapter 4

Supply Chain Resilience and Risk Management at CEL

4.1 Introduction

This chapter provides an in-depth analysis of the supply chain system at Creative Engineers Limited (CEL), in respect of capacity of resilience and risk mitigation strategies. Based on primary and secondary sources, the chapter considers CEL's procurement model, operational structure, logistical workflows, and digital integration. It likewise rules out essential spaces of weakness and advises what to do to be resilient in practice.

4.2 Overview of CEL's Supply Chain Structure

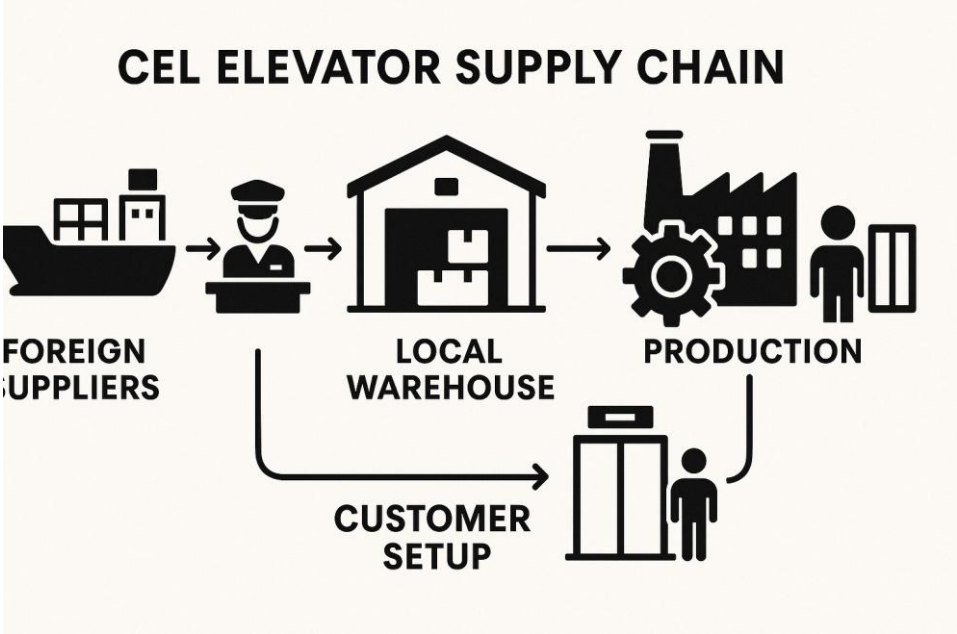


Figure 4.1: CEL Elevator Supply Chain Flow Diagram

CEL's end to end supply chain flow is pictured in this diagram 4.1. This emphasizes dependence on overseas suppliers, the critical dependence on overseas supplier's 3rd points and the critical risks such as port delay and warehousing shortfalls affecting operations.

CEL operates a hybrid supply chain model which is integrated not only internationally but also locally. Five important stages constitute the supply chain:

a. Overseas procurement of core components
b. Customs clearance and inland transport
c. Inventory warehousing
d. Production and assembly
e. Delivery and installation at customer sites

4.3 Procurement and Import Dependency

CEL uses about 70–80% of the imported elevator components, including:

- Motors and drives
- Control panels
- Safety gear
- Limit switches
- Guide rails

Moreover, most of these parts are supplied from China, Germany, and Japan, which means that CEL therefore is quite sensitive to:

- Exchange rate fluctuations
- International shipping delays
- Geo-political uncertainties (e.g., COVID-19, trade disputes)

Table 4.1: Core Imported Components and Risk Level

Component	Country of Origin	Risk Category	Risk Level
Traction Motor	Germany	Lead Time, Currency Risk	High
Door Operator	China	Quality Risk	Moderate
Microprocessor Unit	Japan	Supply Disruption	High
Guide Rails	China	Shipping Delay	Moderate

This table 4.1 classifies the main components of CEL to which risk level is associated. This highlights that they are high risk, high impact items – motors and processors – that show the need for having backup sourcing or more extensive range stock.

4.4 Local Sourcing and Fabrication

However, CEL is import dependent on imports for high tech components; it has localized the following:

- Brackets, Joists, Channels
- Elevator cabin structures
- Shafts and minor electrical fittings

These challenges however remain, and standardization and certification are still problems.

Many local vendors lack:

- ISO certifications
- Precision engineering tools
- Quality consistency over long-term contracts

Table 4.2: Comparison Between Imported and Local Components

Criteria	Imported	Local
Quality Assurance	High (certified)	Medium (inconsistent)
Lead Time	Long (4–8 weeks)	Short (1–2 weeks)
Cost	High	Medium
Flexibility in Design	Low	High

Key performance indicators of imported and locally sourced components are compared to as shown in this table 4.2. It indicates that while local fabrication shortens lead time and cost, it struggles in proving final installation consistency because it increases quality assurance challenges.

4.5 Inventory and Buffer Strategy

CEL has a small level of buffer stock, especially for critical parts. To take advantage of the residual income and liquidate the aircraft, the practical limit to a full-scale stockpiling model does not allow space or liquidity constraints. This table 4.3 indicates the current buffered parts.

Table 4.3: Inventory Risk and Buffer Levels

Component	Buffer Stock Status	Lead Time Risk	Impact on Project Delay
Control Panel	Yes (Critical) Partial	High Medium	High Medium
Elevator Rails	No	High	Very High
Door Systems			

and how availability of these parts impacts project schedule. This also shows the current of a stock that doesn't have specific components.

4.6 Logistics and Transport Management

Logistics related inefficiencies also include delays at Chittagong port, inconsistent delivery timeline due to traffic, fuel issues, and lack of digital vehicle tracking faced by CEL.

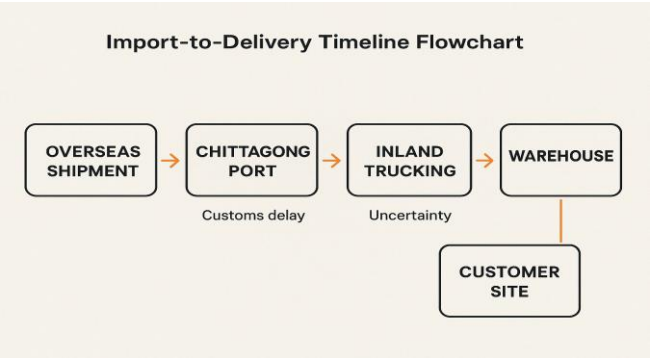


Figure 4.2: Import-to-Delivery Timeline Flowchart

A typical delivery cycle is mapped out in diagram 4.2 and key pain points such as customs delay and inland trucking uncertainty that could stretch out the delivery process are pointed out.

4.7 Risk Identification and Categorization

The risks in CEL's supply chain differ at various stages. The ability to identify and classify them is useful to answer questions on what areas are of priority to improve health resilience.

Table 4.4: Risk Matrix (Impact vs Likelihood)

Risk Category	Description	Likelihood	Impact	Priority
Import Delay	Customs & shipping issues	High	High	Critical
Price Volatility	Exchange rate, supplier pricing	Medium	High	High
Local Vendor Quality	Variability in finishing and fitting	High	Medium	High
Machine Downtime	Equipment breakdown at factory	Medium	Medium	Medium
Skilled Labor Shortage	Lack of trained technical manpower	Low	High	Medium

Risks are identified and scheduled in terms of how often they occur and their severity in this matrix 4.4. It aids CEL in deciding to invest and plan for contingencies.

4.8 Resilience Strategies at CEL

In order to mitigate disruptions, CEL employs a mix of manual practices and informal coordination. Some examples include:

- Emergency sourcing through alternative ports or local suppliers
- Air freight for urgent imports
- Adjusted project timelines when delivery delays occur.

4.9 Technology and Digital Tools

Basic inventory tracking tools such as Excel based systems or standalone software are used by CEL, but no fully integrated ERP or SCM system is available.

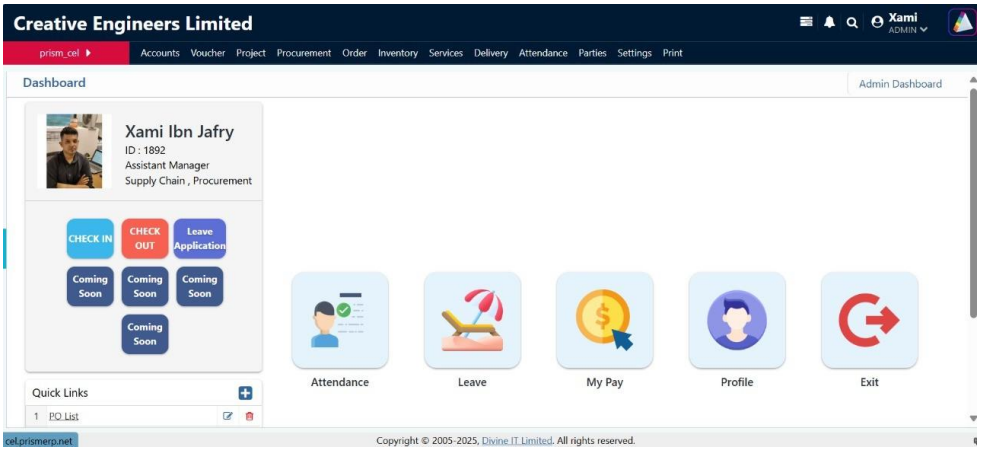


Figure 4.3: Initial Stock Entry Sheet

Inventory Initial Entry Sheet The image 4.3 is a manual inventory entry sheet documenting items as they are added to stock. It includes a preset structured data layout that includes a serial number, item code, item description, quantity, unit of measure, location, and remarks. From a value perspective, the information form is the first step where all the inventory items that will be inputted into system are standardized. From a technology perspective, the form serves as the entry stock input form that would exist in an integrative and automated digital inventory management systems functionality. Ideally, the manual inventory form above will eventually be replaced or complemented with a web form designed in ASP .NET, where an input would be through item use of an existing database. When inventory items are added to the system, direct real-time input for certain fields will minimize human error and improve user accessibility of data, especially for larger scale environment.

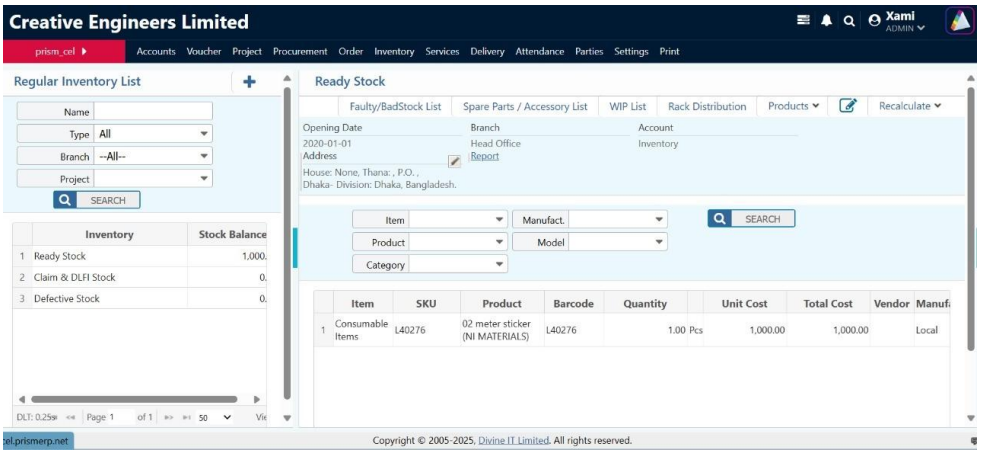


Figure 4.4: Bulk or Continuation Entry

Bulk or Continuation Inventory Entry The image 4.4 represents an ongoing or second part of the first sheet, to be used to document multiple items at a time. It uses the same preset structured data layout as above in table form, with the ability to create multiple rows with bulk catch all inputs in it, often used during stocktaking, on delivery of multiple items, or during physical audits when items are strictly being checked off in order. referring to technology or digital tools, it would be reasonable for the entry sheet to be backward and forward compatible to provide a dynamic data entry grid in a application for users. Dynamic data entry grid technologies are handed be Grid View controls and Repeater controls in creating the application using ASP .NET Web Forms, and in associations to backend references to system's ADO .NET references, as each row is dynamically added with validation, items directly stored to the inventory in batches. The potential gains of efficiency through these are the obvious feasibility of using manual forms are eliminated or where the process can achieve maximum efficiency.

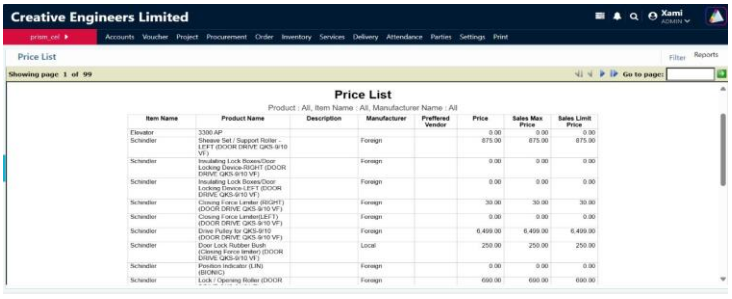


Figure 4.5: Department-wise Inventory Summary Report

Figure 4.5 is a more formal and structured inventory report, and it is used generally at department level. The header on this sheet is a date and department name, the item details comprise of item code, description, quantity, unit, and remarks. In addition to that, it may include spots for verification or signature approval, implying that this is for official inventory documentation, an audit, or an internal report. This document should ideally be generated from a digital technology perspective with the help of an inventory management system. With such data entered and verified stock data, the system can generate downloadable PDF reports prefilled with data and ready to suit the departmental requirement. It also supports authentication and approval workflows to add authenticity and audit readiness to such records.

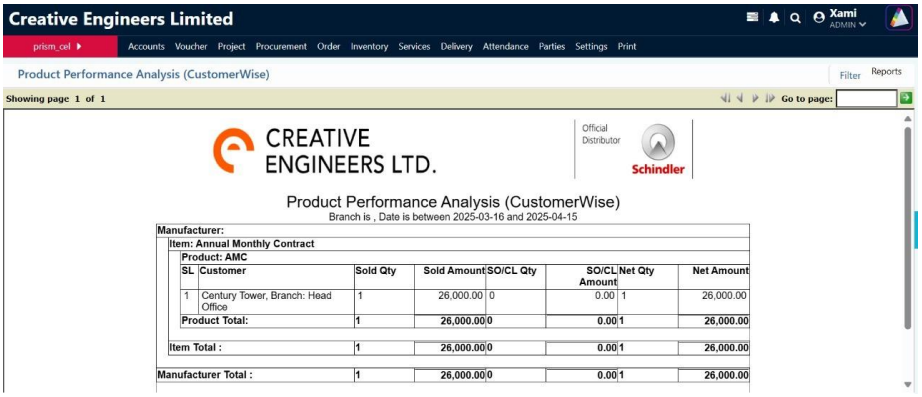


Figure 4.6: Department-wise Inventory Summary Report

The figure 4.6 shows the interface of the report of the internal system of Creative Engineers Limited, also by the name, “Product Performance Analysis (Customer Wise).” Our particular report here should be related to the sales performance of the product specified as an item under Annual Monthly Contract (AMC) within a stated date range. This is a customer specific report, and, in this case, it is one transaction of a branch of Century Tower. It logs one sale of an AMC product, and the quantities of a product sold and the delivery and the financial amounts in each instance.

The reported data is arranged according to the structure to give a clear understanding of total products sold with its related organized revenue in the period. The report header also includes the CEL logo and designation as Official distributor of Schindler and suggests a business focus on elevator systems or some related services. This report is used as a tool for the company to internally analyze how sales to customers based on customer contract performance and customer-based revenue occurred.

4.10 Supplier Collaboration

CEL's supplier collaboration model currently functions in a transactional manner, particularly with its main supplier Schindler, with no foundational elements of strategic partnership. This investigation reveals several weaknesses:

- **Transactional Relationship Model**
  - Order-purchasing only, with Schindler
  - No strategic long-term contracts or partnership
  - Limited communications after the purchase order is fulfilled
- **Lack of Collaborative Processes**
  - No joint demand forecasting or planning
  - No shared visibility for inventory management
  - No coordinated production scheduling
- **Lack of Performance Management**
  - No formal evaluation metrics for suppliers
  - No continual improvement processes
  - No regular performance meetings
- **Limited Innovation**
  - No joint research and development processes or product development
  - No feasibility of transferring new technologies or local customization
- **Lack of Risk Sharing**
  - No mutual business continuity planning process
  - No visibility into Schindler's upstream supply chain
  - No coordinated response protocols to deal with disruptions.
- **Impact of Current Model:**
  - Increased lead-times during disruptions in the marketplace
  - Higher overall inventory costs due to safety stock levels required.
  - Lack of continual sales and service opportunities for process improvements.

- **Strategic Opportunities for Improvement:**
  - 15–20% improvement in lead-time reliability
  - 10–15% reduction in inventory carrying costs through JIT capabilities
  - Increased customization locally
  - Participative crisis coordination with the supplier
- **Action Plan and Roadmap:**
  - Formalize true partnership agreements with Schindler.
  - Establish monthly senior strategic business review meetings.
  - Develop joint key performance indicators (KPIs)
  - Create information-sharing platforms for real-time visibility.
  - Launch pilot projects to establish processes for local component customization.

This transformation from transactional to collaborative supplier relationships represents a critical resiliency initiative in the transformation of the CEL supply chain. The recommended shifts would develop the ability for the company to survive a global supply chain crisis while simultaneously improving regular operational processes and responsiveness to local market conditions.

4.11 Impact of Global Events

The elevator industry in Bangladesh, much like its global counterparts, is heavily reliant on complex international supply chains, primarily driven by imports of critical components, finished units, and spare parts. Consequently, global events — both predictable and unforeseen — have profound impacts on the continuity, reliability, and cost-efficiency of supply chain operations in this sector. This section outlines how significant global events have shaped and disrupted the supply chain landscape, with implications for elevator businesses operating in Bangladesh.

COVID-19 Pandemic (2020–2022)

The COVID-19 pandemic served as a watershed moment in exposing vulnerabilities in global supply chains. For the elevator industry, which depends on parts and equipment imported from manufacturing hubs such as **China**, **Europe**, and **South Korea**, the lockdown-induced shutdown of factories, coupled with transportation bottlenecks, led to:

- **Extended lead times:** Deliveries that typically took 6–8 weeks, were delayed to 12–16 weeks or more, severely impacting project timelines and maintenance service commitments.
- **Increased logistics costs:** A surge in container shortages and skyrocketing freight costs (especially on China–Bangladesh sea routes) strained company budgets.
- **Restricted site operations:** Social distancing and labor shortages delayed installations, testing, and commissioning works at customer sites.

For Bangladeshi elevator importers, the lack of locally available substitutes amplified dependency risks, underlining the necessity for greater inventory buffers and alternative sourcing strategies.

Global Shipping Crisis (2021–2023)

Following the pandemic, the global shipping industry faced lingering disruptions. Events such as the **Ever-Given blockage in the Suez Canal (March 2021)** and continued port congestions in **China** and **Singapore** further stressed the movement of elevator components. The knock-on effects included:

- **Unpredictable shipping schedules** — making project planning and spare parts replenishment challenging.
- **Volatile freight rates** — eroding profit margins, especially for price-sensitive public procurement projects.

Bangladeshi importers with just-in-time inventory models were most exposed, as their reliance on predictable shipping cycles proved unsustainable in the face of such volatility.

Geopolitical Tensions and Trade Policies

The elevator industry is indirectly affected by evolving **geopolitical dynamics**, especially those involving key manufacturing nations:

- **US-China trade tensions** have periodically created uncertainties in electronics and machinery supply chains, as many elevator components include semiconductors, control panels, and sensors sourced from China.
- **EU regulatory shifts** (e.g., stricter safety or environmental compliance for elevator parts) could alter sourcing costs or require additional certifications.
- For Bangladesh, the risk is amplified by concentrated sourcing from **China** and **Southeast Asia**, making diversification increasingly relevant.

Recent Red Sea Crisis (2023–2024)

The escalation of maritime security threats in the **Red Sea** — a vital artery for Asia–Europe shipping routes — has disrupted shipping lanes, forcing vessels to reroute around the **Cape of Good Hope**. For Bangladeshi elevator importers, this has resulted in:

- **Longer transit times** (up to 14 days extra)
- **Higher freight charges** — as insurance premiums and fuel costs rise.
- **Potential inventory shortages** — affecting both project execution and service maintenance contracts.

Currency Fluctuations and Global Inflation

Global monetary shifts — driven by factors like **US Federal Reserve interest rate hikes** and **energy price shocks** — have led to **currency depreciation** in many emerging markets, including Bangladesh. For the elevator industry:

- **The increased cost of imports** has directly impacted on capital expenditures for new installations and procurement of spare parts.
- **Budget overruns** and **price renegotiations** with customers became necessary in ongoing projects, particularly those under fixed-price contracts.

Key Takeaways for Bangladesh Elevator Industry

- **Inventory Strategies:** The unpredictability of global events reinforces the importance of maintaining strategic inventory levels, especially for fast-moving and critical spare parts.
- **Supplier Diversification:** Reducing dependency on a single geography (mainly China) is vital to mitigate concentrated risk exposure.
- **Enhanced Forecasting & Collaboration:** Close collaboration with suppliers, along with robust demand forecasting and early ordering, can cushion the impact of such global disruptions.
- **Logistics Flexibility:** Exploring multi-modal logistics (air freight as a backup) and building relationships with multiple freight forwarders can offer resilience.

Chapter 5

Findings

5.1 Findings

This chapter analyzes the findings from qualitative interviews with CEL supply chain professionals, secondary data, and literature benchmarking. It assesses the strategic, operational, technological, and relational dimensions of CEL's supply chain resilience, grouping the findings into key thematic areas for clarity and depth.

- CEL faces critical vulnerability due to heavy dependency on imports.
- Import delays and global shipment requirements cause immediate production disruptions.
- Currency volatility impacts landing costs, complicating budget planning.
- No effective backup exists due to a lack of alternative suppliers beyond local sources.
- Inventory management is reactive and not supported by predictive analytics.
- Manual inventory tracking increases risks of errors and inefficiencies.
- There is no integration between procurement, inventory, and logistics systems.
- Supplier performance data and analytics are absent from decision-making.
- CEL lacks an enterprise risk management (ERM) strategy and dedicated risk personnel.
- There is no supply chain analytics capability or vendor scoring expertise.
- Supplier relationships lack scorecards, performance metrics, and joint planning.
- No long-term supplier contracts exist to encourage collaboration or investment.
- Leadership is open to process improvement and innovation.
- Employees are encouraged to propose practical solutions.
- Crisis responses are fast but lack strategic structure.

This study reveals that CEL's resilience is primarily determined by agility, strong leadership and partial localization. However, the strength of its capability to evolve from reactive to proactive resilience is constrained by several critical weaknesses in its supply chain strategy: particularly, digital readiness, formal risk planning and collaborative partnerships. To continue its competitive and sustainable supply chain resilience in the dynamic infrastructure landscape of Bangladesh, CEL must adopt a structured, technology and relationship enabled solution.

Chapter 6

Recommendations and Conclusion

6.1 Recommendations

Based on the detailed analysis of the current supply chain structure, risks, and practices of operational robustness, strategic foresight, and supply chain sustainability, this chapter offers targeted recommendations designed at improving CEL's operation robustness, strategic foresight, and supply chain sustainability for the long term. One is to transition the supply chain to a different state of being from reactive problem solving to proactive, technology-driven and collaboration centered supply chain resilience.

- Develop a Formal Supply Chain Risk Management Framework to transform CEL's approach from ad-hoc reaction to structured and anticipatory risk mitigation.
- Diversify Supplier Base and Strengthen Local Vendor Capacity to reduce supply disruptions, foster flexibility within the region, and give CEL greater control over lead times.
- Implement an Integrated ERP/SCM Digital System which improves visibility, supports data-driven decision making, and allows early disruption detection.
- Strengthening Inventory Optimization Strategy for improved component availability, reduced downtime, and better working capital utilization.
- Invest in Human Resource Development for Supply Chain Roles to reveal new corporate skills inside CEL while decreasing the need for temporary consulting services and last-minute recruitment.
- Foster Collaborative Supplier Relationships increases the levels of trust, decreases variability in lead time, and supports innovation throughout the entire value chain.
- Establish Crisis Response and Business Continuity Protocols to Identify critical disruptions and design and test contingency plans.

6.2 Conclusion

In Bangladesh, industrial growth is concentrated in sectors that offer both high potential and high risk — a landscape where **Creative Engineers Limited (CEL)** operates as a key player. Over the years, CEL has demonstrated commendable adaptability, technical expertise, and resilience in its leadership, positioning itself as a reliable name in the country's elevator and industrial solutions market. However, despite these strengths, CEL remains exposed to several operational vulnerabilities. These include a heavy reliance on imported components, limited integration of digital tools for supply chain management, and the absence of structured, organization-wide risk management frameworks. These challenges constrain the ability to respond swiftly and efficiently to disruptions in an increasingly complex global business environment.

As this thesis has outlined, the path toward building a more **resilient, sustainable, and future-ready supply chain** involves a comprehensive approach — one that integrates strategic sourcing, deeper collaboration with suppliers, robust digital transformation, and the implementation of proactive risk governance frameworks. For CEL, embracing such strategies not only offers a roadmap to mitigate existing vulnerabilities but also positions the company as a blueprint for transformation in developing economies like Bangladesh. By gradually shifting towards local manufacturing capabilities and fostering an indigenous portfolio of products, CEL has the potential to pioneer a new era of industrial self-reliance and innovation in the country.

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