

Report On

Operational Efficiency and Workflow Optimization at Ferdous Steel Ship Recycling Industries

Submitted By:
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An internship report submitted to the BRAC Business School, BRAC University in partial fulfillment of the requirements for the degree of Bachelor of Business Administration.

BRAC Business School
BRAC University
July 21, 2025

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DECLARATION

I, Fardin Ahmad, hereby declare that this internship report titled “Operational Efficiency and Workflow Optimization at Ferdous Steel Ship Recycling Industries” is submitted to BRAC Business School, BRAC University, in partial fulfillment of the requirements for the degree of Bachelor of Business Administration. I further declare that this report is based on my original work during the internship and has not been submitted previously for any degree, diploma, or certificate. Student’s Full Name & Signature:

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LETTER OF TRANSMITTAL

July 21, 2025

Noshin Anjum Chaiti
Lecturer
BRAC Business School (BBS)
BRAC University

Subject: Submission of Internship Report

Dear Madam,

It is with great pleasure that I submit my internship report titled “Operational Efficiency and Workflow Optimization at Ferdous Steel Ship Recycling Industries.” This report has been prepared as a requirement for the completion of my BBA degree. The internship gave me a valuable opportunity to apply theoretical knowledge to practical challenges at FSSRI.

I sincerely thank you for your supervision and support throughout the internship period. Please do not hesitate to contact me if further clarification is required.

Sincerely,

Fardin Ahmad
ID: 21304027
BRAC Business School
BRAC University

Non-Disclosure Agreement

This agreement has been drawn up and executed between Ferdous Steel Ship Recycling Industries (FSSRI) and Fardin Ahmad, Student of BRAC University.

Myself, Fardin Ahmad, hereby certify that this report does not contain any confidential, damaging, or otherwise sensitive information belonging to Ferdous Steel Ship Recycling Industries (FSSRI). This report has been prepared under the guidance of my workplace supervisor and is based solely on my internship experience and observations. As such, this internship report will not be published or made available online. It will be submitted only to BRAC University for academic purposes.

Lastly, I affirm that this report does not discredit the organization in any form, and all sources of information have been acknowledged accordingly.

Acknowledgement

I am pleased to declare that I have successfully completed this report within the designated internship period. I would like to express my heartfelt gratitude to the individuals whose guidance and support have been instrumental in the completion of this internship report:

- Ferdous Wahid, Managing Partner & CEO of Ferdous Steel Ship Recycling Industries, and Meah Mohammad Asaduzzaman, Chief Operating Officer, for their continuous guidance, leadership, and for providing me with the opportunity to intern at their esteemed organization.
- My sincere thanks to all members of the FSSRI team who supported me throughout my internship tenure and helped create a highly enriching learning environment.
- Ms. Noshin Anjum Chaiti, Lecturer, BRAC Business School (BBS), BRAC University, for her valuable supervision, constant encouragement, and academic support throughout the internship period.
- Dr. Nusrat Hafiz, Assistant Professor and Director of the WEC, BRAC Business School, for her guidance and academic leadership.

I consider myself fortunate to have learned from such a knowledgeable and dedicated group of professionals. The experiences, insights, and skills gained during my internship will undoubtedly serve as a strong foundation in my future professional career.

EXECUTIVE SUMMARY

This is an internship report schooling on the working efficiencies and optimization of working methods of Ferdous Steel Ship Recycling Industries (FSSRI) which is a ship recycling company both in the business and in Bangladesh. During the internship, I studied fundamental inefficiencies in communication, use of resources, and management of equipment.

With the help of operational frameworks, e.g., Lean Management, Six Sigma, and Predictive Analytics, a strategic roadmap proposed in this report is aimed at ensuring increased productivity, safety, and financial performance at FSSRI. The study finds the bottlenecks, gives its solutions, and shows how operations can be improved structurally and result in financial savings.

The report is a mixture of the qualitative lessons accompanied by quantitative evaluation of impacts, where efficiency models are able to shorten costs, boost production and fulfill international standards of compliance. The work ends with a list of recommendations that can guide and implement an action and implementation plan consisting of several stages that will provide

Abstract

In the present report, the existing operational inefficiencies at Ferdous Steel Ship Recycling Industries (FSSRI), one of the major companies in the coastal area engaged in ship recycling in Bangladesh, will be analyzed and the ways to enhance its workflow will be proposed. Some of the major problems the report identifies are the gaps in communication, mismanagement of available resources, using obsolete machinery and slowing down during the process of procurement which is affecting the performance of the FSSRI making it difficult to be efficient and respond effectively in the global environment. This report will provide a solution to the given problems with the help of such operational frameworks as Lean Management, Six Sigma, and Predictive Analytics. The possible recommendations are the use of automated systems, the enhancement of communication tools, and predictive maintenance technologies in order to decrease costs, increase productivity, and realize overall efficiencies of operations. Concluding the study with the last analysis point, the anticipated impact of the alterations on the payroll of the company and its operation Cycle, it was emphasized that modernization and optimization were the potential ways to defined the long-lasting success of FSSRI.

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1. Introduction

Ship recycling business forms an important part of global economy especially to countries like Bangladesh where it is one of the largest supplier of recycled steel. Dismantling of steel and other valuable material by decommissioned ships is providing support to the local manufacturing industry and preventing over-dependence on importation of raw materials. Sitakunda in Chattogram in Bangladesh has gained the reputation as the capital of ship recycling because it has contributed much in terms in the percentage of steel recycled globally both in the construction and automotive sectors.

Ferdous Steel Ship Recycling Industries (FSSRI), which was developed under Ziri Subedar Group, has become a top ship recycling company in Bangladesh, playing a vital role in the provision of the steel in the country, as well as employment. The corporation is at the vanguard of the recycling ship industry in Bangladesh and processes hundreds of old ships on a per annum basis hence plays a significant role in influencing the industrialization of the nation. However, despite its significant contribution to the national economy, FSSRI faces considerable challenges that hinder its potential. The company's operations are marred by various inefficiencies, such as poor communication between departments, ineffective resource management, outdated machinery, and delays in procurement processes. These inefficiencies are affecting FSSRI's profitability, productivity, and ability to meet regulatory compliance standards, ultimately putting its long-term sustainability at risk.

The purpose of the case study is to resolve such operational problems and suggest possible solutions to increase the efficiency of the FSSRI workflow. This paper will list real-world recommendations that the inefficiencies at the FSSRI can be resolved by using the frameworks like Lean Management, Six Sigma, and Predictive analytics. Case will also examine the best practices of other industries and companies in different parts of the world like Alang Shipyard industry of India and Aliaga Shipyard industry of Turkey which faced also similar situation of operations deliverance. This case study aims to demonstrate that FSSRI can overcome its present-day inefficiency and even become a more competitive institution in the global setting ensuring its sustainability. Capitalizing on the frameworks recognized in the industry, FSSRI will be able to streamline the internal processes, lower the cost of the operations, and make its operations more profitable and environmentally friendly.

1.1 Importance of the Ship Recycling Industry

In addition to its recent rise in popularity, the industry of recycling ships is one of those among which one should acknowledge a major role in environmental waste reduction and contribution to the whole circular economy of the global economy. With the decommissioning of older ships, materials will be recycled and used on other industries such as construction, automobile and other manufacturing industries. The salvage of ships is extremely lucrative because the main

material that is retrieved, which is steel, constitutes a large percentage of the world produce. Recycling of steel enables the preservation of natural resources, the decrease in energy usage, low carbon footprint of steel manufacturing. To Bangladesh, recycling of ships provides the country with very essential income to the economy. It creates thousands of employment and especially in the Chattogram region and it also makes the country less dependent on imported steel. Ship recycling activities in Bangladesh is a source of steel trade globally and this puts Bangladesh at an advantageous position in the world steel market. Bangladesh had a quarter of the total international market ship recycling in 2019, and Sitakunda region was the leading region recycling more than 200 ships. The amount of money earned through the sale of the recycled steel is enormous and the ship recycling industry marks one of the biggest sources of foreign exchange of Bangladesh.

Challenges Facing the Ship Recycling Industry

Though the ship recycling industry is an industry that is of high priority to the economy, it is prone to various difficulties. The most pressing of these are the state of the environment, safety of workers and the necessity that there should be a technological improvement. There has been criticism about poor working conditions in the ship recycling yards whereby workers are exposed to dangerous substances such as asbestos oil sludge, and heavy metals. The absence of proper safety procedures in certain yards results in injuries and death and thus there is dire necessity to make a change in the nature of worker protection and safety measures.

Moreover, there are quite a lot of shipbreaking yards where manual labour is still used, and the machinery is out-of-date that raises efficiency and safety risks. The ship-dismantling process is labor-intensive, and the ineffective equipment provides the increase in the cost of operation and project duration. The use of this old gear explains why the industry is not competitive like other countries that have incorporated automated process in the recycling of ships as well as modern machinery.

Finally, compliance regulation has become an urgent matter in most of the ship recycling yards in Bangladesh. As pressure mounts by international environmental agencies, the Hong Kong International Convention (2009) and other world-its standards resulted in a demand of the safe retreat of ships and environmental pollution, of workers could be avoided. The number of yards that are trying to coincide with these regulations is great and FSSRI is one of them; however complete compliance is proving hard because of the expenses involved and also because of heightening technology.

1.2 Current State of FSSRI

In FSSRI, the management department has strived to use modernization of its activities and enhance the environmental imprint of the business by conforming to safety regulations and applying superior waste management plans. There are still, however, a number of inefficiencies in the way:

1. Communication Breakdown: At FSSRI, there is a horizontal structure of operation such that the operations, logistics, and procurement departments lack the means to communicate effectively. This breakdown in communication usually leads to unutilized machines, crashing of deadlines and wastage of working hours.
2. Resource Management: Inefficient use of resources, both human and machineries, is a problem in the company. Labor shortages during peak-seasons result in an increase in workload and stress on the workers and during off-peak seasons there is always underutilization of the workforce. Also, the company experiences uneven training among departments hence lack of competency and adequate performance of tasks.
3. Machinery and Equipment: Some of the dismantling tools and cutting machines in FSSRI are already old and need to be repaired very frequently, although a little modernization is also evident. Such a use of manual labor also decreases the speed and efficiency of the process of ship dismantling. Lack of proper preventive maintenance plans means that FSSRI has to bear high costs of machineries repair that lead to extended periods of downtimes.
4. Problems in Procurement: FSSRI does not procure fast or efficiently. These disadvantages are mostly caused by the failure to integrate the procurement and operations departments and thus delays in material supply and failure to meet production schedules. In addition, a system of managing inventories is in a big way manual, and the availability of raw materials cannot be reported in real-time.

Such inefficiencies are affecting the bottom line of the company directly, causing it to incur high costs of operation, late production schedules and slow the level of competitiveness in the market.

1.3 Purpose of the Case Study

The purpose of the case study is to provide solutions to the main causes of the working inefficiencies of FSSRI, recommend actions on the improvement of the working process, better control of the resources and the improvement of the mechanisms. FSSRI can improve its efficiency by implementing the known management models such as Lean Management, Six Sigma, and Predictive Analytics and become more competitive in the global ship recycling industry.

With this case study, we shall:

- Examine the main inefficiencies in FSSRI and how they affected the operations at the company.
- Discuss possible ways out, including the application of the Lean practices, implementation of Six Sigma practices, and the adoption of the predictive maintenance systems.
- Suggest measures in order to improve the procurement process, communication and update the equipment.
- Compare global best practices with regards to other ship recycling yards (including Alang Shipyard, India and Aliaga Shipyard, Turkey) who have managed to introduce technological advancement and best practices in order to carry out their operations more efficiently.

Nipping these inefficiencies can help FSSRI gain a better operational capacity, cut costs and become a more competitive and sustainable force in the global ship recycling business.

2. Background

Company Overview

The company operates under the subsidiary of Ziri Subedar group, one of the most diversified and powerful Bangladesh-based corporate bodies. Ferdous Steel Ship Recycling Industries (FSSRI) is a subsidiary of the group. Ziri Subedar Group is a privately owned business corporation that was initially established by Ziri Subedar, a revolutionary figure in business that has molded the group into an industrial giant as it has deep footings in other businesses including ship recycling, steel manufacturing, real estate development as well as cement production. Its adherence to sustainability, innovation and fair business have been among the critical factors in the growth of the group.

Sitakunda, Chattogram is the seat of FSSRI, which is also one of the major ship recycling industries in this world. It is a stone of the business of shipbreaking in Bangladesh and their major activity is to process dismantled ships and to retrieve metals especially steel, copper, aluminum, and iron. The materials are then used in the construction, automotive and

manufacturing sector to enhance industrial development in Bangladesh and decrease the national import of steel.

The participation of the Ziri Subedar Group in FSSRI is an indication of the wider interest in industrialization and resource saving by the group. The group under the management of Ziri Subedar has always invested in new technologies and processes so that the company with its subsidiaries like the FSSRI can not only support the local demand but also practices international standards of environment. This sustainable business practice has enabled this group to stay competitive in the international market besides giving back to the economy of Bangladesh.

Leadership and Strategic Vision

Leadership in Ziri Subedar Group and especially in FSSRI has had a considerable role towards strategic orientation of the firm. The chief executive officer of FSSRI, Ferdous Wahid has played a major role in leading the organization in growth and has continued to make FSSRI a competitive force in the industry of ship recycling. Having served the industry over 2 decades, Wahid led FSSRI through some of its most trying times such as the mounting competition in the market, changes in regulation as well as the rising need of sustainable solutions. Wahid is a committed leader with a vision on innovation, effectiveness and environmental sustainability. It is based on the guidance given by him that FSSRI has made huge investments in upgrading its machinery and infrastructure in order to achieve both local and international demand of recycled steel. Consecutively, this expansion of production lines and enhancement in safety standards has enabled FSSRI to secure its leading position in the field of Bangladesh to ship recycling. Besides FSSRI, Ziri Subedar Group encompasses quite a few subsidiary companies dealing in various industries that are at the same time the essential part of the industrial environment of Bangladesh. These include:

- Ziri Steel Re-Rolling Mills: A steel manufacturing company that processes scrap steel into construction-grade products such as rebar and steel bars.
- Ziri Cement Ltd.: A cement production company that supplies high-quality cement to meet the growing needs of the country's construction industry.
- Ziri Oxygen Plant: A facility that produces industrial-grade oxygen, catering to industries such as steel, healthcare, and manufacturing.
- Ziri Properties Ltd.: A real estate development company that focuses on residential and commercial properties.
- Ziri Trading International: A trading company that deals with import and export of raw materials for ship recycling and other industries.

All these subsidiaries, which includes FSSRI as well, are crucial in the bigger game that the Ziri Subedar Group is going to play, in the industrialization part of Bangladesh. Quality, innovation, and sustainability have enabled the group to remain the leader in the Bangladeshi economy.

Strategic Importance of FSSRI in Bangladesh

FSSRI will be of strategic importance in developing the economy of Bangladesh as well as becoming self sufficient in main industrial materials. Bangladesh has one of the biggest ship

recycling industries as recycled steel is of much use in building and manufacturing industries. Not only does the industry lessen the burden of importation of steel in the country but it also generates thousands of employment opportunities thereby giving coastal region employees jobs which are scarce. FSSRI has been taking the lead in this sector recycling the decommissioned ships in order to salvage valuable raw materials. All these materials are then consumed to promote industrial development in Bangladesh. The role that the company plays in the national economy is especially significant because Bangladesh is currently going through the process of rapid urbanization and growth of infrastructures. With the increase in demand of construction materials, the capacity of FSSRI to engineer locally sourced recycled steel comes into much more value. FSSRI is also a major exporter of recycled steel besides the local market demands. Its operations have helped to develop the export economy of Bangladesh especially in the Asiatic and Middle Eastern region where the recycled materials are on high demand. The international presence of the company in trading of steel can be used to help build the position of Bangladesh in the international steel recycling trade.

Moreover, with the rise of concerns regarding environmental sustainability in the world, the ship recycling industry in Bangladesh is an area of global interests when it comes to ensuring the development of circular economies. The contribution of FSSRI to decreasing waste and retrieving precious metals coincides with the sustainability targets in the world. Recycling of the materials of decommissioned ships also helps FSSRI to present to the world a way of reducing waste, material conservation and minimize the damage caused to the environment by the steel manufacturing.

Challenges Facing the Ship Recycling Industry

Although the importance of the ship recycling industry in Bangladesh, it poses a lot of challenges especially when it comes to the safety of the workers, environmental safeguarding and use of technology. All these are compounded by the fact that decisions to implement modern technologies are expensive and are not regulated. The following issues manifest themselves as the most acute:

1. **Environmental Impact:** improperly recycled ships may emit dangerous materials like asbestos, lead, oil sludge, and heavy metals into the environmental habitat. This poses a big environmental question especially to shipbreaking yards along the coast. FSSRI has tried as much as possible to reduce such environmental hazards through implementation of waste management systems that are environmental friendly but the problem of pollution still exists.
2. **Workers Safety:** Ship breaking industry in Bangladesh has a reputation of unsafe workplace, which puts workers in risk of working with toxic chemicals and dangerous materials. Inadequate health and safety measures have also pegged many work-related injuries and deaths in shipbreaking centers all over the country. Although FSSRI has already taken up the security measures and supplies its employees with personal protective equipment (PPE), it is still a constant challenge to enhance safety.

3. Technological Limitations: Most of the shipbreaking industries in Bangladesh, including FSSRI, use manual work to break the ship and through their old-fashioned equipment, the industry is not efficient and highly prone to accidents. Ship recyclers will need to invest in new modern equipment and computerized machinery that will boost efficiency levels as well as curb the chances of the workers acquiring injuries. Since Modernization of its operations is also a way in which FSSRI intends to proceed there are still difficulties in transforming technologies or adopting automated technologies because of high costs of implementing them.

4. Regulatory Compliance: Compliance by the ship recycling industry within Bangladesh is having to grapple with pressure posed by the international bodies to stick to environmental standards besides the safety of the workers as the industry further expands. Bangladesh has ratified the Hong Kong International Convention (2009) that gives guidelines on how to recycle ships in a safe way, however, not every yard can afford to completely obey the requirements of this convention with all their costs included; recyclers need better equipment to operate safely.

FSSRI's Efforts to Address Challenges

Even then, FSSRI has reached so far in resolving the top priorities of safety of workers, environmental effects and economical operations. One of the strategies that the firm has adopted is the enhancement of its sustainability and productivity. These include:

- Worker Safety: FSSRI has put effort into ensuring better worker safety measures by giving them PPE, training sessions, and ensuring that the workers abide by the best practices on handling hazardous materials. Safety auditing is also carried out regularly to determine possible hazards and correct them at the company.
- New Machinery: The company has embarked on the journey of modernizing its machinery where automated cutting tools, hydraulic cranes and mechanized sorting plants are added in order to increase efficiency and diminish the use of manual labor.
- Waste Management Systems: FSSRI has a waste management system that is environmentally friendly to lessen its impact on the environment. The company has also come up with waste segregation, oil recovery systems, and air filtration system to reduce the number of harmful chemicals released to the environment.
- Better Communication: To solve the problem of communication breakdown, FSSRI has started looking into the capacity of having a centralized system of communication wherein information can be shared real-time among the operations, logistics, and procurement units of the company.

Although FSSRI has recorded improvements in enhancing its operations, as well as complying with international standards, much is yet to be achieved. To conquer its leadership in the world of recycling productions, the company will have to perscruthRO cue its attempts to modernize the company operation, better working conditions of people who work there, and the HSE compliances of all the international standards of disposal and recycling.

3. Evaluation of the Case

Communication Breakdown

Problem Overview:

One of the greatest causes of inefficiency at FSSRI is breakdown of communications among the major departments that include operations, logistics, procurement, and safety management. The organization uses a manual approach of phone calls, email as well as hardcopy forms to pass crucial information. In an environment where time is the ultimate factor in the aspect of recycling of ships, these approaches pose big delays in the conveyance of information and hence, creates idle time on machinery and mostly the labor. Incorrect communication about the time of arrival of the ships, supplies, and various resources, about the current procurement situation, and the allocation of duties and resources regularly leads to delays in operational processes, poor work cycle terminations, and the volume of resources wasted.

As an example, when the logistics team cannot inform the administration of the fact that dismantling materials will come later, the operations team has no specific instructions, and machineries stand still and people lay about doing nothing. Besides, once the system of procurement does not inform the operations team of unavailability of materials in real-time, the schedule of production is disrupted, and the situation becomes even more problematic because of the delays and inefficiencies caused.

Industry Example:

The same problem on communication was seen at Shree Ram Ship Breakers in India which is one of the largest ship break yards in the entire world. A serious communication barrier existed between the operations and logistics businesses of Shree Ram leading to inefficiency in the usage of resources and idle employees. It has introduced a centralized communication system by incorporating tools such as Slack and Microsoft Teams and embedding it in its ERP system so that updates would be in real-time and tasks would be synchronized. This system improved the efficiency by 30 per cent and the process of disassembling of the ship became more efficient.

Impact of the Problem:

- Idle machineries, unutilized human resources lead to an increase in the cost of operations. As an example, when the machinery in FSSRI stands idle, it incurs a cost of almost 500 dollars an hour including labor, electricity, and maintaining costs. In cases where there are delays in materials provided, wages get paid in terms of hours that would be devoted in other activities, hence unproductive wastes.
- Production delays Delays in production schedules are caused due to lack of timely communication of critical updates which results to interrupted time lines and project deadline losses.
- Resource misallocation In this case, material is either overstocked or understocked hence wasting capital and labor. In the absence of real-time communication system, FSSRI can not effectively align the staffing levels with material requirements.

- Employee morale and frustration are lowered when the employees have no idea on what to do and when to do it. When there is no clarity about the work to be performed, confusion sets in and this reduces job satisfaction leading to increased rate of turnover.
- There is an enhanced safety risk since important safety alerts and precautions are not conveyed on a real-time basis to the workforce and this can lead to occupational injuries, compliance with regulations and guidelines.

Proposed Solutions:

The following are recommendations that FSSRI should adopt in resolving such communication inefficiencies:

- **Centralized Communication Application:** FSSRI needs to invest into cloud-based communication platform such as Slack or Microsoft Teams which can be incorporated with the ERP platform, allowing real-time communication across the entire organization. This will make sure that all departments are in coordination and all the employees can get instant information on delayed production procedures, shortage of materials, and safety instruction.
- **Automated Scheduling System:** An automated scheduling system combined with communication tools will also allow auto-assignment of tasks and informing or updating the departments accordingly in case of change in schedule. The system will make sure there is no wastage of resources as resources will be allocated efficiently so that there are no idle times and this will increase productivity.
- **Standard Operating Procedures (SOPs):** FSSRI ought to come up with and implement effective SOPs to communicate among departments. Such SOPs will involve the aspects of real-time updating, prioritization, and immediate communication procedures to be observed by all employees so that the essential information is delivered with precision and in a timely manner.

Ineffective Resource Management

Problem Overview:

Resource management plays a crucial role in every business venture, and the same applies to FSSRI; however, as a business venture, FSSRI encounters issues in the optimization of its labor and machinery deployment. Staff are missing and workers are overworked during peak demand seasons when the number of ship dismantling goes up and this results in staff shortages and overtime cost and fatigue among the staff. On the contrary, off-peak has an oversupply of labor thereby providing excessive staffing with unproductive wage bills.

Equally, the aspect of controlling of the machineries is another point of drawback. FSSRI is still using manual equipment and old machinery, which called for constant fixing. This old equipment leads to unexpected breaks and disruptions of the ship-dismantling process reducing the overall efficiency. Failure in having a well planned schedule of preventive maintenance also adds to these problems.

Industry Example:

The same problem with resources management was faced in Aliaga Shipyard in Turkey. The ship yard was also having challenges of reducing staff during busy seasons and hiring an excess of staff whereby the business had not been able to maintain a steady number of workers as the workloads always varied with seasonal business demands. In a bid to curb this, Aliaga adopted a predictive model of workforce schedule, which was helpful in order to adjust according to the data and requirements on the past, as well as the expectations on the future. This enabled Aliaga to save on overtime by 25 percent and made sure that the number of staffing levels was adequate in relation to production requirements. Aliaga also adopted a centralized machine tracking system to track performance of cutting machines and cranes and subsequently reduce incidences of breakdown and improve efficiency of production.

Impact of the Problem:

- There are unproductive costs due to underutilization of labor where the employee receives payment but does not add anything to the production. This adds value to the costs of business without creating any value.
- Employee exhaustion in high-demand times leads to the danger of safety and growing absenteeism as well as declining productivity.
- Regular machine accidents raise the cost of maintaining broken machinery and a lack of predictability keeps the cost of emergency repair high due to lack of allocation on production as well as causes unscheduled delays in the carrying out of projects.
- Delays in resource allocation may result in delays of the tasks whereby workers may end up assigning the wrong tasks and hence quality in the materials recovered may be affected.

Proposed Solutions:

In order to become most efficient at managing resources, FSSRI ought to adopt the following solutions:

- **Workforce Optimization Software:** Application of predictive workforce planning software to predict workforce based on the past workforce data and demand. With the aid of the associated staffing to production needs, FSSRI shall be in a position to eschew overstaffing and overworking the workers, during respective peak and off-peak production times.
- **Resource Allocation System:** Install a resource manage system that allocates in real time both machinery and human resources into the ERP system of FSSRI. This will assist FSSRI in allocation of resources which will mean that resources are used in the most effective way possible where they need to be.
- **Use of predictive maintenance:** FSSRI ought to invest in predictive maintenance devices, where IoT sensors can be used to track real time performance of the equipment. The potential failure will be predicted in the system before it happens so that the company can conduct maintenance even before the failure occurs; thus, preventing unscheduled downtimes.

Outdated Machinery

Problem Overview:

Outdated machinery continues to be used in FSSRI and is among the key reasons why the production is delayed and becomes expensive. Most of the cutting machines, cranes and hydraulic presses of FSSRI are manual and are easily broken down. Such machines are not efficient and take too long to accomplish tasks, and often they malfunction, resulting into undesired downtime and high cost of repair.

Moreover, cutting steel, sorting materials and loading are the activities that the company continues to conduct through the manual labor. Automated systems can do these tasks more effectively. This automation problem does not only reduce the speed of the production but it also creates a problem of human error in the process causing material recovery to be irregular and resulting in low productivity.

Industry Example:

Similar problems with out-dated machineries were the case with the Aliaga Shipyard in Turkey as well. The yard had relied on manual work as well as the use of aged equipment, which was inefficient and consumed a lot of money as various parts had to be replaced. Towards the end of 2015, Aliaga Shipyard has adopted automated cutting and sorting robots to facilitate efficiency within its operations process. Upgrading allowed raising the output by 30 percent and lowering labor expenditures considerably. Also, the automatic systems did alleviate the situation with the workers in terms of making them exposed to dangerous substances such as asbestos.

Impact of the Problem:

- Regular breakdowns lead to unscheduled shutdown, slowing the breakage procedure, thus causing high maintenance expenses.
- Low production capability since obsolete equipments cannot cope with the increased demand in ship dismantling.
- Rising labour cost because routine that can be automated is still carried out manually, so the cycle time becomes a longer one, and productivity decreases.
- The old machinery is less updated which has no modern safeguards, thus heightening the chances of accidents and employee injuries.
- The quality of recycled materials is low because they undergo the manual sorting and cutting process, incurring the risk of having untrue recovery.

Further Proposed Solutions:

In order to deal with the problem of old, outdated machinery, FSSRI ought to:

- **Invest in New Machinery:** FSSRI needs to undertake the modern machinery of cutting and the cranes that are manual in nature with the automated systems that are capable of doing high-volume work on cutting, sorting, and handling. This will accelerate the speed at which dismantling is done and lessen human dependability.

- **Implement Robotic Technology:** The company must use robotic arms that would do automatization of sorting of materials and the speed, accuracy and safety would be improved. Robots will be useful in separating copper, aluminum, and steel and hence the possibility of human error is limited and the recovery ratios increase.
- **Preventive Maintenance:** FSSRI ought to initiate a predictive maintenance scheme whereby IoT Mechanical sensors should be used to observe the real-time health of machineries. This will assist in eliminating the unnecessary downtimes and having the award of the machinery in the firm functioning at optimum levels.

Slow Procurement Process

Problem Overview:

Another inefficiency in their operation is that the procurement process at FSSRI is slow leading to delays and lack of material. The order placements are still based on manual approach thus leading to lag in order authorizations, negotiation with suppliers and delivery of materials. This lack of efficiency trickles down into the whole production chain because when materials are not supplied in time it means that machinery will be standing and people will not be working productively.

Moreover, the inventory management system used in the company is out of date and the stock is not monitored in real-time manner. That is why it is hard to predict shortages in materials and breeds conditions when FSSRI overstocks or understocks materials and wastes resources and the cost of purchasing increases.

Industry Example:

The procurement process of Aliaga Shipyard also had a similar challenge with this. The yard had issue of delay in material sourcing due to the procurement team not having a common system of tracking inventory and supplier performance. In response to this, Aliaga adopted an ERP system to it, where it combined procurement, and inventory management with operations. This system enabled Aliaga with real-time information about the level of stocks, delivery dates of the suppliers as well as the requirements of material and therefore enabled Aliaga to automate its order placements and performance of supplier. This project saved 25 percent in delays in making purchases and improved efficiency of the production process.

Impact of the Problem:

- Longer output and inactive devices because of lack of materials that influence the achievement and the schedules.
- Inefficiencies in the inventory area cause over stock and stock out, which in turn increases procurement and wastage of resources.
- There is an increment in the costs incurred as the procurement processes are done manually and a lot of time is wasted in negotiations and various levels of approval.
- Late delivery of products induces client dissatisfaction and revenue losses when they will not succeed in the productions as expected.

Further Proposed Solutions:

In order to maximize procurement, FSSRI ought to:

- **Adoption of an ERP System:** FSSRI ought to adopt an ERP system that incorporates procurement, inventory and production. Through the system, the company will get real-time views on material and supplier performance and enable the company to save costs through shortening lead times, and simplified procurement.
- **Automating Procurement:** FSSRI should put in place an automated procurement system where orders are made automatically with the depletion of a certain level of quantity of the material pre-specified. The system will aid in the guarantee that the materials will be ready anytime they are wanted and do away with time wastage due to manual ordering.
- **Vendor Relationship Management:** FSSRI ought to enhance partnership with its key suppliers as a means of ensuring that delivery schedules are met, hence save cost to the company. This should be done by negotiating long-term deals at attractive prices and the implementation of a vendor management system (VMS) to monitor the performance of the suppliers to ascertain prompt deliveries.

4. List of Questions

Broad Questions

1. What are the primary operational inefficiencies at FSSRI, and how do they impact the company's overall performance?
2. How can Lean Management principles, particularly 5S and Value Stream Mapping, improve communication and workflow at FSSRI?
3. How does FSSRI's reliance on outdated machinery affect its production efficiency, and what steps can be taken to modernize the equipment to meet global standards?
4. What role can Predictive Analytics play in FSSRI's resource management to reduce downtime, maintenance costs, and labor inefficiencies?

Focused Questions

1. How can FSSRI implement Lean Management to address the inefficiencies in its communication channels between procurement, operations, and logistics teams?
2. What steps should FSSRI take to optimize labor allocation, and how can flexible workforce planning improve the balance between peak and off-peak production periods?
3. How can FSSRI apply Six Sigma methodologies to identify and address process inefficiencies in its ship dismantling operations?
4. How can FSSRI utilize Predictive Maintenance and IoT sensors to extend machinery life, reduce unexpected breakdowns, and improve overall operational uptime?
5. What measures can FSSRI take to modernize its procurement system and eliminate the delays caused by manual ordering and inventory tracking?

6. How can FSSRI improve worker safety during the ship dismantling process and ensure compliance with global environmental regulations like the Hong Kong International Convention?
7. How can FSSRI adopt Just-in-Time (JIT) inventory management to reduce costs associated with overstocking and understocking materials?
8. How can FSSRI measure the success of the proposed Lean, Six Sigma, and Predictive Analytics solutions in terms of ROI (Return on Investment), productivity increases, and cost reductions?

5. Proposed Solutions and Changes

Inability to achieve peak performance caused by FSSRI inoperative functions (in the form of communication failures, problems with effective resources management, use of outdated equipment, and slowness of procurement processes) are significant impediments to the desired performance. Nevertheless, the challenges may be solved with specific, evidence-based measures that will simplify the operations, make them cheaper, and enhance the effectiveness of the company processes, in general. Following are the recommended solutions to each of the inefficiencies identified in the former sections together with the implementation steps and output.

5.1 Improving Communication Through Lean Management Principles

Inability of the operations, logistics, procurement, and safety management to effectively communicate is the main factor that leads to inefficiency during operations in FSSRI. The outcome of this inability to integrate and communicate in real-time is delays, misapplied resources and machines that are lying idle. These inefficiencies are made worse by the fact that FSSRI uses the traditional manual system of communication (such as emails and paper-based reports). Failure of these old-fashioned methods to maintain the departments aligned would bring down the production pace by increasing the operation costs and failure to meet the deadlines.

One of the major ways of enhancing communication at FSSRI is adopting the principles of Lean Management, 5S and Value Stream Mapping (VSM). The 5S approach requires the owners of the workspaces to organize them in a manner that enables them to have constant access to tools and materials without wasting time on where to locate resources. Through the implementation of 5S in the premises such as the warehouse and work sites of the dismantling workers, FSSRI will be able to improve the flow of operations, eliminate wastages, and accelerate the production cycle. Value Stream Mapping (VSM) tool, in its turn, is used to reveal the weaknesses of the production process, as well as waste occurring in it. FSSRI will be able to visualize the whole process of dismantling a ship including ship arrival to material recycling and find areas of inefficiency so that improvement efforts can be focussed. With the help of VSM, FSSRI will be able to streamline the movement of materials and labor to streamline by identifying the areas of delays and things to be improved.

The practice that FSSRI ought to employ in order to put these solutions into place is to first introduce 5S in the operations department and the warehouse. Through cross-functional team Value Stream Mapping workshop, FSSRI will be in a position to pin point any bottlenecks experienced in the dismantling process and develop a shared process map as a way to work towards improving the current process. The connection of such communication tools as Slack or Microsoft Teams into everyday work will facilitate a real-time update and easier interdepartmental coordination. Such modifications will lead to fewer idle time, an efficient distribution of resources, shorter production cycle, and the morale of the workers will increase because of better communication and understanding of tasks.

5.2 Optimizing Resource Management Through Predictive Workforce Scheduling and Technology

FSSRI is also not doing so good when it comes to managing resources especially labor and machinery. FSSRI is experiencing a situation during peak periods when there is high demand of dismantling services yet there is a shortage in supply of those members of staff, meaning that workers are forced to go in overtime resulting to fatigue among the workers. Quite the contrary, during off-peak season the company has an overstaff, which means that they underutilize their staff and waste labor costs. Moreover, the old equipment has to be fixed on a regular basis leading to unwanted stoppage thereby interrupting the production and leading to the rise in doing maintenance.

The FSSRI could adopt predictive workforce scheduling systems and predictive maintenance system in order to manage its resources. Predictive workforce scheduling refers to using past data in predicting future demands, which include peak and off-peak labor demands. Such a system will make sure that the labor will be distributed adequately with enough employees during the peak hours and very little extra labor during the off-hours. Further, FSSRI can apply predictive maintenance, which will allow monitoring of the health of the machinery in real-time using IoT sensors. This will enable the sensors to predict time of failure of a machine and thus FSSRI would be able to do the maintenance before any failures happen to reduce downtime and increase the life of the machinery.

To be successfully implemented, the first step that FSSRI needs to take is to invest in the workforce optimization software, either Katanacuts or Kronos Workforce Scheduler, to be able to predict the labor force requirements, according to production plans. The IoT-based sensors need to be attached to the major machinery and coupled to a predictive maintenance software such as Uptake or Predix. Besides, the personnel must be trained on the importance of using these new systems effectively to have a smooth integration and adoption. This way, FSSRI will experience a more effective workforce utilization, lower maintenance expenses, and higher employee satisfactory, with employees enjoying better and regular work schedules.

5.3 Modernizing Machinery and Adopting Automation

The other significant weakness at FSSRI is use of old age equipment to perform important services like cutting steel and sorting materials and loading. The company still relies on manual grade leveling tools and old hard and inefficient machineries that become unreliable often leading to unexpected downtime and higher cost on repairs. Due to the increased demand of recycled materials, the old systems of the company are failing to counter the number of ships being scrapped which results in slowing down its production.

FSSRI will need to make investment in automated, modern machines to enhance the speed of production and eliminate human error and boost efficiency. The aspects that automated systems really cut down on time spent on and increase the accuracy of are high-volume actions such as cutting and sorting and loading and unloading materials as it is far more efficient than manual labour. Automated systems of cutting will accelerate the recovery process, make the cutting more accurate, and raise the materials recovered quality. On the same note, the robotic sorting systems will enable FSSRI to sort high-value metals such as copper and aluminum out of the wastes more in an efficient manner, working without any moment of rest. Implementing predictive maintenance to these machines will guarantee a functional maintenance of these machines before they break down and thus they will extend the life span of a machine and minimize costs spent on repair.

In order to employ this solution, FSSRI ought to start investing in automated cutting tools and robotic arms to sort the material. Also, to complete the predictive maintenance process there should be IoT-based sensors on the new equipment so that the equipment is maintained in the working state at the highest possible level. The effectiveness of these upgrades can only be maximized by training the workers on how to use automated equipment and by creating a regular maintenance schedule. Some of the benefits expected are the kind of increase in the production capacity, the reduction in the cost of labour, the kind of worker safety that is to be enjoyed because there is less exposure to dangerous duties. The modern solution will also contribute to the fact that FSSRI would be able to stay in the competition in the field.

5.4 Streamlining Procurement Processes Through ERP Systems

Procurement process at FSSRI is relatively inefficient and it takes longer to supply materials, this leads to short supply of material and stagnant production. Currently, the procurement department is operating on manual systems to make orders, and this causes delays in approval of orders and communication with the suppliers. Also, the inventory management system of FSSRI is decentralized, which is why it is very hard to monitor the availability of materials and predict their deficit.

As a solution to this, FSSRI needs to adopt Enterprise Resource Planning (ERP) solution in order to integrate the procurement, inventory, and the operations. An ERP system will give real-time access to the availability of materials as well as automate the procedure of making orders and monitoring supplier performance. Automated ordering will enable FSSRI to eliminate stockout and have the right materials at the right time. Vendor Management System (VMS) should also assist FSSRI to manage relations with the suppliers, track the performance of the suppliers and secure better delivery terms and pricing.

To implement it, FSSRI must first find an ERP system that codes procurement, inventory management and operations. VMS should also apply in enhancing supplier tracking systems and their performance. Once the system has been implemented, then procurement and operational personnel ought to undergo training on the procedures to be followed in order to facilitate procurement using the new systems. In this way, FSSRI will save time in procurements, enhance the supply of materials, as well as the management of their inventory resulting in quicker production and clearer distribution of available resources.

6 Outcomes from Proposed Solutions

Proposed solutions will contribute to the operations of FSSRI to a great extent positively. Being based on the Lean Management principles, it will minimize communication failures, enhance the denomination of resources, and facilitate the workflow, which will decrease production cycles and minimize operational expenses. Predictive scheduling and predictive maintenance will allow managing the resources better and efficiently use the labor, and decrease machine downtime, as the production capacity increases.

The automation of machinery will make them more efficient and reduce the chances of error as well as enhance the safety of the workers. Investments made in automated cutting tools and robotic sorting systems will ensure that the level of production in FSSRI will be augmented not only in speed but also the quality of the recycled materials. The procurement process will be made efficient without having to delay on the one side, and without holding excess stock on the other by using an ERP system and managing the inventory using JIT which will consequently increase the cash flow and the allocation of resources.

In the end, all these solutions will enable FSSRI to enhance its productivity, cut down the cost, and become competitive globally. The company will be in a position to rise to increasing demand better.

sustaining sustainability and workers safety. With such solutions FSSRI will reinforce its status as industry leader in ship recycling business and guarantee sustainability in its business operations.

Recommendations

FSSRI experiences high levels of operation inefficiencies that curtail its performance to achieving the increasing demand, cost reduction, and productivity. These incompetencies are

caused by communication failures, inability to manage resources, old equipments and slow procurement services which restricts the performance and potential of the company. Nevertheless, through the introduction of special solutions and best practices, FSSRI could simplify its work, cut the costs, and enhance the overall efficiency. The following are main recommendations on the basis of analysis and solutions.

First, as one of the solutions to solving FSSRI come to their communication problems, FSSRI needs to adhere to the principles of Lean Management, especially the 5S and Value Stream Mapping (VSM). With the implementation of 5S, FSSRI will be able to arrange the work points in a very productive way so that the materials and tools can be easily accessible by the people. This will save more time that is spent in resource search and it will make the process of dismantling easier. Moreover, Value Stream Mapping will enable FSSRI to map the whole process of production literally, starting with the arrival of ships to the recovery of materials. It will aid to find the bottlenecks and inefficiencies and the company can make specific changes to workflow. Real-time information will be updated with the help of a centralized communication platform with integration into the ERP system of the company that will eliminate miscommunication and will enhance coordination within the diverse departments. Lastly, inter-departmental communication Standard Operating Procedures (SOPs) will allow the maintenance of similar patterns that are followed to communicate information to one another institution throughout the whole process.

Thereafter, FSSRI should deal with its inefficient resource management. It is possible to streamline labor distribution through the introduction of a predictive workforce plan. This system will calculate the past data and predict the staffing requirements in accordance with production demand so that the staffing levels and the peaks and off-peaks are at par with the operational requirements. FSSRI will be able to ensure staffing levels are more in line with the demands of production, avoiding overskilling and subsequent costs of paying overtime to workers, who are less and less often needed. In addition to this, FSSRI ought to use predictive maintenance technologies through IoT sensors to gauge the performance of the machinery in real time. Predictive maintenance will help the company to know which machine will stop before it stops and will repair it in advance and decrease unforeseeable maintenance. This will increase the total level of production capacity and minimize the cost of maintenance as well as increase the life time of important machinery.

The other potential area of improvement is on aging machinery at the company. FSSRI needs to spend on more modernized and automated cutting devices and robotic arms to eliminate manual labor in cutting of steel and in grading materials. Besides simply accelerating the dismantling tempo, automation will lessen the threat of human error and enhance the accuracy of recovering the materials. It is also necessary to establish predictive maintenance systems to be applied to the new acquired machinery. These systems will keep a check on machine health, anticipate the failure of a machine before it occurs, plan the maintenance ahead of time and prevent a lot of downtime, increasing its productivity. Automated systems will also increase safety of workers since they will have less contact with the hazardous job that includes cutting and sorting among others that will subsequently reduce injured human beings.

Last but not least, FSSRI needs to modernize the process of procurement, and of making material available when required, minimizing the delays that arise as a result of slow procurement cycles. To combine the procurement, inventory management, and the operations part, the company ought to adopt an ERP system. It can also bring about live update of materials availability and automated ordering in the event of falling below a required stock level. The just in time capability of the procurement process would enable FSSRI to eliminate protracted procurement, delays in delivery of materials and stocking out or excess goods. Also, Just-in-Time (JIT) inventory system should be implemented by the company that will save costs related to materials holding and materials will only be ordered when they are required therefore resulting in an optimized material assignment and cash flow. It will also be important to strengthen relations with the major suppliers so that the efficiency of procurement can be enhanced. FSSRI is able to make long-term contracts with the suppliers, in order to get better prices, and have them in time.

Conclusions

To sum up, FSSRI has a number of operational issues that have affected its performance to date by not being able to work optimally. Nevertheless, all these inefficiencies can be overcome, and the company can better its functioning with specified and data-based solutions. Continuous mixing and matching of Lean Management concepts like 5S and Value Stream Mapping can help FSSRI immensely as the company can better communicate between departments, lessen idle hands and streamline processes. Predictive workforce scheduling and predictive maintenance can also help improve resource management in an organization by adjusting the number of staffing based on production demand and eliminating the number of idle time, as a result of equipment malfunction.

More so, FSSRI should advance in its machinery in order to address the magnifying interest in recycled materials and remain competitive in the world market. Automated systems will also increase the safety of workers and decrease the use of manual labor since the production process will be improved. Lastly, the JIT inventory and ERP system will be implemented to streamline the procurement process of the company, minimize the cost of holding inventories and to ascertain that the materials needed to produce goods are ready when needed.

These strategic changes would allow FSSRI to better its overall operations capacity, cut on fees and become more productive. The firm will also build itself into one of the leadership recyclers in order to face continued sustainability and competitiveness globally. Such solutions will assist FSSRI in improving its capacity of satisfying the market demand of the global market and at the same time of delivering quality recycled steel and other products.

By undertaking such recommendations the profitability of FSSRI will not only be enhanced but it will also gain a better combined image of being a responsible and efficient re-cycler of ships in the global market. And by adopting an automation-driven, data-oriented decision-making approach as well as new methods of resources management, FSSRI is going to better meet the challenge of an ever more competitive global economy, and sustainability-minded economy.

References

- Anupindi, R., Chopra, S., Deshmukh, S. D., Van Mieghem, J. A., & Zemel, E. (2012). *Managing business process flows: Principles of operations management* (3rd ed.). Pearson Education.
- Basel Convention. (1989). *On the control of transboundary movements of hazardous wastes and their disposal*. United Nations Environment Programme. <https://www.basel.int/>
- Chiarini, A. (2013). *Lean organization: From the tools of the Toyota Production System to lean office*. Springer.
- Davenport, T. H. (1998). Putting the enterprise into the enterprise system. *Harvard Business Review*, 76(4), 121–131.
- George, M. L. (2002). *Lean Six Sigma: Combining Six Sigma quality with lean production speed*. McGraw-Hill.
- George, M. L., Rowlands, D., Price, M., & Maxey, J. (2004). *The Lean Six Sigma pocket toolbox*. McGraw-Hill.
- Heizer, J., Render, B., & Munson, C. (2017). *Operations management: Sustainability and supply chain management* (12th ed.). Pearson.
- International Maritime Organization. (2009). *The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships*. <https://www.imo.org/>
- Juran, J. M., & Godfrey, A. B. (1999). *Juran's quality handbook* (5th ed.). McGraw-Hill.
- Kusi-Sarpong, S., Gupta, H., & Sarkis, J. (2019). A supply chain sustainability innovation framework and evaluation methodology. *International Journal of Production Research*, 57(7), 1990–2008.
- Motorola University. (1986). *Six Sigma Training Materials*. Motorola Inc.
- Slack, N., Brandon-Jones, A., & Johnston, R. (2020). *Operations management* (9th ed.). Pearson.
- Tan, K. H., Zhan, Y., Ji, G., Ye, F., & Chang, C. (2015). Harvesting big data to enhance supply chain innovation capabilities. *International Journal of Production Economics*, 165, 223–233.
- Womack, J. P., & Jones, D. T. (2003). *Lean thinking: Banish waste and create wealth in your corporation*. Free Press.
- ZIRI Subedar Group. (2024). *Corporate overview and operations brief*. Retrieved from <https://www.zirisubedar.com>

Zohir, S. C. (2019). *Ship breaking industry in Bangladesh: A study on health hazards and environmental impact*. Bangladesh Institute of Development Studies (BIDS).

Alang Ship Recycling Yard. (2022). *Annual audit report on environmental and safety compliance*. Gujarat Maritime Board.