“Leather waste management and cost efficiency: Optimizing chemical usage, quantifying scraps and expanding efficiency”

A Proposal report for the BDM capstone Project

Submitted by

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Declaration Statement

I am working on a Project titled "**Leather waste management and cost efficiency: Optimizing chemical usage, quantifying scraps and expanding efficiency**". I extend my appreciation to **Dugros Leather India Pvt. Ltd.** , for providing the necessary resources that enabled me to conduct my project.

I hereby assert that the data presented and assessed in this project report is genuine and precise to the utmost extent of my knowledge and capabilities. The data has been gathered from primary sources and carefully analyzed to assure its reliability.

Additionally, I affirm that all procedures employed for the purpose of data collection and analysis have been duly explained in this report. The outcomes and inferences derived from the data are an accurate depiction of the findings acquired through thorough analytical procedures.

I am dedicated to adhering to the principles of academic honesty and integrity, and I am receptive to any additional examination or validation of the data contained in this project report.

I understand that the execution of this project is intended for individual completion and is not to be undertaken collectively. I thus affirm that I am not engaged in any form of collaboration with other individuals, and that all the work undertaken has been solely conducted by me. In the event that plagiarism is detected in the report at any stage of the project's completion, I am fully aware and prepared to accept disciplinary measures imposed by the relevant authority.

I understand that all recommendations made in this project report are within the context of the academic project taken up towards course fulfillment in the BS Degree Program offered by IIT Madras. The institution does not endorse any of the claims or comments.

Signature of Candidate

Name: **Aayush Konar**

Date: **04.07.2024**

Proof of originality: Click here (drive link)

EXECUTIVE SUMMARY

Dugros Leather India Pvt Ltd an ISO 9001:2015 compliant professional OEM/ODM leather goods manufacturer, exporter and wholesale supplier with its factory located at zone no.8/plot 622 Kolkata leather complex Kolkata-743502 West Bengal, India. It's a B2B organized business which deals with customers in the range of "leather goods and accessories".

With over 15 years of industry experience, this business has addressed many challenges. Current issues include high costs of wasted chemicals and leather, and inadequate tracking of leather scraps, leading to disposal expenses. Improved tracking systems and sustainable practices could minimize waste and reduce costs.

The main objectives are to implement a data-driven approach to waste management, accurately track and quantify wastage, and identify cost-saving and profit opportunities. Additionally, the aim is to monitor excess deadstock in unused chemicals and optimize stock levels to minimize wastage and stockouts. Utilizing tools such as Excel, Python, and Machine Learning, the goal is to streamline data processing and decision-making. The expected outcomes include improved waste management, discovering profitable uses for waste materials, and minimizing dead stocks and wasted chemicals and finished leather, ultimately enhancing efficiency and profitability through advanced technology integration.

ORGANIZATION BACKGROUND

Dugros Leather, established over a decade ago by Mr. Ahmad Kamal Khan, is a professional OEM/ODM leather goods manufacturer, exporter, and wholesale supplier based in Kolkata, India. The company is ISO 9001:2015 compliant and boasts one of the few LWG-Gold-certified, SA 8000, Sedex and BSCI certified tanneries in Eastern India.

Comprehensive Services

Dugros offers its clients an end-to-end experience, including:

- Design and product development
- Production and quality control

Production Capabilities

Backed by in-house LWG-certified tanneries, Dugros has a monthly capacity of producing nearly a million sq/ft of finished leather. The company's expertise spans various tanning methods for cow, buffalo, goat, and sheep skins. With two tanneries and three robust factories located in Kolkata's

Leather Industrial Complex, Dugros boasts an impressive annual production capacity:

•300,000 bags

•1,000,000 wallets and accessories

Distinguishing Features

Dugros is renowned for its impeccable craftsmanship and attention to detail. The company's skilled craftsmen, known as ‘karigars,’ carry forward a rich family history of artisanship, using top-tier Italian and German machinery to deliver high-quality products.

Vision and Legacy

Mr. Ahmad Kamal Khan, a chartered accountant with over 30 years of experience in the leather industry, founded Dugros after a decade in the EU. His vision was to create a leather goods factory in his hometown. Today, Dugros specializes in high-quality leather fashion bags, wallets, utility goods, and accessories for international clients and eminent brands, blending the experience of the first generation with the energy of the second.

PROBLEM STATEMENTS

The business has maintained strong profits and high customer retention, minimizing order cancellations, which is crucial in this industry. Despite effectively addressing challenges, analysis revealed areas for improvement in excess stock tracking and wastage management. Problem statements:

Minimize Chemical Wastage During Production:

- Chemical wastage during production is a major issue in a leather tannery.
- Identify key areas where chemical usage can be optimized without compromising product quality.
- Big loss in chemicals wastage every year.

2. Track, Optimize, and Quantify Leather Scraps and Wastage for Business Expansion:

- Lack of a system to accurately track leather scrap and waste generated during production.
- Optimize the use of leather materials to reduce waste and improve efficiency.
- Explore vertical expansion opportunities by utilizing waste materials in new product lines or markets.

3. Conduct Overall Analysis and Provide Data for Future Use:

- Compile data and analysis on chemical and material usage, waste, and efficiency improvements.
- Ensure that the analysis is accessible and useful for ongoing and future projects to maintain continuous improvement.

BACKGROUND OF PROBLEMS

1. Minimize Chemical Wastage During Production:

In the finishing process, chemicals such as various solvents, wax, and silicon are essential for edge painting, color correction, and surface treatment to achieve the perfect finish on leather articles. These chemicals are mixed with the required color before application. However, the mixture is quick-drying and cannot be stored for long periods. Often, after applying the mixture, a certain quantity remains unused. This leftover mixture cannot be applied to other products because each product requires a specific color gradient and design. Consequently, the tannery incurs significant financial losses every month due to this wastage.

2. Track, Optimize, and Quantify Leather Scraps and Wastage for Business Expansion:

Wastage is inevitable in leather production, especially during cutting. Currently, there is no precise measurement of wastage, and the company incurs costs for waste removal. Manual cutting makes optimizing yield challenging. However, scraps could be used as zero-cost raw materials for expansion. Thus, tracking, optimizing, and quantifying leather scraps is essential for growth and cost efficiency.

3. Conduct Overall Analysis and Provide Data for Future Use:

Comprehensive analysis of both expenditure and production is crucial for this project, providing a foundation for ongoing and future insights. Given the complex nature of our business operations, regular analytical assessments promise significant benefits for our company. By consistently monitoring these processes and segments, we can optimize decision-making and enhance overall operational efficiency.

PROBLEM SOLVING APPROACH

To address inventory management challenges, a data-driven approach will be implemented. This includes methods, data collection, and analytical tools to optimize inventory control and reduce costs. Key concerns are mitigating chemical wastage and accurately measuring leather scraps. This strategy aims to streamline operations, enhance cost-efficiency, and ensure sustainable resource management.

Methods used:

The analysis has employed various methods to identify problem areas. The business must adopt specific methods to minimize cost inefficiencies and reduce wastage.

1. **Root Cause Analysis (RCA)** : The root cause of the chemical wastage and generation of more leather scraps have to be identified. This helps to pinpoint specific process inefficiencies or errors leading to wastage, allowing for targeted corrective actions.

2. **Workflow:** The production process for leather goods is mapped out, detailing chemical usage and leather scrap generation, providing a visual **representation of workflow** to identify potential bottlenecks and areas for improvement.
3. **SPC technique:** Chemical usage and leather scrap generation are monitored over time using SPC techniques, detecting trends or abnormalities to enable proactive management by identifying deviations from expected performance and allowing for timely adjustments.
4. **VSM diagrams** are created to visualize the flow of materials and information in the production process, highlighting areas of waste and inefficiency to facilitate the design of leaner processes.
5. **Cost-Benefit Analysis (CBA)**: The costs of chemical wastage and leather scraps against the benefits of waste reduction measures are evaluated, providing a quantitative basis for decision-making.
6. **Environmental Impact Assessment (EIA)**: The environmental consequences of chemical wastage and leather scrap disposal are assessed, guiding sustainable practices and identifying cost-saving opportunities through eco-friendly solutions.

By observing past loss in areas of chemical wastage and various past data, the business will aim to use a data centric approach to make it more cost efficient

Intended Data collection:

To support the proposed approach, Dugros will gather financial data from its balance sheets and cash account summaries concerning the costs incurred due to chemical and leather wastage. Estimates will be made regarding the volume of waste generated and the associated disposal costs. These documents and estimates will provide comprehensive data.

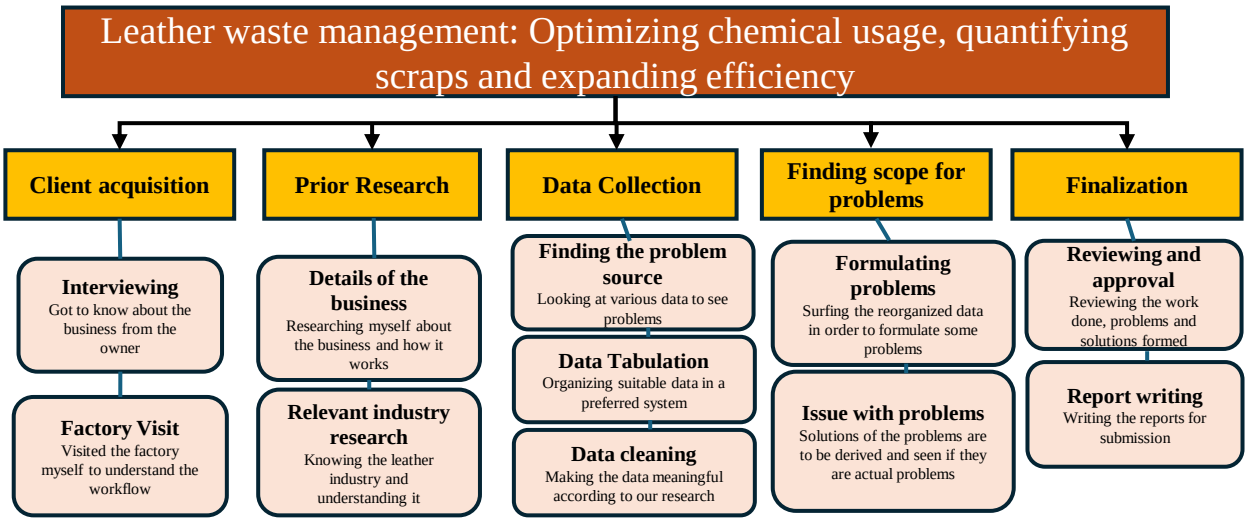
1. Financial records related to chemical wastage will be compiled to produce an annual report detailing losses associated with various chemicals.
2. Estimates will also be made on leather losses due to wear and tear, offering insights into costs incurred from quality-related rejections for export.
3. To estimate leather scrap amounts for products like bags, wallets, and belts, calculations will involve assessing square footage and weight of scraps. Multiplying these figures by their respective costs per unit will provide an estimate of leather lost during production.

Additionally, data will be collected on expenses related to the disposal of these wastes. This data collection process will offer a quantitative overview of the project and facilitate addressing these challenges using mathematical and statistical analyses.

Analysis Tools:

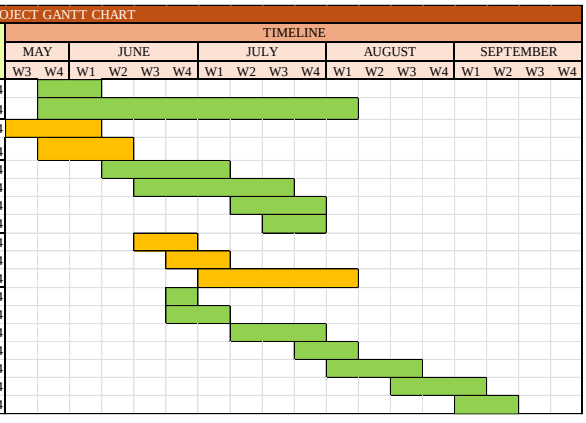
1. **Microsoft Excel and Google sheets** serve as the primary tools for Dugros Leather India Pvt Ltd to effectively manage its inventory data. It enables inputting, organizing, and storing of inventory information, facilitating data manipulation, calculations, and the creation of tables to track stock levels and sales. Excel's graphing and pivot table features are instrumental in visualizing trends and consumption patterns, allowing for data summarization and analysis. Pareto charts within Excel help identify significant inventory items contributing to sales or wastage, aiding in prioritizing inventory management efforts.
2. Dugros will use **Python** and advanced machine learning tools for sophisticated data analysis if needed
3. Python libraries like **Pandas** and **NumPy** will enable efficient data manipulation and complex calculations.
4. **Scikit-learn** will be used for machine learning tasks such as classification, regression, and clustering.
5. **TensorFlow** and **PyTorch** will be employed for deep learning tasks.
6. **Google Colab** will provide cloud-based computational power for developing and deploying models.
7. These tools will help predict trends, optimize production, and enhance efficiency and profitability.

EXPECTED TIMELINE



BDM CAPSTONE PROJECT GANTT CHART

ACTIVITY		START DATE	END DATE
Meetings and visits	Discussion with owner about the business	27-May-24	4-Jun-24
	Visiting the factory and speaking to employees	30-May-24	2-Aug-24
Researching	Understanding the industry and how it works	24-May-24	4-Jun-24
	Detailing of the business	28-May-24	10-Jun-24
Data Acquisition	Acquiring raw data	10-Jun-24	2-Jul-24
	Analyzing the data	16-Jun-24	20-Jul-24
	Tabulating and cleaning the data	10-Jul-24	24-Jul-24
	Reviewing the organized data	16-Jul-24	30-Jul-24
Problems & Solutions	Formulating the problems	20-Jun-24	28-Jun-24
	Reviewing plausibility of problems	28-Jun-24	4-Jul-24
	Ideas about solution of the problems	5-Jul-24	3-Aug-24
Report writing	Finalizing the proposal content	26-Jun-24	28-Jun-24
	Writing the proposal	28-Jun-24	2-Jul-24
	Organizing the content, graphs and charts	11-Jul-24	26-Jul-24
	Preparing mid term submission	26-Jul-24	5-Aug-24
	Final analysis	5-Aug-24	20-Aug-24
	Preparing Final submission	20-Aug-24	5-Sep-24
	Preparing Presentation for viva	3-Sep-24	10-Sep-24

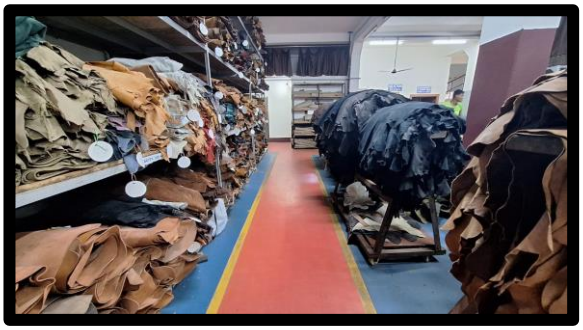


The timeline in the gantt chart along with the work breakdown structure gives detailed insights about the workflow during this project and the course of actions through the period.

EXPECTED OUTCOME

- **Reduction in Chemical and leather Wastage**: Minimize financial losses by optimizing chemical usage and scrap generation during production processes.
- **Accurate Waste Tracking**: Implement a robust system to monitor and quantify waste materials, leading to potential additional revenue streams through vertical expansion into bonded leather products.
- **Comprehensive Dashboard**: Create a detailed and accessible dashboard to display analytical results, providing valuable insights for future decision-making and strategic planning.
- **Enhanced Factory Efficiency and Profitability**: Improve overall operational efficiency, leading to increased profitability through optimized resource usage and waste reduction.
- **Reduced Environmental Pollution**: Minimize the environmental impact by adopting better waste management practices, reducing the dumping of leather scraps and chemical residues.

APPENDIX



Location of the factory (Google Maps):

Click on the location icon