UTM UNIVERSITI TEKNOLOGI MALAYSIA
SCHOOL OF COMPUTING
Faculty of Engineering

Project Proposal Form MCSD 6215
Sem:…1… Session:…2024/2025…

SECTION A: Project Information.

Program Name:	**Masters of Science (Data Science)**
Subject Name:	**Project 1 (MCSD 6215)**
Student Name:	Liew Yng Jeng
Metric Number:	MCS241006
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Project Title:	Delay Prediction On Inventory Shortages In Sport Equipment Supply Chain
Supervisor 1:	Dr.Nor Erne Nazira Binti Bazin
Supervisor 2 / Industry Advisor(if any):	

SECTION B: Project Proposal

Introduction:

In modern supply chain management, many calculation and prediction methods have long appeared in the market to accurately predict the quantity demand of regional supply and the expected arrival time of shipment. However, there are still various delayed deliveries and inventory shortages in the market, which lead to supply chain paralysis. Most enterprises rely on traditional methods to make forecasts based on historical data and assumptions, but the efficiency of obtaining prediction results is reduced and the cost increased. Regarding the aspect of the capital chain, there will be daunting impacts since small and medium-sized enterprises cannot compete with large enterprises. Hence, this project will focus on the delayed prediction of inventory shortage in the sports equipment supply chain issue, and use the sports equipment datasets to minimize the possibility of out-of-stock, overstock, and delayed shipment.

Problem Background:

Global cargo supply has experienced tremendous challenges, among which shipment delays and insufficient inventory still cannot resolved. There is a great correlation between accurately predicting the required inventory to ensure the profitability of enterprises and the satisfaction of consumers who expect to receive the stuff. Usually, the expected delivery time of stuff was delayed due to suppliers, transportation companies, data management, and other factors. On the supplier side, the most common factors are machine failures and raw material shortages leading to production delays and insufficient inventory. In terms of transportation factors, there might be issues of mismatch between the number of loaded goods and the number of transport vehicles, improper route planning, and severe weather conditions. Human factors are generally the cause of the data management side, such as slow manual processing of orders and inability to ship due to information asymmetry. Beyond a doubt, these problems had a significant impact on both suppliers and consumers, and people would gradually lose confidence in this field if continued.

Problem Statement:

From the perspective of the current technologically advanced world, it is impossible to further achieve high-precision accuracy by continuing to rely on traditional methods when real-time and seasonal changes need to be taken into account. The accuracy of an enterprise's inventory forecast is equivalent to the enterprise's profit. Likewise, delivery punctually is equivalent to a promise from the consumers' perspective. Since current forecasting methods may not be sufficient to face all the challenges in this highly competitive market landscape, the accuracy of forecasts is crucial and related to the company's reputation and development prospects. It can ensure that the enterprise's inventory is sufficient and not excessive while ensuring that the goods are delivered to customers on time, which improves the enterprise's profits and customer satisfaction, creating a win-win situation.

Aim of the Project:

This project aims to provide an accessible, affordable, and effective forecasting analysis method to predict market trend and demand by studying various calculation methods to correspond to different supply and demand, help enterprises optimize inventory management, minimize out-of-stock and overstock, accurately calculate the arrival time of goods, and promote data-driven decision-making.

Objectives of the Project:

I. Collect historical sales and inventory data of enterprises and pre-process them to handle missing values, outliers, and seasonality

II. Analyze complex forecast results into actionable insights using Tableau and Power BI

III. Evaluate the performance of various forecasting models using ARIMA and XGBoost, SARIMA, and LSTM based on forecast accuracy, reliability, and applicability

Scopes of the Project:

This project focuses on predicting the inventory instability of international logistics companies from 2015 to 2018. The research uses inventory data of sports equipment supply chain held by selected suppliers and uses forecast data accurately calculated from multiple algorithm models.

Expected Contribution of the Project:

- Provide an efficient and data-driven demand forecasting method to help enterprises improve supply chain performance.
- Use practical forecasting tools to reduce costs, improve customer satisfaction, and optimize inventory management.
- Provides an interactive dashboard to monitor sales trends, inventory levels, and demand forecasts in real time.

Project Requirements:

Software: Tableau, Power BI, Python Programming, Jupyter Notebook

Hardware: 8GB RAM HP Laptop

Technology/Technique/ Methodology/Algorithm : Autoregressive Integrated Moving Average(ARIMA) and Extreme Gradient Boosting(XGBoost) Seasonal ARIMA(SARIMA), Long Short-Term Memory(LSTM)

Type of Project (Focusing on Data Science):

[ ] Data Preparation and Modeling

[ ] Data Analysis and Visualization

[/] Business Intelligence and Analytics

[/] Machine Learning and Prediction

[ ] Data Science Application in the Business Domain

Status of Project:

[/] New

[ ] Continued

If continued, what is the previous title?

SECTION C: Declaration

I declare that this project is proposed by:

[ ] Myself
[/] Supervisor/Industry Advisor ( )

Student Name: Liew Yng Jeng

16 Nov 2024

Signature **Date**

SECTION D: Supervisor Acknowledgement

The Supervisor(s) shall complete this section.

I/We agree to become the supervisor(s) for this student under aforesaid proposed title.

Name of Supervisor 1: Dr.Nor Erne Nazira Binti Bazin

Signature **Date**

Name of Supervisor 2 (if any):

Signature **Date**

SECTION E: Evaluation Panel Approval

The Evaluator(s) shall complete this section.

Result:

[ ] FULL APPROVAL
[ ] CONDITIONAL APPROVAL (Minor)
[ ] CONDITIONAL APPROVAL (Major)*
[ ] FAIL*

***** Student has to submit new proposal form considering the evaluators' comments.

Comments:

Name of Evaluator 1:

Signature **Date**

Name of Evaluator 2:

Signature **Date**