



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

SCHOOL OF COMPUTING
Faculty of Engineering

Project Proposal Form MCST1043
Sem: 2 Session: 2024/25

SECTION A: Project Information.

Program Name: **Masters of Science (Data Science)**

Subject Name: **Project 1 (MCST1043)**

Student Name: Sivarajan A/L S.Esvaran

Metric Number: MCS241051

Student Email & Phone: sivarajan@graduate.utm.my

Project Title: Sales Forecasting Models For Direct Selling Business: Data-Driven Approach
To Predictive Analytics

Supervisor 1: _____

Supervisor 2 / Industry
Advisor(if any): _____

SECTION B: Project Proposal

Introduction:

Direct selling is a global retail model relying on personal networks and face-to-face sales, with companies like Amway expanding rapidly (Al-maaitah, 2023; Korherr et al., 2022). However, distributors face significant challenges in planning and inventory management due to unpredictable demand and seasonality. Predictive analytics, widely used in retail and e-commerce, remains underutilized at the distributor level in direct selling, which still relies heavily on intuition (Daradkeh et al., 2022). his study investigates how forecasting models can empower distributors to shift from reactive to proactive business management, using Amway as a case example (Sivanathan et al., 2024).

Problem Background:

Independent distributors struggle with forecasting sales performance and managing inventory effectively because they lack advanced analytics tools (Daradkeh et al., 2022). Unlike large retailers with ERP systems and analytical teams, distributors often operate without data-driven decision support, resulting in excess inventory or stockouts. The complex, relationship-based nature of direct selling creates sales dynamics that traditional models cannot easily capture, necessitating more sophisticated forecasting approaches (Sivanathan et al., 2024).

Problem Statement:

While predictive analytics has revolutionized retail and e-commerce forecasting, individual distributors in direct selling lack such tools. This leads to inefficient stock management, missing sales opportunities, and poor promotional planning. Therefore, this research seeks to design and implement advanced sales forecasting models that generate reliable, actionable predictions for the direct selling industry, enabling distributors to streamline operations using data-based analytics

Aim of the Project:

The aim of the project is to study and display retail transaction data concerning direct selling companies such as Amway

In order to :

1. To conduct comprehensive exploratory data analysis.
2. To analyze temporal sales patterns.
3. To develop and implement multiple forecasting models
4. To establish comprehensive model evaluation criteria
5. To identify optimal forecasting approaches

Objectives of the Project:

To examine and present sales data across intervals of time for instance, monthly or seasonal.

To identify the top performing and lowest performing products' categories.

To recognize trends in returns and refunds across the products' categories and demographics of customers.

To provide suggestions for increasing sales from the insights gathered through data analysis and visualization tools.

Scopes of the Project:

The scope of this project encompasses the use of transaction and customer data collected from a single Amway distributor, covering the period from April 2023 to April 2025. It involves developing and comparing multiple forecasting models, including ARIMA, Exponential Smoothing, Random Forest, Linear Regression, and LSTM, to determine their suitability for sales prediction in direct selling environments. The project focuses on generating forecasts across different prediction horizons, to support both operational decision-making and long-term strategic planning. The technology stack employed includes Python libraries such as scikit-learn, TensorFlow/Keras, Prophet, and statsmodels to ensure robust model development. Furthermore, cross-validation and walk-forward analysis techniques are applied to validate the models and minimize the risk of overfitting. Finally, the models are designed with deployment considerations in mind, ensuring they are automated, scalable, and user-friendly for independent distributors who may not possess technical expertise.

Expected Contribution of the Project:

This project bridges an important gap by bringing advanced predictive analytics to independent distributors in direct selling, enabling efficient inventory management, better customer service, and improved profitability.

Academically, it contributes to retail analytics literature by exploring forecasting challenges unique to direct selling and demonstrating practical machine learning applications for small businesses. The findings can inform tool development for distributors and extend predictive analytics democratization to other micro-business sectors.

Project Requirements:

Software: Phyton, Google Collab and Excel

Hardware: _____

Technology/Technique/ Technique: Data Cleaning, Feature Engineering, Exploratory Data Analysis (EDA)

Methodology/Algorithm: Algorithm: ARIMA, LSTM, Linear Regression and Random Forest

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 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: _____

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: _____

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