FINAL PROJECT - 242IS4402

BUSINESS INTELLIGENCE (BI) SYSTEM PROJECT FOR GOLDEN GATE RESTAURANTS

Lecturer: PGS. TS. Hồ Trung Thành

Subject: PROJECT MANAGEMENT FOR INFORMATION SYSTEMS

Present by: Group 4

18/3/2025

Our Team Members

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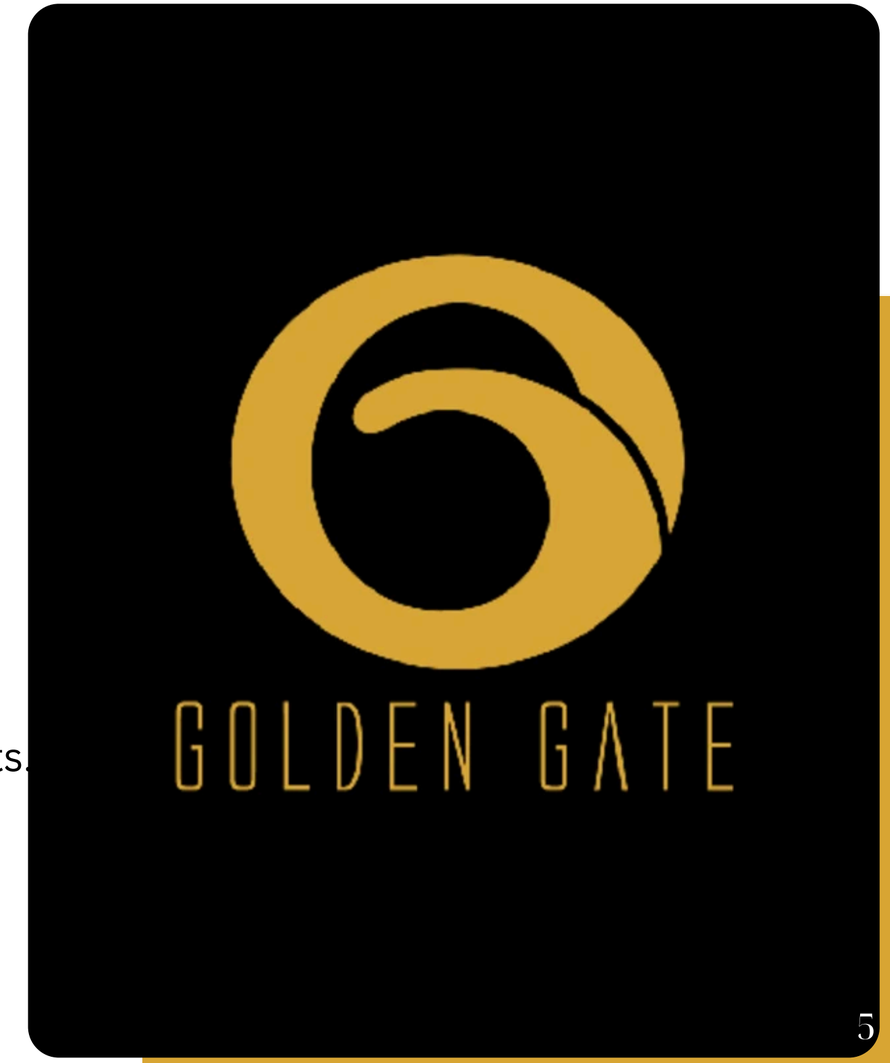
CHAPTER 1

INITIATION PHASE

Introduction

- **Founded:** 2005 by Đào Thế Vinh, officially started operations in 2008.
- **Business model:** Chain of restaurants offering diverse dining experiences.
- **Mission:** "**HAPPY TEAM MEMBER – HAPPY CUSTOMER**" – Focuses on employee satisfaction to create excellent customer experiences.
- **Vision:** "**TO BE THE FIRST F&B CHOICE**" – Aiming to be the leading choice in the F&B industry in Vietnam.
- **Core values:**
    - **Integrity** – Always doing the right thing to build trust.
    - **Humanity** – Respect and empathy for customers.
    - **High Performance** – Always striving for excellent productivity and results.
- **Achievements:**
    - Over **40 brands** and **500 restaurants** in 42 provinces.
    - Popular brands: **Vuvuzela, Sumo BBQ, GoGi House, Kichi Kichi**.



SWOT ANALYSIS

STRENGTH

- Strong brand porfolio
- Diverse offerings
- Data - Driven CRM
- Dedicated sales team at Point of Sale

OPPORTUNITIES

- Digital Transformation
- New market segments
- Creative marketing Strategies
- Sustainability initiatives

WEAKNESSES

- Fragmented IS infrastrucure
- Limited use of advanced Technologies
- High advertising costs
- Seasonal revenue dependece

THREATS

- Intensified Competition
- Economic pesures
- Cybersecurity Risks
- Health and diet Trends

PORTER'S 5 FORCES ANALYSIS

Competitive Rivalry

Strong competition: Golden Gate faces major competitors like Redsun ITI, expanding rapidly in Vietnam.

Threat of New Entrants

Low entry barriers: Small restaurants and startups can easily enter the market. However, Golden Gate's large network gives it a strong advantage.

Bargaining Power of Suppliers

Supplier advantage: Golden Gate has strong bargaining power but still depends on imported goods, which can lead to price changes.

Bargaining Power of Buyers

Many choices for customers: Customers can easily switch brands if they are not satisfied, influenced by online reviews.

Threat of Substitutes

Online delivery and street food: Online food delivery and street food alternatives are increasing, reducing the need for dine-in restaurants.

COCOMO ANALYSIS

Overview of COCOMO Analysis

COCOMO (Constructive Cost Model) is a software estimation technique used for estimating time, resources, and costs.

Three Development Modes:

- Organic Mode: Simple, stable environment.
- Semi-Detached Mode: Moderate size and mix of experience.
- Embedded Mode: Strict constraints and specific requirements.

PROJECT'S COCOMO ANALYSIS

- **Step 1: Define Project Size**

Component	Estimated Lines Of Code
Data Warehouse and ETL Scripts	***1.000***
• Database Schema Design	3.000
• ETL	5.000
• Stored Procedures and Triggers	2.000
Dashboards and Reports	***500***
• Core Dashboards	2.000
• Custom Reports	2.500
• Export Functions	500
Analytics Features	***600***
• Trend Analysis Algorithms	2.000
• Forecasting Models	2.000
• KPI Calculations	2.000
Integration with Systems	***500***
• POS System Data Integration	1.500
• Warehouse System Data Integration	1.000
• CRM System Data Integration	1.500
• API Development for External Systems	1.000
Total	***2.600***

- **Step 2: Select COCOMO Model**

This project will use the Intermediate COCOMO model, which is ideal for projects with moderate complexity and requirements.

- **Step 3: Determine Scale Factors and Calculate the Effort Adjustment Factor (EAF)**

Scale factor	Rating	EAF
Required Software Reliability	Nominal	1.00
Volatility of the virtual machine environment	Low	0.87
Application Experience	Very high	0.82
Software engineer capability	High	0.86
Analyst capability	High	0.86
Use of software tools	Nominal	1.00
Effort Adjustment Factor		0.528

- **Step 4: Estimate Effort**

Effort Applied (E) = $a_i(KLOC)^{(b_i)}$ *(EAF) = 3*2.6*0.528 = 4.118 person-months*

Development Time (D) *= 2.5*4.118*0.35 = 3.603 months*

People required (P) *= Effort Applied / Development Time = 4.118 / 3.603 = 1.143 count*

PAYBACK AND NPV ANALYSIS

- **Payback**

The **payback** method calculates how long it takes to recover the initial investment. When the net annual cash inflow is constant, the payback period is found by dividing the initial investment by the annual cash inflow.

$$Payback\ period = \frac{Investment\ required}{Net\ annual\ cash\ flow}$$

The payback rule determines the time needed for an investor to recoup their initial investment from a project's cash flows. Choosing a cutoff date is crucial, as cash flows beyond this date are ignored.

- **NPV analysis**

Net Present Value (NPV) evaluates a project's profitability by comparing the present value of cash inflows and outflows, using a discount rate to determine its financial viability.

$$NPV = 1 + \sum_{t=1}^{n} \left(\frac{NetCashFlow}{(1+r)^t}\right)$$

NPV Decision Criteria:

Positive NPV: Project generates more value than it costs, making it a good investment.

Zero NPV: Break-even, no gain or loss

Negative NPV: Likely to lose value, suggesting it's a poor investment.

ROI ANALYSIS

- **Definition:**

ROI measures the profitability of an investment by comparing net profit to initial investment costs. In Business Intelligence (BI), it evaluates the effectiveness of data-driven initiatives.

- **Types of ROI:**
    - **Expected ROI:** Estimated profit before the project starts.
    - **Actual ROI:** Compares actual performance to estimates
    - **Positive ROI:** Project generates more value than it costs.
    - **Negative ROI:** Project incurs losses but offers lessons for future improvements.
- **ROI Formula:**

$$ROI = \frac{Total\ value\ of\ investment - Total\ cost\ of\ investment}{Total\ cost\ of\ investment} \times 100\%$$

In BI project:

$$ROI = \frac{Benefits - Costs}{Cost} \times 100\%$$

FIXED COSTS RELATED TO THE PROJECT

FIXED COST RELATED TO PROJECT			
Category	**Detail**	**Description**	**Estimated Cost ($)**
Software and Licensing	BI Tools (Power BI)	Enterprise licenses for centralized BI reporting across all locations.	0
	ETL Tool Licensing (Visual Studio 2022)	Data pipeline automation for extracting and transforming data from multiple sources.	20.000
	Database License (SQL Server on-premises)	Formatting data	80.000
Evaluate and collect requirements	Surveys & Questionnaires	Distributing forms to staff and management to understand reporting needs and key KPIs for BI implementation.	250
	Process Documentation	Mapping existing workflows, identifying data sources (POS, ERP, CRM), and defining BI integration points.	300
	Requirement Validation	Reviewing collected data with stakeholders, refining requirements, and ensuring alignment with business objectives.	250
	Competitive Benchmarking	Analyzing BI solutions used by competitors or similar F&B chains to identify best practices and potential improvements.	300
Data Integration/ETL (Data Consolidation & Transformation)	Custom Development for ETL Pipelines	Building connectors for integrating POS (Point of Sale) data, customer insights, and operational analytics	7.000
	API & Connector Development	APIs to connect BI dashboards with internal CRM, ERP, and marketing databases.	15.000
	Data Cleaning & Quality Management	Identifying and rectifying inconsistencies in collected data.	2.500
Analyze Data	Descriptive Analytics	Generating summary reports on sales, inventory, and operational performance.	1.500
	Predictive Analytics	Using data models to forecast trends and optimize restaurant operations.	2.000
	Customer Insights Analysis	Analyzing customer behavior and preferences to enhance marketing strategies.	1.500
Visualization	Dashboard Development	Creating interactive BI dashboards for real-time monitoring.	5.000
	Report Customization	Customizing reports for different stakeholders (executives, managers, finance team).	2.500
Salary (Labor)	Project Manager (1 person)		600
	Data Analysts & Engineers (1 person)		400
	QA/QC Specialist (1 person)		400
	Developer (1 person)		500
	Business Analyst (1 person)		500
Consulting Services	BI Consulting Fees (External Experts)	BI consultant, customization support and declarative development.	4.000
User Training	Training Sessions for Employees (120 employees)	In-person or online training to ensure effective use of BI dashboards.	3.000
	Training Materials (Documentation, Videos, Guides)	Costs for content creation and distribution.	1500
Testing	Functional Testing	ensuring all BI dashboards, reports, and integrations work correctly	1.500
	Performance Testing	testing query speed and report generation under load	1.500
	Security & Compliance Testing	ensuring data security and regulatory compliance	1.500
	UAT (User Acceptance Testing)	testing by end-users before final deployment	1.500
Implementation Cost	Internet & Network Expenses	Dedicated broadband connections and leased lines for 20locations.	1.800
	Electricity & Power Costs	Increased power usage for servers, workstations, and BI dashboards.	2.200
	Office Setup & Operational Costs	Temporary workspace arrangements for BI deployment team.	11.000
Maintenance and Support	System Updates & Patches	Includes ongoing bug fixes, version upgrades, and troubleshooting.	1.000
	Backup & Disaster Recovery	Cloud-based or on-prem backup solutions for BI system data security.	400
Cloud Infrastructure (AWS)	Cloud Storage	Storing transaction data, customer records, and aggregated analytics for 20 locations.	1.000
	BI Servers & Compute Instances	Virtual machines to process BI analytics, run queries, and support data visualization.	4.000
Networking Equipment (Firewalls, Switches, Routers)	Enterprise-Grade Firewalls	Secure data transmission between restaurant locations and cloud servers.	10.000
	Redundant VPN Setup for Secure Remote Access	Secure tunneling for remote data access by executives and analysts.	1.200
Total cost			**187600**

VARIABLE COSTS RELATED TO THE PROJECT

Variable Costs Related To The Project		
Category	**Detail**	**Estimated Cost ($)**
Contingency Budget	For arising problems, delays or changes, unforeseen expenses.	200
Transportation Costs	Cover travel expenses for team members attending in-person project meetings or restaurant site visits.	500
Internet and Communication	Cover additional expenses for video conferencing tools (e.g., Zoom, Google Meet) and data charges.	200
Materials and Supplies	Include items like pens, notebooks, printed handouts, and snacks for 10 weekly meetings.	200
Total Cost		1,100

Contribution Margin & Break-Even Point

Contribution Margin: Difference between revenue and variable costs.

Formula: **Contribution Margin = Revenue - Variable Cost**

Break-Even Point (BEP): The level of output where total revenue equals total costs, resulting in no profit or loss.

Formula 1: **BEP = Total Fixed Costs / (Price per Unit - Variable Cost per Unit)**

Formula 2: **BEP = Total Fixed Costs / Contribution Margin**

PROJECT BUSINESS CASE

Project Business Case			
Project Name	Business Intelligence (BI) System for Golden Gate Restaurant Chain – Marketing and Sales Modules.		
Project Description	A Business Intelligence (BI) system for Golden Gate Restaurant Chain designed to centralize data, gain customer insights, optimize operations, enhance marketing effectiveness, and ensure scalability for long-term growth and adaptability.		
Project Sponsor	Assoc. Prof. Ho Trung Thanh, Ph.D		
Program Manager	Assoc. Prof. Ho Trung Thanh, Ph.D		
Project Manager	To Nguyen Tuong Vy		
Organization	Golden Gate Restaurant Chain		
Time scale			
Target Start Date	3rd January, 2025	**Target End Date**	3rd March, 2025
Problems Faced	**Inconsistent Data Management**: Multiple brands use different systems and data formats (CSV, Excel, SQL), leading to manual, error-prone data aggregation and difficulty in generating comprehensive reports. **Fragmented Customer Insights**: Customer data is scattered across various systems, limiting the ability to analyze behavior and personalize experiences effectively. **Operational and Cost Management**: Difficulty tracking KPIs, managing inventory, and forecasting demand, leading to inefficiencies, shortages, or surpluses. **Marketing Effectiveness**: Measuring the true ROI of campaigns is challenging due to external factors and difficulty isolating promotion-driven sales increases.		

Contribution to Business Strategy	
- **Centralized Data Management:** The system consolidates data from multiple sources, including CRM, POS, inventory, and financial systems, into a unified platform. This centralization ensures seamless access to reliable data, empowering leadership to make informed, data-driven decisions. - **Operational Excellence:** By streamlining operations such as inventory management, demand forecasting, and supply chain optimization, the system reduces inefficiencies. Enhanced operational efficiency lowers labor costs and minimizes errors caused by manual processes, boosting profitability. - **Enhance Customer Experience:** The system provides insights into customer behavior and preferences, enabling highly targeted marketing campaigns. Personalized offers and loyalty programs tailored to customer needs foster long-term relationships and improve retention rates. - **Support for Digital Transformation:** Modernizing outdated systems and integrating them with advanced BI tools helps the company embrace the digital age. This transformation positions Golden Gate as a tech-savvy leader, capable of adapting to shifting market dynamics.	

Options Considered	**Option 1: Maintain Current Systems (Status Quo)**
	• Continue using the existing mix of legacy systems and newer tools without integration.
	• This option would preserve current workflows but fail to address operational silos, data fragmentation, and inefficiencies.
	• **Drawbacks:**
	  ○ Limited ability to perform real-time analytics.
	  ○ Persisting inefficiencies in inventory and demand management.
	  ○ Inability to compete effectively with technologically advanced rivals.
	Option 2: Partial Upgrades to Existing Systems
	• Focus on improving individual components, such as upgrading the CRM or POS systems.
	• While this approach offers incremental improvements, it lacks the comprehensive benefits of an integrated system.
	• **Drawbacks:**

	○ Misses opportunities for synergy across departments.
	○ Does not address overarching data integration challenges.
	Option 3: Build a Centralized BI System (Chosen Option)
	• Develop and implement a unified BI platform to integrate data across marketing, sales, and operational functions.
	• This option enables advanced analytics, automation, and real-time decision-making.
	• **Advantages:**
	  ○ Provides a complete, accurate overview of business operations.
	  ○ Improves forecasting, customer targeting, and operational performance.
	  ○ Ensures scalability and adaptability for future growth and digital transformation.

Benefits	**Sales Performance Optimization** • **Improved Sales Reporting Accuracy:** By integrating sales data from POS systems into the BI platform, the company can reduce reporting errors by **20%**, ensuring more accurate daily and monthly performance tracking. • **Revenue Growth through Forecasting:** Enhanced sales forecasting with BI tools will increase forecasting accuracy by **15%**, helping restaurants anticipate demand better and reduce lost sales during peak periods, potentially boosting revenue by **1-2%.** **Marketing Campaign Effectiveness** • **Increased Campaign ROI:** BI-driven customer segmentation will enable personalized marketing campaigns, improving the return on investment (ROI) for promotions by 10%. • **Targeted Upselling:** Insights from the BI system can guide targeted upselling strategies, such as recommending high-margin items based on customer preferences,
	potentially increasing average transaction value by 5%. **Improved Decision-Making on Sales and Marketing** • Real-Time Analytics: Dashboards will provide real-time data on campaign performance and sales trends, reducing decision-making time by **20%**. • Quick Adaptation to Market Trends: With actionable insights, the marketing team can respond to evolving customer preferences (e.g., healthier options or delivery services), reducing the time to adjust strategies by **25%**. **Customer Retention and Loyalty** • Loyalty Program Optimization: Better insights into customer behavior will increase active loyalty program participation by **10%**, strengthening the brand's relationship with its existing customer base. • Higher Retention Rates: Personalized marketing through the BI system is expected to improve customer retention rates by **5%**. **Competitive Advantage:** • Leveraging BI tools helps close the gap with competitors that already use AI and advanced analytics. • Enables the company to stay ahead by adapting quickly to emerging trends and customer preferences. **Scalability and Adaptability** • A centralized system ensures consistency in service quality and operational standards across locations, even as the business expands. • The system's modular design accommodates future updates to meet evolving market demands and regulatory changes.
Time Scales	**Project Start Date**: January 3, 2025. **Project End Date**: March 7, 2025.

PROJECT SCOPE STATEMENT

***Project Idea: Business Intelligence (BI) System for Golden Gate Restaurant Chain – Marketing and Sales Modules* – Scope Statement**

Project Sponsor: Assoc. Prof. Ho Trung Thanh, Ph. D

Project Manager: To Nguyen Tuong Vy

Target Kick-Off Date: 3rd January, 2025

Target Completion Date: 7th March 2025

Project Goal:

- Implement business intelligence to streamline operations by centralizing data from POS, warehouse, and CRM systems for clear analysis.
- Use SQL Server, Visual Studio, and MDX to manage and analyze databases, supporting sales and marketing.
- Enable data-driven decisions with real-time insights using tools like Power BI, Tableau, and Excel for reports and forecasts.
- Enhance business performance across **15 restaurant branches** by optimizing operational processes and improving customer satisfaction through trend and behavior analysis.
- Displaying KPIs such as revenue, profit margins, customer count, and expenses…

Scope Description: BI system will integrate data from various sources, including POS, warehouse management, and CRM systems, into a unified platform, ensuring real-time accuracy and consistency. By providing actionable insights, improve the operational efficiency of 15 branches, boost restaurant performance, and improve customer satisfaction.

Deliverables:

- Official Project Plan: Goals and Scope
- Centralized Data Platform
- Interactive Dashboards
- Customizable Reports
- Trend Analysis and Forecasting
- Marketing Analysis
- Restaurant Performance Metrics

Challenges / Constraints:

- Resource Limitations (Time and Budget): Break the project into phases to prioritize critical functionalities and ensure timely delivery.
- Complex Data Integration and Standardization: Work closely with technical teams from each system and all 15 branches to ensure compatibility and resolve integration issues promptly.
- Data Security and Privacy Risks: Implement clear data access control, encryption, and security protocols in line with industry standards.
- Inadequate User Adoption and Training: Collect user feedback on system usability and make necessary adjustments to improve the user experience.
- Inadequate Testing and Quality Assurance: Conduct multiple testing cycles across 15 branches to ensure system stability, performance, and error reduction before deployment.

Acceptance criteria:

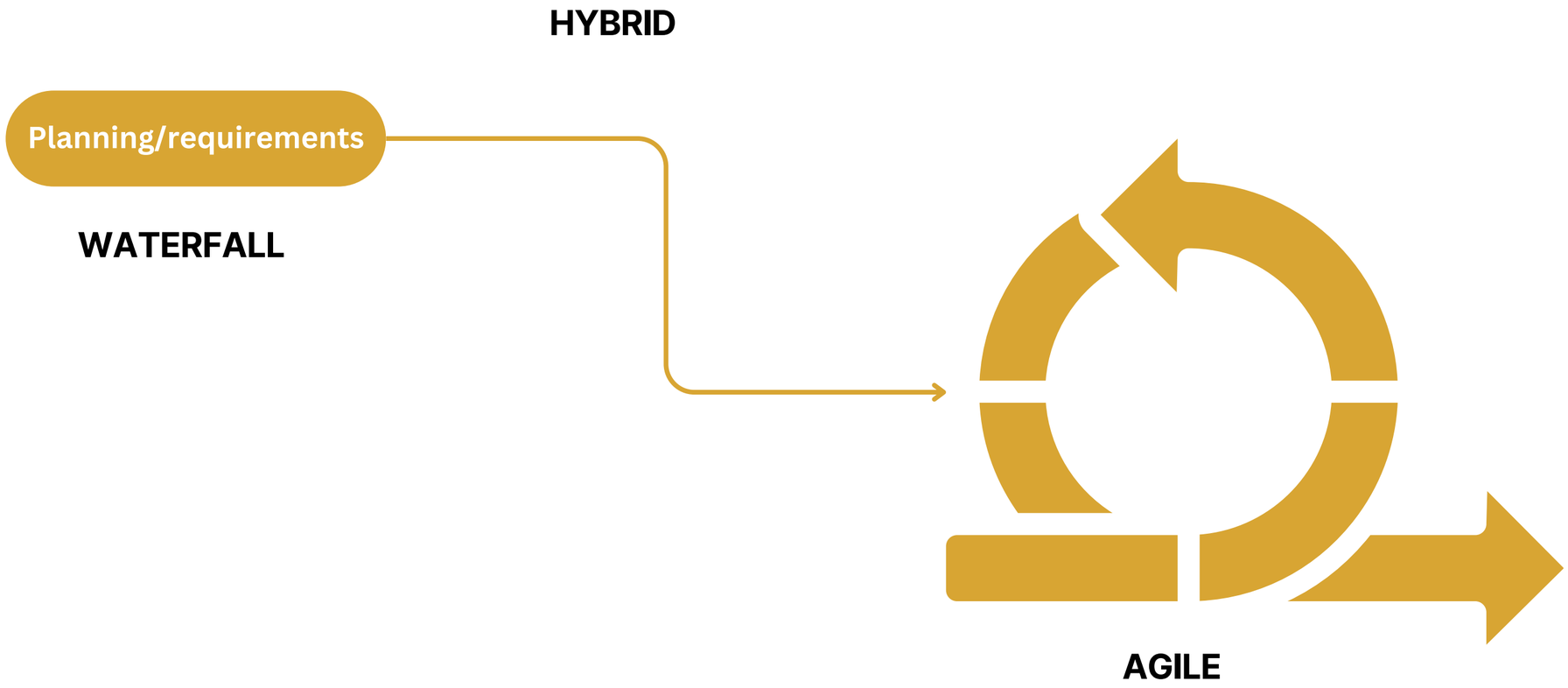
- The delivered BI system must meet all defined objectives and support operations.
- All deliverables must be fully functional, thoroughly tested, and meet quality standards.
- The system must address the needs and expectations of key stakeholders.
- The project must be completed within the agreed timeframe and budget constraints.

Approver: Golden Gate's Executive Sponsor, typically a senior executive or representative from the management team overseeing the BI initiative across 15 branches.

Assumptions:

- All team members have the skills and knowledge needed to use tools like SQL Server, Visual Studio… to complete their tasks effectively.
- Data from POS, warehouse, and CRM systems across all 15 branches will be available and suitable for analysis and integration into the central data warehouse.
- All necessary hardware and software will be accessible and sufficient to meet project needs.
- Stakeholders will actively take part in gathering requirements, reviewing progress, and testing the system during User Acceptance Testing (UAT).
- The project scope and requirements will stay consistent after the initial planning and requirement-gathering stages.
- The allocated budget will be enough to support all project activities.

CHOSEN PROJECT DEVELOPMENT LIFECYCLE

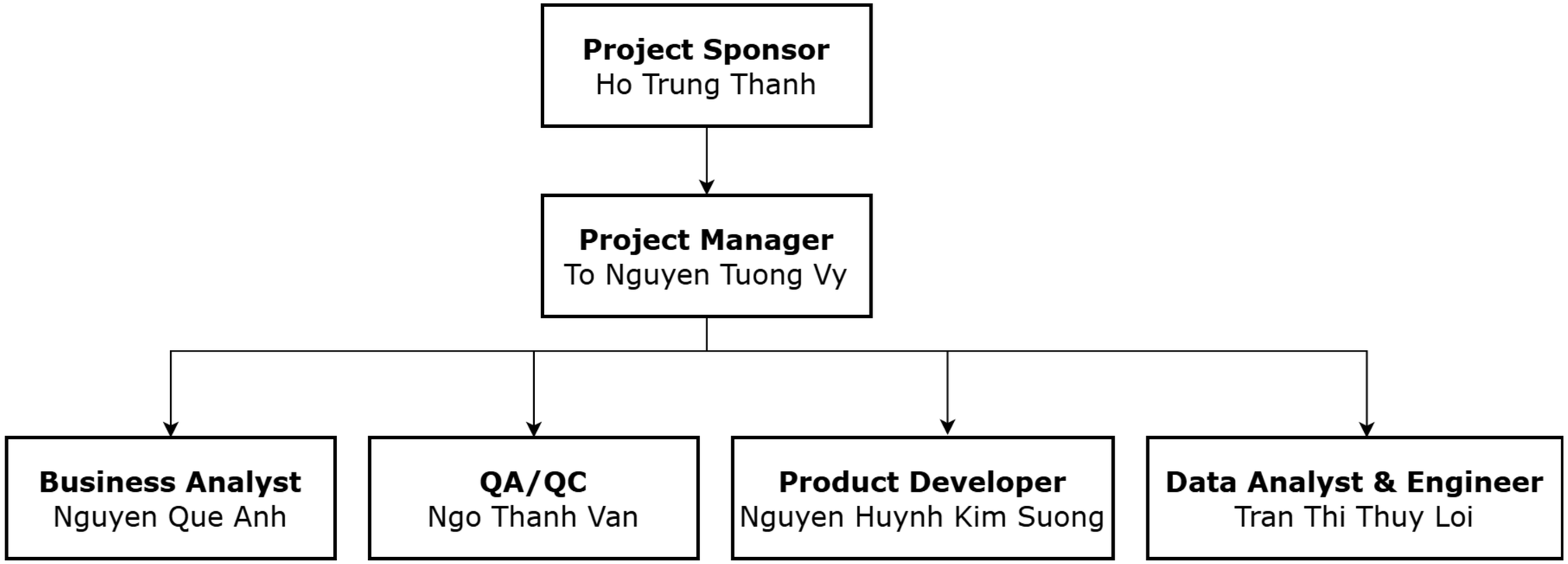


Hybrid Project Management

CHAPTER 2

PLANNING PHASE

ORGANIZATIONAL BREAKDOWN STRUCTURE (OBS)



Our team has **6 positions**

STAKEHOLDERS AND ROLE ANALYSIS

Project Sponsor

- Provides **high-level guidance** and support to ensure the project aligns with strategic business goals.
- Secures funding and resources for the project.

Project Manager

- Oversees the entire project lifecycle, including planning, execution, and monitoring.
- Manages the project timeline, budget, and deliverables.
- Coordinates communication between the team, stakeholders, and sponsor.

Business Analyst

- Collaborates with stakeholders to gather business requirements.
- Translates business needs into functional specifications for the Marketing and Sales Modules.

QA/QC

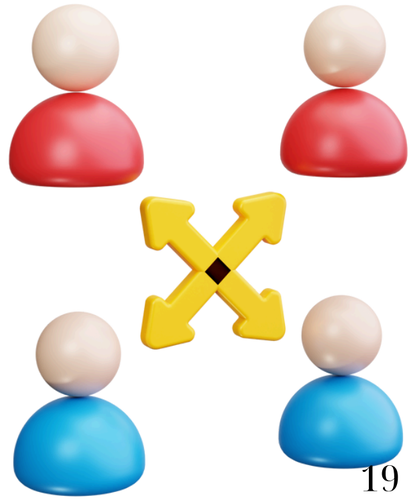
- Designs and executes test plans and cases to ensure system quality.
- Conducts functional, performance, and user acceptance testing (UAT).

Product Developer

- Develops and integrates the BI system according to requirements.
- Designs and implements dashboards, ensuring seamless data visualization.

Data Analyst and Engineer

- Collects, cleans, and standardizes data from various sources (POS, CRM, ERP, etc.).
- Develops data models for Marketing & Sales analysis.



RACI MATRIX

Each role is categorized as **R**esponsible, **A**ccountable, **C**onsulted, or **I**nformed

RACI MATRIX

**Business Intelligence (BI) System for Golden Gate Restaurant Chain – Marketing and Sales Modules*

Roles / Deliverables or Tasks	Sponsor - Ho Trung Thanh	Project Manager - To Nguyen Tuong Vy	Business Analysist - Nguyen Que Anh	QA/QC - Ngo Thanh Van	Product Developer - Nguyen Huynh Kim Suong	Data Analyst and Engineer - Tran Thi Thuy Loi
	PMO		Production Department		Production Department	
Project Management						
Appoint PM and support project	A			I	I	
Project Planning and Kick-Off	C	A/R	C		C	
Weekly Status Report	I	A/R	I	C	I	
Phase 1: Business requirement collection						
Market Research		A	C	R		
Analysis report about customer (SWOT, Current Status, Business requirement,...)	I	A	R		I	
Phase 2: Implementation						
Distribute resources based on each sprint or phase		R	I		C	I
Build additional capacity / upgrades	I	A/R			I	
Evaluate product functionality at every stage	I			C		R
Process report/meeting	I	A/R	I		I	I
Phase 3: Testing						
Comprehensive testing on the system is completed		A		C	I	R
Testing report	I	A		R		I

R	Responsible
A	Accountable
C	Consulted
I	Informed

ACTIVITY LIST

Activity List

ID	Activity list
0	Business Intelligence (BI) System for Golden Gate Restaurant Chain – Marketing and Sales Modules
1	Initiation and Planning
2	Requirement Analysis
3	Data Preparation and Modeling
4	Data Integration
5	Development of Marketing Module
6	Development of Sales Module
7	Testing and Quality Assurance
8	Deployment and Training
9	Post Implementation Review
10	BI Solution Report Completion
11	**BI PROJECT CLOSURE AND COMPLETE**

Activity List of our project - ***Summary***

(Sources: Authors' Sources)

ACTIVITY LIST

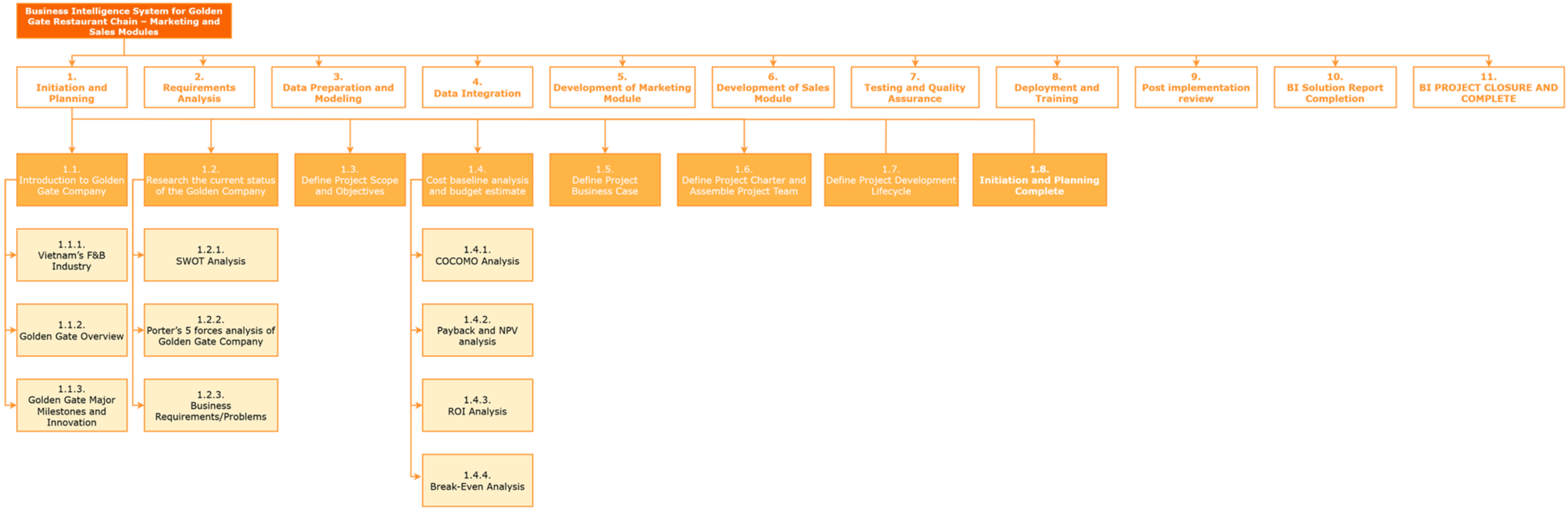
ID	Activity list
0	Business Intelligence (BI) System for Golden Gate Restaurant Chain – Marketing and Sales Modules
1	**Initiation and Planning**
1.1	Introduction to Golden Gate Company
1.1.1	Vietnam's F&B Industry
1.1.2	Golden Gate overview
1.1.3	Golden Gate Major Milestones and Innovation
1.2	Research the current status of the Golden Company
1.2.1	SWOT Analysis
1.2.2	Porter's 5 forces analysis of Golden Gate Company
1.2.3	Business Requirements/Problems
1,3	Define Project Scope and Objectives
1,4	Cost baseline analysis and budget estimate
1.4.1	COCOMO analysis
1.4.2	Payback and NPV analysis
1.4.3	ROI analysis
1.4.4	Break-Even analysis
1,5	Define Project Business Case
1,6	Define Project Charter and Assemble Project Team
1,7	Define Project Development Lifecycle
1.8.	Initiation and Planning Complete
2	**Requirement Analysis**
2.1	Conduct detailed stakeholder interviews and surveys
2.2	Analyze existing business processes to understand current workflows
2.3	Identify key performance indicators (KPIs) needed for success
2.4	Draft user stories and detailed use cases
2.5	Review all identified requirements with stakeholders
2.6	Revise and finalize the requirements documentation
2.7	Secure stakeholder sign-off on the approved requirements
2.8	Requirement Analysis Complete
3	**Data Preparation and Modeling**
3.1	Collect and review existing datasets from all relevant departments (Sales&Marketing)
3.2	Perform data cleaning
3.2.1	Identify and handle missing values
3.2.2	Remove duplicate records
3.2.3	Standardize data format
3.3	Transform raw data into structured formats suitable for modeling
3.4	Develop initial data models
3.4.1	Create data schemas and relationships
3.4.2	Define primary and foreign keys
3.4.3	Bus Matrix
3.4.4	Master Data
3.4.5	Transactional Data
3.4.6	Fact and Dimension Tables
3.4.7	Relationships
3.5	Validate the data models against the approved requirements
3.6	Iterate on data models, incorporating stakeholder feedback
3.7	Document the final data model design for reference
3.8	Data Preparation and Modeling Complete
4	**Data Integration**
4.1	Analyze source systems to determine data extraction points
4.2	Design ETL (Extract, Transform, Load) workflows
4.2.1	Map source data fields to target data fields
4.2.2	Define transformation rules and data cleansing steps
4.3	Set up the data integration environment
4.4	Conduct test runs of the ETL process with sample data
4.5	Verify that integrated data meets accuracy and consistency standards
4.6	Implement automated processes for regular data refreshes
5.2	Develop tools for sales trend analysis
5.3	Implement regional and product-specific sales reporting
5.4	Integrate POS (Point of Sale) data into reporting
5.5	Development of Marketing Module Complete
6	**Development of Marketing Module**
6.1	Build campaign performance dashboards
6.2	Implement customer segmentation analysis tools
6.3	Develop social media and email marketing metrics tracking
6.4	Integrate customer feedback analysis
6.5	Development of Marketing Module Complete
7	**Testing and Quality Assurance**
7.1	Perform unit testing on individual components
7.2	Conduct system integration testing
7.3	Validate data accuracy and consistency
7.4	Execute user acceptance testing (UAT)
7.5	Testing and Quality Assurance Complete
8	**Deployment and Training**
8.1	Deploy BI system to production environment
8.2	Provide training sessions for marketing and sales teams
8.3	Develop user manuals and reference guides
8.4	Offer ongoing support during the transition period
9	**Post Implementation Review**
9.1	Document all outcomes and lessons learned from the review
9.2	Distribute to team members
9.3	Create software maintenance team
9.4	Address any issues identified during the post-implementation phase
9.5	Post implementations review complete
10	**BI Solution Report Completion**
10.1	Collect and organize all project documents
10.2	Perform content validation and quality checks
10.3	Format the report
10.4	Add visual documents
10.5	Make presentation
11	**BI PROJECT CLOSURE AND COMPLETE**

Activity List of our project - ***In detail***

(Sources: Authors' Sources)

WORK BREAKDOWN STRUCTURE

Work Breakdown Structure (WBS) is the tool that utilizes this technique and is one of the most important project management documents



(WBS) *for the Business Intelligence System for Golden Gate Restaurant Chain – Marketing and Sales Modules. It outlines 11 key phases, detailing tasks and sub-tasks essential for project execution, from initiation and planning to project closure.*

(Sources: Authors' Sources)

GANTT CHART

Plan Scheduled Management

*The project is scheduled to begin on **Friday, January 3,** 2025, and conclude on **Tuesday, March 11, 2025***

***Duration:** 48 days*

*Divided into **10 main phases***

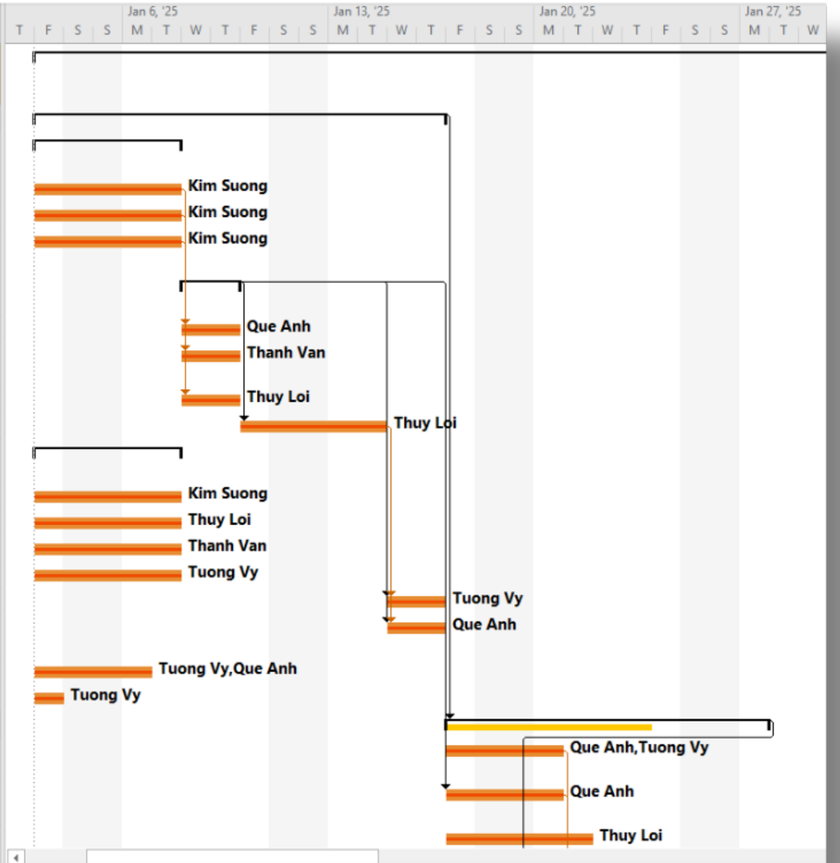
		Task Mode	Task Name	Duration	Start	Finish	Predec	% Complete
1	✓		**Business Intelligence (BI) System for Golden Gate Restaurant Chain – Marketing and Sales Modules.**	**48 days**	Fri 1/3/25	Tue 3/11/25		**100%**
2	✓		Initiation and Planning	**10 days**	Fri 1/3/25	Thu 1/16/25		**100%**
21	✓		Requirement Analysis	**7 days**	Fri 1/17/25	Mon 1/27/25	**2**	**100%**
30	✓		Data Preparation and Modeling	**7 days**	Mon 1/20/25	Tue 1/28/25	**21**	**100%**
49	✓		Data Integration	**7 days**	Tue 1/28/25	Wed 2/5/25	**30**	**100%**
60	✓		Development of Sales Module	**5 days**	Thu 2/6/25	Wed 2/12/25	**49**	**100%**
66	✓		Development of Marketing Module	**5 days**	Thu 2/13/25	Wed 2/19/25	**60**	**100%**
72	✓		Testing and Quality Assurance	**5 days**	Thu 2/20/25	Wed 2/26/25	**66**	**100%**
78	✓		Deployment and Training	**5 days**	Thu 2/27/25	Wed 3/5/25	**72**	**100%**
83	✓		Post Implementation Review	**2 days**	Thu 3/6/25	Fri 3/7/25	**78**	**100%**
89	✓		BI Solution Report Completion	**2 days**	Mon 3/10/25	Tue 3/11/25	**83**	**100%**
95	✓		**BI PROJECT CLOSURE AND COMPLETE**	**1 day**	Mon 3/10/25	Mon 3/10/25		**100%**

Plan Scheduled Management
(Sources: Authors' Sources)

GANTT CHART

Detailed Scheduling and Resources Allocation

	Task Mode	Task Name	Duration	Start	Finish	Predec	% Complete
1		**Business Intelligence (BI) System for Golden Gate Restaurant Chain – Marketing and Sales Modules.**	**48 days**	Fri 1/3/25	Tue 3/11/25		**100%**
2		Initiation and Planning	**10 days**	Fri 1/3/25	Thu 1/16/25		**100%**
3		**Introduction to Golden Gate Company**	**3 days**	**Fri 1/3/25**	**Tue 1/7/25**		**100%**
4		Vietnam's F&B Industry	3 days	Fri 1/3/25	Tue 1/7/25		100%
5		Golden Gate Overview	3 days	Fri 1/3/25	Tue 1/7/25		100%
6		Golden Gate Major Milestones and Innovation	3 days	Fri 1/3/25	Tue 1/7/25		100%
7		**Research the current status of the Golden Company**	**2 days**	**Wed 1/8/25**	**Thu 1/9/25**		**100%**
8		SWOT Analysis	2 days	Wed 1/8/25	Thu 1/9/25	4,5,6	100%
9		Porter's 5 forces analysis of Golden Gate Company	2 days	Wed 1/8/25	Thu 1/9/25	4,5,6	100%
10		Business Requirements/Problems	2 days	Wed 1/8/25	Thu 1/9/25	4,5,6	100%
11		Define Project Scope and Objectives	3 days	Fri 1/10/25	Tue 1/14/25	7	100%
12		**Cost baseline analysis and budget estimate**	**3 days**	**Fri 1/3/25**	**Tue 1/7/25**		**100%**
13		COCOMO Analysis	3 days	Fri 1/3/25	Tue 1/7/25		100%
14		Payback and NPV Analysis	3 days	Fri 1/3/25	Tue 1/7/25		100%
15		ROI Analysis	3 days	Fri 1/3/25	Tue 1/7/25		100%
16		Break-Even Analysis	3 days	Fri 1/3/25	Tue 1/7/25		100%
17		Define Project Business Case	2 days	Wed 1/15/25	Thu 1/16/25	7,11	100%
18		Define Project Charter and Asssemble Team	2 days	Wed 1/15/25	Thu 1/16/25	7,11	100%
19		Define Project Development LifeCycle	2 days	Fri 1/3/25	Mon 1/6/25		100%
20		Initiation and Planning Complete	1 day	Fri 1/3/25	Fri 1/3/25		100%
21		Requirement Analysis	**7 days**	Fri 1/17/25	Mon 1/27/25	**2**	**100%**
22		Conduct detailed stakeholder interviews and surveys	2 days	Fri 1/17/25	Mon 1/20/25		100%
23		Analyze existing business processes to understand current workflows	2 days	Fri 1/17/25	Mon 1/20/25	7	100%
24		Identify key performance indicators	3 days	Fri 1/17/25	Tue 1/21/25		100%



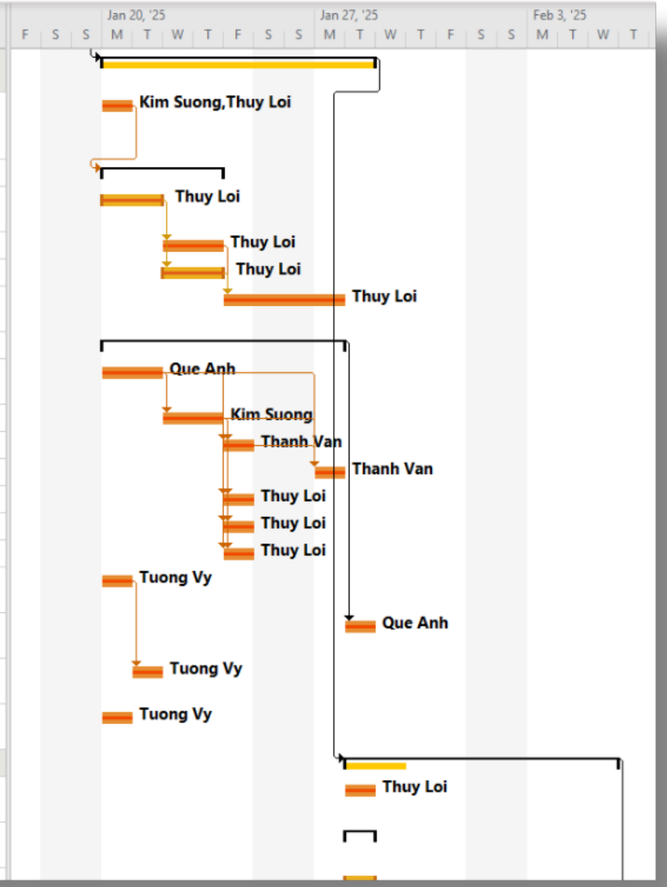
Gantt Chart for the first 2 phases

(Sources: Authors' Sources)

GANTT CHART

Detailed Scheduling and Resources Allocation

	Task Mode	Task Name	Duration	Start	Finish	Predec	% Complete
30		**Data Preparation and Modeling**	**7 days**	Mon 1/20/25	Tue 1/28/25	**21**	**100%**
31		Collect and review existing datasets from all relevant departments (Sales & Marketing)	1 day	Mon 1/20/25	Mon 1/20/25		100%
32		**Perform data cleaning**	**4 days**	**Mon 1/20/25**	**Thu 1/23/25**	**31**	**100%**
33		Identify and handle missing values	2 days	Mon 1/20/25	Tue 1/21/25		100%
34		Remove duplicate records	2 days	Wed 1/22/25	Thu 1/23/25	33	100%
35		Standardize data format	2 days	Wed 1/22/25	Thu 1/23/25	33	100%
36		Transform raw data into structured formats suitable for modeling	2 days	Fri 1/24/25	Mon 1/27/25	34,35	100%
37		**Develop initial data models**	**6 days**	**Mon 1/20/25**	**Mon 1/27/25**		**100%**
38		Create data schemas and relationships	2 days	Mon 1/20/25	Tue 1/21/25		100%
39		Define primary and foreign keys	2 days	Wed 1/22/25	Thu 1/23/25	38	100%
40		Bus Matrix	1 day	Fri 1/24/25	Fri 1/24/25	38,39	100%
41		Master Data	1 day	Mon 1/27/25	Mon 1/27/25	38,39,4	100%
42		Transactional Data	1 day	Fri 1/24/25	Fri 1/24/25	38,39	100%
43		Fact and Dimension Table	1 day	Fri 1/24/25	Fri 1/24/25	38,39	100%
44		Relationships	1 day	Fri 1/24/25	Fri 1/24/25	38,39	100%
45		Validate the data models against the approved requirements	1 day	Mon 1/20/25	Mon 1/20/25		100%
46		Iterate on data models, incorporating stakeholder feedback	1 day	Tue 1/28/25	Tue 1/28/25	37	100%
47		Document the final data model design for reference	1 day	Tue 1/21/25	Tue 1/21/25	45	100%
48		Data Preparation and Modeling Complete	1 day	Mon 1/20/25	Mon 1/20/25		100%
49		Data Integration	**7 days**	Tue 1/28/25	Wed 2/5/25	**30**	**100%**
50		Analyze source systems to determine data extraction points	1 day	Tue 1/28/25	Tue 1/28/25		100%
51		**Design ETL (Extract, Transform, Load) workflows**	**1 day**	**Tue 1/28/25**	**Tue 1/28/25**		**100%**



Gantt Chart for the next 2 phases

(Sources: Authors' Sources)

NETWORK DIAGRAM

PERT is commonly used to estimate the time required to complete a project and determine the sequence in which critical tasks should be carried out. In this method, tasks are represented as a **network or PERT chart**, which illustrates the dependencies between tasks and the estimated completion time. **PERT** allows the team to analyze and plan in detail the essential tasks and activities involved in the project execution process.

The PERT formula for calculating the expected time (ET) is:

$$\mathbf{ET} = \frac{O + 4M + P}{6}$$

- **Optimistic time (O):** Represents the shortest time in which the activity can be completed if all conditions are favorable.
- **Most probable time (M):** This is the time that has the highest likelihood of occurring when all conditions proceed as expected.
- **Pessimistic time (P):** This is the longest time required to complete the activity under the worst possible conditions, such as unforeseen issues or resource shortages.

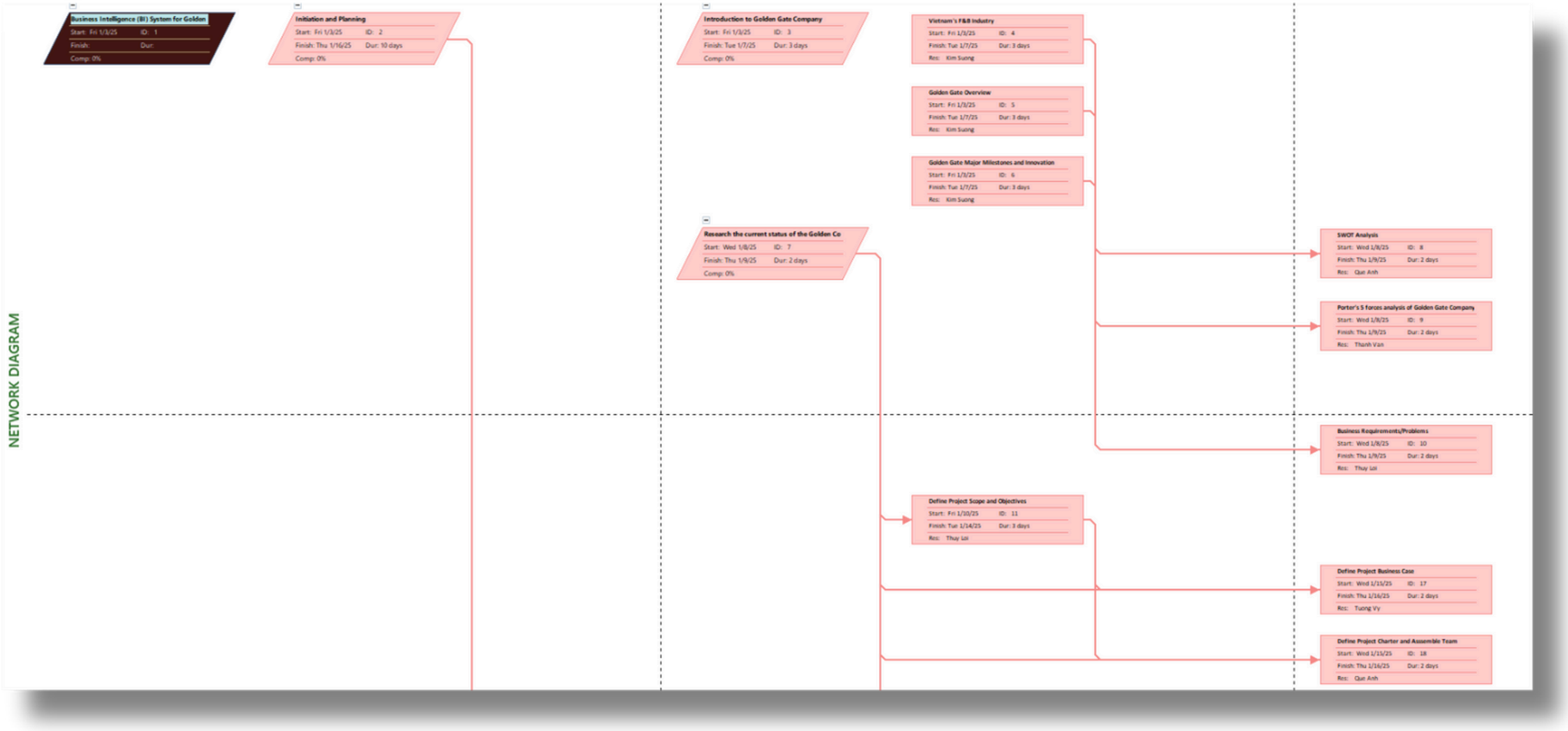
NETWORK DIAGRAM

ID	Activity list	TE	O	M	P
0	Business Intelligence (BI) System for Golden Gate Restaurant Chain – Marketing and Sales Modules	-	-	-	-
1	**Initiation and Planning**	-	-	-	-
1.1	Introduction to Golden Gate Company	3.83	3.0	4.0	4.0
1.1.1	Vietnam's F&B Industry	1.33	2.0	1.0	2.0
1.1.2	Golden Gate overview	1.58	0.5	2.0	1.0
1.1.3	Golden Gate Major Milestones and Innovation	0.92	0.5	1.0	1.0
1.2	Research the current status of the Golden Company	1.42	1.0	1.5	1.5

Process Flow Network **- Summary**

(Sources: Authors' Sources)

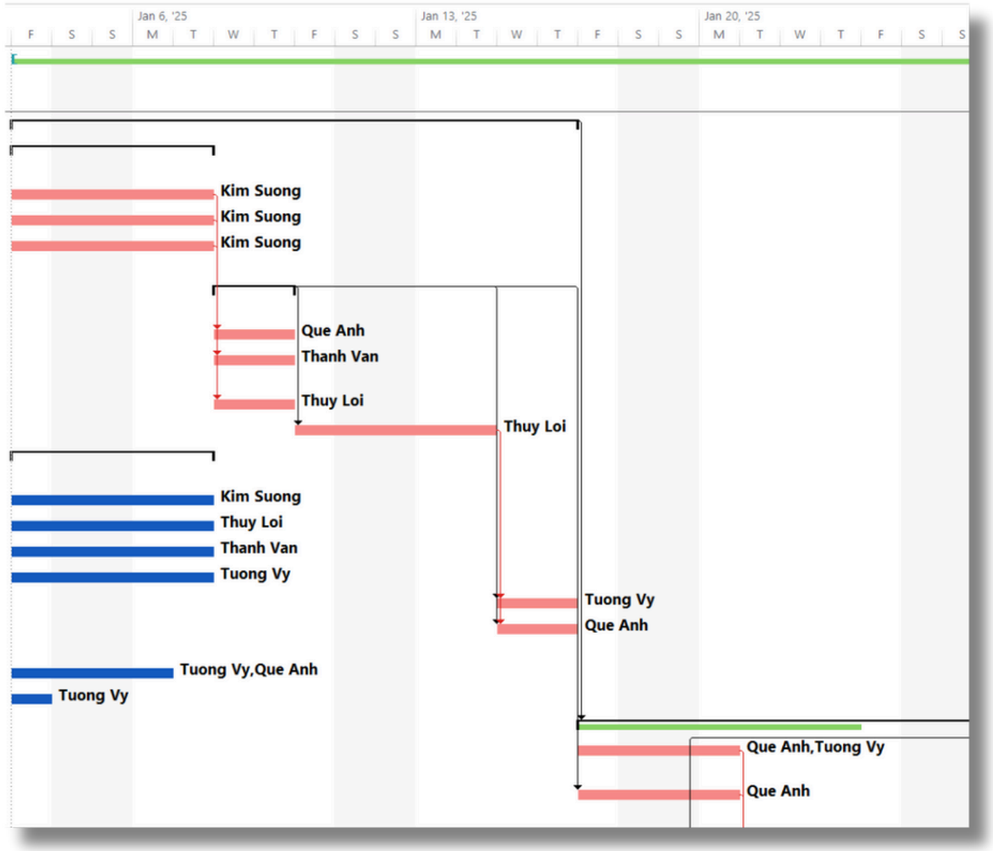
NETWORK DIAGRAM



Part of Network Diagram **- Summary**

(Sources: Authors' Sources)

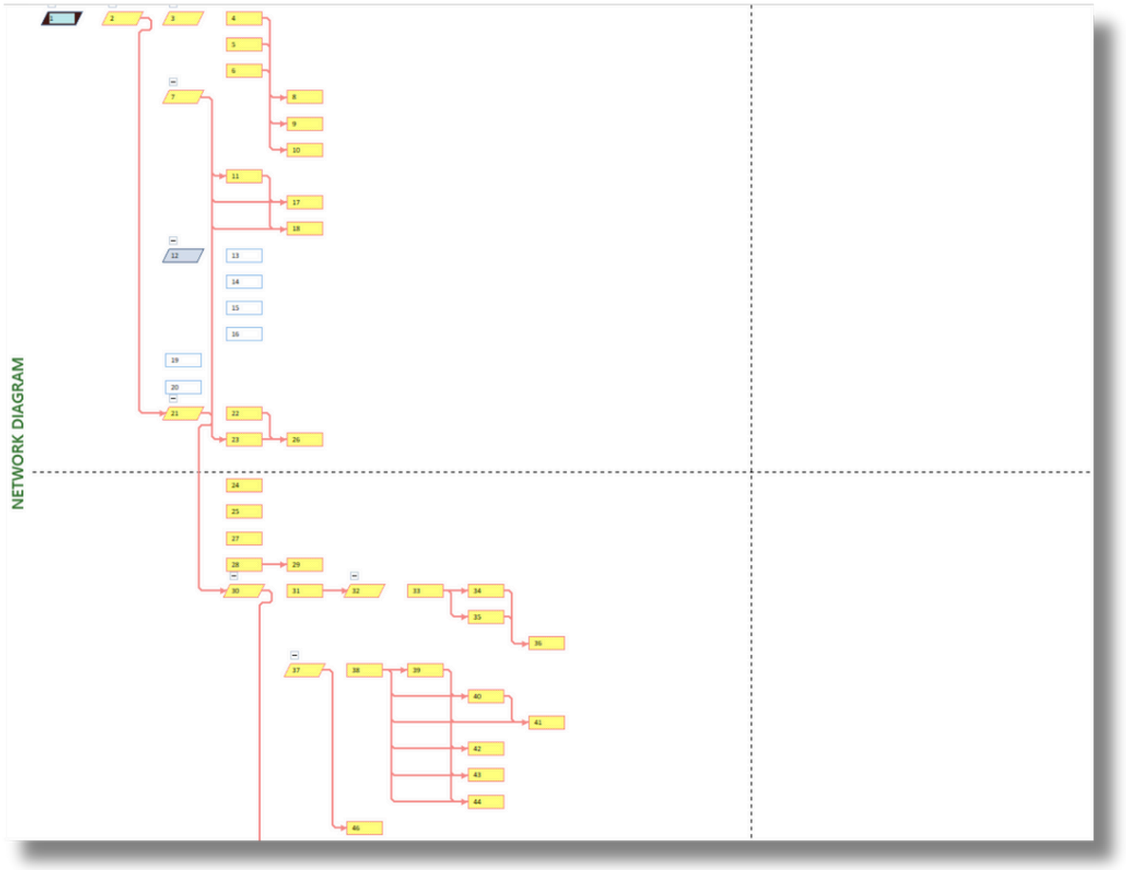
CRITICAL PATH



Critical path in the final stages of the project **- Summary**

(Sources: Authors' Sources)

CRITICAL PATH



Critical path in a compact model of the network diagram **- Summary**

(Sources: Authors' Sources)

RISK IDENTIFICATION, RISK LEVEL, SOLUTION FOR EACH RISK

Risk identification is identifying potential business risks and analyzing them to learn about their effects on the business.

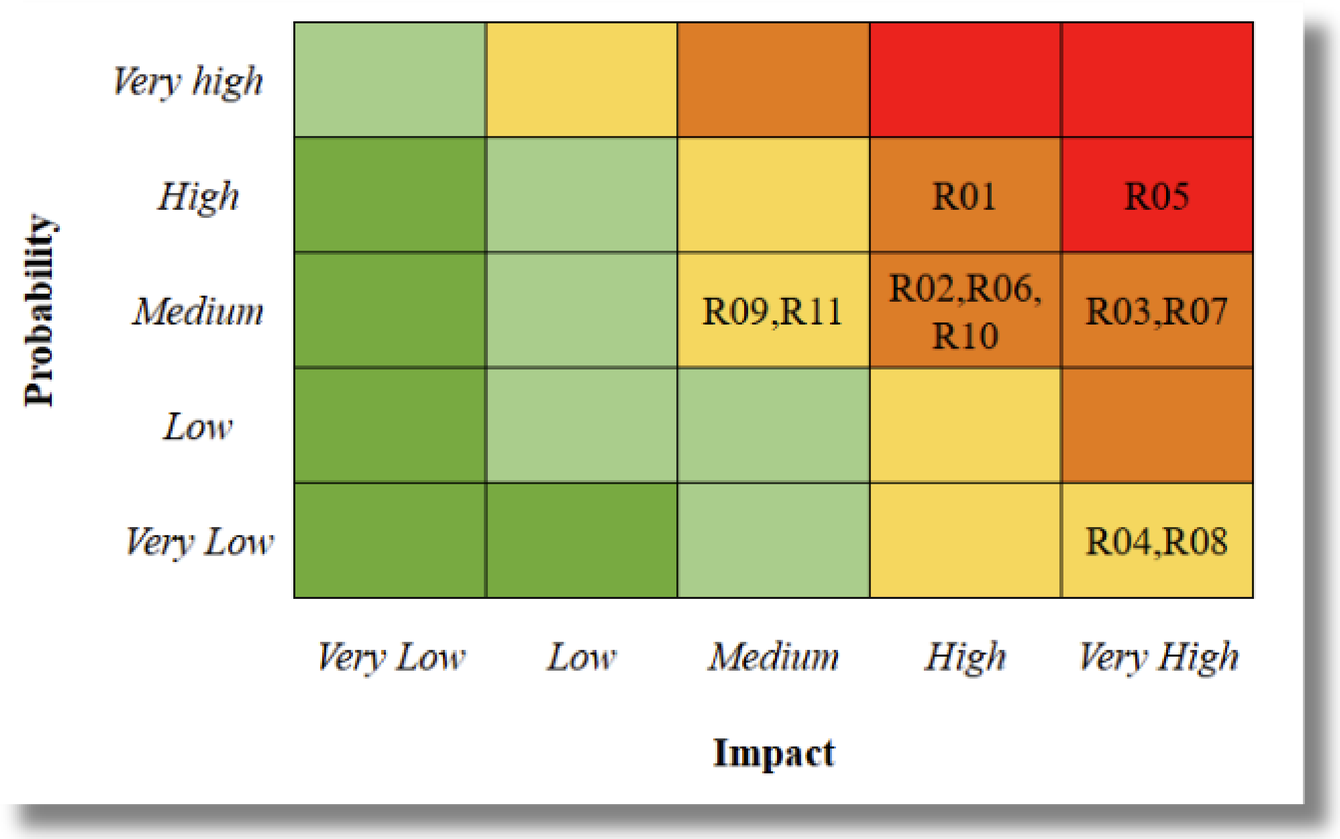
Risk Category	Risk Code	Hazard identification	Description	Risk assessment			Safety risk control
				Probability	Impact	Risk level	
Technical Risks	R01	System Integration Issues	Difficulty in integrating legacy systems with the new BI platform may cause delays or functionality gaps	High	High	16	Implement middleware solutions to bridge system gaps and ensure detailed documentation of existing systems.
	R02	Data Quality Problems	Inconsistent or incomplete data could affect the accuracy of analytics	Medium	High	12	Perform data profiling and cleansing before migration and train staff on maintaining high data quality standards.
	R03	Implementation Failures	Technical errors or system failures during deployment could hinder the system's	Medium	Very High	15	Conduct extensive system testing, create rollback plans, and provide technical support during deployment.

Risk assessment provides an estimate of ***the severity of a risk***. Without this assessment, a project manager can fail to give sufficient attention to significant risks.

Risk identification, Risk level, Solution for each risk **- Summary**

(Sources: Authors' Sources)

RISK MATRIX



Risks that fall within the ***blue zone*** should be given special attention and addressed proactively, as they have a ***high likelihood of occurring.***

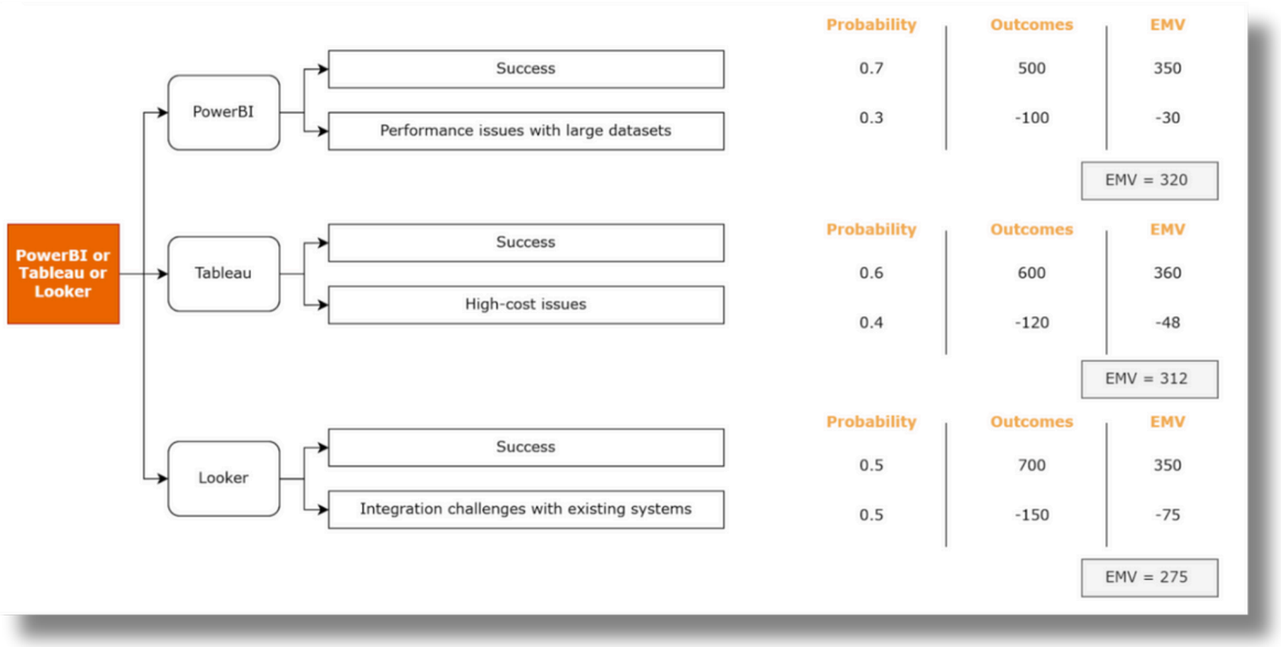
Risk Matrix

(Sources: Authors' Sources)

DECISION TREE AND EVM ANALYSIS

EMV and decision tree analysis complement each other in decision-making processes. EMV quantifies risk by assigning financial values to uncertain outcomes, while decision tree analysis provides a clear and structured framework for evaluating different decision paths.

Power BI has the highest EMV **($320)** and the highest success probability **(70%).**



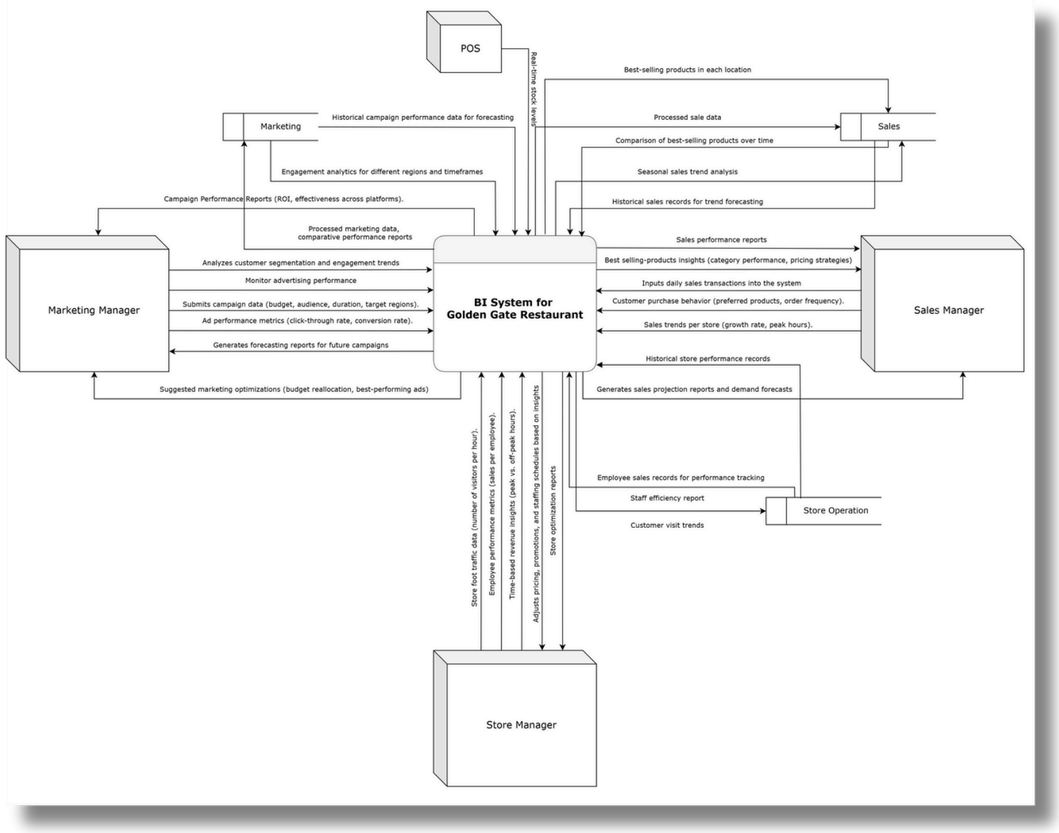
Decision tree and EMV analysis of scenario 1 - Choosing the Visualization platform

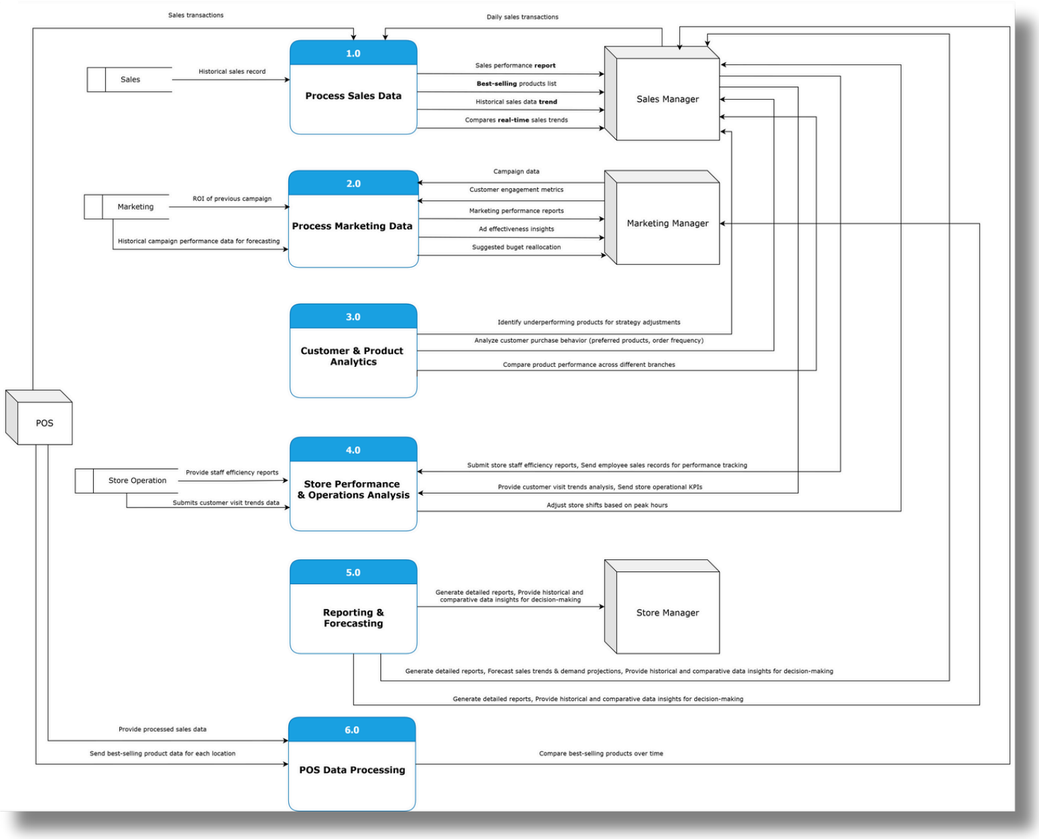
(Sources: Authors' Sources)

CHAPTER 2

SYSTEM DESIGN & ARCHITECTURE

DFD - DATA FLOW DIAGRAM





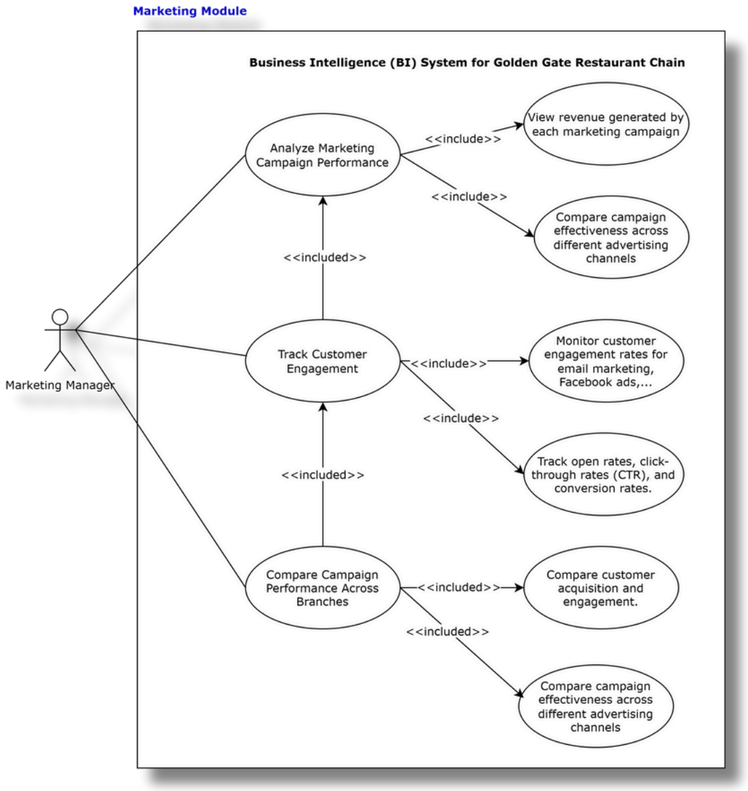
Data Flow Diagram - Level 0

(Sources: Authors' Sources)

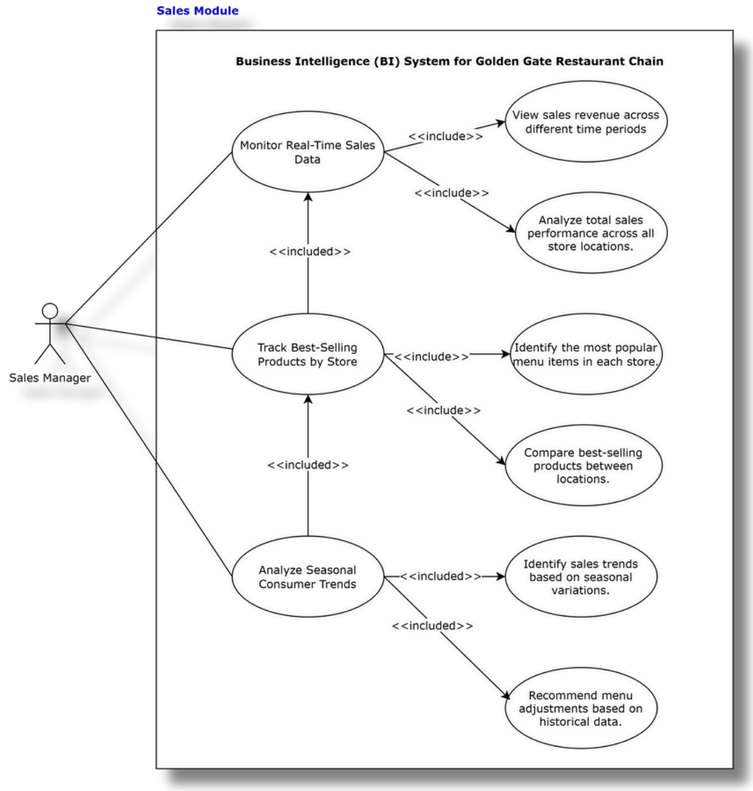
Data Flow Diagram - Level 1

(Sources: Authors' Sources)

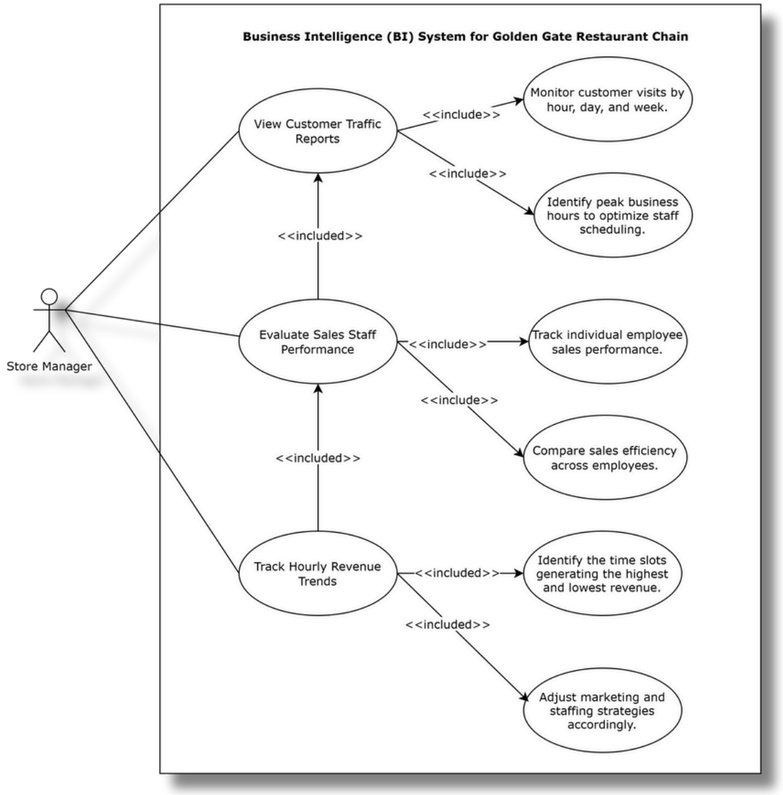
USE CASE



Use case Diagram of Marketing Module
(Sources: Authors' Sources)

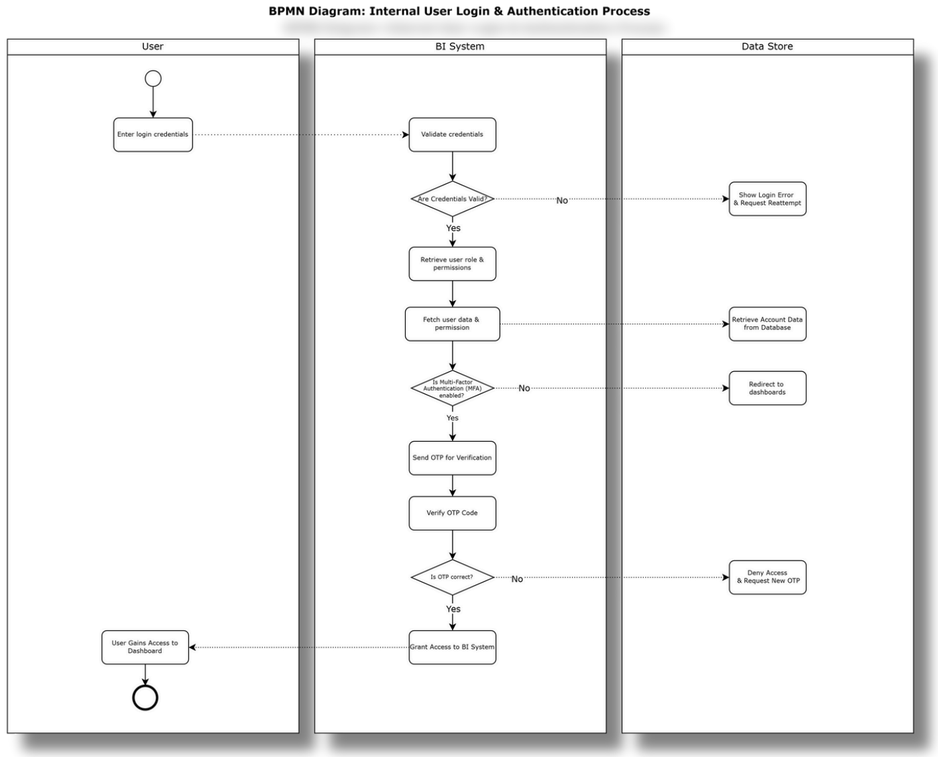


Use case Diagram of Sales Module
(Sources: Authors' Sources)



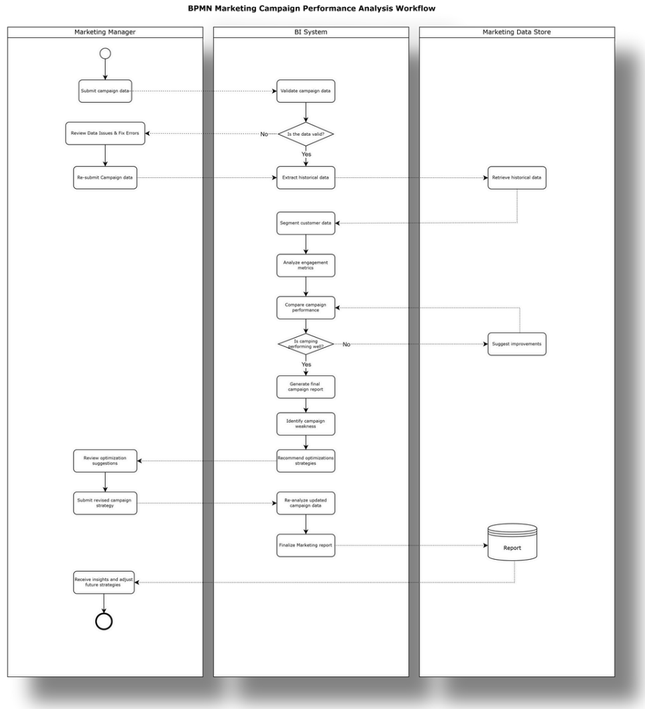
Use case Diagram of Store Manager
(Sources: Authors' Sources)

BPMN DIAGRAM



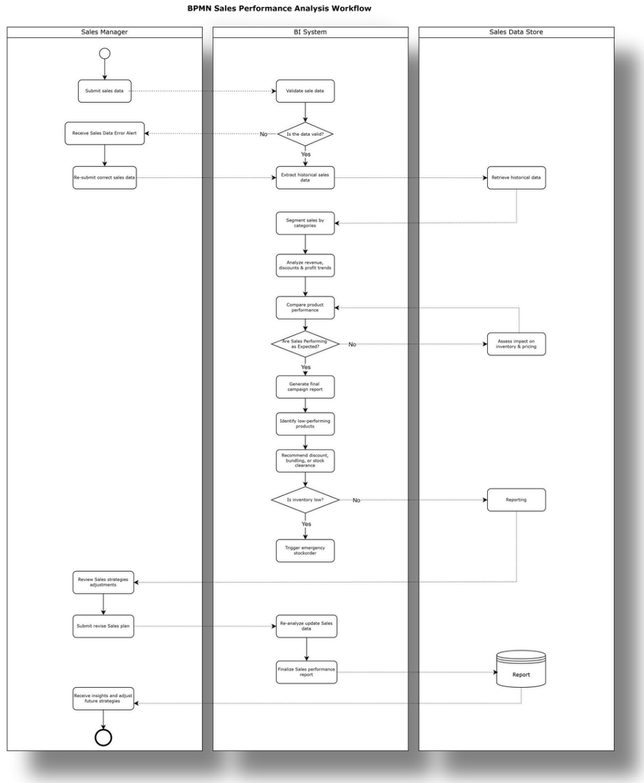
BPMN Diagram: Internal User Login & Authentication Process

(Sources: Authors' Sources)



BPMN Marketing Campaign Performance Analysis Workflow

(Sources: Authors' Sources)



BPMN Sales Performance Analysis Workflow

(Sources: Authors' Sources)

DESIGNING DATA WAREHOUSE

Objective	Description
dbo.olist_customers_dataset	Contains customer information such as unique IDs, zip codes, cities, and states.
dbo.olist_products_dataset	Stores product details like category, weight,freight, and description length.
dbo.olist_sellers_dataset	Includes seller details such as seller ID, location, and zip code prefix.

Master Data

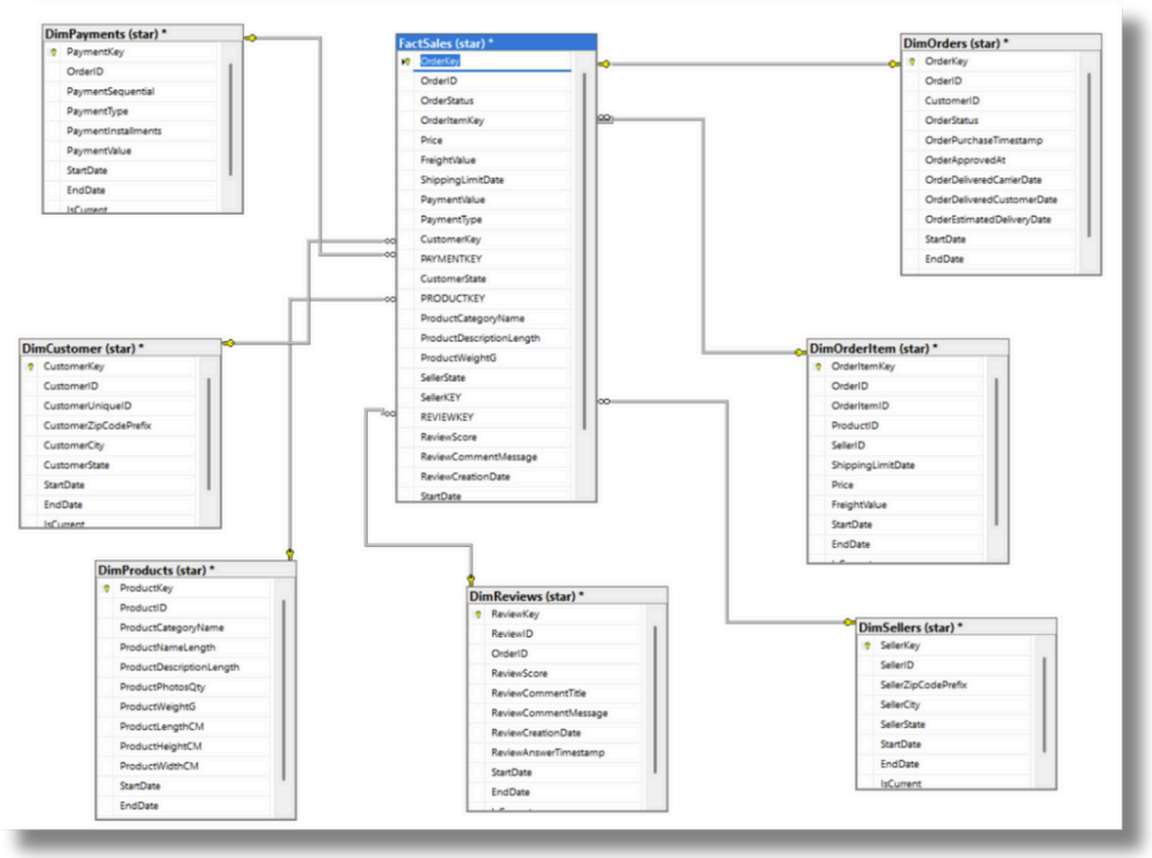
(Sources: Authors' Sources)

Objective	Description
dbo.olist_orders_dataset	Core order dataset, including order status, timestamps, and delivery details,etc.
dbo.olist_order_items_dataset	Stores items per order (product, seller, price, shipping details).
dbo.olist_order_payments_dataset	Transactional payment details (amount, type, installments).
dbo.olist_order_reviews_dataset	Customer reviews, ratings, and comments for each order.

Transaction Data

(Sources: Authors' Sources)

DESIGNING DATA WAREHOUSE



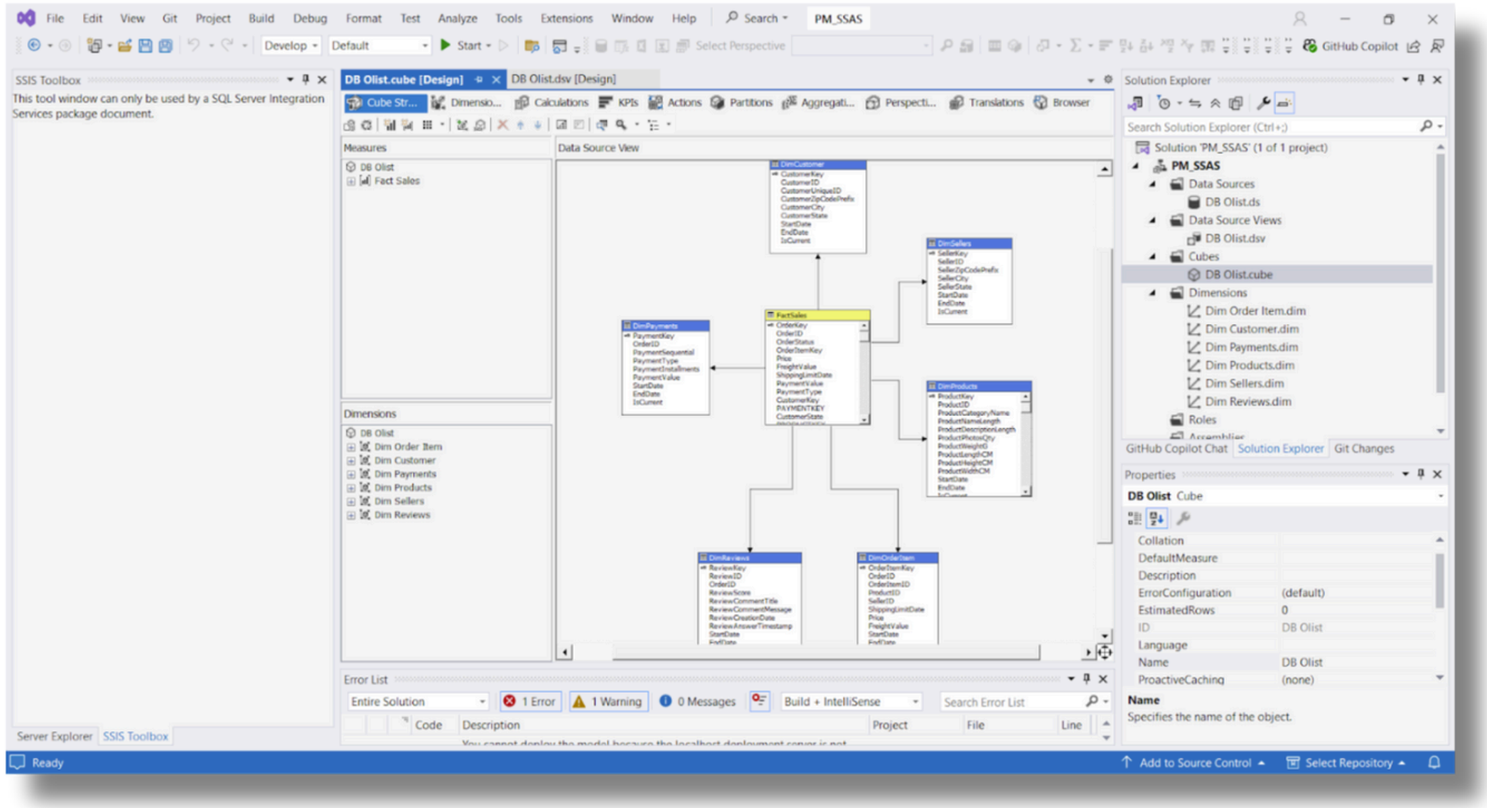
The proposed Data Warehouse model

(Sources: Authors' Sources)

DESIGNING DATA WAREHOUSE

Step 1: Create a ***SSAS*** project.

Step 2: Create Data Source is the data source for building data cube, here is the previously built ***SQL data warehouse Sale DW.***



Step 3: Create a ***Data Source View***, add the tables one by one dimension and facts table contained in the datastore.

Step 4: Create a cube.

Step 5: Linking columns in the Dimension Table.

Data analysis with SSAS

(Sources: Authors' Sources)

CHAPTER 3

MONITORING PROGRESS AND QUALITY CONTROL

CHANGE REQUEST FORM

Transition from manual data extraction to API-Based Real-Time Integration	
Date:	16/02/2025
Change No:	01
Description:	Modification in data integration strategy for the BI system. Initially, data from different sources (POS, CRM, inventory) was planned to be extracted and loaded using manual data entry and batch processing. This change request proposes a shift to real-time API-based data integration, ensuring faster updates, increased accuracy, and better system efficiency.
Reason:	1. Optimized data accuracy & efficiency: Manual data extraction may result in delays and inconsistencies, whereas real-time API integration synchronizes data instantly, reducing errors. 2. Cost efficiency & Long-term scalability: • While initial setup requires API development, it reduces long-term operational workload compared to maintaining batch processing. • The system will be easier to scale as more data sources and modules are added in future phases. 3. Better integration with existing IT infrastructure: • Golden Gate is already using cloud-based CRM and POS systems, making API integration a natural extension for smoother operations. • Ensures faster reporting for sales and marketing teams, enabling better decision-making.

Scope Impact:	No changes to scope – The BI system was designed to collect data from various sources; this change only modifies the data collection method (from manual/batch processing to API-based integration).
Timelines Impact:	Minor impact on the development phase (+1 week) for API configuration and testing. However, this is within the project's contingency buffer, meaning the overall go-live date remains unchanged.
Budget Impact:	1. No additional costs - The switch to API integration will be implemented using existing BI tools and infrastructure, avoiding new software expenses. 2. Cost-saving advantage: Reduces the need for long-term manual data processing and maintenance, making the system more efficient in the long run.
Other Impact:	1. Enhanced real-time analytics: Faster and more accurate reporting for sales and marketing teams. 2. Lower manual workload: Less reliance on manual data imports, freeing up team resources for strategic analysis. 3. Improved security & compliance: API-based integration provides better data control and reduces the risk of human errors.
Change Requested By:	Nguyen Huynh Kim Suong – Product Developer
Approver:	Assoc. Prof. Ho Trung Thanh, Ph.D – Project Sponsor Approval Date: 18/02/2025

Upgrade to a Cloud-Based Data Warehouse for Enhanced BI Performance	
Date:	05/03/2025
Change No:	02
Description:	This change request proposes migrating the **Business Intelligence (BI) system** from on-premise servers to a **Cloud-Based Data Warehouse (Cloud DWH)** to improve data processing speed, expand storage capacity, and enhance query performance. This upgrade aims to enable faster big data processing and support more advanced analytics.
Reason:	1. Higher performance & scalability: The current BI system faces limitations in processing power as data volume increases. Cloud DWH provides automatic scaling to meet business demands. 2. Faster query execution & reporting: The current system takes a long time to execute complex queries. Cloud DWH significantly reduces query response time. 3. Better integration with modern BI tools: Many advanced analytics tools work more efficiently with cloud infrastructure, optimizing data analysis and reporting capabilities.
Scope Impact:	Significant scope change – Migrating to Cloud DWH not only alters data storage methods but also requires updates to data processing workflows and integration with existing BI tools.
Timelines Impact:	Estimated **2-3 additional months** for setup, data migration, testing, and system optimization.

Budget Impact:	**1. High costs** - Requires investment in Cloud Data Warehouse services, with higher monthly operational costs than the current system. **2. Additional data migration expenses** - The transition demands technical resources, increasing labor and consulting costs. **3. Not feasible within the current budget** - The project lacks sufficient financial resources for this upgrade without affecting other critical initiatives.
Other Impact:	**1. Improved system performance** - If implemented, the BI system would run faster and handle large-scale data analysis more efficiently. **2. Increased operational costs** - Cloud infrastructure requires ongoing monthly fees, adding financial pressure in the long term. **3. Security and compliance risks** - Migrating data to the cloud requires additional security measures to ensure compliance with data protection regulations.
Change Requested By:	Tran Thi Thuy Loi – Data Analyst and Engineer
Approver:	Assoc. Prof. Ho Trung Thanh, Ph.D – Project Sponsor Approval Date: 07/03/2025

PROJECT DIARY

Project Kickoff & Scope Definition

03/01/2025

Defines scope, objectives, and team roles

API-Based Real-Time Data Integration

16/02/2025

Replaces manual data entry, improving accuracy and efficiency

Sales & Marketing Module Development

11/02/2025 - 17/02/2025

Develops key BI dashboards for performance tracking

User Acceptance Testing

21/02/2025

Validates system usability and gathers feedback.

BI System Deployment & Post-Implementation Review

25/02/2025 - 03/03/2025

Launches BI system and evaluates outcomes

No	Action	Owner	Due Date
1	Conduct project kickoff meetings with stakeholders, define scope, objectives, and expected outcomes. Finalize the project team and assign responsibilities.	Project Manager	3/1/2025
2	Perform business landscape research on Golden Gate's market, analyze competitors, and document key challenges in the restaurant industry.	Business Analyst	5/1/2025
3	Estimate project costs, identify resource requirements, and finalize the project budget. Develop and approve the project charter. Send the Initiation Phase report progress to the Project Sponsor.	Project Manager	16/01/2025
4	Conduct stakeholder interviews to gather business requirements, identify key performance metrics, and document technical needs for BI implementation.	Business Analyst	16/01/2025
5	Document and finalize business and technical requirements. Review and obtain approvals from stakeholders before moving forward. Send the report progress to the Project Sponsor.	Business Analyst	19/01/2025
6	Collect raw sales and marketing data, perform data cleaning, and prepare structured datasets for modeling.	Data Analyst & Engineer	20/01/2025
7	Develop logical data models, define schema relationships, and ensure alignment with business needs. Validate data accuracy and consistency.	Data Analyst & Engineer	27/01/2025
8	Implement and test ETL (Extract, Transform, Load) processes to automate data integration and ensure seamless data flow from multiple sources.	Data Analyst & Engineer	30/01/2025
9	Develop the Sales Module, including dashboards for sales trends, product performance, and regional sales analysis. Conduct initial testing. Send the report progress to the Project Sponsor.	Product Developer	11/2/2025
10	Develop the Marketing Module, including customer segmentation analysis, campaign performance tracking, and predictive analytics. Send the report progress to the Project Sponsor.	Product Developer	17/02/2025
11	Conduct unit testing and system integration testing to validate data accuracy, BI tool performance, and dashboard functionality.	QA/QC	17/02/2025
12	Organize User Acceptance Testing (UAT) with marketing and sales teams to gather feedback, ensure usability, and address potential system gaps.	QA/QC & Business Analyst	21/02/2025
13	Deploy the BI system to the production environment and ensure all necessary configurations are in place.	Project Manager	25/02/2025
14	Conduct user training sessions on dashboard usage, report generation, and system functionalities. Provide documentation and guidelines.	Business Analyst	27/02/2025
15	Perform a post-implementation review, collect feedback from stakeholders, and identify areas for future improvement.	Entire Project Team	28/02/2025
16	Finalize and submit the BI solution report, including key insights, data visualizations, lessons learned and	Entire Project Team	3/3/2025

RISK LOG

Mismatch
BI System

If BI reports don’t align with business needs, decision-making is affected.
Mitigation: Conduct thorough research, collect feedback, and run pilot tests.

Errors
Deployment Technical

System failures may disrupt operations.
Mitigation: Test in a staging environment, have a rollback plan for quick recovery.

Resistance
Employee

Users may hesitate to adopt the new system, slowing productivity.
Mitigation: Demonstrate benefits, provide training, and offer ongoing support.

No.	Risk	Description	Severity	Probability of Occurrence	Contingency and Mitigation Actions (incl. "Plan B")
1	*Changing customer requirements*	*Delays due to constant changes in requirements.*	Low	High	*1. Require the customer to clearly define the requirements up front with an SRS (Software Requirement Specification) document. 2. Limit the number of free changes, then charge for additional changes.*
2	*BI system mismatch*	*BI reports and insights may not align with business needs, affecting decision-making.*	Very High	Medium	*1. Conduct thorough research before implementation to ensure BI meets actual needs. 2. Continuously gather feedback from departments to adjust the system accordingly. 3. Run pilot tests before full deployment.*
3	*Extra requirement costs*	*Unexpected costs may cause budget overruns, delaying implementation.*	Low	High	*1. Define the project scope from the start and sign a tight contract. 2. Budget for contingencies (~10-20% of total budget).*
4	*Data format inconsistency*	*Inaccurate data input may result in unreliable BI reports.*	High	High	*1. Standardize data input and processing workflows across different systems. 2. Use ETL tools for automated data conversion. 3. Establish common data standards across integrated systems.*
5	*Human data errors*	*Data errors may lead to incorrect analysis and decision-making.*	Medium	High	*1. Use Data Validation Checks to alert you when data is formatted incorrectly. 2. Automate data entry with API integration.*
6	*Poor task prioritization*	*Mismanagement of tasks may slow down the project timeline.*	High	Medium	*1. Use project management frameworks like Kanban or Scrum to prioritize tasks. 2. Develop a task prioritization matrix based on impact and urgency. 3. Regularly review progress and adjust priorities as needed.*
7	*Deployment technical errors*	*System malfunctions may hinder operational efficiency.*	Very High	Medium	*1. Run tests on a staging environment before deploying to the real world. 2. Create a rollback plan to have a backup plan in case of errors.*
8	*Limited resources*	*Lack of resources may prolong project delivery.*	Very High	Medium	*1. Plan detailed resource allocation and distribute workload efficiently. 2. Leverage automation tools to reduce labor demands. 3. Propose a contingency budget to handle financial constraints.*
9	*Employee resistance*	*Employee hesitation in using the system may slow down adoption.*	Medium	High	*1. Explain the benefits of the BI system by demonstrating performance & efficiency. 2. Organize training & support sessions to help employees get familiar with the new system.*
10	*Inadequate training*	*Untrained staff may struggle with system functionality, reducing efficiency.*	Very High	Low	*1. Develop comprehensive training materials and conduct regular training sessions. 2. Provide online learning modules or 24/7 support for easy access. 3. Assess employees' learning progress and adjust training programs accordingly.*

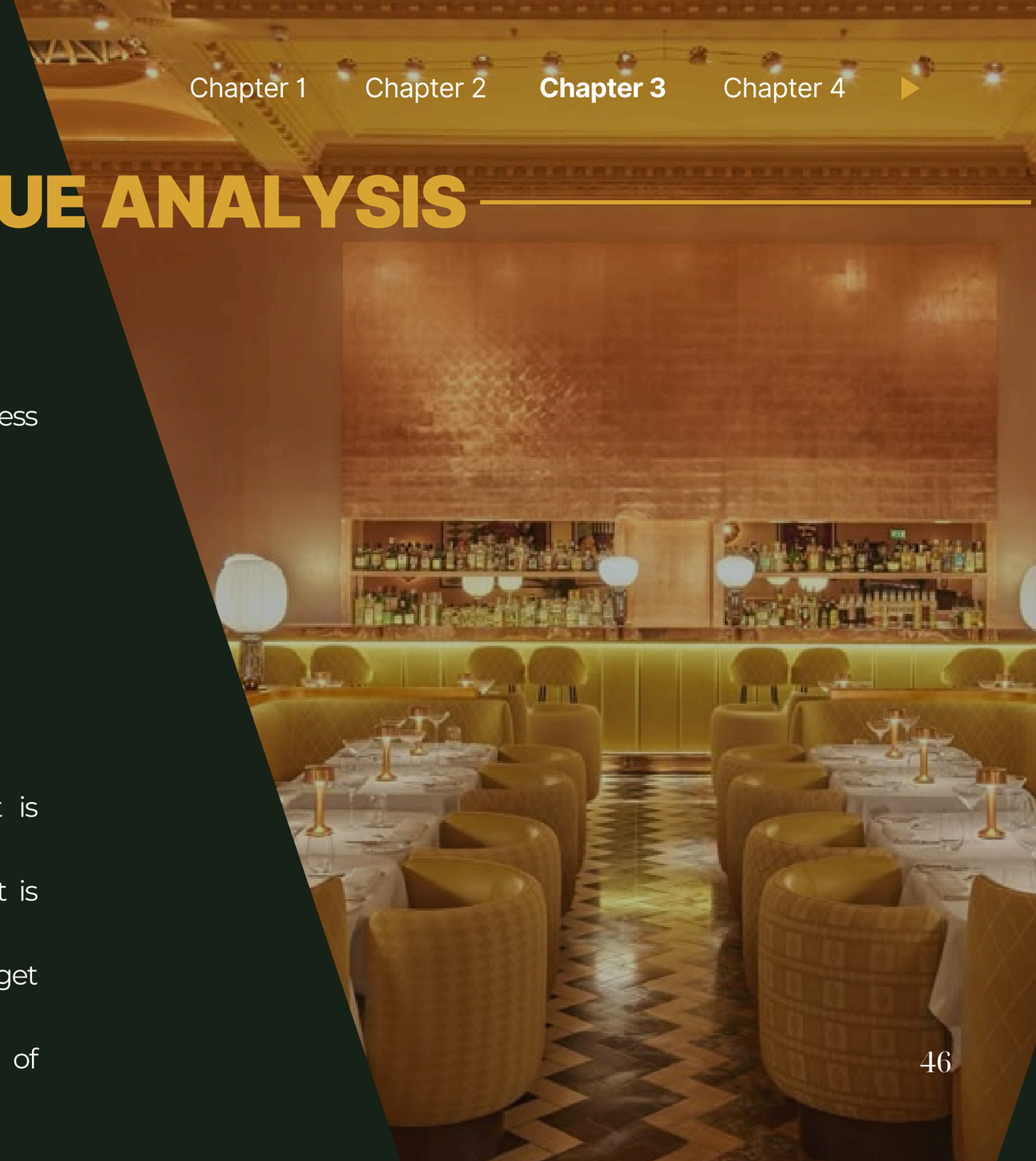
EARNED VALUE ANALYSIS

1 WHAT IS EVA

A cost-control method tracking scope, time, and cost to assess project performance.

2 KEY METRICS & FORMULAS

- **Planned Value (PV)**: Budgeted cost for scheduled work.
- **Earned Value (EV)**: Budgeted cost for completed work.
- **Actual Cost (AC)**: The actual expense incurred.
- **Cost Variance (CV)** = EV - AC → Measures if the project is over/under budget.
- **Schedule Variance (SV)** = EV - PV → Indicates if the project is ahead or behind schedule.
- **Cost Performance Index (CPI)** = EV / AC → Efficiency of budget usage.
- **Schedule Performance Index (SPI)** = EV / PV → Efficiency of schedule adherence.



PROJECT LEVEL EVM

Project budget & monitoring

- Total Budget (BAC): **$187,600**.
- EVM reviewed weekly over 9 weeks.
- Key indicators (PV, EV, AC, CPI, SPI) calculated for tracking performance.

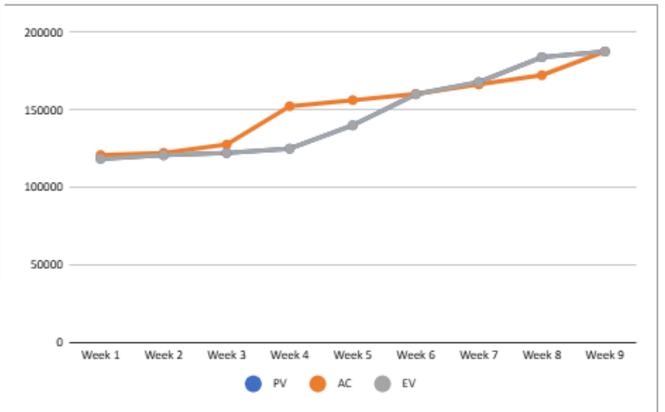
Earned value performance metrics

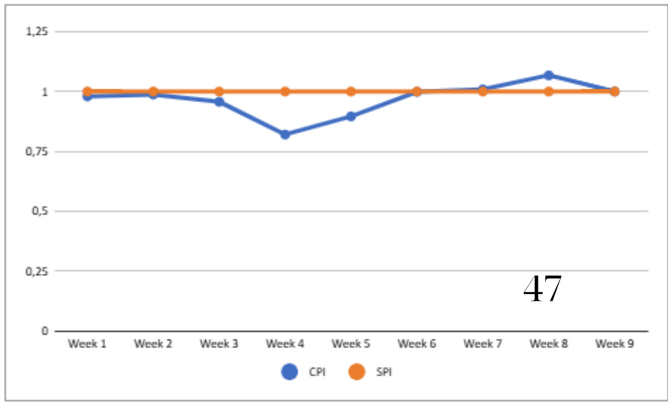
- The **Visualization of Earned Value Analysis** graph shows that AC initially exceeded PV, indicating cost overruns in the early weeks.
- The **Performance Index** graph shows that CPI dropped in Week 4 but later exceeded 100% by Week 8. EV slightly below PV, but SPI remained at 100%, indicating adherence to timeline.

Lessons learned

Accurate cost estimation, proactive budget adjustments, and continuous monitoring ensure financial efficiency and timely execution.

Project Overall Budget	2025									Plan	% Completed	EV
Category	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9			
Software and Licensing	$ 100.000									$ 100.000	100%	$ 100.000
Consulting Services	$ 2.000	$ 2.000								$ 4.000	100%	$ 4.000
Cloud Infrastructure (AWS)	$ 5.000									$ 5.000	100%	$ 5.000
Networking Equipment (Firewalls, Switches, Routers)	$ 11.200									$ 11.200	100%	$ 11.200
Evaluate and collect requirements			$ 1.100							$ 1.100	100%	$ 1.100
Analyze Data				$ 2.500	$ 2.500					$ 5.000	100%	$ 5.000
Data Integration/ETL (Data Consolidation & Transformation)					$ 12.250	$ 12.250				$ 24.500	100%	$ 24.500
Visualization						$ 2.500	$ 2.500	$ 2.500		$ 7.500	100%	$ 7.500
Implementation						$ 5.000	$ 5.000	$ 5.000		$ 15.000	100%	$ 15.000
Testing								$ 6.000		$ 6.000	100%	$ 6.000
User Training								$ 2.250	$ 2.250	$ 4.500	100%	$ 4.500
Maintenance and Support									$ 1.400	$ 1.400	100%	$ 1.400
Salary (Labor)	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300		$ 2.400	100%	$ 2.400
Weekly PV	$ 118.500	$ 2.300	$ 1.400	$ 2.800	$ 15.050	$ 20.050	$ 7.800	$ 16.050	$ 3.650	$ 187.600	100%	$ 187.600
PV or cumulative plan	$ 118.500	$ 120.800	$ 122.200	$ 125.000	$ 140.050	$ 160.100	$ 167.900	$ 183.950	$ 187.600			
Weekly AC	$ 120.950	$ 1.400	$ 5.300	$ 24.725	$ 3.925	$ 4.000	$ 6.075	$ 5.975	$ 15.250			
AC or cumulative actual	$ 120.950	$ 122.350	$ 127.650	$ 152.375	$ 156.300	$ 160.300	$ 166.375	$ 172.350	$ 187.600			
Weekly EV	$ 118.500	$ 2.300	$ 1.400	$ 2.800	$ 15.050	$ 20.050	$ 7.800	$ 16.050	$ 3.650			
EV or cumulative actual	$ 118.500	$ 120.800	$ 122.200	$ 125.000	$ 140.050	$ 160.100	$ 167.900	$ 183.950	$ 187.600			
CV = EV - AC	$ (2.450)	$ (1.550)	$ (5.450)	$ (27.375)	$ (16.250)	$ (200)	$ 1.525	$ 11.600	$ -			
SV = EV - PV	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
CPI = EV/AC	97,97%	98,73%	95,73%	82,03%	89,60%	99,88%	100,92%	106,73%	100%			
SVI = EV/PV	100%	100%	100%	100%	100%	100%	100%	100%	100%			





PLAN QUALITY MANAGEMENT

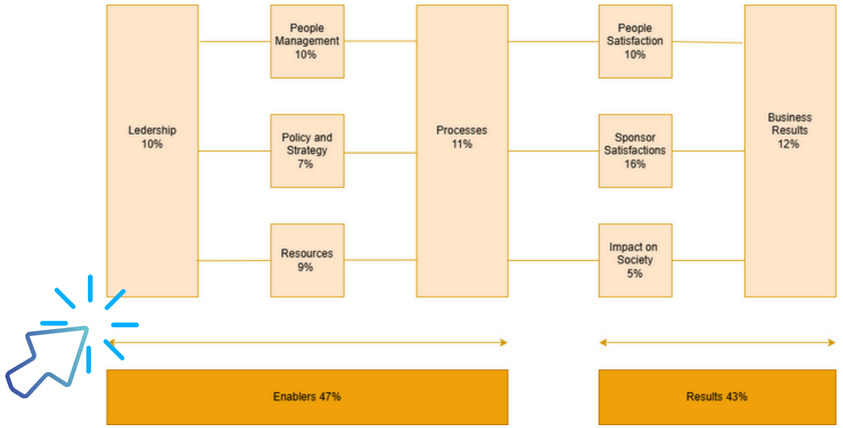
Key TQM Practices

✓ Quality Control & Process Management – Ensuring high-quality standards.
✓ Employee Training – Enhancing skills for better performance.
✓ Customer Feedback – Driving improvements based on user insights.

TQM in Project Management

- Plan Quality Management – Define quality standards.
- Manage Quality – Control and improve processes.
- Control Quality – Ensure deliverables meet standards.

EFQM MODEL



EFQM Model (*European Foundation for Quality Management*)

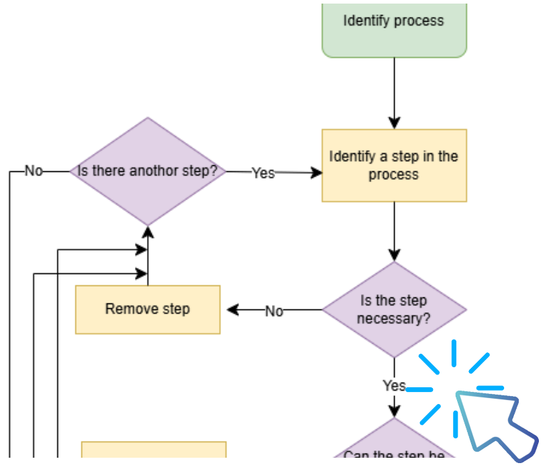
- 2 key groups:

✓ Enablers (47%)
✓ Results (43%)

- Uses RADAR Model *(Results, Approach, Deployment, Assessment & Refinement)* for performance evaluation.

Quality Management in Projects

- **Manage Quality** – Ensures processes meet defined standards using audits, process analysis, and design improvements.
- **Control Quality** – Monitors project deliverables through inspections, testing, & feedback collection to ensure compliance.



Quality Control Flowchart

- **Identifies process inefficiencies** and provides a structured approach for continuous quality improvement.
- **Helps remove redundant** steps, document improvements, and ensure stakeholder approval before making changes.

COST-BENEFIT ANALYSIS

EXPECTED MONETARY VALUE (EMV)

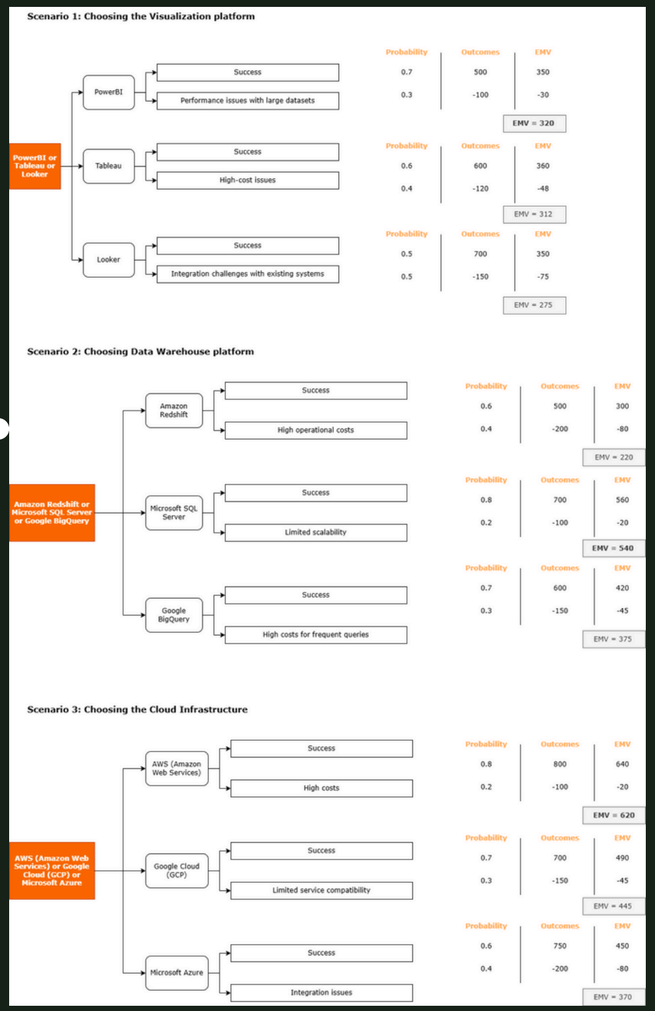
Used to evaluate financial benefits under uncertain conditions

CBA INSIGHTS FROM DECISION TREE

✓ Power BI → Best visualization platform (EMV: $320, 70% success rate).

✓ Microsoft SQL Server → Best data warehouse (EMV: $540, 80% success rate).

✓ AWS → Most profitable cloud infrastructure (EMV: $620, 80% success rate).



PARETO DIAGRAMS

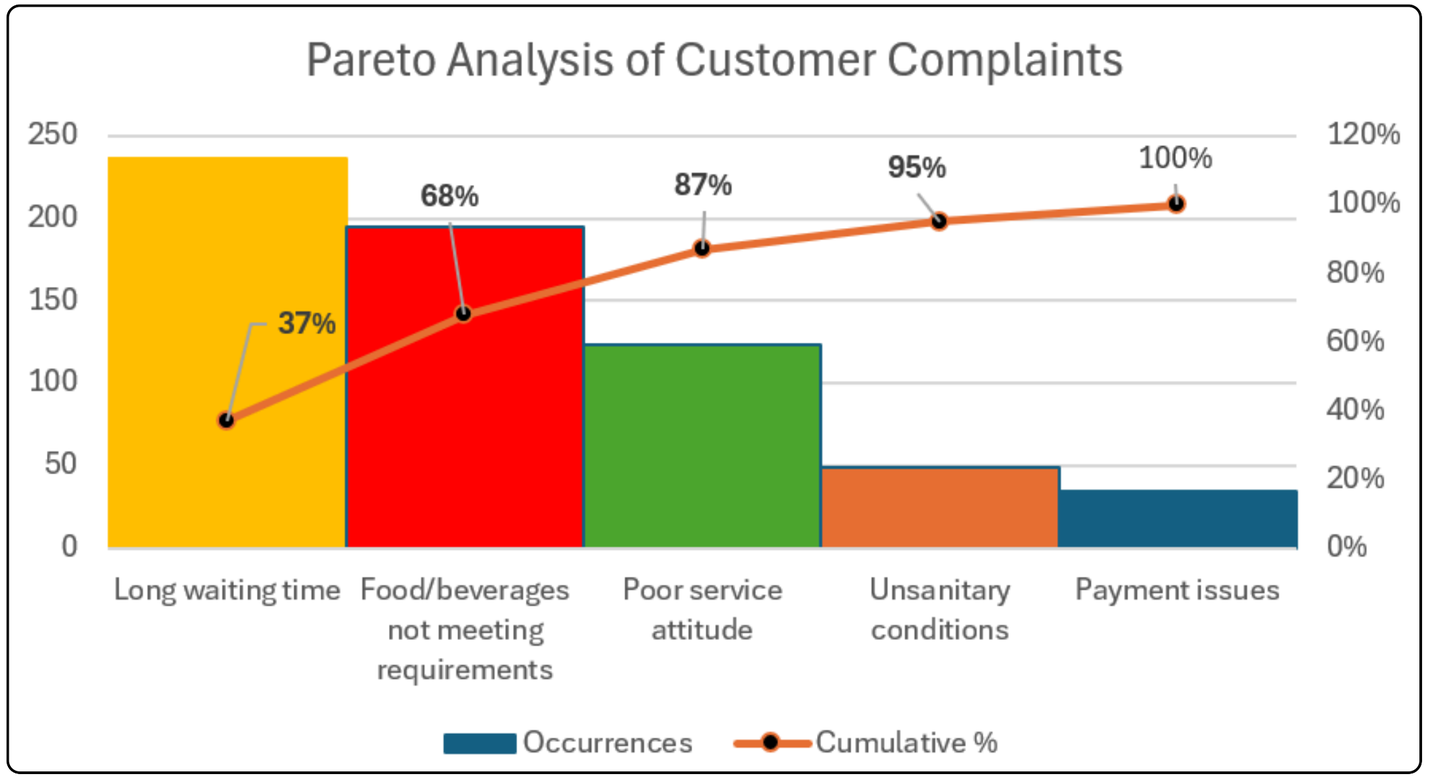
TOP 3 ISSUES (87% OF COMPLAINTS)

37%
Long waiting times

68%
Food & beverage issues

87%
Poor service attitude

APPLICATION IN CUSTOMER COMPLAINTS



CHAPTER 4

LESSON LEARN AND PROJECT EVALUATION

WORK OVERVIEW REPORT

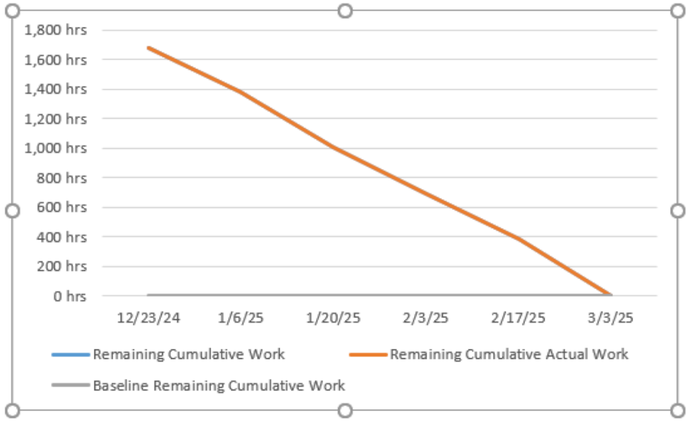
WORK OVERVIEW

Fri 1/3/25 Tue 3/11/25

% Work Complete	Remaining Work	Actual Work
100%	0 hrs	1,768 hrs

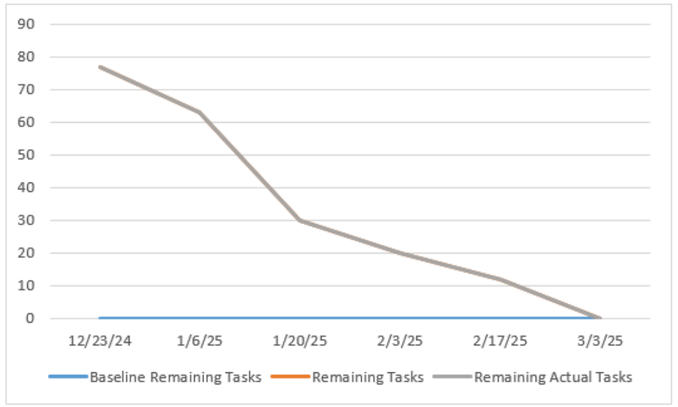
Fri 1/3/25 - Tue 3/11/25

BURNDOWN



WORK BURNDOWN

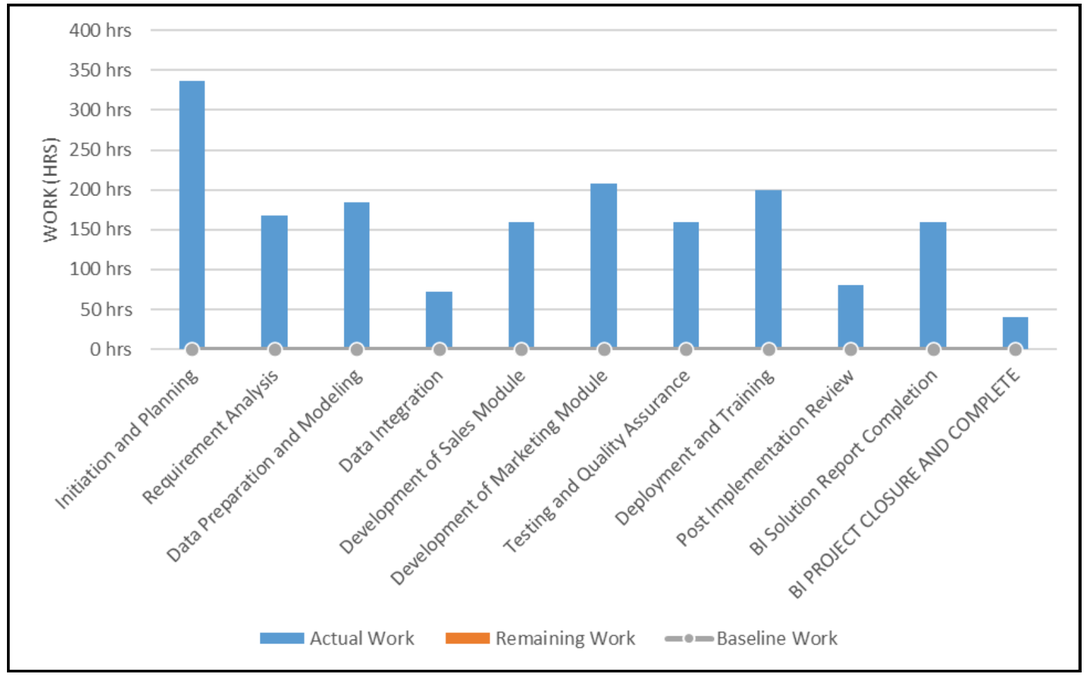
Shows how much work you have completed and how much you have left. If the remaining cumulative work line is steeper, then the project may be late. Is your baseline zero?

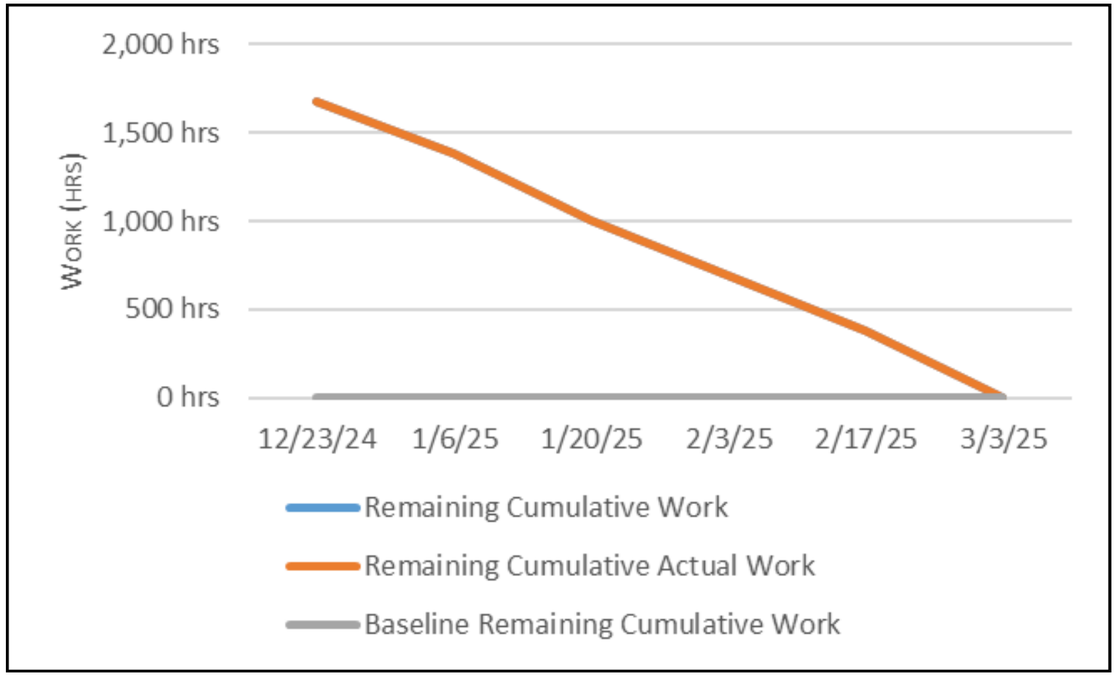


TASK BURNDOWN

Shows how many tasks you have completed and how many you have left. If the remaining tasks line is steeper, then your project may be late.

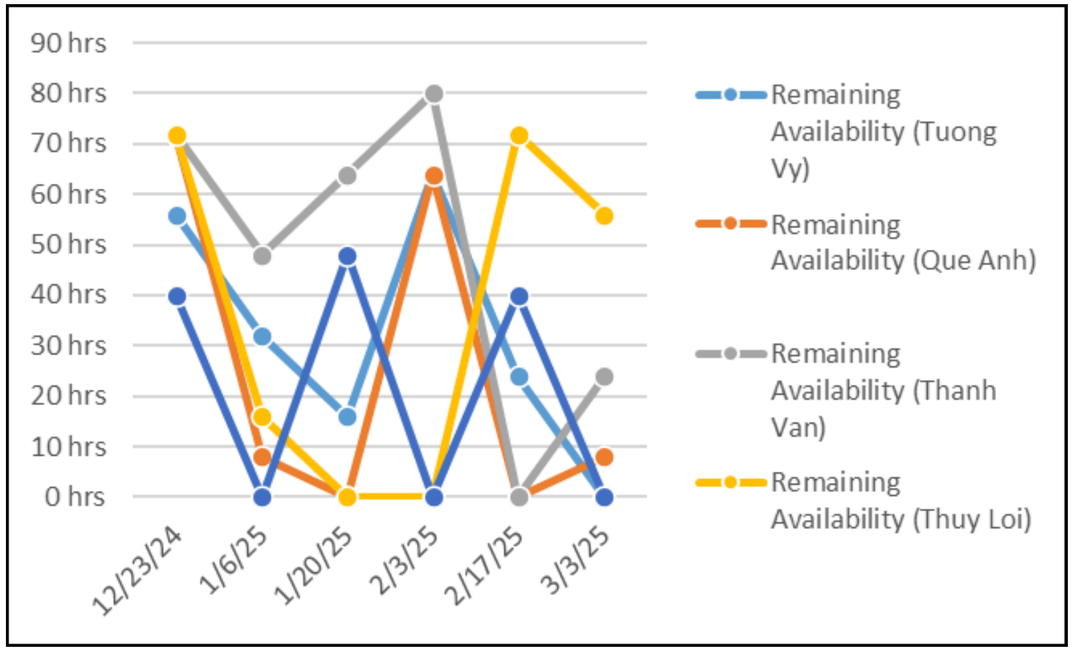
WORK OVERVIEW REPORT

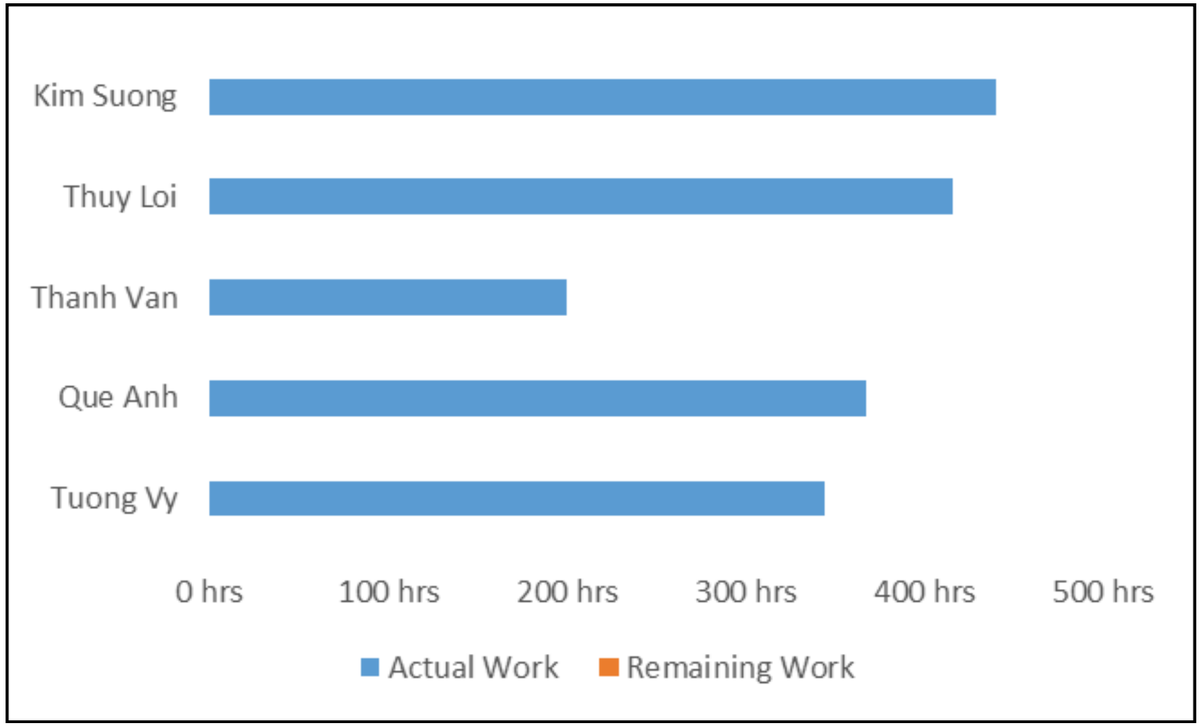




The Burndown and Work Stats charts show steady progress with no delays.

WORK OVERVIEW REPORT





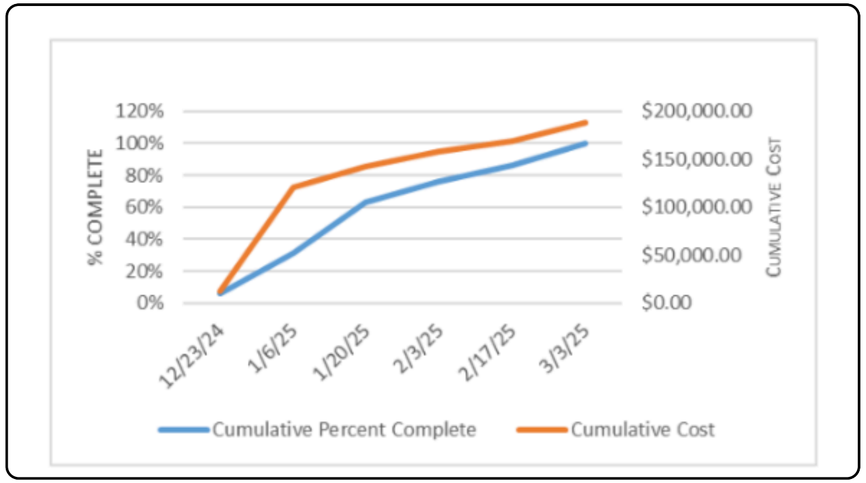
COST OVERVIEW REPORT

COST

$187,600.00

% COMPLETE

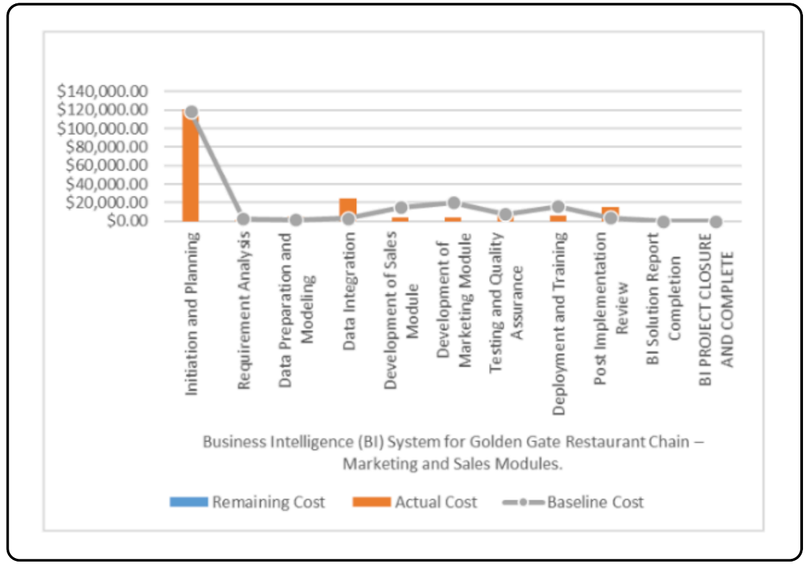
100%



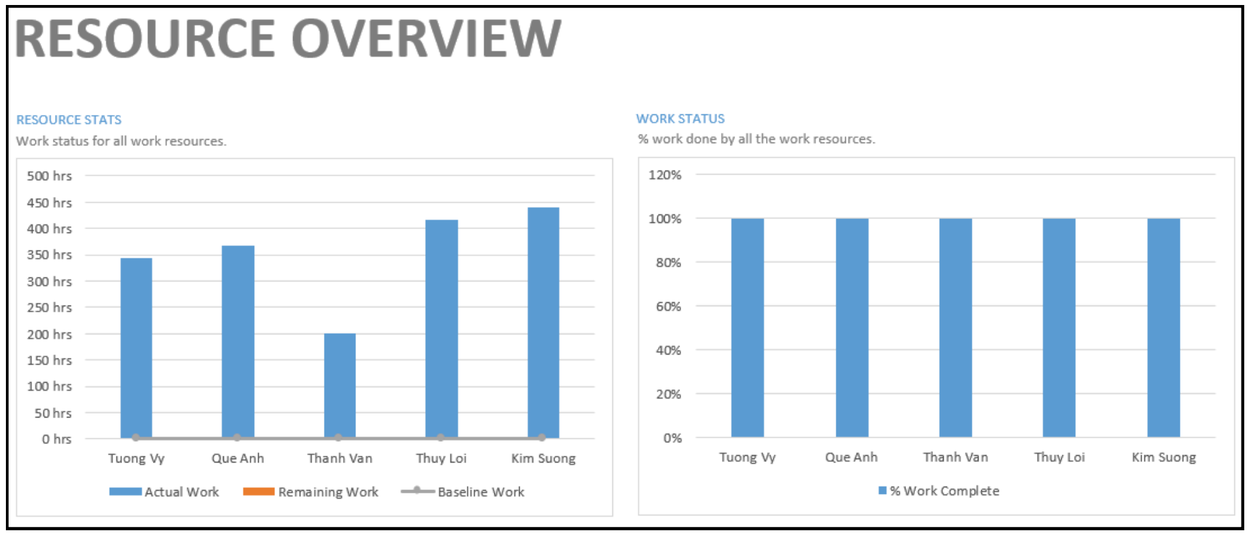
COST STATUS

Cost status for top level tasks.

Name	Actual Cost	Remaining Cost	Baseline Cost	Cost	Cost Variance
Initiation and Planning	$120,950.00	$0.00	$118,500.00	$120,950.00	$2,450.00
Requirement Analysis	$1,400.00	$0.00	$2,300.00	$1,400.00	($900.00)
Data Preparation and Modeling	$5,300.00	$0.00	$1,400.00	$5,300.00	$3,900.00
Data Integration	$24,725.00	$0.00	$2,800.00	$24,725.00	$21,925.00
Development of Sales Module	$3,925.00	$0.00	$15,050.00	$3,925.00	($11,125.00)
Development of Marketing Module	$4,000.00	$0.00	$20,050.00	$4,000.00	($16,050.00)
Testing and Quality Assurance	$6,075.00	$0.00	$7,800.00	$6,075.00	($1,725.00)
Deployment and Training	$5,975.00	$0.00	$16,050.00	$5,975.00	($10,075.00)
Post Implementation Review	$15,250.00	$0.00	$3,650.00	$15,250.00	$11,600.00
BI Solution Report Completion	$0.00	$0.00	$0.00	$0.00	$0.00
BI PROJECT CLOSURE AND COMPLETE	$0.00	$0.00	$0.00	$0.00	$0.00



RESOURCE OVERVIEW REPORT

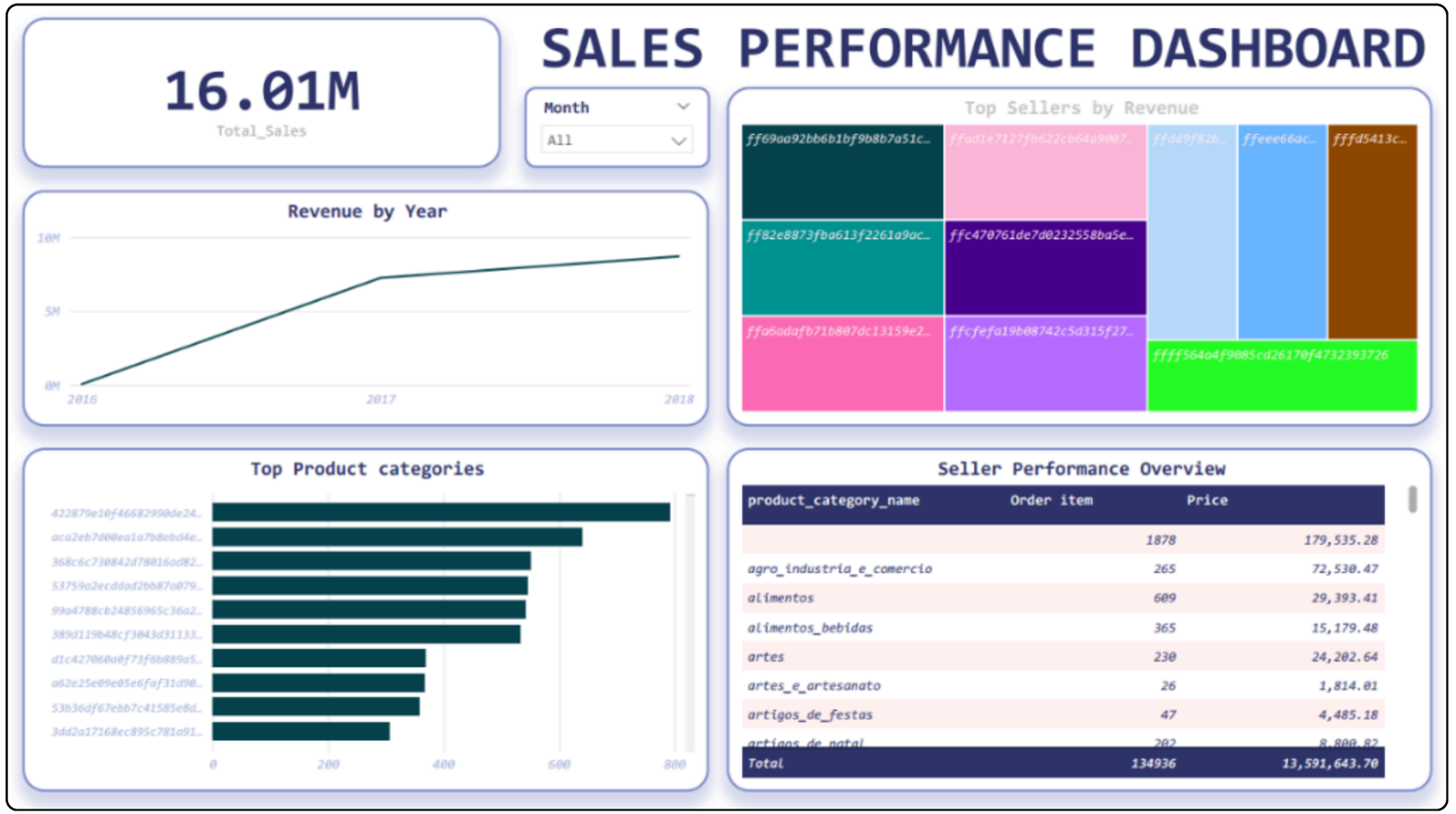


RESOURCE STATUS

Remaining work for all work resources.

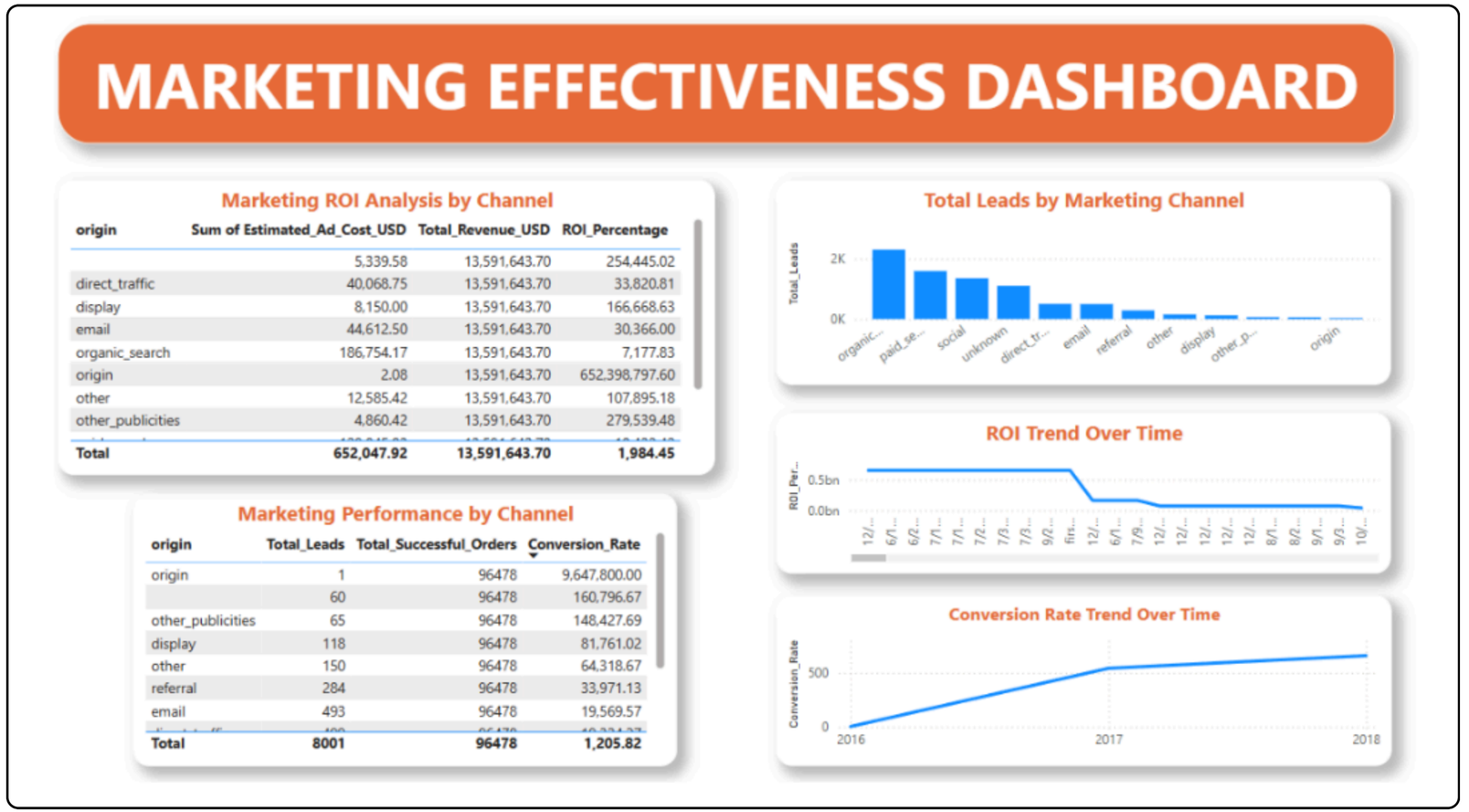
Name	Start	Finish	Remaining Work
Tuong Vy	Fri 1/3/25	Tue 3/11/25	0 hrs
Que Anh	Fri 1/3/25	Tue 3/11/25	0 hrs
Thanh Van	Fri 1/3/25	Tue 3/11/25	0 hrs
Thuy Loi	Fri 1/3/25	Tue 3/11/25	0 hrs
Kim Suong	Fri 1/3/25	Tue 3/11/25	0 hrs

DASHBOARDS



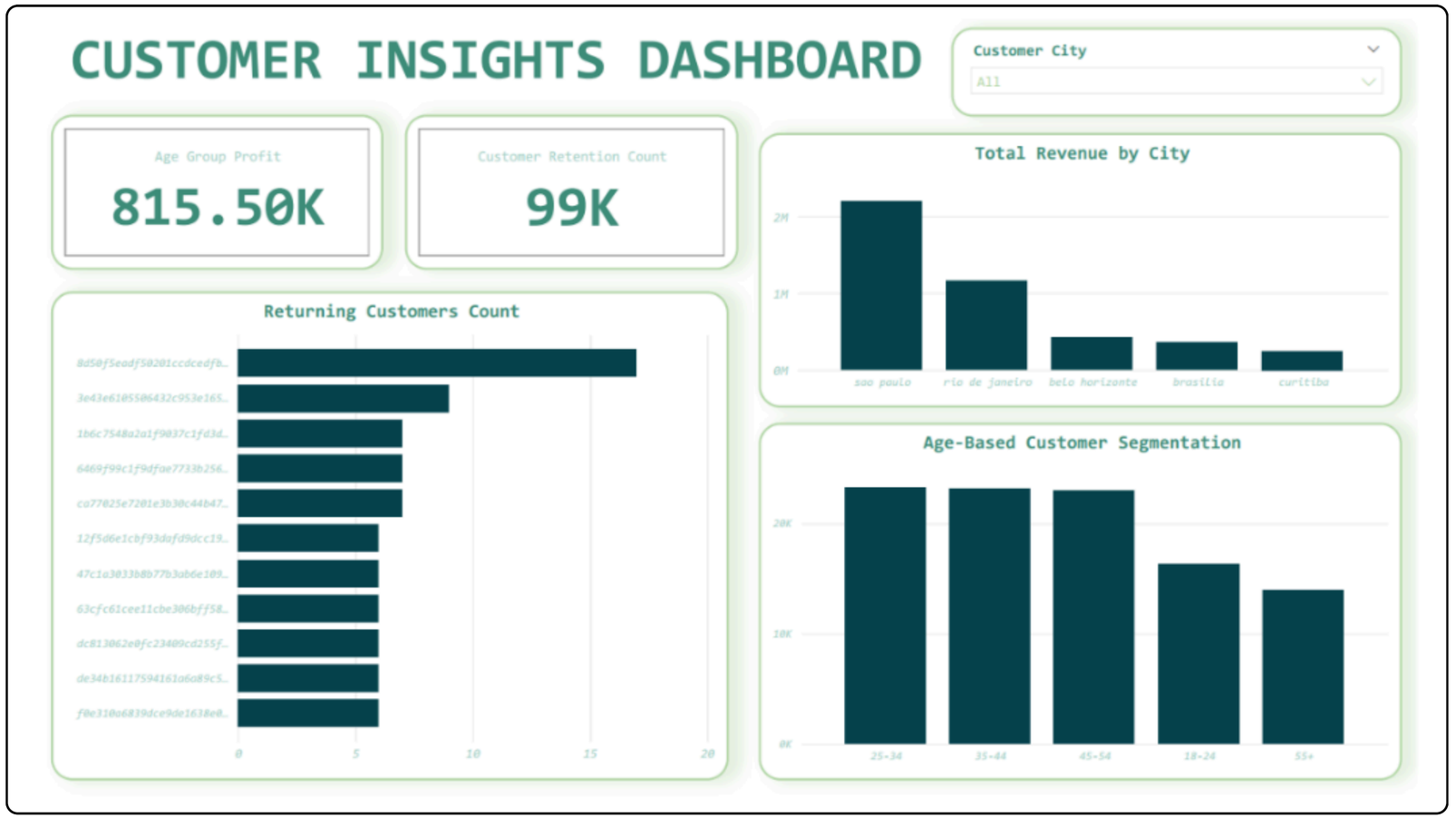
Sales Performance Dashboard

DASHBOARDS



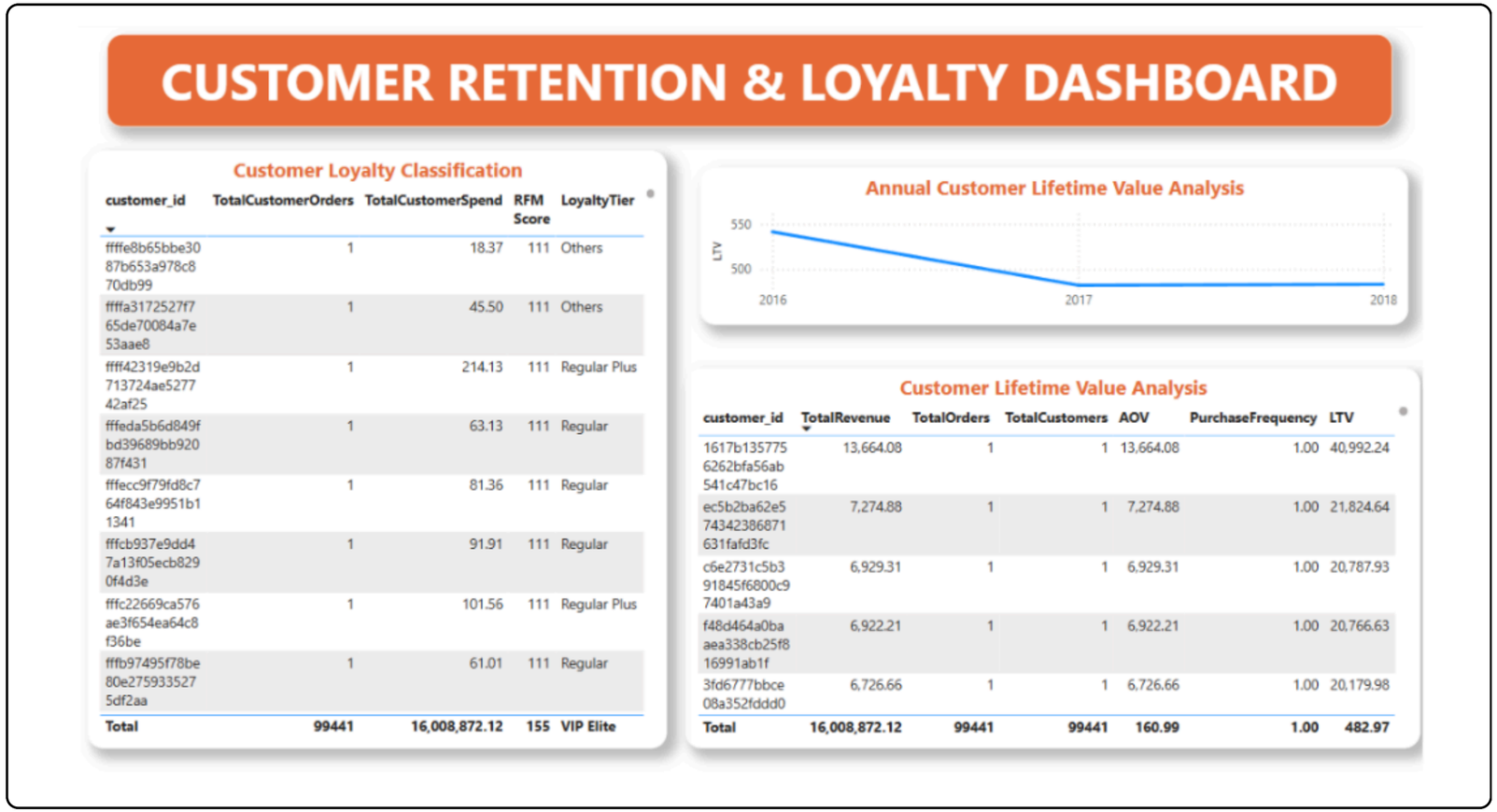
Marketing Effectiveness Dashboard

DASHBOARDS



Customer Insights Dashboard

DASHBOARDS



Customer Retention & Loyalty Dashboard

LESSON LEARNED

LESSONS LEARNED

Today's Date: 1/3/2025

Project Name: Business Intelligence (BI) System for Golden Gate Restaurant Chain – Marketing and Sales Modules.

Project Manager: To Nguyen Tuong Vy

ProjectManager

WIN / ISSUE	Category	Describe What Happened	What Was the Impact?	How Does This Change Future Projects?	Action Items
WIN	Design	Creating the Fact table is a critical and complex task. The team struggled with building it due to a lack of experience and reference materials.	The team faced delays building the Fact table but gained experience, improved data modeling, and enhanced problem-solving for future tasks.	Future projects will benefit from better training and documentation to ensure the team has the necessary expertise. Standardized guidelines and best practices can be developed to streamline the process and avoid similar challenges.	1. Create a knowledge base with best practices for Fact table design. 2. Train the team on Fact table design and data modeling. 3. Assign mentors to support junior members.
ISSUE	Requirement Gathering	Golden Gate's fragmented data management system causes inefficiencies, as different brands use different POS, CRM, and inventory systems, making data consolidation difficult.	The fragmented data system causes inefficiencies, reporting delays, and analysis inconsistencies, making decision-making harder and hindering operational performance due to the lack of a unified view across brands.	Standardize POS, CRM, and inventory systems across all brands for better efficiency. Prioritize early integration planning to avoid inconsistencies.	1. Standardize POS, CRM, and inventory systems across all brands. 2. Implement a centralized data management strategy to streamline integration. 3. Establish cross-brand data governance policies to ensure consistency.
WIN	Deploy	During implementation, the team discovered several data errors and inconsistencies across different software versions.	Finding data errors early helped avoid reporting and decision issues. The team fixed mistakes, improved data quality, and made the system more reliable.	Adopt proactive data validation early. Use automated checks to detect issues before they affect operations.	1. Use automated data validation before and during implementation. 2. Set up a dedicated data quality assurance process. 3. Perform regular system audits to detect and fix inconsistencies early.
WIN	User Acceptance Testing	Employees struggled to adapt to the new BI system due to unfamiliarity with data analytics tools and resistance to change. Many found the interface complex and had difficulty extracting insights.	User resistance and lack of familiarity with analytics tools slowed down adoption, reducing the initial effectiveness of the BI system. Training programs were needed to improve user competency.	Future projects need a structured change management process to document scope changes and plan budget adjustments. Clear client communication on cost impacts is also essential.	1. Establish a clear change request process with cost analysis. 2. Allocate contingency budgets for unexpected changes. 3. Communicate proactively with clients to manage expectations.
WIN	User Acceptance Testing	Changes in client requirements during the project implementation may result in an increased budget.	Changes in client requirements increased the budget, enabling better features, functionality, and business alignment. This flexibility led to a more tailored and effective solution.	Using advanced analytics and attribution models can improve ROI measurement. Controlled testing and AI insights help remove external factors for better campaign evaluation.	1. Use advanced analytics to track marketing ROI accurately. 2. Create a standardized framework to measure campaign effectiveness. 3. Apply A/B testing to isolate promotion-driven revenue changes.
ISSUE	Testing	Difficulty in evaluating the ROI of marketing campaigns due to external factors, making it hard to assess promotion-driven revenue increases.	Difficulty in measuring ROI made it harder to optimize marketing spend and assess campaigns. Lack of clear insights weakened data-driven decisions, risking poor budget use and missed revenue growth.	Standardizing software versions across all team members will be a priority in future projects. A centralized software update policy should be enforced to avoid compatibility issues and ensure smooth collaboration.	1. Standardize software versions across the team. 2. Use centralized version control for consistency. 3. Train regularly on software updates.
ISSUE	Coding and Unit Testing	There were inconsistencies in the versions of SQL Server, Power BI, and Visual Studio used by different team members.	Software version mismatches caused delays, errors, and collaboration issues, requiring extra time for standardization.	Future projects will enforce strict data governance with uniform security policies. Regular audits and compliance checks will reduce integration risks.	1. Establish strict data security policies across all brands. 2. Conduct regular security audits and compliance checks. 3. Provide cybersecurity training to all relevant stakeholders.
ISSUE	Design	Data security issues arose due to inconsistent governance across brands, leading to potential risks during integration.	Inconsistent governance increased data breach risks, compliance issues, and integration failures, requiring stronger security and standardized policies.	A more thorough assessment of legacy systems should be conducted before implementation. Future projects should allocate more time for integration planning and consider middleware solutions earlier to reduce delays.	1. Assess legacy systems before integration. 2. Preemptively implement middleware to bridge gaps. 3. Allow extra time for integration challenges.
WIN	Deploy	The team encountered difficulties integrating legacy systems with the new BI platform. These issues caused delays and required additional middleware solutions to bridge system gaps.	Despite early challenges, the team implemented middleware to connect systems, ensuring smooth integration between old and new platforms. This improved data flow, system compatibility, and future scalability.	A stronger change management policy will be enforced to track and evaluate scope changes. Future projects will include contingency budgets and predefined approval processes to manage financial impacts effectively.	1. Implement change management with financial impact analysis. 2. Define clear scope control and approval guidelines. 3. Maintain a flexible contingency budget for adjustments.
WIN	Project Management	Budget overruns occurred due to new requirements and weak change management, leading to extra costs and resource reallocation.	Despite budget overruns, fund reallocation met changing needs, highlighting the need for better change management and financial planning.	Future projects should use A/B testing and multi-touch attribution to isolate promotion effects. Data teams must work closely with marketing to improve evaluation methods.	1. Implement multi-touch attribution models for accurate ROI tracking. 2. Introduce AI-driven analytics to analyze the impact of external factors. 3. Enhance collaboration between marketing and data teams to refine evaluation methods.

PRESENTATION 2025

THANK YOU

While preparing and reporting, despite their best efforts, the group could not avoid making mistakes.

We hope for your understanding!