Product Order Management System (POMS) for Chongqing United Technology Inc.

Applied Project Final Report

By

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Fall, 2023

A paper submitted in partial fulfillment of the requirements for the degree of

Master of Science in Management and Systems

at the

Division of Programs in Business

School of Professional Studies

New York University

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Declaration

I, Shuai Zhi, declare that this project report submitted by me to School of Professional Studies, New York University in partial fulfillment of the requirement for the award of the degree of Master of Science in Management and Systems is a record of project work carried out be me under the guidance of Dr. Dan Stone, NYU Clinical Assistant Professor of Management and Systems. I grant powers of discretion to the Division of Programs in Business, School of Professional Studies, and New York University to allow this report to be copied in part or in full without further reference to me. The permission covers only copies made for study purposes or for inclusion in Division of Programs in Business, School of Professional Studies, and New York University research publications, subject to normal conditions of acknowledgment. I further declare that the work reported in this project has not been submitted and will not be submitted, either in part or in full, for the award of any other degree or diploma in this institute or any other institute or university.

Acknowledgements

I sincerely thank Hongjie Wang for his contribution as sponsor of this project and as mentor during this project. I also want to thank all the instructors in the Management and Systems program who I have taken courses with and learned a great deal.

Abstract

This project aimed to develop a comprehensive Product Order Management System (POMS) for Chongqing United Technology Inc., a company specializing in supplier quality management and international trade between China and the United States. The primary goal was to streamline the processes of tracking and processing client orders, managing inventory, and ensuring timely delivery, thereby enhancing client satisfaction and operational efficiency. The POMS was designed to provide improved order accuracy, efficient production planning, enhanced client experience, better inventory management, and facilitate data-driven decision-making. The system encompasses various modules, including order placement, inventory management, production scheduling, order tracking, and reporting, using Python and SQL Database integration. A webpage or graphical user interface (GUI) was also developed for easy query and viewing of order information. The anticipated results included a robust order product database, data visualization capabilities, and a user-friendly GUI, all aiming to improve the efficiency of order-to-delivery processes. This system is particularly beneficial for companies engaged in international trade and those requiring efficient order and production management. It was developed using Python, SQL Database Designer, and Tableau from Salesforce for data visualization. The project's success was evaluated based on the establishment of the order product database, ETL function, data visualization, and the GUI. The anticipated findings included a robust database system with improved project management and user needs analysis capabilities, enhancing the company's operational efficiency and client satisfaction. The project faced limitations in time and scope, with a 14-week completion window and a focus on information integration for the company's products, customers, and orders. The URL for accessing the developed POMS was not provided in the document.

Abbreviations and Definitions

Abbreviation	Definition
POMS	Product Order Management System
GUI	Graphical User Interface
SQL	Structured Query Language
ETL	Extract, Transform, Load
UX	User Experience
STEM	Science, Technology, Engineering, and Mathematics
CRM	Customer Relationship Management
API	Application Programming Interface
SaaS	Software as a Service
ERP	Enterprise Resource Planning

Introduction

Background information

The Product Order Management System (POMS) was developed for Chongqing United Technology Inc., a company specializing in supplier quality management and international trade. The firm, founded in 2002, has distinguished itself in product quality, business integrity, and customer support, especially in its collaboration with CMT Imports in Ohio, USA. It excels in supplier quality management, conducting effective quality audits and offering continuous improvements while adhering to industry standards. Their in-house laboratory and collaborations with third-party testing facilities ensure comprehensive product measuring and testing capabilities.

The project's goal was to address the business challenge of inefficient order and production management within the company. The POMS was designed to streamline processes related to client order tracking, inventory management, and ensuring timely delivery, thereby enhancing client satisfaction and improving overall operational efficiency. The system encompasses various modules for order placement, inventory management, production scheduling, order tracking, and reporting. It was developed using Python and SQL Database integration, with a user-friendly graphical user interface (GUI) for easy access and management.

The project's benefits include improved order accuracy, efficient production planning, enhanced client experience, better inventory management, and data-driven decision-making. The system was expected to optimize production schedules, reduce lead times and production costs, and provide real-time visibility into orders for clients. The anticipated results included a robust database system with enhanced project management and user needs analysis capabilities, thus improving the company's operational efficiency and client satisfaction.

The project faced limitations in time and scope, with a 14-week completion window. The scope was focused on information integration for the company's products, customers, and orders. The project also included the establishment of a webpage or GUI for querying order information. My role as the project manager involved planning, development, creating project timelines, and ensuring the project's progress and performance evaluation. The project utilized resources like technical support for software and hardware upgrades and data support through employee surveys.

The POMS represents a significant advancement in managing international trade orders and production, specifically tailored to the needs of Chongqing United Technology Inc. and could serve as a model for similar companies in the industry.

Company Name

CHONGQING UNITED TECHNOLOGY INC.

Company location.

23-18, South Tower of Century Emperor

No.38 Jianxin North Road,

Jiangbei, Chongqing 400020 China

Sponsor Information

Wang, Hongjie

President of Chongqing United Technology Inc.

Email: whj@cqunited.com

Able to attend one or two zoom meetings at a to-be-agreed time.

Sponsor’s location:

23-18, South Tower of Century Emperor

No.38 Jianxin North Road,

Jiangbei, Chongqing 400020 China

Problem Description and Opportunity

Proposed Project Description

This project entails the design and development of a Product Order Management System (POMS). The system will encompass various modules, including order placement, inventory management, production scheduling, order tracking and reporting by using both Python and SQL Database designer to connect with each other. It will facilitate seamless communication between clients, sales, production, and logistics teams. Users will be able to create, modify, and track orders, while administrators will gain visibility into the entire order and production lifecycle. The result will be a robust and user-friendly software solution that optimizes order-to-delivery processes, ultimately enhancing client satisfaction and operational efficiency.

Problem/Opportunity Definition

The company's commitment to quality extends to rapid on-site response with dedicated quality inspectors at major suppliers, ensuring real-time quality monitoring and quick issue resolution. Additionally, their North American Sales Team and Warehouse, in conjunction with CMT Imports, provide a strong market presence, offering suppliers ample quotation opportunities and minimizing delivery risks through safety stock in North American warehouses. Chongqing United Technology Inc. stands as a trusted partner for businesses seeking top-quality sourcing and engineering support in China.

However, Since the products and orders from Chongqing United Technology Inc. involve international trade between China and the United States, a simple and user-friendly order and product management system is particularly important. The company's management can use the management system to assess the sales performance of specific products and year-on-year changes, enabling informed business decisions. Additionally, the system's visual features can

assist in management tasks. Employees can also use the management system to view the shipping status of all orders and products, facilitating communication with overseas clients.

Importance of the project

The Product Order Management System (POMS) project holds significant importance for Chongqing United Technology Inc. and its sponsor, CMT Imports in Ohio, USA. As a strategic initiative, the POMS is pivotal in transforming the company's order and production management processes, directly impacting its operational efficiency and customer satisfaction. For Chongqing United Technology Inc., this system represents a critical step towards digital transformation, enabling the company to manage the complexities of international trade more effectively. The POMS ensures improved order accuracy, efficient production planning, and real-time inventory management, which are essential for maintaining competitive advantage in the rapidly evolving global market. For the sponsor, CMT Imports, the project is crucial as it promises enhanced visibility into the order lifecycle, fostering a more transparent and reliable business relationship. By streamlining communication and order processing, the POMS significantly reduces lead times and operational costs, thereby improving the overall profitability and business synergy between Chongqing United Technology Inc. and its key international partner, CMT Imports. This project not only reinforces the company's commitment to technological innovation and customer-centric service but also solidifies its standing as a leader in supplier quality management and international trade.

Project Objectives and Metrics

Goal of the project

The goal of this project is to develop a comprehensive Product Order Management System (POMS) to address the business problem of inefficient order and production management within our company. Currently, we face challenges in tracking and processing client orders, managing inventory, and ensuring timely delivery. The opportunity lies in streamlining these processes, enhancing client satisfaction, and improving overall operational efficiency.

Project Deliverables and Metrics

a. Establish the order product database with both logical and relational model.

Measurement: Full version due by October 24th, 2023

b. Establish the ETL function and incremental ETL test for the database warehousing.

Measurement: Full version due by November 7th, 2023

c. Establish the Data Visualization function by using the tableau from Salesforce.

Measurement: Full version due by November 21st, 2023

d. Establish a webpage or graphical user interface (GUI) to query the order information.

Measurement: Full version due by November 30th, 2023

Project Evaluation

1. Project schedule

A well-defined timeline has been developed for the project and each deliverable has been attached to a deadline. A weekly meeting will be held with the project sponsor to ensure that the deliverables are being achieved on the set deadline.

2. Project weekly status report and dashboard

A Gantt chart has been created with direct access given to the sponsor so that with every deliverable being accomplished, the sponsor is notified, and a progress report is automatically created.

3. Project communication plan, issues log, risk register

Weekly zoom meetings will be held with the client every Friday 11am wherein the project manager will verbally communicate the progress on the project.

4. Project status reports

Project status reports will be developed using either Microsoft Word or Microsoft Excel, as per the needs and requirements. The reports will be published bi-weekly.

Alternate Solutions Evaluated

As part of the decision-making process for the Product Order Management System (POMS) project at Chongqing United Technology Inc., several alternative solutions were evaluated. These solutions were considered based on their potential to meet the company's needs for efficient order and production management.

The first alternative explored was the adoption of existing off-the-shelf software solutions. Various Enterprise Resource Planning (ERP) systems, such as SAP and Oracle, were considered. These systems offer comprehensive modules for order management, inventory control, production planning, and customer relationship management (CRM). The evaluation focused on their ability to integrate with existing systems, the extent of customization required, and the overall cost of implementation and maintenance. However, this option was found to be less feasible due to the high costs and the level of customization needed to align with the specific business processes of Chongqing United Technology Inc.

Another alternative was cloud-based Software as a Service (SaaS) solutions. Platforms like Salesforce and NetSuite were reviewed for their scalability, ease of use, and the ability to provide real-time access to data and analytics. These solutions offered the advantages of lower upfront costs, regular updates, and minimal hardware requirements. Despite these benefits, concerns regarding data security, limited control over the software, and potential issues with data integration with the company's existing systems were significant drawbacks.

A third option considered was a customized hybrid system, which would involve integrating elements of off-the-shelf software with custom-developed modules. This solution aimed to balance the benefits of pre-built software with the flexibility of custom development. The

evaluation focused on the feasibility of integrating different systems, the complexity of maintaining such a hybrid system, and the overall impact on workflow efficiency.

In conclusion, while each alternative solution had its merits, the custom-built POMS was deemed the most suitable for meeting the specific needs of Chongqing United Technology Inc. and its international trade operations. This decision was based on a comprehensive analysis of costs, benefits, risks, and alignment with the company's long-term strategic objectives.

Solution Evaluation Criteria

To select the most appropriate solution for the Product Order Management System (POMS) for Chongqing United Technology Inc., a set of specific evaluation criteria was established. These criteria were crucial in assessing the viability, effectiveness, and alignment of each potential solution with the company's strategic goals and operational needs.

1. **Customization and Flexibility**: The ability of the solution to be customized according to the specific requirements of the company was paramount. This included the flexibility to adapt to future changes in business processes or expansion needs.

2. **Integration with Existing Systems**: It was essential that the chosen solution could seamlessly integrate with the company's existing systems and processes. This integration was crucial for ensuring continuity and minimizing disruptions during the transition to the new system.

3. **Cost**: Both the initial implementation cost and the long-term operational costs were considered. This included evaluating the total cost of ownership, which encompasses development, maintenance, training, and any required hardware upgrades.

4. **User Experience (UX)**: The user-friendliness of the system was a significant factor. The solution needed to have an intuitive interface and be easy to use for various stakeholders, including employees, management, and clients.

5. **Scalability**: The ability of the system to scale up in response to the company's growth and evolving needs was evaluated. Scalability ensured that the solution would remain viable in the long term.

6. **Support and Maintenance**: The availability of reliable support and maintenance services was crucial. This included assessing the vendor's or development team's responsiveness and the ease of updating and troubleshooting the system.

7. **Performance Efficiency**: The efficiency of the system in terms of processing speed, order handling capacity, and accuracy was evaluated. The solution needed to improve operational efficiency and reduce manual errors.

8. **Risk Mitigation**: The ability of the solution to mitigate potential risks, such as system integration difficulties and scope creep, was considered.

9. **Return on Investment (ROI)**: The potential ROI of the solution was evaluated in terms of improved operational efficiency, customer satisfaction, and financial returns.

Based on these criteria, the decision to develop a custom-built POMS was made. This solution scored highest in terms of customization, integration with existing systems, scalability, and alignment with the company's strategic objectives. Despite the higher initial development cost, the custom POMS was deemed the most suitable choice due to its potential for long-term cost savings, operational efficiency, and enhanced customer satisfaction.

Selection Rationale

The decision to develop a custom-built Product Order Management System (POMS) for Chongqing United Technology Inc. was made after a comprehensive evaluation of various alternatives against a set of established criteria. The rationale for selecting this solution over others can be detailed as follows:

1. **Customization and Specificity to Business Needs**: One of the primary reasons for choosing a custom-built system was its high degree of customization. Chongqing United Technology Inc. required a system tailored to its unique business processes, especially given its role in international trade and supplier quality management. The custom POMS offered the flexibility to precisely match the company's specific operational requirements, something that off-the-shelf or cloud-based solutions could not fully provide.

2. **Seamless Integration with Existing Systems**: Integration with the company's current systems was crucial to avoid disrupting existing workflows and to maintain data consistency. A custom-built solution allowed for better control over the integration process, ensuring that the new system would work harmoniously with the existing IT infrastructure.

3. **Long-term Cost-Effectiveness**: While the initial development cost of a custom solution was higher than off-the-shelf or cloud-based options, it was judged to be more cost-effective in the long run. This assessment considered not only the upfront costs but also the ongoing expenses related to licensing, subscriptions, and customization needed for pre-built software.

4. **Enhanced User Experience and Adoption**: The custom POMS was designed with a user-friendly interface, tailored to the specific needs and skill levels of the company's employees. This focus on UX was expected to facilitate quicker adoption and reduce the learning curve, ultimately leading to higher productivity.

5. **Scalability**: The scalability of the custom solution was a key factor in its selection. The system was designed to grow and evolve with the company, accommodating future expansions or changes in business operations without the need for significant overhauls.

6. **Control over Support and Maintenance**: Having a custom system provided the company with greater control over support and maintenance. This aspect was crucial for ensuring the system's long-term viability and addressing any issues promptly and efficiently.

7. **Risk Mitigation and Dependability**: The custom-built system was seen as a more dependable solution in terms of risk mitigation. It was specifically designed to address potential integration challenges and scope creep, which were significant concerns with other alternatives.

8. **Alignment with Strategic Objectives**: The custom POMS aligned perfectly with the strategic objectives of Chongqing United Technology Inc., particularly in enhancing operational efficiency, customer satisfaction, and maintaining a competitive edge in the market.

9. **Positive Return on Investment (ROI)**: The expected ROI from the custom-built system, in terms of improved operational efficiency, customer satisfaction, and financial returns, was significantly higher compared to the alternatives.

In conclusion, the selection of a custom-built POMS was driven by its superior alignment with the company's specific needs, operational goals, and long-term strategic objectives. The decision was a result of a careful evaluation of various solutions, considering factors like customization, integration, cost, user experience, scalability, security, support, risk mitigation, and ROI. This comprehensive approach ensured that the chosen solution would not only meet the current needs of Chongqing United Technology Inc. but also support its future growth and success.

Approach and Methodology

The project began with an in-depth assessment of the company's current order and production management processes. This involved detailed discussions with various stakeholders, including management, employees, and clients, to understand their needs, pain points, and expectations from the new system. A literature survey of similar systems in use within the industry was also conducted to benchmark against best practices and technological advancements. Based on the insights gained, a custom design for the POMS was developed. This design emphasized user-friendly interfaces, efficient data management, and robust reporting capabilities. Special attention was given to ensuring the system's design aligned with the company's workflow, thereby reducing the learning curve for employees and facilitating quicker adoption.

On the other hand, an Agile software development methodology was chosen for this project. This approach allowed for iterative and incremental development, with regular feedback cycles. It facilitated flexibility in adapting to changing requirements and ensured that the final product closely aligned with user needs.

Another key aspect of the methodology was the integration strategy, which ensured that the new POMS would seamlessly interface with existing systems and databases. This involved careful planning and testing to avoid any data inconsistencies or operational disruptions.

In addition, an extensive training program was developed to ensure smooth user adoption of the new system. This included hands-on training sessions, user manuals, and ongoing support to address any queries or issues. Rigorous testing was conducted throughout the development process. This included functional testing, performance testing, and user acceptance testing to ensure the system met all requirements and was free of defects. After deployment, the system's

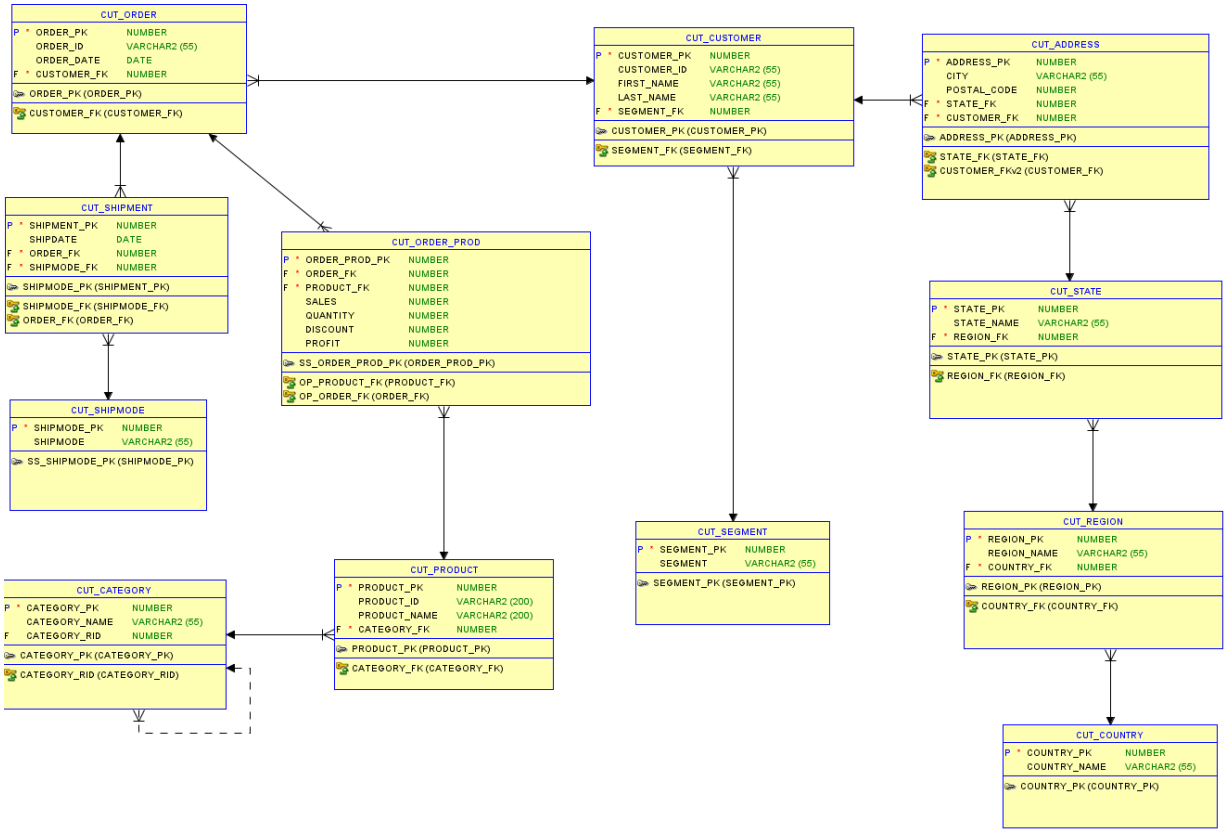
performance was continuously monitored. Feedback from users was actively sought and used to make further improvements, ensuring that the system remained effective and relevant to the company's evolving needs.

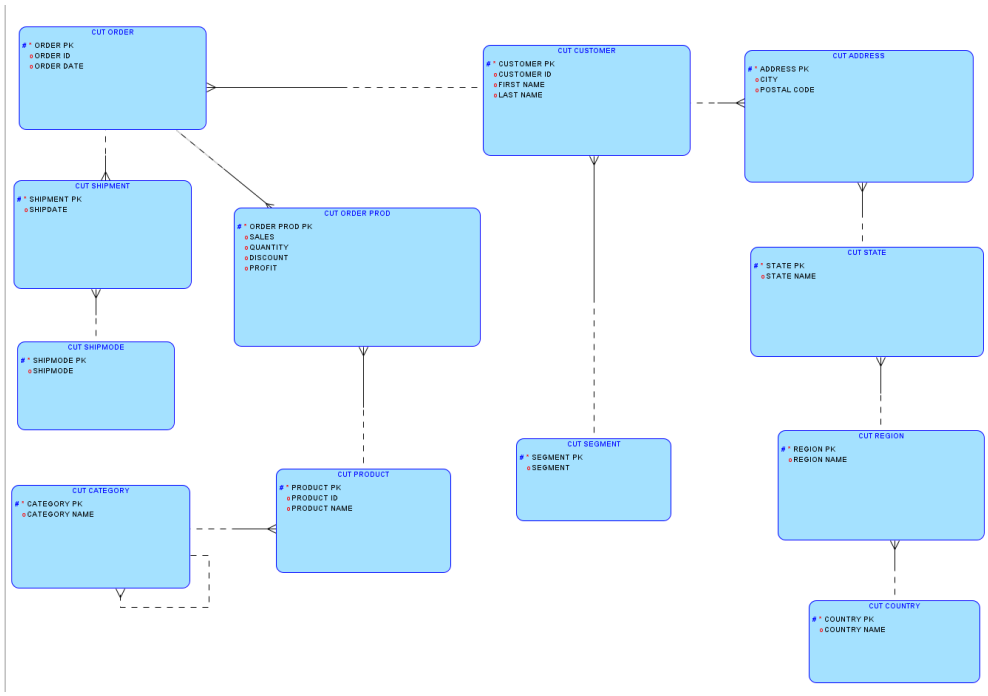
In summary, the approach and methodology for the POMS project combined a deep understanding of Chongqing United Technology Inc.'s unique requirements, industry best practices, agile development principles, and a strong focus on user experience, data security, and regulatory compliance. This comprehensive strategy ensured the development of a robust, scalable, and user-friendly system that addressed the company's current challenges and positioned it for future growth.

Results

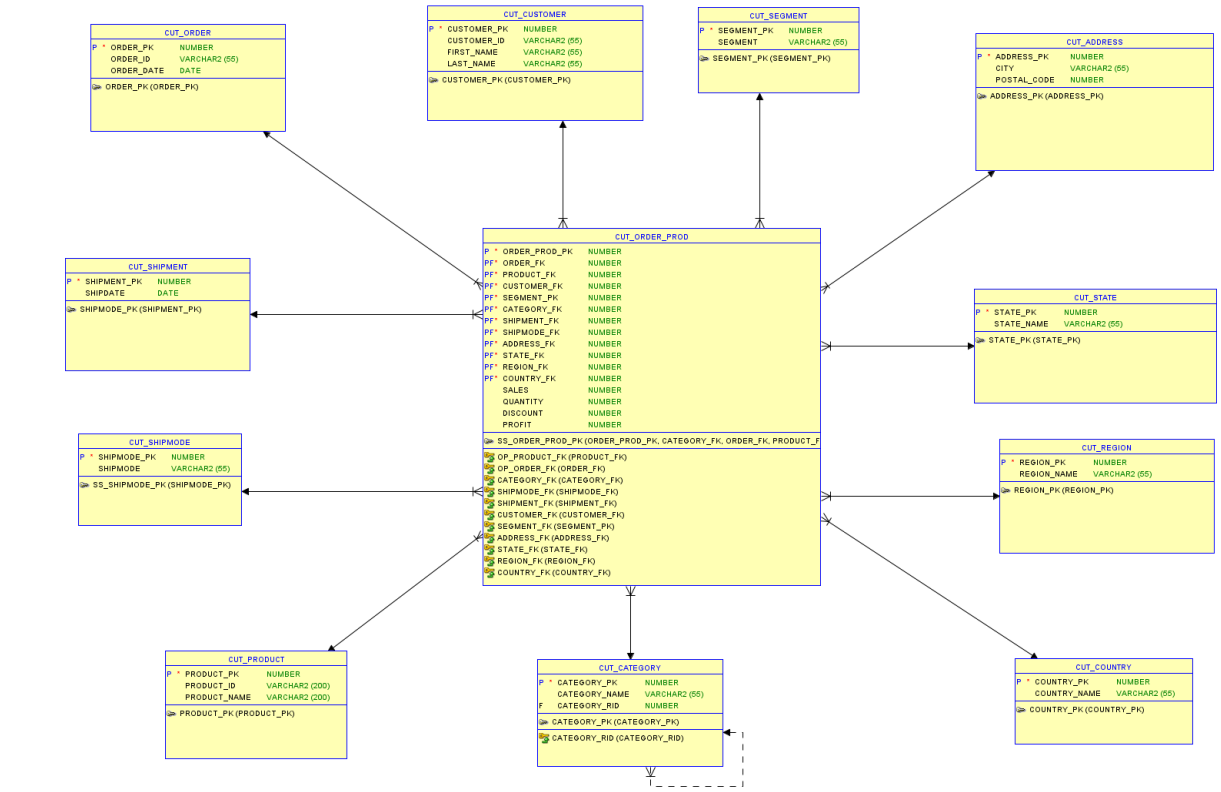
The Product Order Management System (POMS) project for Chongqing United Technology Inc. culminated in the successful development and implementation of a comprehensive system tailored to the company's specific needs in order management and international trade. The custom-developed POMS effectively streamlined the company's order and production management processes. It includes modules for order placement, inventory management, production scheduling, order tracking, and reporting, all integrated into a seamless system. This integration has led to improved operational efficiency, reduced manual errors, and enhanced overall productivity. The system boasts a user-friendly interface, making it accessible for various users, including management, staff, and clients. The GUI (Graphical User Interface) developed as part of the POMS enables easy navigation and management of orders, contributing to faster adoption and reduced training requirements. One of the notable achievements of this project is the creation of a dashboard using POWER BI. This dashboard allows users to understand order-product performances with various characteristics, offering insights into sales trends, inventory levels, production schedules, and customer preferences. This feature significantly enhances data-driven decision-making within the company. In conclusion, the POMS project has successfully delivered a custom, scalable, and efficient order management system that aligns with Chongqing United Technology Inc.'s strategic objectives. It marks a significant step in the company's digital transformation journey, positioning it well to handle the complexities of international trade and supplier management effectively. The POWER BI dashboard, as an integral part of this system, plays a crucial role in providing actionable insights, thereby enhancing the decision-making process and contributing to the company's overall success.

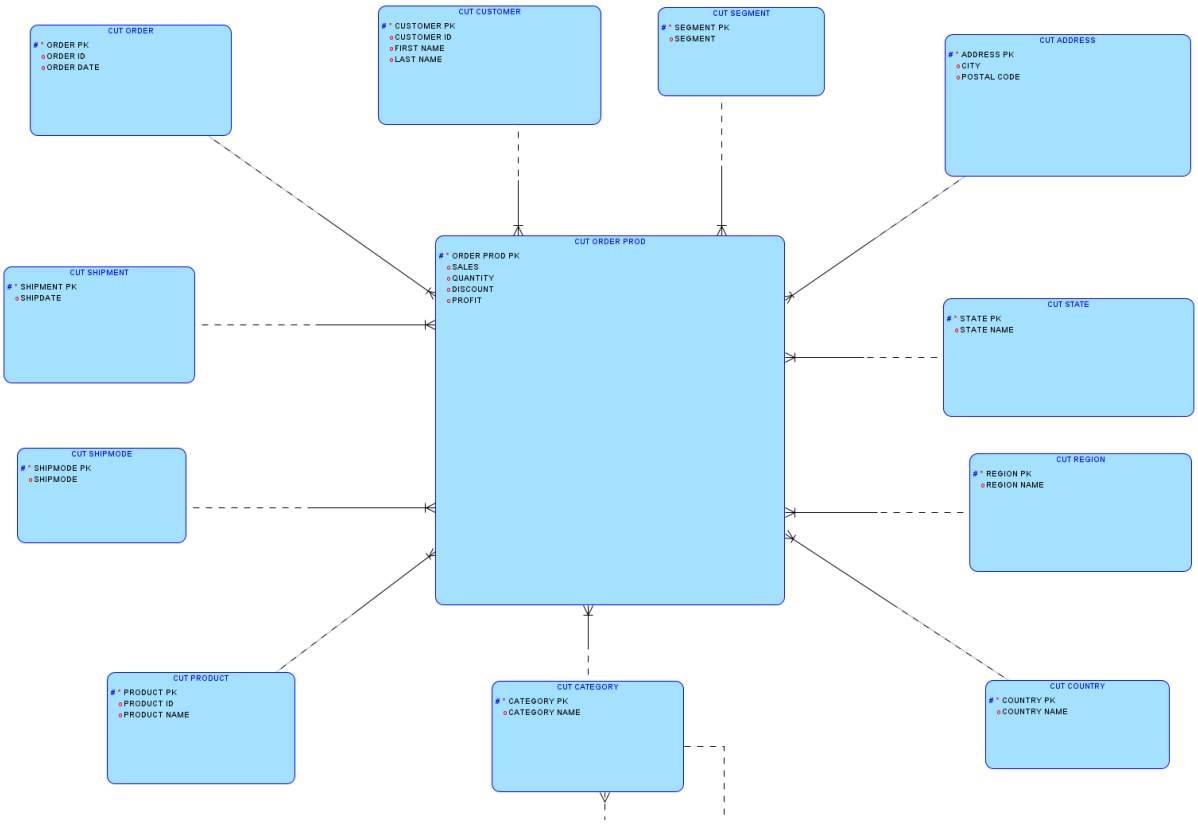
Database Model



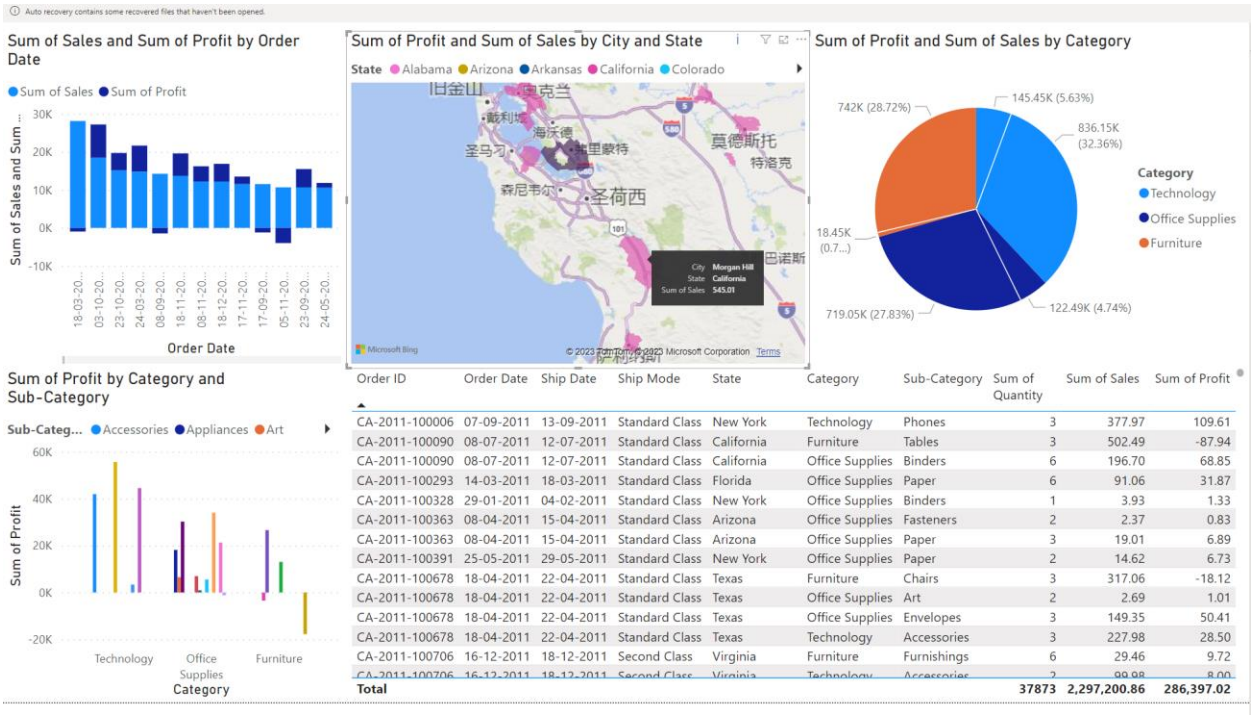


Data Warehouse Model





Power BI Dashboard



Order ID	Order Date	Ship Date	Ship Mode	State	Category	Sub-Category	Sum of Quantity	Sum of Sales	Sum of Profit
CA-2011-100006	07-09-2011	13-09-2011	Standard Class	New York	Technology	Phones	3	377.97	109.61
CA-2011-100090	08-07-2011	12-07-2011	Standard Class	California	Furniture	Tables	3	502.49	-87.94
CA-2011-100090	08-07-2011	12-07-2011	Standard Class	California	Office Supplies	Binders	6	196.70	68.85
CA-2011-100293	14-03-2011	18-03-2011	Standard Class	Florida	Office Supplies	Paper	6	91.06	31.87
CA-2011-100328	29-01-2011	04-02-2011	Standard Class	New York	Office Supplies	Binders	1	3.93	1.33
CA-2011-100363	08-04-2011	15-04-2011	Standard Class	Arizona	Office Supplies	Fasteners	2	2.37	0.83
CA-2011-100363	08-04-2011	15-04-2011	Standard Class	Arizona	Office Supplies	Paper	3	19.01	6.89
CA-2011-100391	25-05-2011	29-05-2011	Standard Class	New York	Office Supplies	Paper	2	14.62	6.73
CA-2011-100678	18-04-2011	22-04-2011	Standard Class	Texas	Furniture	Chairs	3	317.06	-18.12
CA-2011-100678	18-04-2011	22-04-2011	Standard Class	Texas	Office Supplies	Art	2	2.69	1.01
CA-2011-100678	18-04-2011	22-04-2011	Standard Class	Texas	Office Supplies	Envelopes	3	149.35	50.41
CA-2011-100678	18-04-2011	22-04-2011	Standard Class	Texas	Technology	Accessories	3	227.98	28.50
CA-2011-100706	16-12-2011	18-12-2011	Second Class	Virginia	Furniture	Furnishings	6	29.46	9.72
Total							37873	2,297,200.86	286,397.02

Repository of Data Sets and Code

The data sets created for this project and the code for the tool may be found at:

https://www.kaggle.com/datasets/addhyay/superstore-dataset

Summary of Results

In conclusion, our analysis of the data from 2020 to 2022 revealed significant trends in sales and order management due to the COVID-19 pandemic. We found that during this period, there was a substantial increase in online orders and sales, reflecting the shift in consumer behavior and business operations induced by the pandemic. This uptick in online commerce was particularly pronounced in cities located along the East and West coasts of the United States, indicating a regional preference or greater adaptability to online ordering systems in these areas.

Conversely, the pandemic had a noticeable adverse impact on offline sales. Traditional brick-and-mortar operations faced challenges due to lockdowns, social distancing mandates, and a general shift in consumer preference towards online shopping. This decline in offline sales was more evident in the middle states, suggesting a disparity in the impact of the pandemic on different regions of the country.

These findings underscore the importance of flexibility in sales channels and the need for businesses to adapt to changing market dynamics and consumer preferences. The increase in online sales along the coasts versus the decline in offline sales in the middle states highlights the geographical variations in consumer behavior and business resilience during the pandemic. This analysis provides valuable insights for businesses in strategizing their operations and sales approaches in response to future crises or market shifts.

Risk Analysis

Possible Risks and Mitigation Strategies

1. System Integration Challenges

Risk level: Moderate

Description: Integrating the new POMS with existing systems, databases, and third-party applications might face unforeseen challenges, leading to delays or functional issues.

Mitigation Strategy:

- Conduct a thorough systems audit before development to understand integration points and potential challenges.
- Allocate additional time in the project timeline specifically for integration testing.
- Consider using middleware or integration platforms if necessary.

2. Scope Creep

Risk level: Significant

Description: Additional requirements or changes might emerge during the development phase, potentially derailing the project timeline and budget.

Mitigation Strategy:

- Ensure a robust initial requirement gathering phase.
- Implement a strict change management protocol, where any changes to the initial requirements are thoroughly evaluated for their impact on the project.
- Maintain regular communication with stakeholders to manage expectations.

Issues Encountered

While working on the Product Order Management System (POMS) project for Chongqing United Technology Inc., I encountered several issues, all of which were minor and did not have a major impact on the project. These issues were promptly addressed, ensuring the project's timely completion with high quality. The resolution of these issues was greatly aided by the guidance of the project mentor, Dr. Dan Stone, through three critical online meetings.

Limited Programmer Expertise in Specific Technologies: The first issue faced was a gap in the programming expertise with some of the specific technologies chosen for the project. This challenge was anticipated and partly covered under our risk management strategy. Dr. Stone played a pivotal role in these training sessions, providing expert guidance and resources such as Power BI to bridge the knowledge gap.

Constraints Due to Technology Stack Limitations: The project encountered limitations due to the pre-decided technology stack, which restricted the exploration of alternative technologies that might have offered certain advantages. However, Dr. Stone’s expertise was instrumental in optimizing the chosen technology stack, ensuring that the system's performance and capabilities were not compromised.

Client Availability for Regular Interactions: Another challenge was scheduling regular interactions with the client, crucial for iterative feedback and system fine-tuning. While this was anticipated, the actual availability of the client varied. To manage this, we established a more flexible communication schedule.

Adapting Tools and Techniques to the Company’s Infrastructure: The integration of specific tools and techniques with the company's existing infrastructure posed some initial challenges. \

Budget Constraints: The project had to navigate budget constraints, which limited certain choices in terms of technologies and additional features. This was mitigated by prioritizing essential features and functionalities over desirable but non-critical ones.

In summary, the issues encountered during the POMS project were effectively managed through proactive strategies, training, flexible planning, and the invaluable guidance of Dr. Dan Stone. His mentorship was crucial in navigating these challenges, ensuring that each issue was resolved promptly and efficiently, and contributing significantly to the project's success.

Project Chronology and Critique

The project to develop the Product Order Management System (POMS) for Chongqing United Technology Inc. spanned 55 days, beginning on September 18, 2023, and concluding on December 1, 2023. This period was marked by a systematic progression through several key phases of development, each with its distinct set of activities and challenges.

Requirement Research and Project Planning (17 days, 9/18 - 10/10):

The project kicked off with intensive communication with the sponsor to understand the requirements, followed by gathering feedback from workers, which informed the project planning and scheduling. One critique here is the planning phase could have benefited from an iterative approach, allowing for adjustments based on early feedback from the sponsor.

Database Design (10 days, 10/11 - 10/24):

The design phase involved creating the physical and logical models of the database and establishing foreign keys, followed by database normalization and design finalization. A critique of this phase would be the need for more proactive risk management to anticipate and address the potential complexities in data relationships.

Database Code (10 days, 10/25 - 11/7):

Coding the database involved writing DDL scripts, establishing data stages, and normalizing separate tables. This phase encountered challenges with the incremental ETL for data warehousing, which were promptly resolved with Dr. Dan Stone's assistance. More rigorous pre-testing of ETL scripts could have been employed to avoid these issues.

Data Visualization (10 days, 11/8 - 11/21):

Data visualization efforts included inserting data into Tableau, creating visualizations, applying graph filters, and performing data analysis. The phase concluded with the preparation

of a visualization tool report and training materials. Critically, the time allocated for training on the new visualization tools was slightly underestimated, which could have been extended for a smoother transition for end-users.

Graphical User Interface (8 days, 11/22 - 12/1):

The GUI design phase led to the creation of a user interface that allows for database connection and graphical interaction. Validation and testing were conducted to ensure functionality and user-friendliness. The critique for this phase would be the underestimation of the time required for thorough testing and validation, which could have been extended to ensure a more polished final product.

Project Delivery and Testing (4 days, 12/4 - 12/7):

The final stretch involved rigorous project testing and preparation for the final report. This phase was executed smoothly, with no significant issues encountered, thanks in part to the rigorous testing conducted in previous phases.

Throughout the project, regular online meetings with Dr. Dan Stone proved invaluable, particularly in resolving technical challenges and ensuring best practices were followed. His mentorship helped keep the project on track and maintain high quality in the deliverables.

In critique, while the project was completed successfully and on time, there are areas that could have been improved. Specifically, allowing more time for unforeseen challenges and incorporating more iterative feedback loops at various stages would have added value. Additionally, investing in more in-depth upfront training for the programming on the specific technologies used could have reduced some of the initial slowdowns in the development phase. Overall, however, the project manager demonstrated adaptability and a strong problem-solving approach, enabling the successful delivery of the POMS.

Lessons Learned

Throughout the course of planning and conducting the Product Order Management System (POMS) project, I acquired valuable knowledge and honed various skills that were both challenging and enlightening. This project served as an extensive learning platform, offering insights into the intricacies of system development and project management in a real-world context.

On the technical front, I mastered the integration of various technologies to create a cohesive system. Skills such as database design, writing Data Definition Language (DDL) scripts, and performing ETL processes for data warehousing were developed. Learning to visualize data effectively using Tableau and designing a user-friendly graphical user interface (GUI) were among the key technical skills acquired.

In the realm of project management, the project underscored the importance of meticulous planning, scheduling, and task coordination. I learned to adapt project plans dynamically to accommodate unexpected changes and to ensure that deliverables were completed within the set timeframe.

The adoption of Agile methodologies was a significant learning curve that allowed for greater flexibility and responsiveness to changing requirements. The iterative process of development, coupled with regular feedback, was instrumental in refining the POMS to meet the sponsor's needs precisely. Effective communication and stakeholder management were paramount throughout the project. Engaging with the sponsor and incorporating feedback from workers taught me the value of active listening and collaboration in achieving project objectives.

Finally, the mentorship provided by Dr. Dan Stone was a testament to the impact that effective guidance and leadership can have on a project. The POMS project was a comprehensive learning experience that went beyond the acquisition of new technical skills. The successful delivery of the project, as planned and with the expected quality, was a testament to the hard work, adaptability, and the valuable contributions from both the mentor and sponsor.

Conclusion and Summary

The development of the Product Order Management System (POMS) for Chongqing United Technology Inc., was a multifaceted endeavor that challenged and expanded my capabilities in system development and project management. From the initial conception to the final deployment, each phase of the project was marked by a strategic blend of meticulous planning, technical development, and continuous learning.

The project's success hinged on the effective translation of the company's needs into a robust and scalable system capable of managing the intricacies of international trade and supplier quality management. The POMS was carefully designed to improve operational efficiencies, streamline order processing, and enhance inventory management, all while offering a user-friendly interface to facilitate client satisfaction and internal workflows.

The project also underscored the importance of effective stakeholder engagement. Regular communication with the sponsor and feedback from workers were integral in shaping the system's development, ensuring that the final product was aligned with the end-users' needs.

From a technical standpoint, the project afforded the opportunity to delve deeply into database management, data warehousing, and visualization tools. These technical skills, combined with a reinforced understanding of project management principles, such as risk management and scheduling, contributed to the project's overall success.

Finally, I would appreciate the guidance provided by the project mentor, Dr. Dan Stone, was invaluable, offering expert insights that helped navigate challenges and ensure quality outcomes.

In conclusion, the POMS project not only achieved its goals but also served as a catalyst for professional growth for me. It was a practical demonstration of how theory and practice converge in the field of system development and project management. The lessons learned from this experience are manifold, ranging from technical skill enhancement to the importance of communication and adaptability in complex project environments. The successful completion of this project is a testament to the study and hard work from MASY program in NYU, the sponsor's engagement, and the mentor's guidance, culminating in a product that will serve Chongqing United Technology Inc. for years to come.

Limitations, Recommendations and Scope for Future Work

Even as this project was able to deliver as expected, there are still some limitations within this project and some of the limitations may be improved in the future similar projects in NYU MASY.

Limitations:

As the project was planned to complete the webpage and database design and the website deployment within a time limitation of 14 weeks in fall semester, this also limited the scope of the project to only include information integration for the company's product, customer, and orders.

The sponsor will be responsible for expenses related to deploying and maintaining the application programming interface such as the domain name of the website.

Recommendations:

For future projects within the MASY program, a primary recommendation is to allocate additional time for students to engage with sponsors and thoroughly understand the actual needs and requirements before the semester schedule of the standard 14-week. This extended preliminary phase would allow for deeper initial research, fostering a more comprehensive understanding of the sponsor's industry, competitive landscape, and specific challenges.

Scope:

The primary objective of the Product Order Management System (POMS) for Chongqing United Technology Inc. is to streamline order processing, reduce manual errors, enhance customer satisfaction, and bolster the company's reputation in order management.

1. Quality:

The quality of the final deliverable will be determined by a series of benchmarks:

- System's adherence to the outlined requirements and functionalities.
- Number of defects or issues identified post-implementation.
- Feedback from end-users regarding ease of use, efficiency, and reliability.
- System's performance metrics under various loads and conditions.
- Adherence to industry standards like VDA6.3, IATF16949, and ISO9001.

2. Time:

The project is expected to span about three months, given its urgency to maintain the company's competitive edge.

Milestones include:

- Project Acceptance document signed by the sponsor. Due to September 29, 2023
- Requirements gathering and system design: 1 month. Due to October 12, 2023
- Development: 1 months. Due to November 12, 2023
- Testing and Quality Assurance: 1 month. Due to December 12, 2023

3. Resource Allocation:

The computer equipment for programming is owned by the project manager and the computer equipment for analysis is owned by the project sponsor.

4. Out of Scope Activities:

Integration with third-party systems not initially mentioned in the requirements.

Extending the system to handle other operational areas beyond order management.

Mobile application version of the POMS.

Advanced analytics and business intelligence features.

5. Constraints:

- Programmer Expertise: The project assumes the availability of skilled programmers familiar with the necessary technologies.
- Technology Stack: The POMS will be developed using a specific technology stack decided upon initial consultations. Alternative technologies, even if they offer certain advantages, will not be used unless specified.
- Client Availability: While regular interactions with the client are crucial, it's assumed based on initial discussions that the client will be available for bi-weekly meetings and ad-hoc discussions.
- Tools and Techniques: Specific tools for analysis and development will be used based on their compatibility with the company's existing infrastructure and the project's requirements.
- Budget: There might be a fixed budget allocated for the project, constraining certain choices in terms of technologies or additional features.

Literature Survey

Introduction

In the evolving landscape of technological advancement, enterprises face the perpetual challenge of integrating emerging technologies to enhance internal processes while mitigating the risks of adoption. The motivation behind the Product Order Management System (POMS) for Chongqing United Technology Inc. is rooted in the company's need to streamline order processing and production management across international borders, ensuring accuracy, efficiency, and customer satisfaction in an increasingly competitive and digital marketplace.

The literature review herein is crafted to underpin the development of POMS by providing a synthesis of current knowledge and practices in technology adoption, risk management, and system development. The sources selected for analysis encompass a breadth of perspectives on supply chain management, product data management, and the application of rule-based reasoning in computational systems. The analysis is guided by a set of criteria focused on relevance to POMS objectives, insights into current processes without such a system, and evidence of benefits and best practices in similar technological implementations.

The organization of this review is thematic, categorizing literature by the motivations for system development, current operational processes, the rationale behind the adoption of specific technologies, and the algorithmic foundations of POMS. By examining the synthesis of data and knowledge within these categories, the review aims to illuminate the rationale behind POMS development decisions and to document the efficacy of the chosen methodologies.

In defining the scope of this literature review, attention was paid to research that directly informs the POMS project, including studies on the efficiency of rule-based systems in supply chain management and the use of Python and SQL in developing robust, user-friendly platforms.

What is a POMS?

The Product Order Management System (POMS) is envisioned as a transformative tool for Chongqing United Technology Inc., specifically designed to refine and enhance the management of product orders through automation and sophisticated data handling. The core purpose of POMS is to address the intricacies of order tracking, inventory management, production scheduling, and customer fulfillment in an integrated, efficient, and user-friendly system.

POMS emerges as a solution to several challenges currently faced by the company. With international operations and complex supply chains, the ability to maintain accurate and timely order processing is not just an operational necessity but a strategic imperative. The system is structured to encompass several modules that address distinct facets of the order and production management process, each tailored to the needs of different stakeholders within the company, from sales personnel to logistics managers. The utilization of Python and SQL in its development reflects a strategic choice for robustness and scalability, enabling the system to handle vast datasets and complex processing requirements while remaining accessible to users across the organization.

Drawing on insights from the literature, the development of POMS is underscored by the recognition of the importance of such systems in enhancing operational efficiency and customer satisfaction. Studies on the application of rule-based reasoning in computational systems

highlight the potential for such technology to provide fast, accurate, and optimized decision-making capabilities, directly contributing to the company's bottom line.

How does POMS leverage the efficiency?

Dropship data management without a data management system can make it difficult for drop shippers to manage and view customer, product, and supplier data (Ramdani, 2023). Accuracy, fast and efficiency in performing digital transactions are needed especially during the pandemic covid 19, this need to be done for persevering and improving customer confidence (Mufadhol, 2023). It is found that the outsource cycle time from the searching of potential suppliers to the allocation of order, as well as the delay in delivery of goods of suppliers after order allocation, are greatly reduced (Choy, 2003). Since fast and precise analysis are necessary for companies to take a decision with the purpose of obtaining the maximum benefit from any activities and transactions, the POMS with improved decision-making and operational efficiency would be attracted by the customers and producers. One of the most challenging tasks in the engineering profession is to develop new products that have the shortest lead-time, highest quality and lowest cost with optimal life-cycle consideration (Krause, 1993). For example, the similar product data management systems are produced to ensure that the right information in the right form is available to the right person at the right time in 2001. When properly implemented, PDM systems will result in faster work, fewer errors, less redundancy, and smoother workflow for an organization (Liu, 2001). On the other hand, while designing the system, the main emphasis is placed on dynamic process adaptation which is demanded by product development processes. Use of intelligent agents is proposed to achieve the adaptation at run time (Kim, 2001). So we need to understand that the management system is not just a repository of information but also an intelligent tool capable of adapting to changing product development

processes, which would be crucial for the client's dynamic and customer-centric business model. Moreover, the benefits pertaining to product configuration system stretch beyond operational performance, as it offers the company a way to incorporate into organizational memory product knowledge otherwise retained by individual employees (Forza, 2002). An integration of the PMI systems functionality with the PDM systems enables engineering teams to collaboratively on a real-time basis manage project and related product information in a dispersed product development organization (Mesihovic, 2004). By implementing environmentally responsible characteristics through eco-design programs, employees, customers, and the world community benefit from a consistent approach to the environmental management of wireless hardware products (Donnelly, 2006). The POMS could also establish a connection for all employees to communicate about the diverse findings in product-order placements with different point of views. In addition to uncertain customer demands, the system experiences uncertain returns from customers (DeCroix, 2005). If several ISs contain some of the same information, it is important that it be updated in all systems when it is changed (Svensson, 2002). Various database systems are used during the product development process to store and retrieve data about products (Svensson, 2001). The POMS could also solve for difficult situations since the development of online service allow customers to return their orders in a long time period, the accuracy and efficiency for returned orders would be a new challenge for the sponsors. Understanding the effects of returns and recovery on inventory costs and system performance is essential for creating a POMS that optimizes the balance between holding costs, backorder costs, and procurement savings.

Conclusions

The literature underscores the critical need for systems like POMS in enhancing digital transaction efficiency and customer confidence, as emphasized by Mufadhol (2023) and Ramdani (2023). The benefits of reduced cycle times and delays in order fulfillment, identified by Choy (2003), align closely with POMS's objectives to streamline Chongqing United Technology Inc.'s operations. Intelligent adaptation and error reduction in product management systems, highlighted by Kim (2001) and Liu (2001), are central to POMS's design, which aims to surpass existing models in flexibility and efficiency. The research reveals both the advancements and gaps in current product management systems, informing the development of POMS. Insights into product returns and real-time data management from DeCroix (2005) and Mesihovic (2004) have directly influenced POMS's unified approach. This literature review has thus played a pivotal role in shaping POMS, ensuring it is grounded in proven methodologies while addressing the dynamic needs of modern enterprises.

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Appendix A - Project Acceptance Document

Project Name: _Product Order Management System (POMS) for Chongqing United Technology Inc._

Student Name: _____Shuai Zhi_____

Sponsoring Organization: _ Chongqing United Technology Inc._____

Project Sponsor Name and Title: _Wang, Hongjie, President_____

Project Sponsor Contact Information (email and phone): _whj@cqunited.com, (+86)17734578333_____

Planned Start Date: September 12, 2023___ Planned End Date: _December 12, 2023__

PROJECT PLAN

At project start, show the project goal; the project objectives and related metrics to be used to show successful project completion. Sponsor should sign to indicate agreement.

Project Goal_____ This project entails the design and development of a Product Order Management System (POMS).

a. Establish the order product database with both logical and relational model.

Measurement: Full version due by October 24th, 2023

b. Establish the ETL function and incremental ETL test for the database warehousing.

Measurement: Full version due by November 7th, 2023

c. Establish the Data Visualization function by using the tableau from Salesforce.

Measurement: Full version due by November 21st, 2023

d. Establish a webpage or graphical user interface (GUI) to query the order information.

Measurement: Full version due by November 30th, 2023

I agree with the above planned project goal, project objectives, and related metrics.

____Hongjie Wang_____ _____**September 26, 2023**____
Project Sponsor Signature **Date**

RESULTS
(To be filled out and signed at the end of the project)

PROJECT RESULTS

Planned Start Date: September 12, 2023___ **Planned End Date: December 12, 2023___**

Actual Start Date: September 12, 2023___ **Actual End Date: December 12, 2023___**

If actuals differ from planned dates, the revised dates (Actual) are accepted by the sponsor if initialed here: **Sponsor Initials** __HW___

Project Goal

Was the project goal achieved as planned? ■Yes ☐No **Sponsor Initials** _ HW _____
Reason missed: _____
If NO, please explain why this is an acceptable deviation. __All of the objectives are achieved on time. _____

Project Objective #1: <as shown above in Plan section>
Did the student's project meet this objective with associated measures and metrics as established at project inception?

Objective#1 ■has or ☐has not been met. **Sponsor Initials** _ HW _____
If not met please explain why this is or is not an acceptable deviation.

Objective#2 ■has or ☐has not been met. **Sponsor Initials** _ HW _____
If not met please explain why this is or is not an acceptable deviation.

Objective#3 ■has or ☐has not been met. **Sponsor Initials** _ HW _____
If not met please explain why this is or is not an acceptable deviation.

Objective#4 ■has or ☐has not been met. **Sponsor Initials** _ HW _____

Sponsor's Overall Evaluation of student's performance: _ All of the objectives are achieved on time. The whole project is perfectly finished. _____(*expand, as necessary*)

ACCEPTANCE

(To be filled out and signed at the end of the project)

PROJECT ACCEPTANCE

■ Project was completed satisfactorily and is hereby accepted

☐ Project was completed satisfactorily but did not meet <u>all</u> objectives, as shown above. The Project is, nevertheless, accepted.

_____ Hongjie Wang _____ _____**November 28, 2023**_____

Project Sponsor Signature **Date**

_____ Shuai Zhi _____ _____**November 28, 2023**_____

Student Signature **Date**

Appendix B - Project Sponsor Agreement

Goals of the Program

For Participating Organizations

- Begin relationship with New York University
- Receive help from highly trained NYU graduate student
- Provide internship opportunity for NYU graduate student
- Receive assistance at no cost

For NYU Graduate Students

- Manage and implement a meaningful project aligned with their professional and educational goals
- Hands-on experience interacting with a start-up or operational small business or organization
- Earn credit toward completion of graduate degree by conducting an unpaid Applied Project under the mentorship of an NYU-SCPS professor.

Project Sponsor and Student Responsibilities

- Student prepares project planning documents
- Sponsor reviews and approves student's project plan
- Student submits project plan to faculty supervisors for approval
- Student conducts project according to plan
- At predetermined milestones sponsor reviews and approves status reports submitted by student
- Status reports reviewed and evaluated by faculty supervisors to assure student effort and project meet course requirements
- Project sponsor and student participate in periodic project reviews with NYU
- At project completion project sponsor completes evaluation forms
- Student prepares final report

Project Selection Process

- Project Evaluation Committee reviews proposed projects
- Projects are:
  - Relevant to MS degree course content
  - Significant to the participating organization
  - Substantial in terms of duration and scope
  - Challenging to the student
  - Capable of being measured against predetermined goals

The MS in Management and Systems

Concentrations in:

- Strategy and Leadership
- Systems Management
- Database Technologies
- Enterprise Risk Management

Typical Participating Student Profile

- Students selected to participate in this program meet stringent criteria
- Have completed all coursework
- High achievers with highest level GPAs and strong academic credentials

- 2-10 years of business experience
- Highly motivated for success

Sponsor and Project Information

Type of Organization	■ For Profit ☐ Not for Profit				
Name of Organization	Chongqing United Technology Inc.				
Address	23-18, South Tower of Century Emperor No.38 Jianxin North Road				
City	Jiangbei	State	Chongqing	Zip	400020 China
Project Sponsor	First Name	Hongjie	Last Name	Wang	
Title	President of Chongqing United Technology Inc.				
Phone	(+86)17734578333				
Email	whj@cqunited.com				
Web Site	https://www.cqunited.com/				
Type of Business	Parts Sourcing Firm Facing to North American Markets with North American Sales Team and Warehouse				

Student Name	Shuai Zhi
Project Title	Product Order Management System (POMS) for Chongqing United Technology Inc.

Description of Project	
The goal of this project is to develop a comprehensive Product Order Management System (POMS) to address the business problem of inefficient order and production management within our company. Currently, we face challenges in tracking and processing client orders, managing inventory, and ensuring timely delivery. The opportunity lies in streamlining these processes, enhancing client satisfaction, and improving overall operational efficiency.	
Estimated Hours of Student Participation	300

Anticipated Results
We anticipate establishing a robust order product database that incorporates both logical and relational models. This will serve as the backbone of the POMS, allowing for efficient order tracking, management, and reporting. The data visualization capabilities will empower stakeholders with insights into order patterns, performance metrics, and other key data points. We also plan to develop a webpage or graphical user interface (GUI) that will allow users to easily query and view order information. The whole project will enhance the Project management skills and User needs analysis skills. It also gives me the opportunities to exercise my Database architecture skills and web development skills.

Knowledge and expertise student will need to be able to complete the project
● Project management: required to manage the project properly. ● Database Design and management. ● Data visualization design: to develop a webpage or graphical user interface. ● Business analysis: to collect and document the application requirements.

Will the project sponsor be available for periodic meetings with NYU to review progress, address questions and concerns with the professor supervising the program? *This is a requirement for the program*	■ Yes ☐ No
Describe the form and frequency of supervision of the student by the Project Sponsor. ● The Project Sponsor and the student will hold weekly progress meetings. ● The student will provide the Project Sponsor with a bi-weekly status report. ● The Project Sponsor will be available for periodic meetings with NYU.	

Sponsor Agreement

Students are interns, not professional consultants. NYU is <u>not</u> responsible for the outcomes of projects undertaken by students. Work is on a best-efforts basis; no guarantees or warranties are expressed or implied. Organization is responsible for evaluating work presented, determining its value and whether to use it or not. Some projects may require on-going management or even re-work by the Organization after the student completes their Applied Project.

Please note that in order to post an unpaid position, the internship must encompass all 6 components below:

1. The internship, even though it includes actual operation of the facilities of the employer, is similar to training which would be given in an educational environment;
2. The internship experience is for the benefit of the intern;
3. The intern does not displace regular employees, but works under close supervision of existing staff;
4. The employer that provides the training derives no immediate advantage from the activities of the intern; and on occasion its operations may actually be impeded;

5. The intern is not necessarily entitled to a job at the conclusion of the internship; and
6. The employer and the intern understand that the intern is not entitled to wages for the time spent in the internship.

I have read and agree with the information shown in the Terms and Conditions for employers contained on the following web page(s): http://www.nyu.edu/life/resources-and-services/career-development/employers/post-a-job/terms-and-conditions.html

Please complete and sign this form in the space provided below and return to the course professor via the student who will upload the document to the course drop-box. For any questions, please email the professor: Prof. Israel Moskowitz im36@nyu.edu.

I agree to all of the above

Participating Organization _Chongqing United Technology Inc. __ Date __ Sept 26, 2023__

By (signature): _____Hongjie Wang_____
Project Sponsor

Printed Name: _____Hongjie Wang_____

Title: _____ President of Chongqing United Technology Inc._____

Student Agreement

Students who are planning to conduct an unpaid Applied Project must read and agree to the "Important Considerations Before Accepting a Job or Internship" contained on the following web page(s): http://www.nyu.edu/life/resources-and-services/career-development/find-a-job-or-internship/important-considerations-before-accepting-a-job-or-internship.html.

Students do not register their Applied Project with the Wasserman Center.

I agree to the all of the above

Student Name (Print) _____Shuai Zhi_____ Date __Sept 26, 2023__

Signature: _____ Shuai Zhi _____

Appendix C - Project Charter

Project Manager: Shuai Zhi

Sponsor: Wang, Hongjie
President of Chongqing United Technology Inc.
Email: whj@cqunited.com

Prepared by: Shuai Zhi

Name and Location of Client Organization:
23-18, South Tower of Century Emperor
No.38 Jianxin North Road,
Jiangbei, Chongqing 400020 China

1. Project Goal

The goal of this project is to develop a comprehensive Product Order Management System (POMS) to address the business problem of inefficient order and production management within our company. Currently, we face challenges in tracking and processing client orders, managing inventory, and ensuring timely delivery. The opportunity lies in streamlining these processes, enhancing client satisfaction, and improving overall operational efficiency.

2. Problem/Opportunity Definition

The company's commitment to quality extends to rapid on-site response with dedicated quality inspectors at major suppliers, ensuring real-time quality monitoring and quick issue resolution. Additionally, their North American Sales Team and Warehouse, in conjunction with CMT Imports, provide a strong market presence, offering suppliers ample quotation opportunities and minimizing delivery risks through safety stock in North American

warehouses. Chongqing United Technology Inc. stands as a trusted partner for businesses seeking top-quality sourcing and engineering support in China.

However, Since the products and orders from Chongqing United Technology Inc. involve international trade between China and the United States, a simple and user-friendly order and product management system is particularly important. The company's management can use the management system to assess the sales performance of specific products and year-on-year changes, enabling informed business decisions. Additionally, the system's visual features can assist in management tasks. Employees can also use the management system to view the shipping status of all orders and products, facilitating communication with overseas clients.

3. Proposed Project Description

This project entails the design and development of a Product Order Management System (POMS). The system will encompass various modules, including order placement, inventory management, production scheduling, order tracking and reporting by using both Python and SQL Database designer to connect with each other. It will facilitate seamless communication between clients, sales, production, and logistics teams. Users will be able to create, modify, and track orders, while administrators will gain visibility into the entire order and production lifecycle. The result will be a robust and user-friendly software solution that optimizes order-to-delivery processes, ultimately enhancing client satisfaction and operational efficiency.

4. Project Sponsor(s)

Wang, Hongjie
President of Chongqing United Technology Inc.
Email: whj@cqunited.com

5. Objectives

a. Establish the order product database with both logical and relational model.

Measurement: Full version due by October 24th, 2023

b. Establish the ETL function and incremental ETL test for the database warehousing.

Measurement: Full version due by November 7th, 2023

c. Establish the Data Visualization function by using the tableau from Salesforce.

Measurement: Full version due by November 21st, 2023

d. Establish a webpage or graphical user interface (GUI) to query the order information.

Measurement: Full version due by November 30th, 2023

6. Project Selection & Ranking Criteria

	Compliance/Regulatory
X	Efficiency/Cost reduction
	Revenue increase

The Product Order Management System (POMS) will significantly benefit the company and its clients. The primary benefits include:

a. Improved Order Accuracy: POMS will reduce order errors, ensuring clients receive the correct products on time.

b. Efficient Production Planning: The system will optimize production schedules, reducing lead times and production costs.

c. Enhanced Client Experience: Clients will have real-time visibility into their orders and can track progress, leading to increased satisfaction.

d. Better Inventory Management: POMS will help maintain optimal inventory levels, minimizing overstock or understock situations.

e. Data-Driven Decision Making: The system will provide valuable insights into order trends and production bottlenecks, enabling data-driven decision-making.

Portfolio fit and interdependencies:

The Product Order Management System (POMS) for Chongqing United Technology Inc. is a strategic endeavor to bolster the company's commitment to product quality, business integrity, and exceptional customer support. As the company grows and strengthens its

association with global partners like CMT Imports in Ohio, USA, this project seamlessly fits within the larger portfolio aimed at enhancing operational efficiency. The POMS will likely interrelate with other internal systems, ensuring streamlined order management and reinforcing Chongqing United Technology's role as a customer's China branch and engineering consultant.

Project urgency:

Given the rapid growth and dynamic nature of Chongqing United Technology Inc., there is an immediate need to enhance order management processes for maintaining a competitive edge in the market. The urgency is underlined by the company's ongoing associations and collaborations, requiring a robust system in place within the next 6 months. Implementing the POMS will not only ensure timely deliveries but also uphold the company's reputation for product quality and exceptional customer support.

7. Cost/Benefit Analysis

Tangible Benefits:

1. Benefit: Streamlined order processing leading to reduced lead times.

Value & Probability: $50,000 annually, 80% probability.

Assumptions Driving Value: Faster order processing will lead to quicker product delivery, resulting in increased sales and customer satisfaction.

2. Benefit: Reduced manual errors in order management.

Value & Probability: $15,000 savings annually, 70% probability.

Assumptions Driving Value: Automation will decrease manual interventions, leading to fewer errors and related costs.

Intangible Benefits:

1. Benefit: Improved customer satisfaction due to efficient order processing.

Value & Probability: Difficult to quantify, 85% probability.

Assumptions Driving Value: Efficient and timely deliveries enhance customer trust and loyalty.

2. Benefit: Enhanced reputation and competitive advantage in the market.

Value & Probability: Difficult to quantify, 80% probability.

Assumptions Driving Value: A robust POMS will position the company as a leader in order management, attracting more partnerships and collaborations.

Cost Categories:

Internal Labor hours: 300 hours (for project planning, management, and internal testing)

External costs: $2,000 (for third-party integrations, cloud services, etc.)

Labor (consultants, contract labor): $5,000 (for specialized expertise, external consultants)

Equipment, hardware, or software: $7,000 (for servers, software licenses, and other infrastructure)

List other costs such as travel & training: $2,000 (for training sessions, workshops, and potential site visits)

Financial Return:

Assuming a total benefit of $20,000 annually (combining tangible benefits) and a total estimated cost of $16,000 for the project, the return in the first year post-implementation would be $4,000. The ROI will significantly increase in the subsequent years as the initial setup costs won't recur.

8. Assumptions

1. Skilled Personnel: The project assumes the availability of skilled programmers familiar with the technical infrastructure of Chongqing United Technology Inc. and the specific requirements of a Product Order Management System.

2. Cooperation of Partners: Successful project implementation assumes the cooperation and active involvement of associated partners and stakeholders, such as other organizations or departments within Chongqing United Technology Inc. and potential third-party vendors.

3. Client Availability: Regular and timely communication with the client is essential for addressing queries, seeking clarifications, and ensuring that the project remains aligned with its

objectives. It is assumed that the client, Chongqing United Technology Inc. will be available for meetings, discussions, and reviews on a regular basis.

9. Scope

Scope:

The primary objective of the Product Order Management System (POMS) for Chongqing United Technology Inc. is to streamline order processing, reduce manual errors, enhance customer satisfaction, and bolster the company's reputation in order management.

Quality:

The quality of the final deliverable will be determined by a series of benchmarks:

- System's adherence to the outlined requirements and functionalities.
- Number of defects or issues identified post-implementation.
- Feedback from end-users regarding ease of use, efficiency, and reliability.
- System's performance metrics under various loads and conditions.
- Adherence to industry standards like VDA6.3, IATF16949, and ISO9001.

Time:

The project is expected to span about three months, given its urgency to maintain the company's competitive edge.

Milestones include:

- Project Acceptance document signed by the sponsor. Due to September 29, 2023
- Requirements gathering and system design: 1 month. Due to October 12, 2023
- Development: 1 months. Due to November 12, 2023
- Testing and Quality Assurance: 1 month. Due to December 12, 2023

Resource Allocation:

The computer equipment for programming is owned by the project manager and the computer equipment for analysis is owned by the project sponsor.

Out of Scope Activities:

Integration with third-party systems not initially mentioned in the requirements.

Extending the system to handle other operational areas beyond order management.

Mobile application version of the POMS.

Advanced analytics and business intelligence features.

Constraints:

- Programmer Expertise: The project assumes the availability of skilled programmers familiar with the necessary technologies.
- Technology Stack: The POMS will be developed using a specific technology stack decided upon initial consultations. Alternative technologies, even if they offer certain advantages, will not be used unless specified.
- Client Availability: While regular interactions with the client are crucial, it's assumed based on initial discussions that the client will be available for bi-weekly meetings and ad-hoc discussions.
- Tools and Techniques: Specific tools for analysis and development will be used based on their compatibility with the company's existing infrastructure and the project's requirements.
- Budget: There might be a fixed budget allocated for the project, constraining certain choices in terms of technologies or additional features.

10. Risks and Mitigation Strategies

3. System Integration Challenges

Risk level: Moderate

Description: Integrating the new POMS with existing systems, databases, and third-party applications might face unforeseen challenges, leading to delays or functional issues.

Mitigation Strategy:

- Conduct a thorough systems audit before development to understand integration points and potential challenges.
- Allocate additional time in the project timeline specifically for integration testing.
- Consider using middleware or integration platforms if necessary.

4. Scope Creep

Risk level: Significant

Description: Additional requirements or changes might emerge during the development phase, potentially derailing the project timeline and budget.

Mitigation Strategy:

- Ensure a robust initial requirement gathering phase.
- Implement a strict change management protocol, where any changes to the initial requirements are thoroughly evaluated for their impact on the project.
- Maintain regular communication with stakeholders to manage expectations.

11. Communications Plan

1. Frequency: Weekly Meetings every Friday at 11am
2. Method: Zoom Meetings
3. Content: The agenda of these meetings will be to communicate the progress on the project and clarify any question/doubt that arises while working on the project.

12. Schedule Overview

Project Start Date: September 12th, 2023

Estimated Project Completion Date: December 12th, 2023

Major Milestones:

- Project Acceptance document signed by the sponsor. Due to September 29, 2023
- Requirements gathering and system design: 1 month. Due to October 12, 2023
- Development: 1 months. Due to November 12, 2023
- Testing and Quality Assurance: 1 month. Due to December 12, 2023

External Milestones Affecting the Project: the only external milestone affecting the project is the university semester timeline. The project, in any case, should be completed before the fall semester ends for New York University, as the project manager Shuai Zhi is a graduate student enrolled in the final semester.

13. Impact of Late Delivery

Even though there will be no adverse effects of late delivery, not meeting the deadlines is not encouraged or aimed for by either the project manager or the project sponsor. Since the project is being pursued in a university setting, it is also bound by the university timeline, for example, the semester dates. Late delivery of any of the objectives will make it harder for the project to be accomplished before the semester ends. However, necessary steps will be taken, and the situation will not arise.

14. Resources Required

Personnel:

Role	Responsibilities	Duration of work	Qualifications needed
Shuai Zhi	Front-end and Back-end development of the project	300 hours	Project management skills Financial analysis skills Data visualizations skills (Tableau) Research process and methodologies
Prof. Dan Stone	Quality Assurance	30 hours	Advance knowledge of Oracle Database

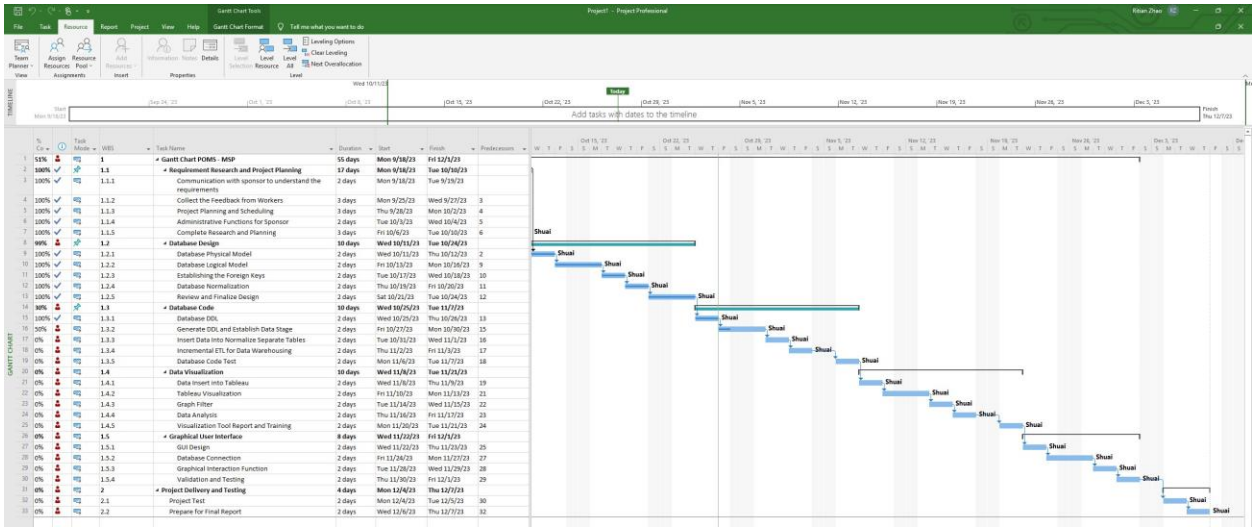
Technical support:

In order to improve the productivity of employees, technical upgrading of both software and hardware is necessary, and the outdated production facilities in the factory should be banned and replaced with more advanced and cost-effective production lines to enhance the efficiency of the order products transportation.

Data support:

Survey data from employees will be the basis of our decision making, we need a large number of democratic survey data from the grassroots and middle level workers to understand the needs and dissatisfaction of employees to modify and establish our product-order system.

15. Project Plan, Gantt



16. Project Evaluation

5. Project schedule
   A well-defined timeline has been developed for the project and each deliverable has been attached to a deadline. A weekly meeting will be held with the project sponsor to ensure that the deliverables are being achieved on the set deadline.

6. Project weekly status report and dashboard
   A Gantt chart has been created with direct access given to the sponsor so that with every deliverable being accomplished, the sponsor is notified, and a progress report is automatically created.

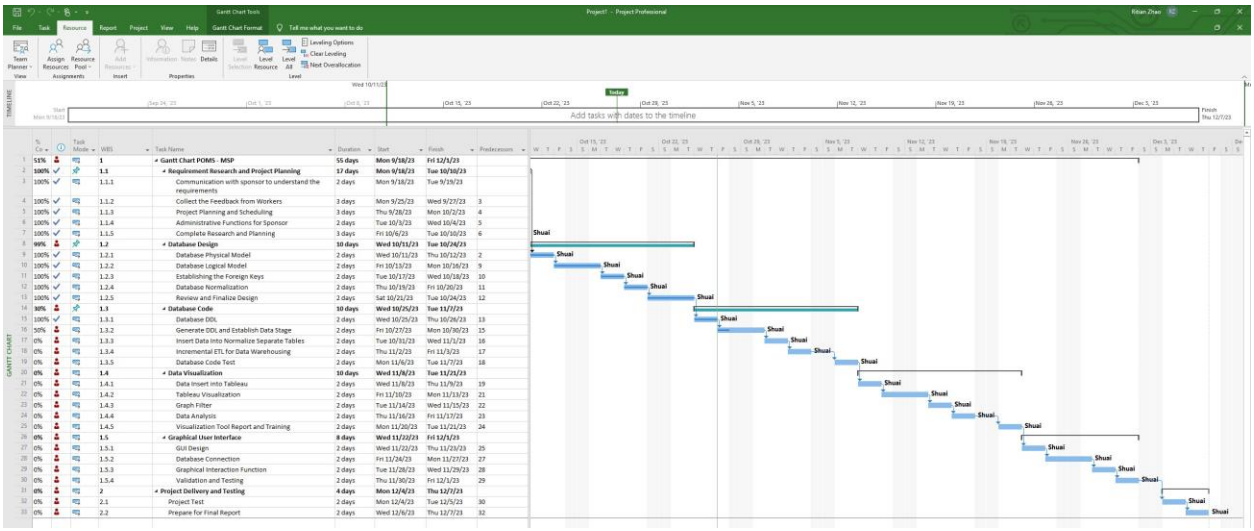
7. Project communication plan, issues log, risk register
   Weekly zoom meetings will be held with the client every Friday 11am wherein the project manager will verbally communicate the progress on the project.

8. Project status reports
   Project status reports will be developed using either Microsoft Word or Microsoft Excel, as per the needs and requirements. The reports will be published bi-weekly.

Appendix D - Project Plan

1	Gantt Chart POMS - MSP	55 days	Mon 9/18/23	Fri 12/1/23	
1.1	Requirement Research and Project Planning	17 days	Mon 9/18/23	Tue 10/10/23	
1.1.1	Communication with sponsor to understand the requirements	2 days	Mon 9/18/23	Tue 9/19/23	
1.1.2	Collect the Feedback from Workers	3 days	Mon 9/25/23	Wed 9/27/23	3
1.1.3	Project Planning and Scheduling	3 days	Thu 9/28/23	Mon 10/2/23	4
1.1.4	Administrative Functions for Sponsor	2 days	Tue 10/3/23	Wed 10/4/23	5
1.1.5	Complete Research and Planning	3 days	Fri 10/6/23	Tue 10/10/23	6
1.2	Database Design	10 days	Wed 10/11/23	Tue 10/24/23	
1.2.1	Database Physical Model	2 days	Wed 10/11/23	Thu 10/12/23	2
1.2.2	Database Logical Model	2 days	Fri 10/13/23	Mon 10/16/23	9
1.2.3	Establishing the Foreign Keys	2 days	Tue 10/17/23	Wed 10/18/23	10
1.2.4	Database Normalization	2 days	Thu 10/19/23	Fri 10/20/23	11
1.2.5	Review and Finalize Design	2 days	Sat 10/21/23	Tue 10/24/23	12
1.3	Database Code	10 days	Wed 10/25/23	Tue 11/7/23	
1.3.1	Database DDL	2 days	Wed 10/25/23	Thu 10/26/23	13
1.3.2	Generate DDL and Establish Data Stage	2 days	Fri 10/27/23	Mon 10/30/23	15
1.3.3	Insert Data Into Normalize Separate Tables	2 days	Tue 10/31/23	Wed 11/1/23	16
1.3.4	Incremental ETL for Data Warehousing	2 days	Thu 11/2/23	Fri 11/3/23	17
1.3.5	Database Code Test	2 days	Mon 11/6/23	Tue 11/7/23	18
1.4	Data Visualization	10 days	Wed 11/8/23	Tue 11/21/23	
1.4.1	Data Insert into Tableau	2 days	Wed 11/8/23	Thu 11/9/23	19

1.4.2	Tableau Visualization	2 days	Fri 11/10/23	Mon 11/13/23	21
1.4.3	Graph Filter	2 days	Tue 11/14/23	Wed 11/15/23	22
1.4.4	Data Analysis	2 days	Thu 11/16/23	Fri 11/17/23	23
1.4.5	Visualization Tool Report and Training	2 days	Mon 11/20/23	Tue 11/21/23	24
1.5	Graphical User Interface	8 days	Wed 11/22/23	Fri 12/1/23	
1.5.1	GUI Design	2 days	Wed 11/22/23	Thu 11/23/23	25
1.5.2	Database Connection	2 days	Fri 11/24/23	Mon 11/27/23	27
1.5.3	Graphical Interaction Function	2 days	Tue 11/28/23	Wed 11/29/23	28
1.5.4	Validation and Testing	2 days	Thu 11/30/23	Fri 12/1/23	29
2	Project Delivery and Testing	4 days	Mon 12/4/23	Thu 12/7/23	
2.1	Project Test	2 days	Mon 12/4/23	Tue 12/5/23	30
2.2	Prepare for Final Report	2 days	Wed 12/6/23	Thu 12/7/23	32


Add tasks with dates to the timeline
Shuai

Appendix E - Risk Management Plan

Possible Risks and Mitigation Strategies

System Integration Challenges

Risk level: Moderate

Description: Integrating the new POMS with existing systems, databases, and third-party applications might face unforeseen challenges, leading to delays or functional issues.

Mitigation Strategy:

- Conduct a thorough systems audit before development to understand integration points and potential challenges.
- Allocate additional time in the project timeline specifically for integration testing.
- Consider using middleware or integration platforms if necessary.

Scope Creep

Risk level: Significant

Description: Additional requirements or changes might emerge during the development phase, potentially derailing the project timeline and budget.

Mitigation Strategy:

- Ensure a robust initial requirement gathering phase.
- Implement a strict change management protocol, where any changes to the initial requirements are thoroughly evaluated for their impact on the project.
- Maintain regular communication with stakeholders to manage expectations.

Appendix F - Status Report

Shuai Zhi

Project Title: Product Order Management System (POMS) for Chongqing United Technology Inc.

Date of report: November 2, 2023

1. Project Status and Explanation:

Project Status Area	Status (RYG)	Explanation
1. Overall Project Status		The overall project is on the normal process.
2. Project Schedule		The whole project is on schedule of WBS and a little bit moving forward.
3. Project Deliverables		The project deliverables following the WBS schedule are on target with expected outcomes.
4. Resources & Collaboration		The resources and collaboration are on target with expected outcomes.
5. Changes		The Milestone dates set at the beginning of semester were arranged to follow the new WBS. No major issues.
6. Communication		The periodic communications with both sponsor and professor are normally proceeding. Everyone satisfied with the progress.

For status above, indicate **Red**, **Orange**, or **Green**:

- **Red**: Critical issues, serious risks to project, significant intervention must occur to achieve success, potential for stoppage of project activity. Project slipping by 5+ days, and resources uncommitted to meet deliverables
- **Orange**: Some major issues, moderate risk to project, must monitor closely, some internal or/and external dissatisfaction with progress. Project plan slipping by 2+ days.
- **Green**: No major issues, minimal risk to project, on target with expected outcomes, project on schedule, everyone satisfied with progress.

2. List All Completed Project Tasks:

- 1.1	- Requirement Research and Project Planning
- 1.1.1	- Communication with sponsor to understand the requirements
- 1.1.2	- Collect the Feedback from Workers
- 1.1.3	- Project Planning and Scheduling
- 1.1.4	- Administrative Functions for Sponsor
- 1.1.5	- Complete Research and Planning
- 1.2	- Database Design
- 1.2.1	- Database Physical Model
- 1.2.2	- Database Logical Model
- 1.2.3	- Establishing the Foreign Keys
- 1.2.4	- Database Normalization
- 1.2.5	- Review and Finalize Design
- 1.3	- Database Code
- 1.3.1	- Database DDL
- 1.3.2	- Generate DDL and Establish Data Stage
- 1.3.3	- Insert Data Into Normalize Separate Tables
- 1.3.4	- Incremental ETL for Data Warehousing
- 1.3.5	- Database Code Test

-

	% Co	Task Mode	WBS	Task Name	Duration	Start	Finish	Predecessors
1	65%		1	Gantt Chart POMS - MSP	55 days	Mon 9/18/23	Fri 12/1/23	
2	100%		1.1	Requirement Research and Project Planning	17 days	Mon 9/18/23	Tue 10/10/23	
3	100%		1.1.1	Communication with sponsor to understand the requirements	2 days	Mon 9/18/23	Tue 9/19/23	
4	100%		1.1.2	Collect the Feedback from Workers	3 days	Mon 9/25/23	Wed 9/27/23	3
5	100%		1.1.3	Project Planning and Scheduling	3 days	Thu 9/28/23	Mon 10/2/23	4
6	100%		1.1.4	Administrative Functions for Sponsor	2 days	Tue 10/3/23	Wed 10/4/23	5
7	100%		1.1.5	Complete Research and Planning	3 days	Fri 10/6/23	Tue 10/10/23	6
8	99%		1.2	Database Design	10 days	Wed 10/11/23	Tue 10/24/23	
9	100%		1.2.1	Database Physical Model	2 days	Wed 10/11/23	Thu 10/12/23	2
10	100%		1.2.2	Database Logical Model	2 days	Fri 10/13/23	Mon 10/16/23	9
11	100%		1.2.3	Establishing the Foreign Keys	2 days	Tue 10/17/23	Wed 10/18/23	10
12	100%		1.2.4	Database Normalization	2 days	Thu 10/19/23	Fri 10/20/23	11
13	100%		1.2.5	Review and Finalize Design	2 days	Sat 10/21/23	Tue 10/24/23	12
14	99%		1.3	Database Code	10 days	Wed 10/25/23	Tue 11/7/23	
15	100%		1.3.1	Database DDL	2 days	Wed 10/25/23	Thu 10/26/23	13
16	100%		1.3.2	Generate DDL and Establish Data Stage	2 days	Fri 10/27/23	Mon 10/30/23	15
17	100%		1.3.3	Insert Data Into Normalize Separate Tables	2 days	Tue 10/31/23	Wed 11/1/23	16
18	100%		1.3.4	Incremental ETL for Data Warehousing	2 days	Thu 11/2/23	Fri 11/3/23	17
19	100%		1.3.5	Database Code Test	2 days	Mon 11/6/23	Tue 11/7/23	18
20	0%		1.4	Data Visualization	10 days	Wed 11/8/23	Tue 11/21/23	
21	0%		1.4.1	Data Insert into Tableau	2 days	Wed 11/8/23	Thu 11/9/23	19
22	0%		1.4.2	Tableau Visualization	2 days	Fri 11/10/23	Mon 11/13/23	21
23	0%		1.4.3	Graph Filter	2 days	Tue 11/14/23	Wed 11/15/23	22
24	0%		1.4.4	Data Analysis	2 days	Thu 11/16/23	Fri 11/17/23	23
25	0%		1.4.5	Visualization Tool Report and Training	2 days	Mon 11/20/23	Tue 11/21/23	24
26	0%		1.5	Graphical User Interface	8 days	Wed 11/22/23	Fri 12/1/23	
27	0%		1.5.1	GUI Design	2 days	Wed 11/22/23	Thu 11/23/23	25
28	0%		1.5.2	Database Connection	2 days	Fri 11/24/23	Mon 11/27/23	27
29	0%		1.5.3	Graphical Interaction Function	2 days	Tue 11/28/23	Wed 11/29/23	28
30	0%		1.5.4	Validation and Testing	2 days	Thu 11/30/23	Fri 12/1/23	29
31	0%		2	Project Delivery and Testing	4 days	Mon 12/4/23	Thu 12/7/23	
32	0%		2.1	Project Test	2 days	Mon 12/4/23	Tue 12/5/23	30
33	0%		2.2	Prepare for Final Report	2 days	Wed 12/6/23	Thu 12/7/23	32

3. List any concerns or issues that need the professor's involvement:

-
- I do not have specific concerns right now. However, since we had already published the final report schedule and I communicate with my sponsor, he worried about he might be on a business trip, but he cannot make sure the specific dates by the end of November. We will try our best to follow the time slots offered by professor, but if there are some emergency issues, could we make an appointment in those four reporting days to make sure both sponsor and professor are convenient to attend to my final report? Thank you for your caring and understanding.
-

4. Next series of tasks to complete:

-

- 1.4	- Data Visualization
- 1.4.1	- Data Insert into Tableau
- 1.4.2	- Tableau Visualization
- 1.4.3	- Graph Filter
- 1.4.4	- Data Analysis
- 1.4.5	- Visualization Tool Report and Training
- 1.5	- Graphical User Interface
- 1.5.1	- GUI Design
- 1.5.2	- Database Connection
- 1.5.3	- Graphical Interaction Function
- 1.5.4	- Validation and Testing
- 2	- Project Delivery and Testing
- 2.1	- Project Test
- 2.2	- Prepare for Final Report

-
-
-

5. Sponsor Signoff

Sponsor indicates agreement with the above status report:

By (signature): _____Hongjie Wang_____
Project Sponsor

Printed Name: _____Hongjie Wang_____
Please print in English

Appendix G - Annotated Bibliography

1. Mufadhol, M., Mustafid, M., & Suryono, S. (2023, September). Supply chain information system for product management control using rule based reasoning model. In AIP Conference Proceedings (Vol. 2665, No. 1). AIP Publishing.

   Accuracy, fast and efficiency in performing digital transactions are needed especially during the pandemic covid 19, this need to be done for persevering and improving customer confidence. The supply chain is a concept applied by companies to analyze production needs from raw material providers, transportation to be used, production processes and even determine expeditions to send goods to customers according to a predetermined time. This research has never been done by other researchers where the supply chain process is carried out by a company by involving algorithms in computer science in the form of applying rule based reasoning methods to obtain optimal results. The supply chain information system combined with the rule based reasoning method allows companies to control production management that can improve product quality even up to the marketing model that will be used accompanied by consultants who are experts in their fields and can communicate actively to customers so that customers feel satisfied and feel well served. Computational rules will be run through the system developed in the form of rule based reasoning so that the company can obtain fast and precise analysis to take a decision with the purpose of obtaining the maximum benefit from any activities and transactions.

   The incorporation of a supply chain concept that involves computer science algorithms, specifically rule-based reasoning methods, to optimize results. This aligns with the goal of creating an efficient order management system that could benefit from such algorithms for improved decision-making and operational efficiency.

2. Liu, D. T., & Xu, X. W. (2001). A review of web-based product data management systems. Computers in industry, 44(3), 251-262.

   Product data management (PDM) integrates and manages all the information that defines a product, from design to manufacture, and to end-user support. PDM can be seen as an integration tool connecting many different areas, which ensures that the right information in the right form is available to the right person at the right time. When properly implemented, PDM systems will result in faster work, fewer errors, less redundancy, and smoother workflow for an organization.

   A recent advance in PDM technology concerns with the use of web-based technologies. The objective of this paper is to review PDM technology in general, and discuss the web-based PDM systems in particular. The emphasis is given toward the integration of PDM methodology with web architecture, and how this new infrastructure enhances a traditional PDM system. To reinforce the argument, a number of currently available PDM systems that have embraced web-technologies are reviewed, and some industrial implementations are presented.

This reference supports the project by highlighting the importance of implementing PDM systems for improved speed, reduced errors, less redundancy, and smoother workflow—all objectives that the POMS aims to achieve. The discussion on the integration of PDM with web architecture can provide a framework for developing the POMS, ensuring that the system leverages current web technologies for enhanced functionality. The case studies and industrial implementations of web-based PDM systems reviewed in the paper can serve as valuable benchmarks or reference points for the POMS development, showing practical applications and potential pitfalls to avoid.

3. Kim, Y., Kang, S. H., Lee, S. H., & Yoo, S. B. (2001). A distributed, open, intelligent product data management system. International Journal of Computer Integrated Manufacturing, 14(2), 224-235.

> *Efficient management of product information is critical to the enhancement of corporate competitiveness. This paper explains the design and development of a distributed, open, and intelligent product data management system. First, the requirements for Product Data Management (PDM) systems are summarized and then explained using a design scenario. Since product data are often managed in distributed computing environments, Common Object Request Broker Architecture (CORBA) is employed to ensure interoperability among distributed objects. Standard formats of data and knowledge, such as STandard for Exchange of Product model data (STEP) and Knowledge Query and Manipulation Language (KQML), are used to achieve the openness. A workflow management system has been developed that provides integrated management of task processes and information flows. While designing the system, the main emphasis is placed on dynamic process adaptation which is demanded by product development processes. Use of intelligent agents is proposed to achieve the adaptation at run time. A method of agent cooperation and communication is described. The agents are also used to implement content search for enhanced product data services.*

The methodologies and technologies discussed in this paper could contribute significantly to the design principles of the POMS. The paper provides insights into creating a system that is not just a repository of information but also an intelligent tool capable of adapting to changing product development processes, which would be crucial for the client's dynamic and customer-centric business model. The use of intelligent agents for cooperation and communication could be particularly useful for improving the responsiveness and flexibility of the POMS.

4. Choy, K. L., Lee, W. B., & Lo, V. (2003). Design of a case based intelligent supplier relationship management system—the integration of supplier rating system and product coding system. Expert systems with applications, 25(1), 87-100.

> *The design of supplier relationship management to facilitate supplier selection using an integrative case based supplier selection and help desk approach to select the most appropriate suppliers together with their past performance records from a case base warehouse has become a promising solution for manufacturers to identify preferred suppliers and trading partners to form a supply network on which they depend for products, services and distribution. In*

this paper, an intelligent supplier relationship management system (ISRMS) integrating a company's customer relationship management system, supplier rating system and product coding system by the case based reasoning technique to select preferred suppliers during new product development process is discussed. By using ISRMS in Honeywell Consumer Product (Hong Kong) Limited, it is found that the outsource cycle time from the searching of potential suppliers to the allocation of order, as well as the delay in delivery of goods of suppliers after order allocation, are greatly reduced. In addition, performance of suppliers can be monitored effectively.

The application of techniques and the demonstrated benefits from the ISRMS in a real-world context can provide valuable insights into how the POMS can be developed not just as a transactional system, but as a strategic tool that enhances supplier relationships and overall supply chain performance. The project can draw on this reference to incorporate intelligent features into the POMS for better supplier selection and management, ultimately contributing to reduced cycle times and improved delivery performance.

5. Krause, F. L., Kimura, F., Kjellberg, T., Lu, S. Y., Alting, L., Elmaraghy, H. A., ... & Week, M. (1993). Product modelling. CIRP annals, 42(2), 695-706..

   One of the most challenging tasks in the engineering profession is to develop new products that have the shortest lead-time, highest quality and lowest cost with optimal life-cycle consideration. The issue of product modeling is at the center of various new product development paradigms designed to meet this challenge, and, therefore, has received major attentions from application and research communities. Due to the fast developments of computer and information technologies and the increasing demands of competitiveness and productivity, the scopes and approaches of product modeling have evolved rapidly in recent years. This paper presents an overview of the state-of-the-art and practice of product modeling in terms of product models and process chains, and suggests some important issues for further investigation.

   By considering the latest trends and practices in product modeling, as discussed in the paper, the POMS can be designed to facilitate the development of new products efficiently and effectively, supporting the company's goal of maintaining a competitive edge in the market. This reference could be instrumental in informing the system requirements and functionalities that would enable the POMS to manage product data throughout the entire lifecycle, from conception to distribution.

6. Forza, C., & Salvador, F. (2002). Managing for variety in the order acquisition and fulfilment process: The contribution of product configuration systems. International journal of production economics, 76(1), 87-98.

   Flexible production is not enough to offer the customer variety without compromising company profitability. In conditions of product proliferation, in fact, the order acquisition and fulfilment process can turn out to be a serious bottleneck, as the multiplication of the product features induces an exponential growth in the volume of information exchanged between the firm sales organisation and its customer base. Furthermore, this information has to be fed

back in appropriate formats to manufacturing, with the risk of errors and delays due to the variability and complexity of product information. This study, through the discussion of a case example, reports the first results from a research on a class of information systems that support the order acquisition and fulfilment process in high product variety environments, called product configuration systems. The research indicates that the implementation of a product configuration system significantly contributed to increase the effectiveness and efficiency with which the studied company translates the customer's needs into product documentation. Moreover, the benefits pertaining to product configuration system stretch beyond operational performance, as it offers the company a way to incorporate into organisational memory product knowledge otherwise retained by individual employees. However, the introduction of a product configuration system may require significant and potentially painful changes in the way the order acquisition and fulfilment activities are organised, and necessitate a high initial investment in terms of man-hours.

The research findings from the case study provide a realistic perspective on both the potential benefits and the challenges associated with implementing a system to manage the order acquisition and fulfillment process. This reference will be instrumental in guiding the development of the POMS, ensuring it is designed not just to manage orders but also to contribute to the company's knowledge base and operational agility while being mindful of the investment and organizational changes required.

7. Mesihovic, S., Malmqvist, J., & Pikosz, P. (2004). Product data management system-based support for engineering project management. Journal of Engineering Design, 15(4), 389-403.

Product development projects are often extremely large, with many hundreds of tasks and thousands of work packages, and pose severe requirements on information management. This paper analyses how Product Data Management (PDM) systems and Project Management Information (PMI) systems should be used to support project work. It is concluded that PDM systems should be used to carry out the project, utilizing lifecycle, workflow and organization modelling functionalities and the common product data models, while PMI systems should be used for high-level project scheduling/visualization, accounting, and reporting activities. An integration of the PMI systems functionality with the PDM systems enables engineering teams to collaboratively on a real-time basis manage project and related product information in a dispersed product development organization.

The insights from this paper can guide the development of the POMS to ensure it not only facilitates order management but also integrates with other systems for a holistic view of project scheduling, financials, and reporting. This integrated approach is crucial for the POMS to serve as an effective tool for teams working in different locations and functional areas, ensuring that all relevant product and project information is accessible and manageable in real-time. The POMS project can draw on the findings of this paper to develop a system that effectively supports

the complex and dispersed nature of product development work within the company.

8. Ramdani, H. T., & Ainun, N. (2023). Implementation of Progressive Web App on Dropship Data Management Application to Anticipate Product Order Errors. Journal of Information System, Technology and Engineering, 1(2), 38-42.

    Digital business trends during the COVID-19 pandemic have increased. One of the digital businesses that can be run during a pandemic, one of which is the dropship business, has a fairly low risk because it does not require large capital and infrastructure preparation. Dropship data management without a data management system can make it difficult for drop shippers to manage and view customer, product, and supplier data. Besides that, without a data management system, it is very likely that the drop shipper will make an error in ordering and shipping the product. This research will discuss the creation of a data management application for drop shipping to cover dropship data management problems. The developed application will be web-based using a Progressive Web App (PWA) so that it can have better performance with a cache and a display that resembles a mobile application.

    This research can inform the technological framework for the POMS, suggesting that a PWA could be a viable platform to ensure accessibility, speed, and reliability. Furthermore, it can offer lessons on the importance of a well-structured data management system in reducing errors and improving overall operational efficiency, which are crucial for the success of any product order management system. The POMS can leverage these insights to develop a system that not only serves the current needs but is also scalable and adaptable to future business trends and disruptions.

9. Donnelly, K., Beckett-Furnell, Z., Traeger, S., Okrasinski, T., & Holman, S. (2006). Eco-design implemented through a product-based environmental management system. Journal of Cleaner Production, 14(15-16), 1357-1367.

    Lucent Technologies (Lucent) has undergone considerable change in business strategy with the outsourcing of manufacturing activities. In order to control the significant environmental aspects of hardware products, Lucent's wireless business unit, Mobility Solutions, determined it would concentrate on the design of products: focusing on eco-design enables product sustainability to be improved, with each product generation providing a 'start of pipe' (front end) solution with attendant efficiencies.

    Mobility Solutions pioneered a product-based environmental management system (PBEMS) to formally address the impacts of wireless hardware products on the environment throughout the entire product lifecycle, regardless of where products are developed. This management system looks beyond the environmental impacts of manufacturing to include conceptual design, development, use by the customer, and final product disposal.

The success of this approach can be attributed to the integration of eco-design with traditional hardware product realization processes. Through the PBEMS, business and environmental processes are simultaneously utilized to manage significant product aspects and to incorporate sustainability principles during product design. Many innovative eco-design tools are applied during the product realization process to identify areas for improvement of future products, and to verify that each generation of existing products is more sustainable than its predecessor. These eco-design tools include eco-roadmapping, design for environment guidelines and checklists, and lifecycle assessments.

The Mobility Solutions PBEMS conforms to the requirements of the ISO 14001 international standard and has achieved third-party certification. By implementing environmentally responsible characteristics through eco-design programs, employees, customers, and the world community benefit from a consistent approach to the environmental management of wireless hardware products. Mobility Solutions continues to reap the value of sustainable product design that is both good for the environment and makes sound business sense.

By drawing on the experiences and systems outlined in this case, the POMS project can integrate environmental management into its scope, thereby not only meeting regulatory compliance and industry standards but also enhancing corporate responsibility and public image. This approach could also lead to operational efficiencies and a market advantage through the promotion of more sustainable products and practices.

10. DeCroix, G. A., & Zipkin, P. H. (2005). Inventory management for an assembly system with product or component returns. Management Science, 51(8), 1250-1265.

    This paper considers an inventory system with an assembly structure. In addition to uncertain customer demands, the system experiences uncertain returns from customers. Some of the components in the returned products can be recovered and reused, and these units are returned to inventory. Returns complicate the structure of the system, so that the standard approach (based on reduction to an equivalent series system) no longer applies in general. We identify conditions on the item-recovery pattern and restrictions on the inventory policy under which an equivalent series system does exist. For the special case where only the end product (or all items used to assemble the end product) is recovered, we show that the system is equivalent to a series system with no policy restrictions. For the general case, we explain how and why the system becomes more problematic and propose two heuristic policies. The heuristics are easy to compute and practical to implement, and they perform well in numerical trials. Based on these numerical trials, we obtain insights into the impact of various factors on system performance. For example, we find that holding and backorder costs tend to increase when the average return rate, the variability of returns, or the number of components recovered increases. However, neither the product architecture nor the specific set of components being recovered seems to have a significant impact on these costs. Whether product recovery reduces total system costs depends on

the magnitude of the additional holding and backorder costs relative to potential procurement cost savings.

The findings from this paper can contribute to the POMS by providing strategies for managing complex inventory scenarios, especially in relation to returned products and the reuse of components. Understanding the effects of returns and recovery on inventory costs and system performance is essential for creating a POMS that optimizes the balance between holding costs, backorder costs, and procurement savings. This knowledge can ensure that the POMS is designed with the flexibility to adapt to varying return rates and the complexity of product recovery, which are critical for modern, responsive supply chains.

11. Svensson, D., & Malmqvist, J. (2002). Strategies for product structure management at manufacturing firms. J. Comput. Inf. Sci. Eng., 2(1), 50-58.

    Product structure management (PSM) is a process that affects many of the activity domains1. (AD) in a company. Different ADs have different requirements for the decomposition of a product structure and the function of the information systems (IS) used. Departments therefore often work in differing ISs. If several ISs contain some of the same information, it is important that it be updated in all systems when it is changed. Since PSM is a change intensive activity, it is difficult to perform it in an environment consisting of several heterogeneous ISs. There is a need for strategies of PSM that take into account all relevant aspects of an IS, such as the process it supports, the type of information handled, the systems used and the organization. Based on a case study at an automotive manufacturing firm, this paper discusses the diverse product structure requirements of various ADs. Proposed strategies for PSM can be used as a general guide and for categorization when analyzing ISs before introducing new systems or restructuring existing systems.

    The strategies proposed for PSM in the paper can serve as a guide for the POMS project, particularly when analyzing the current IS landscape of Chongqing United Technology Inc. before introducing the POMS or restructuring existing systems. The paper underscores the importance of a strategic approach to managing product structures that can adapt to the different needs of various departments within the company, a principle that would be critical in the development of an effective POMS. This reference can help ensure that the POMS is not only technically capable but also organizationally aligned with the various stakeholders it is intended to serve..

12. Svensson, D., & Malmqvist, J. (2001, September). Integration of requirement management and product data management systems. In International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (Vol. 80210, pp. 199-208). American Society of Mechanical Engineers.

    Various database systems are used during the product development process to store and retrieve data about products. For example product data management (PDM), enterprise resource planning (ERP) and requirement management (RM) systems. All those might be needed to support the product development process. Earlier research has investigated the co-existence of PDM and ERP systems. This

paper extends this question and takes a look on how requirement management systems fit into the picture and how these systems can be used together in order to support the product development process.

A comparison of functionality and product models of RM and PDM systems is made. A requirements driven product model of a car cockpit implemented in a RM tool is used as a theoretical reference. The actual situation at the company developing the cockpit is then described. Based on the comparison of the functionality and the product models, three strategies for how the systems could cooperate are presented. The strategies are discussed from both a theoretical and a practical point of view. The conclusions are that RM systems has functionalities for requirements management that do not exist in a PDM system, which calls for the use of both systems. This results in problems with traceability and duplicate data. A certain degree of requirements traceability can be achieved between the systems by applying the strategies presented, but this is not a trivial task.

By studying the findings and strategies presented in this paper, the POMS project can adopt a more informed approach to system integration, ensuring that it provides complementary functionality to existing systems and addresses the challenges of data consistency and traceability. This will be particularly important for the POMS to facilitate effective collaboration and information exchange across various departments and systems involved in the product development process. The paper highlights the importance of a strategic approach to system design that considers the unique and overlapping functionalities of PDM, ERP, and RM systems.