

# **NAAN MUDHALVAN – DATA ANALYTICS WITH TABLEAU**

## **PROJECT TITLE: ESTIMATION OF BUSINESS PROJECT**



### **Team Members:**

- 1.Ashwin S
- 2.Baranidharan R
- 3.Dhanush V
- 4.Dineshwaro Rao M

### **Team ID:**

**NM2023TMID07941**

## TABLE OF CONTENT

CHAPTER NO	TOPIC	PAGE NO
1.	INTRODUCTION	3
2.	DATA PREPARATION, CLEANSING, AND PREPROCESSING STEPS	6
3.	LITERATURE SURVEY	8
4.	PROJECT DESIGN	17
5.	SOLUTIONING EXPLANATION FOR BUSINESS OPERATING EXPENSES AND FINANCIAL ASPECTS	19
6.	PERFORMANCE TESTING FOR BUSINESS PROJECT ESTIMATION	23
7.	RESULT	25
8.	ADVANTAGE & DISADVANTAGE	26
9.	CONCLUSION	29
10.	FUTURE SCOPE	30

## **1. Introduction :**

In today's dynamic business world, effective project management is crucial, and accurate project estimation is at its core. This project addresses the persistent challenges businesses face when aligning project aspirations with reality, aiming to provide practical insights and tools for precise estimation. It bridges theory and practice, emphasizing the importance of informed decision-making, cost control, and stakeholder satisfaction. While not a one-size-fits-all solution, it empowers businesses to tailor estimates to their unique needs, ultimately transforming estimation from a hurdle into a catalyst for business growth and sustainability. This project invites you to join us on a journey to demystify project estimation's complexities and project your organization's future with confidence.

### **1.1 Purpose**

Estimating the purpose of a business project is a crucial step in its planning and development. The purpose of a business project is typically defined by its objectives, goals, and desired outcomes.

**Identify the Problem or Opportunity:** Start by identifying the problem or opportunity that the project aims to address. Clearly define the issue or need that the project is intended to resolve. This forms the basis for the project's purpose.

**Set Specific Goals and Objectives:** Establish clear and specific goals and objectives for the project. Goals should be broad and long-term, while objectives should be specific, measurable, achievable, relevant, and time-bound (SMART). These goals and objectives will give the project its purpose and direction.

**Determine the Scope:** Define the scope of the project, which includes the boundaries of what the project will and will not cover. This helps in clearly understanding the purpose and extent of the project.

**Define Target Outcomes:** Describe the desired outcomes of the project. What results do you expect to achieve? These outcomes are an essential part of the project's purpose and will guide its execution.

**Assess Feasibility:** Evaluate the feasibility of the project by considering factors such as available resources, time constraints, and potential risks. Ensure that the purpose of the project is realistic and achievable.

**Consider Stakeholder Needs:** Take into account the needs and expectations of all stakeholders involved in the project. This includes customers, employees, investors, and any other parties with an interest in the project. The project's purpose should align with these stakeholder needs.

**Create a Mission Statement:** Develop a clear and concise mission statement that encapsulates the purpose of the project. A mission statement should explain what the project does, who it serves, and why it exists.

**Align with the Overall Business Strategy:** Ensure that the purpose of the project aligns with the overall business strategy and objectives. It should contribute to the company's mission and vision.

**Review and Refine:** Periodically review and refine the purpose of the project as necessary. Business environments can change, and it's important to adapt the project's purpose accordingly.

**Communicate the Purpose:** Clearly communicate the purpose of the project to all stakeholders, team members, and anyone involved in its execution. This will help ensure everyone is aligned with the project's goals.

**Measure Progress:** Establish key performance indicators (KPIs) to track the progress of the project toward its goals and objectives. Regularly assess and report on the project's performance to ensure it stays on track.

The purpose of a business project should be well-defined, realistic, and aligned with the overall business strategy. It should address a specific problem or opportunity, set clear goals and objectives, and be communicated effectively to all stakeholders

## **2. Data Preparation, Cleansing, and Preprocessing Steps:**

**Data Collection:** The first step in data preparation is the collection of relevant data. This involves gathering information on various expense categories, such as data processing and computer services, commission expenses, communication services, and more. The data should be obtained from reliable sources within the organization.

**Data Cleaning:** Once the data is collected, it undergoes a cleaning process. This step involves identifying and addressing missing values, duplicates, and inconsistencies in the data. For example, data related to maintenance of buildings and offices may have entries with different units of measurement, which need to be standardized.

**Data Integration:** In many cases, data comes from different sources and in various formats. Data integration is the process of combining this disparate data into a unified dataset. This step ensures that all relevant data is available for analysis.

**Data Transformation:** Some features may require transformation to make them suitable for analysis. For instance, depreciation and amortization may need to be calculated as a percentage of the asset's value to make them comparable.

**Outlier Detection and Handling:** Outliers in the data can significantly impact estimation accuracy. Techniques like statistical analysis or machine learning algorithms can be used to identify and handle outliers in expenses like taxes and licenses.

**Normalization and Scaling:** Different expense categories may have widely varying scales. Normalization and scaling techniques are applied to ensure that all features have a consistent scale, which is particularly important when using machine learning algorithms.

**Feature Engineering:** Feature engineering involves creating new features or modifying existing ones to better represent the problem at hand. For example, you might create a new feature that combines different utility expenses into a single "utilities" category for more straightforward analysis.

**Data Splitting:** To evaluate the performance of the estimation model, the data is typically split into training and testing sets. The training set is used to build the model, while the testing set is used to assess its accuracy.

**Data Encoding:** If the data includes categorical variables (e.g., types of services), they need to be encoded into numerical values that the estimation model can understand. Techniques like one-hot encoding can be applied to achieve this.

**Imputation:** If there are missing values in the data, imputation methods can be used to fill in these gaps. Common approaches include mean imputation or using predictive models to estimate missing values.

**Data Validation:** Before applying the estimation model, the prepared data is thoroughly validated to ensure it adheres to the required data quality standards and is ready for analysis.

### **3. Literature Survey**

#### **Existing problem**

Identifying existing problems in the estimation of a business project is essential for preventing potential issues and ensuring a successful project outcome. Here are some common problems that can arise during the estimation phase of a business project:

##### **Lack of Clear Objectives:**

**Problem:** The project lacks well-defined and measurable objectives, making it challenging to estimate scope, resources, and timelines accurately.

**Solution:** Clearly define project objectives and deliverables to establish a solid foundation for the estimation process.

##### **Inadequate Data and Information:**

**Problem:** Incomplete or inaccurate data can lead to flawed estimates. This may occur due to a lack of historical project data or a failure to gather relevant information.

**Solution:** Conduct thorough research and data collection, and ensure that you have access to accurate and up-to-date information.

##### **Poor Scope Definition:**

**Problem:** Scope creep occurs when project boundaries are not clearly defined, leading to increased costs and delays.

**Solution:** Establish a detailed project scope statement that outlines what is and isn't included in the project.



### Unrealistic Timeframes:

Problem: Overly optimistic project schedules can lead to missed deadlines and increased stress on the project team.

Solution: Develop a realistic timeline by considering all project activities, dependencies, and potential setbacks.

### Inaccurate Cost Estimates:

Problem: Underestimating costs can result in budget overruns and financial strain on the project.

Solution: Use historical data, expert judgment, and cost estimation techniques to create accurate cost estimates.

### Resource Constraints:

Problem: Not having access to the required resources, such as skilled personnel or equipment, can disrupt project execution.

Solution: Identify resource constraints early and work on resource allocation and acquisition plans.

### Inadequate Risk Assessment:

Problem: Failing to identify and assess potential risks can lead to unexpected issues that disrupt the project's progress.

Solution: Conduct a comprehensive risk analysis and develop a risk management plan to mitigate and address potential threats.

### Lack of Stakeholder Involvement:

Problem: If key stakeholders are not actively involved in the estimation process, their needs and expectations may not be considered.

Solution: Engage stakeholders and regularly communicate with them to understand their requirements and concerns.

### Technology and Tool Limitations:

Problem: Using outdated or inadequate estimation tools and technology can hinder the accuracy of estimates.

Solution: Invest in appropriate estimation software and tools and ensure your team is trained to use them effectively.

### Change Management Issues:

Problem: Failure to manage and control changes to project requirements and scope can result in confusion and delays.

Solution: Implement a formal change management process to handle scope changes and modifications effectively.

### Lack of Contingency Planning:

Problem: Not accounting for unexpected events or changes can leave the project vulnerable to disruptions.

Solution: Develop contingency plans and allocate contingency reserves to address unforeseen challenges.

### Overreliance on Expert Judgment:

Problem: Solely relying on expert opinions without data and historical analysis can lead to biased estimates.

Solution: Use expert judgment in conjunction with quantitative methods and data-driven analysis to improve estimation accuracy.

#### Failure to Document Assumptions:

Problem: Omitting or inadequately documenting assumptions can lead to misunderstandings and disputes during the project.

Solution: Clearly document all assumptions made during the estimation process to ensure transparency and alignment.

By addressing these common problems in the estimation phase of your business project, you can enhance the accuracy of your project planning, reduce risks, and increase the likelihood of a successful project outcome. Regularly review and update your estimates as the project progresses to adapt to changing circumstances.

#### **Ideation & Proposed Solution:**

In response to the pressing need for enhanced project estimation in today's business landscape, several key strategies can be considered. First, businesses can leverage historical project data to inform future estimates, gaining valuable insights into how various variables impact project outcomes. Second, a comprehensive risk assessment framework should be developed, taking into account potential challenges, uncertainties, and external factors, thus enabling the quantification and mitigation of risks to improve the accuracy of estimates. Third, scalable estimation models tailored to project size and complexity can be created, incorporating variables like project scope, resource availability, and external dependencies. Moreover,

engaging stakeholders throughout the estimation process can provide valuable insights and validate assumptions, contributing to more realistic estimates. Finally, fostering a culture of continuous learning within the organization through periodic reviews of completed projects can yield valuable lessons and insights that can be applied to future estimations, promoting ongoing improvement and accuracy in project estimation practices.

### **Proposed Solution:**

In our pursuit of precise and data-driven business project estimation, we present a comprehensive solution harnessing the formidable capabilities of IBM Cognos. This robust business intelligence and analytics platform provides the foundation for our transformative approach. Our proposed solution comprises several key components.

It begins with a meticulous needs assessment, collaborating with project stakeholders to understand specific challenges and requirements. We collect and integrate historical project data, ensuring its accuracy and consistency, setting the stage for reliable analysis.

IBM Cognos' data analysis and machine learning prowess unearth critical patterns and variables impacting project outcomes, while a systematic risk assessment framework quantifies project risks. The user-friendly interface streamlines data analysis, and performance optimization ensures timely results.

Continuous learning is encouraged through a dedicated hub, promoting adaptability to evolving project needs. Compliance and

security measures safeguard sensitive data. Rigorous testing and validation guarantee accuracy, while training and phased deployment minimize disruptions.

Post-deployment, continuous monitoring and optimization further enhance the system's effectiveness. By implementing this solution, we aspire to revolutionize project estimation, enhancing accuracy, reliability, and efficiency, while adeptly managing potential risks. IBM Cognos stands as the cornerstone of this transformation, leading to successful project outcomes and organizational growth.

## **Requirement Analysis for Business Project Estimation:**

### **Functional Requirements:**

In the pursuit of effective business project estimation, a range of functional requirements must be meticulously addressed. At the outset, project scope definition stands as a fundamental necessity. A clear delineation of the project's objectives, deliverables, and key milestones ensures that all stakeholders grasp the project's boundaries and aspirations. Furthermore, data collection and storage mechanisms should be put in place to accumulate and systematically organize historical project data. This data reservoir serves as the bedrock for data-driven estimation and trend analysis, providing invaluable insights into project performance.

To elevate the accuracy of estimation, the integration of data analysis tools is imperative. These tools, equipped with machine learning algorithms, have the capacity to sift through historical project data, identifying patterns, correlations, and the critical variables that underpin project outcomes.

A systematic approach to risk assessment comes next. Businesses should establish a risk assessment framework, systematically identifying and assessing risks linked to the project. These assessments should encompass tools for quantifying the impact and probability of risks.

Alongside risk assessment, the development of robust risk mitigation strategies is essential. A set of guidelines should be established to mitigate identified risks effectively. This process is complemented by the maintenance of a risk register, which serves to track identified risks and the actions taken to address them throughout the project's lifecycle.

In the domain of estimation, adaptable and scalable estimation models are imperative. These models must be designed to cater to projects of varying sizes and complexities, encompassing critical variables such as project scope, resource availability, and external dependencies.

To ensure alignment with stakeholder expectations, the implementation of a stakeholder collaboration platform is pivotal. This collaborative space enables stakeholders to actively engage in the estimation process, facilitating discussions, reviews, and approvals.

Finally, the establishment of a Continuous Learning Framework is integral to the process. This framework includes a Continuous Learning Hub where project teams can share their experiences and lessons learned. It involves post-project reviews and the

documentation of best practices, creating a cycle of improvement for future estimations.

Collectively, these functional requirements provide a robust foundation for businesses seeking to enhance their project estimation capabilities, promoting precision, transparency, and collaborative excellence.

### Non - Functional Requirements :

In the realm of business project estimation, non-functional requirements play a pivotal role in shaping the effectiveness of the process. Chief among these requirements is accuracy, where the aim is to minimize the variance between estimated and actual project outcomes, fostering precision and reliability. Scalability is another critical factor, ensuring that the estimation framework and tools can seamlessly adapt to projects of varying sizes and complexities without sacrificing accuracy. Data security stands as a paramount concern, necessitating that collected data is not only used effectively but also kept secure and compliant with data protection regulations.

User-friendliness is integral to the usability of data analysis and estimation tools. A user-friendly interface ensures that project managers and stakeholders can interact with the system with ease, promoting effective collaboration. Performance optimization is essential, with the need for timely delivery of results in mind. Reliability ensures that the estimation framework and tools are consistently available to support the estimation process.

Adaptability allows the system to respond dynamically to changes in project requirements and variables, accommodating shifts and updates. Finally, compliance is critical, mandating adherence to industry standards and best practices for project estimation and risk assessment. In essence, these non-functional requirements form the cornerstone of a robust project estimation framework, enhancing accuracy, reliability, and efficiency while effectively managing potential risks.



## 4. Project Design:

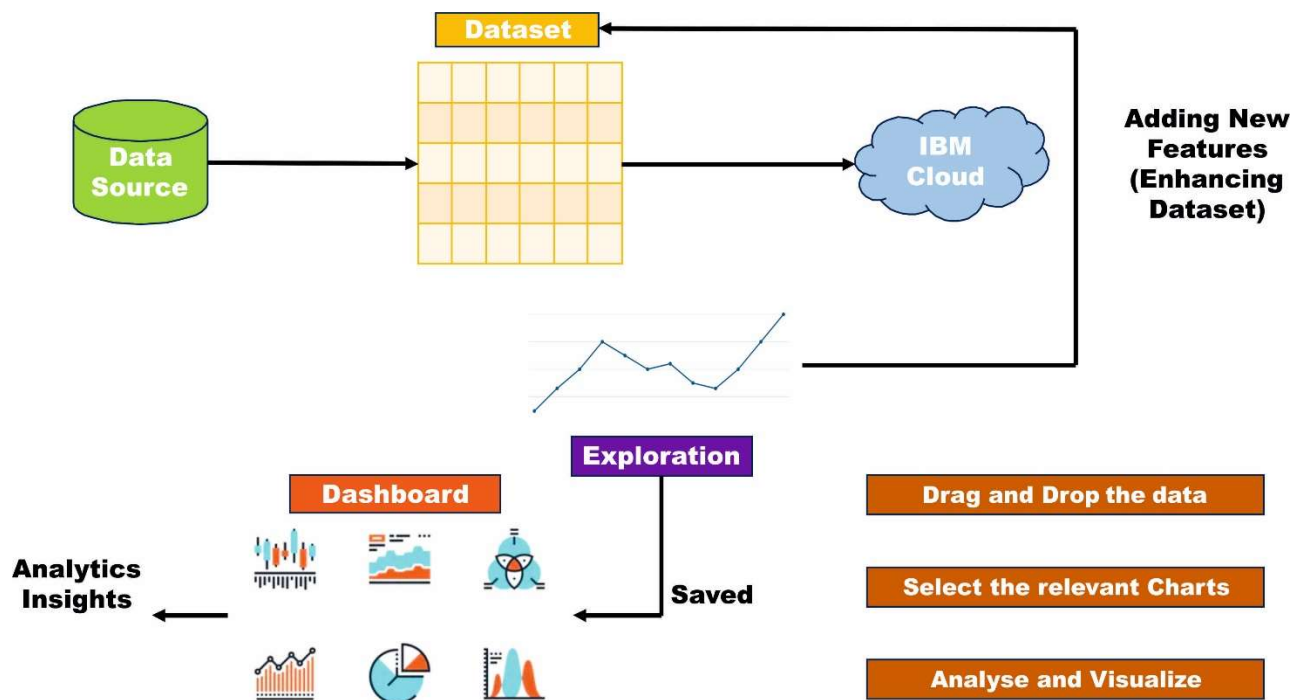
The project's structured journey begins with a needs assessment, where collaboration among project managers, stakeholders, and data analysts helps understand project estimation challenges. It leverages IBM Cognos Analysis to integrate historical project data, using data analysis and machine learning to unveil patterns and correlations.

### TECHNICAL ARCHITECTURE



The project includes a risk assessment framework and prioritizes a user-friendly interface for accessibility. Performance optimization ensures timely results. Continuous learning through a Learning Hub promotes adaptability. Compliance and data security measures safeguard information.

Testing and validation verify accuracy, and training sessions prepare users. Phased deployment minimizes disruptions, and continuous monitoring post-deployment ensures ongoing effectiveness. Anchored in IBM Cognos Analysis, the project aims to enhance accuracy, reliability, and efficiency in project estimation, paving the way for successful outcomes and organizational growth.



## **5. Solutioning Explanation for Business Operating Expenses and Financial Aspects**

In the world of business management and financial planning, the dataset's columns offer a wealth of information for effective solutioning and decision-making. Let's break down the significance of each feature:

**Naics\_code:** The North American Industry Classification System (NAICS) code provides insight into the specific industry or sector, which is crucial for tailoring solutions to industry-specific challenges.

**Business Types:** Understanding the nature of the business, whether it's manufacturing, services, or retail, is vital for crafting customized strategies.

**Operating Expenses:** This column represents the total costs incurred to operate the business, which is central to financial management and cost-cutting strategies.

**Annual Payroll:** Payroll expenses are a substantial part of a business's budget, and careful management is essential for long-term sustainability.

**Employer Costs:** This includes expenses related to employing workers, such as health insurance, contribution plans, and pension plans. Managing these costs impacts the overall financial health of the organization.

**Contract Labor Costs:** For businesses utilizing contract labor, this figure affects project budgets and overall financial planning.

**Expensed Equipment Amount:** Investment in equipment and technology is crucial. This column provides insights into the capital required for business operations.

**Packing Materials and Containers:** Expenses related to packaging are important for supply chain and logistics optimization.

**Parts and Supplies (Not for Resale):** Managing expenses related to operational supplies is vital for cost control.

**Purchases of Software:** Investment in software affects productivity and operational efficiency.

**Data Processing and Computer Services:** In the digital age, data management is pivotal, impacting both efficiency and security.

**Commission Expense Amount:** Commission expenses may affect sales strategies and profitability.

**Communication Services:** Efficient communication is crucial for collaboration and customer service.

**Repairs and Maintenance:** Ensuring equipment and facilities are well-maintained impacts longevity and overall operational costs.

**Rental Payments:** Costs associated with renting machinery, buildings, or offices are a significant part of overhead expenses.

**Utilities:** Expenses for electricity, fuels, and water/sewer services are fundamental for daily operations.

**Transportation, Shipping, and Warehousing:** Logistics costs impact supply chain management and delivery to customers.

**Advertising and Promotional Services:** Marketing expenses affect brand visibility and sales strategies.

**Professional and Technical Services:** Investments in expertise can streamline business processes.

**Depreciation and Amortization:** Accounting for asset depreciation and amortization is crucial for financial reporting and tax planning.

**Taxes and License:** Compliance with tax regulations is essential for avoiding legal issues and managing expenses.

**Other Operating Expenses:** Miscellaneous expenses are a part of the financial landscape that require careful management.

**Solutioning Explanation for Business Trends over Time:**

Understanding and effectively managing these features is essential for financial planning, cost control, and business optimization. By leveraging this dataset, businesses can tailor solutions to their specific needs and challenges, ultimately driving sustainable growth and success.

Understanding business trends and performance over several years is a crucial element of informed decision-making and strategic planning. The dataset's columns provide a comprehensive view of various businesses and industries, enabling the analysis of their performance from 2006 to 2014. Starting with the most recent year, 2014, and progressing backward, these columns offer insights into how businesses have evolved over time. This historical data is invaluable for identifying growth patterns, potential areas for improvement, and the impact of economic events like the global financial crisis. By scrutinizing these trends, businesses can make data-driven decisions, set realistic goals, and plan for the future effectively. Furthermore, understanding how different business types have fared over time provides a meaningful context for benchmarking and expectation setting.

## **6. Performance Testing for Business Project Estimation:**

Performance testing is a crucial step in ensuring that your business project estimation process works efficiently. Here are the key elements:

**Test Objectives:** Clearly define what you want to achieve with the performance testing.

**Test Environment:** Create a testing setup that mimics real-world conditions.

**Performance Metrics:** Identify what you need to measure, like response times and resource usage.

**Load Testing:** Check how the system handles normal and peak loads.

**Stress Testing:** Push the system to its limits to see how it holds up.

**Scalability Testing:** Test if the system can grow with your project requirements.

**Stability Testing:** Ensure the system consistently provides accurate estimates.

**Resource Utilization:** Monitor CPU, memory, and network use to find bottlenecks.

Reporting and Analysis: Create detailed reports and prioritize improvements.

Iterative Testing: Continuously test and optimize as the system evolves.

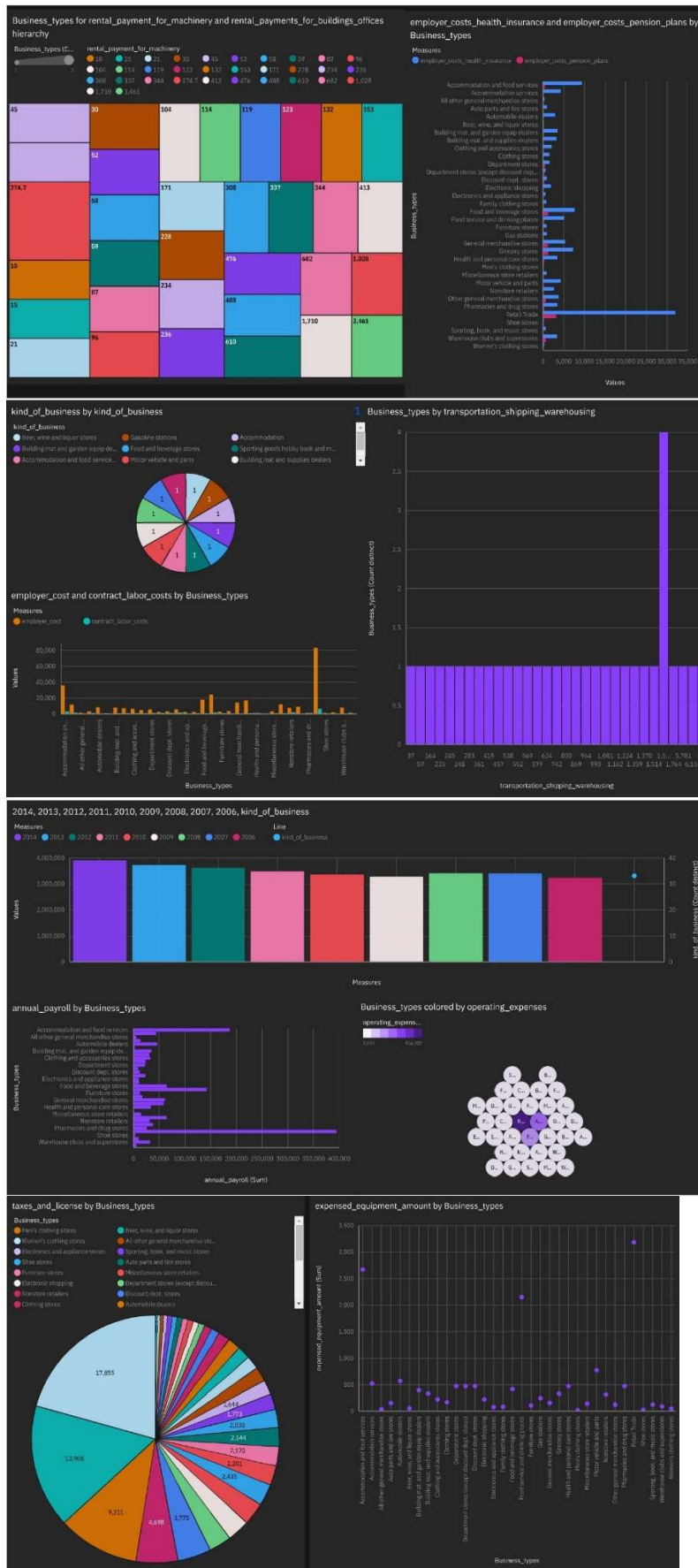
User Feedback: Get input from users and stakeholders for further improvements.

Documentation: Keep thorough records of the testing process.

Integrating performance testing into your project estimation framework helps ensure your system remains efficient and accurate as your business grows and evolves.



## 7. Results



## **8.Advantages:**

1. **Data-Driven Insights:** Incorporating data processing and computer services into the estimation process provides data-driven insights, allowing for more accurate predictions and informed decision-making.
2. **Accurate Commission Tracking:** The inclusion of commission expense amount allows for precise tracking of commission expenses, aiding in budgeting and resource allocation.
3. **Effective Communication:** Communication services help maintain effective collaboration among project stakeholders, ensuring smooth project execution.
4. **Cost Management:** Monitoring and accounting for repairs and maintenance of equipment, maintenance of buildings and offices, rental payments, and utility expenses enable effective cost management and budgeting.
5. **Streamlined Logistics:** The consideration of transportation, warehousing, and related expenses streamlines logistics, leading to optimized project timelines.
6. **Strategic Promotion:** Investment in advertising and promotional services enhances brand visibility and market positioning.

7. Expertise Access: Engaging professional and technical services brings specialized expertise into the project, improving overall quality.

8. Tax Efficiency: Depreciation and amortization, as well as tax and licensing considerations, help optimize tax efficiency.

### **Disadvantages:**

1. Complexity: Incorporating numerous expense categories can make the estimation process more complex and time-consuming.

2. Data Overload: Managing a wide range of data sources and categories can lead to information overload, making it challenging to extract meaningful insights.

3. Cost Overestimation: Inclusion of various expenses may lead to overestimation if not carefully controlled, potentially impacting project budgets.

4. Resource Intensity: Managing and processing diverse expenses may require additional resources, both in terms of time and personnel.

5. Risk of Misallocation: Without a thorough understanding of each expense category, there is a risk of misallocating resources and making inaccurate estimations.

6. Subject to Market Fluctuations: Certain expense categories, such as fuel and utility costs, are subject to market fluctuations, making them harder to predict accurately.

In conclusion, while the inclusion of various expense categories and data-driven insights enhances project estimation, it also introduces complexity and resource challenges. Careful management and a clear understanding of each feature's impact are essential to realizing the advantages while mitigating the disadvantages.

## **9. Conclusion:**

In the realm of business project estimation, precision is vital. This project has delved into the challenges of aligning project aspirations with practical execution. By integrating data-driven insights, risk management, scalable estimation models, stakeholder collaboration, and a culture of continuous learning, it aims to revolutionize project management. Features like data processing, communication services, utility expenses, and more enhance the estimation process. This synergy empowers businesses to confidently navigate the complexities of project estimation, transforming it from a hurdle into a growth lever. The project's adaptability and scalability promise more successful project outcomes and sustainable growth.

## **10. Future Scope:**

The future of business project estimation holds immense promise, with a trajectory of evolution to meet the growing complexity and challenges faced by businesses. Key areas of development include the integration of advanced data analytics and machine learning, increased use of artificial intelligence and automation, seamless integration with project management software, and the adoption of real-time estimation. Risk management will gain prominence, and environmental impact estimation will become vital, especially in eco-sensitive industries. Blockchain technology and crowdsourced estimation will ensure transparency and diverse insights, while cross-functional collaboration and a balance between quantitative and qualitative factors will enhance estimation accuracy. The use of sensitivity analysis, robotic process automation, global collaboration, compliance, and cybersecurity will be critical in shaping the future of business project estimation. These advancements will empower businesses to make data-driven decisions and navigate an ever-changing business landscape more effectively.