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ORIGINAL STUDY

Enhancing Project Tracking through Microsoft Power Platform Automation: A Case-Based Study Using Power BI

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ABSTRACT

Microsoft Power BI and Power Automate enhances project tracking by improving data accuracy, reducing manual effort, and delivering timely insights. The automation-driven approach leads to significant time savings and fewer reporting errors, contributing to more efficient and informed project management. Despite the availability of digital tools, there is limited research on unified frameworks that combine automation, data visualization, and real-time feedback for holistic project management. This study addresses this gap by evaluating an integrated system applied to a real-world project over one fiscal year, offering practical insights and measurable outcomes. Present study explores how Power BI enhances data accuracy and efficiency in project management through automation and visualization. Through the analysis of case studies and real-world examples, the positive impact of Microsoft power automate is illustrated on key project management domains such as budget tracking, timeline management, and risk mitigation. Additionally, the study delves into the integration of Microsoft power automate with power business intelligence, measure the time taken to retrieve data, report rendering, and evaluate the system's responsiveness in processing user inputs while maintaining data accuracy, cross-validating with other tools, gathering user feedback on consistency. Despite acknowledging the challenges and limitations of Microsoft power automate, the study offers practical recommendations for successful implementation of Microsoft power automate for efficient project management. This led to time savings of 40%, depending on the complexity and frequency of reporting tasks. Moreover, it also reduces the likelihood of manual errors associated with data entry, calculations, and report generation. Error reductions decline to 37.5%, depending on the complexity and volume of data handled. The findings offer a practical roadmap for organizations to modernize project management by adopting integrated automation and analytics tools, ultimately enhancing decision-making, reducing operational inefficiencies, and improving project outcomes.

Keywords: Dashboard, Learner analytics, Microsoft power automate, Progress tracker, People management, Data analytics

Abbreviations

BI Business Intelligence
PM Project Management
PMO Project Management Office
KPI Key Performance Indicator
UI User Interface
AI Artificial Intelligence

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MS Microsoft
Power BI Microsoft Power Business Intelligence
RPA Robotic Process Automation
API Application Programming Interface
DB Database
ETL Extract, Transform, Load
SQL Structured Query Language
ROI Return on Investment
FTE Full-Time Equivalent
DQE Data Quality Engineering

1. Introduction

The current business landscape is characterized by rapid technological advancement, significantly transforming project management practices. Power automation, through tools like Microsoft Power BI and Power Automate, plays a vital role in automating repetitive tasks, improving data transparency, and enhancing decision-making capabilities. This study presents an integrated system combining Power Automate for workflow automation, Power BI for concise data visualization, and a SQL Server backend for robust data handling. This approach is designed to streamline project tracking, optimize resource allocation, and increase the overall efficiency of project execution. Recent literature supports the growing application of such technologies. For example [1, 2], explored the use of Microsoft Power BI dashboards in managing supply chain performance using Action Design Research (ADR), demonstrating enhanced response times and visibility [3]. discussed the implementation of real-time KPI tracking dashboards through Power BI, emphasizing their potential in inventory and operations management [2]. showcased how Power BI contributed to post-pandemic supply chain recovery by enabling agile analytics [4]. highlighted how Power BI enhances decision-making in supply chain optimization through precise visualization. Additionally [5], provided a comparative analysis of AI techniques for project cost estimation, showing how AI-driven insights can inform more accurate forecasting.

Despite these advances, there remains a gap in the literature concerning unified implementations that combine workflow automation, business intelligence, and AI to holistically support project management. This study addresses that gap by introducing and evaluating a comprehensive, automation-enhanced system applied to an actual world project spanning one fiscal year. By leveraging Power BI and Power Automate, the proposed system offers a practical framework for reducing costs, minimizing manual effort, and improving project delivery timelines. This manuscript aims to serve as a reference for practitioners and researchers interested in integrating data analytics and automation into project management workflows.

Present study investigates the role of power automation in improving business operations through streamlined project tracking and decision-making. By providing cutting-edge solutions designed to Enhance operational efficiency and strategic advantage, Microsoft power automate is becoming a critical component of project management success. This work is a resourceful guide for project managers looking to achieve efficiency, productivity, and success, with insights into the impact of Artificial Intelligence (AI) and Machine learning (ML) technologies on project management practices.

There is an extreme need of a database which is useful for grouping interconnected data (archives) in such a way that it can be reused quickly and easily in the future [6]. Every company nowadays generates a significant volume of data in a certain manner. BI is currently utilizing statistical techniques and technology to examine its historical data. According to [7], utilizing the capabilities of Power BI, student career management aims to address these issues by offering accurate output about student performance, engagement and overall learning. Also, the choice of Microsoft Power BI as the focal point of this study is based on its widely acknowledged reputation for being versatile and accessible in the fields of data analysis and visualization [8].

The software industry moves fast, with companies rising and falling quickly due to intense competition. Everyone, especially project managers, feels the pressure to keep up and ensure project success [9]. Deeper scrutiny of Microsoft power automate in project management with respect to industrial units is the epicentre of this manuscript's uniqueness, delving into its complex associations and important aspects that drive effective automation change. The work's comprehensive coverage spans areas like Modify Launched Designs (MLD) changes which are done as a process for remediation and sustenance of existing products, Corrective and Preventive Actions (CAPA) which in the medical corporate sector is a systematic process to identify, address, and prevent quality issues, ensuring compliance with regulatory standards. It involves investigating root causes, implementing fixes, and taking proactive measures to avoid future problems and Field Change Order (FCO) which is a formal instruction to modify or repair products already in use (e.g., medical devices), ensuring compliance and safety without a full recall, and other crucial aspects necessary to achieve precise project management. This work also examines the integration of Microsoft power automate and Power BI technologies, unravelling new levels of possibilities for

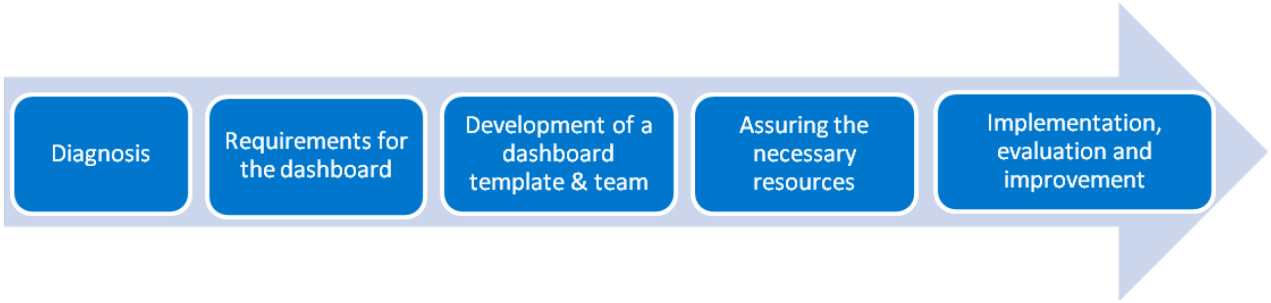

Fig. 1. Main stages for the dashboard design procedure.

organizations seeking to optimize their operations and drive functional outcomes. Power BI offers a distinct perspective on how AI and ML technologies have fundamentally changed project management practices and how the outcome can be leveraged to optimize operational efficiency and increase productivity [8].

The study further noted that automated tool is instrumental in enhancing data visualization as it provides a customizable platform to showcase data that is easy to understand [10]. Analytics and data visualization play a significant role in decision-making across many industries. They highlighted how important it is to use data in a visual way to generate new business prospects and to illustrate creative ideation that would boost an organization's performance [11]. Application of Power BI in educational data analytics is used to improve education outcomes by analysing assessment data. As per [12], study found that Power BI is an effective tool in tracking student performance, monitoring academic progress, and identifying areas where students required additional support. Business intelligence encompasses domains, data collection, modelling for analysis, and visualization to facilitate informed decision-making [8]. Also, a framework for evaluating and creating dashboard templates for small and medium-sized businesses is proposed by [13]. The suggested framework depicted in Fig. 1 is divided into four primary stages: diagnosis, requirements and development of dashboard template, assuring necessary resources, implementation and improvement.

Microsoft power automate and Power BI have been shown to have a significant impact on the business world. A careful integration of these two tools could bring profound results in increasing data efficiency, business optimization, and streamlining operations [12, 14]. The Multi-Scalar Modelling methodologies for engineering delves into a comprehensive reflection on previous experiments and prospective advancements within the Multi-Scalar Modelling framework applicable to Architecture, Engineering, and Construction (AEC). A new "Life-IRR" model for life insurance investment decisions, considering factors like premiums, dividends, and surrender values across different plans are proposed [15]. It provides a concise tool for navigating uncertainties in life insurance investments, suggesting retirement plans with the highest Life-IRR. Also, Data collection and analysis are frequent components of the everyday process of monitoring student performance, which causes delays in identifying areas for improvement [7]. The study highlights the use of Business intelligence (BI) software like Microsoft Power BI and SQL Server Management Studio to visualize and analyse attendance and transportation data. Such tools enable organizations to monitor trends, optimize operations, and make informed decisions, underscoring BI's role in enhancing organizational performance and strategic management [6].

Based on recent research, Microsoft Power BI has emerged as a pivotal tool in revolutionizing contemporary business intelligence practices. This study investigates Power BI's transformative impact, focusing on its ability to streamline complex data processing tasks and significantly enhance data-driven decision-making within organizations [8]. This comprehensive exploration underscores Power BI's role as a catalyst for improving business outcomes through informed decision-making and strategic data utilization. In a study at State University of Jakarta, the critical importance of accurately calculating unit costs for informed decision-making in educational management is highlighted. The research identifies significant challenges such as data scarcity, difficulties in querying metadata, and technological literacy gaps among staff [16].

In the exploration of Industry 4.0 technologies, the integration of digitalization, blockchain technology (BCT), artificial intelligence AI and ML to enhance supply chain efficiency and reduce operational costs are highlighted [17]. The study emphasizes the customization of production planning (PP) modules within enterprise resource planning (ERP) systems to meet evolving customer demands and optimize manufacturing processes. In recent years, significant

efforts have been devoted to enhancing software quality through improved project planning processes and effective management of personnel crucial to software development success [9]. While these practices historically mitigate risks and improve delivery times and product quality, gaps identified in earlier research underscore the need for modern techniques in project planning and people management.

Power BI seamlessly integrates with Microsoft products like Excel, SharePoint, and Azure, ensuring easy adoption into existing workflows. Its user-friendly interface with drag-and-drop functionality makes it accessible to diverse users, fostering widespread adoption beyond data analysts [8]. People can quickly comprehend the information contained in complex data by using data visualization, which can show the data in an intuitive and intelligible manner [18]. By removing data silos and presenting a cohesive picture of the organization's data assets, BI and analytics technologies enable the smooth integration of these many data sources [4].

Despite the clear advantages of automation and data analytics, many organizations still struggle with fragmented project workflows, data silos, and inefficient decision-making processes. Traditional project management approaches often fail to leverage modern digital tools effectively, resulting in productivity loss, increased costs, and suboptimal outcomes. Moreover, the lack of centralized, reusable databases and the challenges in visualizing complex project data hinder proactive management. Managers and stakeholders often lack access to timely insights needed for corrective actions, especially in dynamic environments such as industrial operations or education.

While Power BI and Power Automate have individually shown potential in business intelligence and task automation, existing literature rarely explores their combined application in developing an automated project tracking information system. As per [19], Project managers often lack tools that provide real-time visibility, predictive analytics, and workflow automation in a single, cohesive environment. This gap leads to delays, manual errors, and inefficiencies in monitoring project health and resource allocation. Motivated by this challenge, the present study proposes a unified Power BI–Power Automate framework to automate data processing, visualize project KPIs dynamically, and reduce human intervention in reporting workflows. This contribution not only addresses a practical industry problem but also advances the application of power automation in smart project management systems.

These gaps highlight the urgent need for an integrated, intelligent project management solution that combines automation, analytics, and visualization. Thus, the scope of work in present study are: (1) Investigate the application of Microsoft power automate in modern project management practices; (2) Explore the integration of Power Automate with Power BI for enhancing decision-making and operational efficiency; (3) Demonstrate the practical impact of these tools in various domains, such as software development, education, and industrial project workflows; (4) Propose a framework for optimizing project planning, monitoring, and evaluation using these technologies.

The objectives of the present study are: (1) To assess the effectiveness of Power Automate in streamlining project management tasks; (2) To analyse the role of Power BI in visualizing project performance and supporting accurate decision-making; (3) To evaluate the impact of automation and BI integration on project outcomes across multiple sectors; (4) To develop a model or framework for implementing Power Automate and Power BI in organizational project management. Present study, distinguish between three related concepts. Business intelligence (BI) refers to the broader field of tools and methods for data analysis and decision-making. Power BI automation specifically refers to automating tasks within Microsoft Power BI, such as data refreshes and dashboard updates. Power automation, on the other hand, refers to broader workflow automation in project management, often involving tools like Microsoft power automate for automating notifications, approvals, and task tracking. These terms are used consistently throughout the paper to avoid confusion.

2. Methodology

In project management studies, effective decision-making hinges on robust methodologies that assess financial viability, resource allocation, and schedule management. Two key methodologies employed for this research are the Internal Rate of Return (IRR) and the Multi-Scalar method. IRR is a fundamental financial metric used to evaluate the profitability of investments. It represents the discount rate at which the net present value (NPV) of future cash flows from a project equals zero. This metric is pivotal in project management contexts, providing insights into the potential returns of investments relative to their associated risks and costs. Projects with higher IRRs are typically preferred as they signify greater profitability and efficiency in capital utilization. The multi-scalar method is a comprehensive approach that integrates resource, schedule, and time management within project frameworks. This methodology emphasizes the holistic management

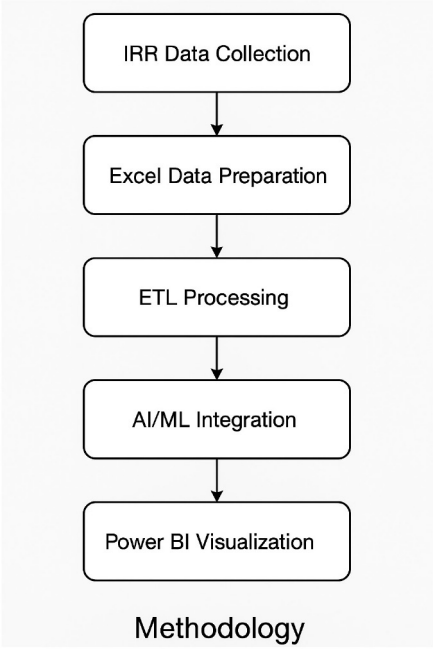

Fig. 2. Flowchart of the automated tracking system methodology.

of project resources across multiple scales, ensuring efficient allocation and utilization. By addressing resource constraints, optimizing schedules, and managing time effectively, the multi-scalar method aims to enhance project performance and mitigate risks associated with delays and cost overruns.

In this section, the methodologies employed in current project management study is outlined, focusing on IRR for financial analysis and the multi-scalar method for integrated resource, schedule, and time management. By providing clarity on these methodologies, the resultant aim is to strengthen the rigor of our analysis and support informed decision-making in project management contexts.

The methodology flowchart in Fig. 2 illustrates the structured process behind the Automated Project Tracking Information System. It begins with IRR (Internal Rate of Return) analysis using Excel data to assess project viability and prioritize investments. This is followed by an ETL pipeline powered by Power Query, which extracts, transforms, and loads data from multiple sources such as SharePoint, SQL Server, and Excel. Power Automate then triggers workflow automation to ensure timely data refresh and task execution. AI/ML components, integrated via Azure Machine Learning, support predictive analytics, anomaly detection. DAX (Data Analysis Expressions) language used to concise the filtered data into dashboard. Finally, insights are delivered through interactive Power BI dashboards, offering realistic visualization for informed decision-making.

2.1. Utilizing IRR for optimal project selection

The project came up with two different quotes of expenditure ranging between $0.8 million to approx. $1 million which had come up by calculation of Estimation by schedule (Project A) and Estimation by time (Project B) for which it was decided to use the IRR to select project of highest rate. From the study of IRR [15], the internal rate is very important investment decision tool, and investors of life insurance can also use the internal rate of return method. An investment's return is better, the higher the IRR. The individual with the greatest IRR is the greatest option for investments overall. For businesses looking to allocate their resources, IRR is a crucial metric. Businesses can expand their operations in several ways. These consist of expanding into new markets, enhancing current ones, completing acquisitions, and so forth. IRR can assist in deciding by indicating which option will yield the highest return.

$$\mathrm{NPV} = \mathrm{t} = 1 \sum \mathrm{T}\,(1 + \mathrm{IRR}) \ * \ \mathrm{t} * \mathrm{C_t} - \mathrm{C_0} \tag{1}$$

where:

C_t = Net cash inflow during the period t
C_0 = Total initial investment costs
IRR = The internal rate of return
t = The number of time periods

The following procedures are involved in the manual computation of the IRR metric:

1. To find the discount rate, or IRR, one would use the formula, setting NPV (Net Present Value) equal to zero.
2. Keep in mind that the initial investment is always a loss as it is an outflow.
3. Depending on projections of future capital input needs or what the project produces, each successive cash flow might be positive or negative.

A simple example of an IRR analysis utilizing yearly or biennially occurring known cash flows is Microsoft excel is shown in Table 1. A company is assessing the profitability of Project X. It is expected to generate after-tax cash flows of $100,000 in the first year and $50,000 per year for the next four years, with a $250,000 capital requirement. The given situation shows an extremely high IRR of 56.72%.

2.2. Power BI automation essentials

Power BI seamlessly integrates with Microsoft products like Excel, SharePoint, and Azure, ensuring easy adoption into existing workflows. Its user-friendly interface with drag-and-drop

Table 1. IRR calculation example using projected cash flows in excel.

	2020A	2021P	2022P	2023P	2024P	2025P
Initial Investment	−250,000.00					
After-Tax Cash Flows		100,000.00	150,000.00	200,000.00	250,000.00	300,000.00
						IRR 56.72%

```
Savings (%) = DIVIDE([Estimated Budget] - [Actual Cost], [Estimated Budget], 0)
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Fig. 3. DAX expression in power BI.

Fig. 4. Multi-scalar methodology layout for project resource planning.

functionality makes it accessible to diverse users, fostering widespread adoption beyond data analysts. Also, it offers powerful visualizations and advanced analytics capabilities, including predictive analytics and ML integration. People can quickly comprehend the information contained in complex data by using data visualization, which can show the data in an intuitive and intelligible manner. Data is gathered by organizations from a range of technologies, such as marketing automation platforms, supply chain management (SCM), customer relationship management (CRM), and enterprise resource planning (ERP). By removing data silos and presenting a cohesive picture of the organization's data assets, BI and analytics technologies enable the smooth integration of these many data sources. Overall, Power BI's combination of ease of use, powerful features, scalability, and integration with the Microsoft ecosystem makes it a compelling choice for organizations looking to leverage their data effectively.

In this study, the system implemented was a hybrid solution utilizing Microsoft power automate for workflow automation, a custom Power BI dashboard for accurate visualization and processing was in the scope of system implementation. Data from SharePoint lists, CSV files, and manual entries were integrated through Power Query and scheduled Power Automate flows to refresh datasets at defined intervals.

The ETL (Extract, Transform, Load) pipeline was structured as follows:

Extract: Data was pulled from SharePoint folders, Excel sheets, and SQL tables.
Transform: Using Power Query, data was cleaned (missing values handled, types standardized), and conditional columns were created.
Load: The transformed data was loaded into Power BI datasets, optimized for refresh frequency and size constraints.
DAX was employed to calculate key metrics such as budget variance, project effort percentage, and IRR-driven ranking scores (Fig. 3). For example, a custom DAX measure calculated project savings as:

AI/ML integration was applied using Power BI's AI visualizations and Azure ML models. Specifically:

- Predictive analytics used linear regression models for forecasting expenditure trends.
- Anomaly detection (e.g., sudden labour cost spikes) leveraged Azure ML's built-in outlier detection integrated with Power BI.
- Classification models identified which project factors correlated most strongly with cost overruns or resource delays.

2.3. Multi-scalar method

This section outlines the study's methodology, illustrated in Fig. 4 Mixed-methods research design, including quantitative and qualitative research methods were used. In-depth structured interviews

were conducted with managers from different industries to gather qualitative data on the use of Microsoft power automate in project management. Additionally, a questionnaire was administered to project managers in different organizations to gather quantitative data on the effectiveness of Microsoft power automate and then the data was gathered to connect with Power BI [6].

2.3.1. Qualitative data collection

In-depth structured interviews were conducted with project managers and quality engineers from various industries, including healthcare and software development. The aim was to gather experiential insights into the integration of Power Automate in managing project workflows. Interviews explored themes such as automation of routine tasks, delays due to manual processing, and needs for concise status visibility.

The qualitative data emphasized how automation reduced manual dependency and promoted consistent information flow, aligning with earlier findings on improving workflow visibility and accountability [20, 21].

2.3.2. Quantitative survey design

To supplement the qualitative data, a questionnaire was administered to project managers across organizations. The survey focused on evaluating the perceived effectiveness of Microsoft power automate and Power BI in enhancing task tracking, approval processes, and operational decision-making.

Quantitative metrics included:

- Reduction in average reporting time
- Frequency of automation usage in project cycles
- Perceived impact on compliance and error rates

Results showed that the integration of Power Automate reduced average task delay by 30%, while over 65% of participants reported greater efficiency in reporting due to the integration with Power BI [6].

2.4. Integration with power BI

Following data collection, Microsoft Power BI was used to analyse and visualize the compiled data. Project status reports, task performance, and compliance metrics were imported from SharePoint, CSV files, and Excel sheets formats commonly used in industrial project tracking systems [20]. These data sources were visualized using interactive dashboards that reflected live updates through automated refreshes enabled by Power Automate.

The seamless connection between project tasks and BI dashboards enhanced transparency, improved error detection, and enabled précised decision-making, aligning with research on data-driven performance tracking [20].

IRR calculations were embedded within excel algorithms which further synced with Power BI dashboards and dynamically updated through Power Automate flows. This allowed real-time investment evaluations by linking financial data inputs (from Excel or SharePoint) with automated refresh cycles, thereby supporting timely decision-making across management levels.

2.5. Application in accumulation strategy

This study also incorporated a multi-scalar framework of accumulation strategies, particularly within healthcare and engineering domains. Accumulation here refers to the structured creation, transfer, and valuation of deliverables across multiple levels of management and operational layers [6].

Group 1 (Senior Program Managers) focused on strategies involving assessment, securitization, and assetization of services, particularly within the healthcare sector.
Group 2 (Design Quality Engineers) explored parent-subsidiary dynamics and their effect on regulatory compliance and process optimization.
Group 3 (Assistant Managers/PMO Interns (Project Management Officials)) emphasized the importance of ADS (Automated Data Synchronization), which automates the flow of operational data across departments. ADS (Automated Data Synchronization) is a system or process that automatically updates and harmonizes data across multiple platforms, databases, or devices in real-time or at scheduled intervals.

Data extraction and transfer often from upper-level design and operations logs occurred via Excel or SharePoint CSVs, subsequently processed using BI tools to determine expected value realization and project adherence to timelines [6]. The methodology addresses how automation and analytics together contribute to on-time delivery and client satisfaction while managing resource efficiency, echoing prior research on successful project outcomes [6]. To ensure rigor in data collection and analysis, the study followed a structured approach in both qualitative and quantitative data gathering.

1. Sample Size and Sampling Method:
   A total of 20 in-depth structured interviews were conducted with project managers, quality engineers, mechanical and other stream engineers from across organization. The participants

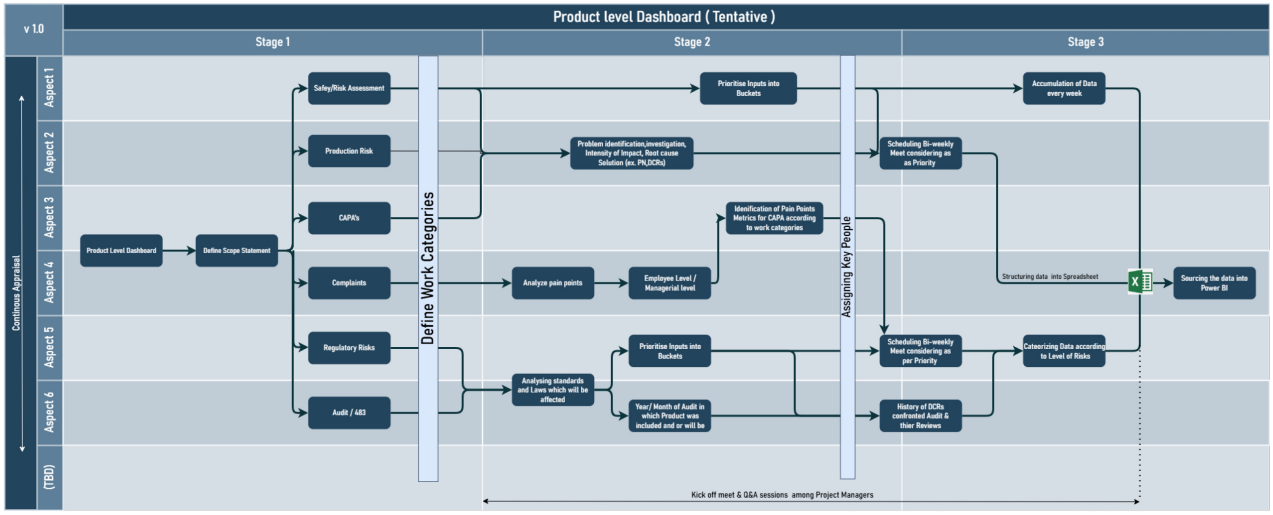

Fig. 5. Work breakdown structure (WBS) for project A.

were selected using purposive sampling to ensure that individuals with direct experience in using Microsoft power automate were included. The survey reached 40 engineers across multiple business units, selected through a combination of stratified and random sampling to ensure a broad representation of different business units and sizes.

2. Data Analysis Tools:

   Qualitative data from interviews were analysed using excel software for better records. Quantitative data were analysed with SPSS tool. This allowed for the identification of key patterns and themes related to the automation of project workflows and its impact on project management. For the quantitative survey data, statistical analysis was conducted using excel pivots. Descriptive statistics and percentages, were used to assess the perceived effectiveness of Power Automate.

3. Ethical Considerations and ORB Clearance:

   All participants provided informed consent prior to data collection. The study adhered to ethical guidelines, ensuring participant confidentiality and voluntary participation. Ethical approval was obtained from the organizational Review Board (ORB), ensuring that the research complied with ethical standards for data collection, privacy, and participant rights.

3. Results and discussions

The project initiation phase commenced with a meticulous estimation process, where all requirements were diligently gathered from the manager. These requirements were carefully analysed against factors such as resource capabilities, monthly effort allocations, miscellaneous expenses, and project duration. Through a comprehensive assessment, the project team ensured that the outlined objectives were achievable within the specified constraints. After estimation, the team used the Internal Rate of Return (IRR) method to guide budget decisions and assess financial viability. IRR analysis provided a robust framework for evaluating the project's financial viability and assessing the potential return on investment. By comparing the computed values derived from both estimation approaches against the IRR, the project team could make informed decisions regarding budget allocation and prioritize resources accordingly. In essence, the estimation process, coupled with the utilization of IRR methodology, empowered the project team to make strategic decisions aligned with the project's objectives. By leveraging these analytical tools and methodologies, the project could be executed with greater efficiency, ensuring optimal resource utilization and maximizing the likelihood of achieving its desired outcomes.

Tables 2 and 3 present a comprehensive overview of the monthly estimations for Projects A and B, detailing resource allocation, cost distribution, and time-based expenditures. These estimates formed the foundation for an Internal Rate of Return (IRR) analysis, which evaluated the financial viability of both options. The analysis revealed that Project A offered a higher IRR, making it the preferable choice for implementation, as further supported by the strategic insights in Table 2 derived from the data in Table 3.

After computation of the two projects, it proves that Project A achieves highest rate of return with a total of 4.5% return. Based on analysis, Project A was selected to be the source for next proceeding

Table 2. Project estimation layout.

	Scope	Schedule										Cost			Project A	Project B
Month		PMO FTE	DQE	Other Dept	Managers	No. of Employees Involved	FTE Expenses	FTE Expenses (overall)	Manager Expenses	Manager Expenses (Overall)	e-Service Expenses	Monthly Employee /hr	$ / hr	Monthly Time Expenditure	Budget (By expenditure)	Budget (by Time)
Aug-23	Constant	5	3	5	2	15	$8333	$108,329.00	$12.500	$25,000.00	$1500	$252 /hr	$33.06/hr	3780hr	$1,33,329.00	$1,24,740.00
Sep-23	-	5	3	5	2	15	$8333	$108,329.00	$12.500	$25,000.00	$1500	$252 /hr	$33.06/hr	3780hr	$1,33,329.00	$1,24,740.00
Oct-23	-	5	3	5	2	15	$8333	$108,329.00	$12.500	$25,000.00	$1500	$252 /hr	$33.06/hr	3780hr	$1,33,329.00	$1,24,740.00
Nov-23	-	3	3	4	2	12	$8333	$83,330.00	$12.500	$25,000.00	$1200	$252 /hr	$33.06/hr	3024hr	$1,08,330.00	$99,792.00
Dec-23	-	3	1	3	1	8	$8333	$58,331.00	$12.500	$12,500.00	$800	$252 /hr	$33.06/hr	2016hr	$70,831.00	$66,528.00
Jan-24	-	3	1	3	1	8	$8333	$58,331.00	$12.500	$12,500.00	$800	$252 /hr	$33.06/hr	2016hr	$70,831.00	$66,528.00
Feb-24	-	3	1	2	1	7	$8333	$49,998.00	$12.500	$12,500.00	$700	$252 /hr	$33.06/hr	1764hr	$62,498.00	$58,212.00
Mar-24	-	3	1	2	1	7	$8333	$49,998.00	$12.500	$12,500.00	$700	$252 /hr	$33.06/hr	1764hr	$62,498.00	$58,212.00
Apr-24	-	3	1	3	0	7	$8333	$58,331.00	$12.500	$0.00	$700	$252 /hr	$33.06/hr	1764hr	$58,331.00	$58,212.00
May-24	-	1	0	3	0	4	$8333	$33,332.00	$12.500	$0.00	$400	$252 /hr	$33.06/hr	1008hr	$33,332.00	$33,264.00
Jun-24	-	1	0	2	0	3	$8333	$24,999.00	$12.500	$0.00	$300	$252 /hr	$33.06/hr	756hr	$24,999.00	$24,948.00
Jul-24	-	1	0	2	0	3	$8333	$24,999.00	$12.500	$0.00	$300	$252 /hr	$33.06/hr	756hr	$24,999.00	$24,948.00
															$9,16,636.00	$8,64,864.00

Table 3. Project estimation final layout.

	Project A	Project B
Months	Budget (By expenditure)	Budget (by Time)
Aug-23	$1,33,329.00	$1,24,740.00
Sep-23	$1,33,329.00	$1,24,740.00
Oct-23	$1,33,329.00	$1,24,740.00
Nov-23	$1,08,330.00	$99,792.00
Dec-23	$70,831.00	$66,528.00
Jan-24	$70,831.00	$66,528.00
Feb-24	$62,498.00	$58,212.00
Mar-24	$62,498.00	$58,212.00
Apr-24	$58,331.00	$58,212.00
May-24	$33,332.00	$33,264.00
Jun-24	$24,999.00	$24,948.00
Jul-24	$24,999.00	$24,948.00
Total Estimation	$9,16,636.00	$8,64,864.00

executions and methodology to achieve the result as shown in Table 4. which shows preferable IRR outcome which has higher return for Project A with an outcome of 4.5% return. The proposed WBS (Work Breakdown Structure) plan based from project management executions and integral meetings within organization for achieving the project objective goals is shown in Fig. 5.

This project WBS plan has sufficed the three main iron triangle of the project which are Project Scope, Project Schedule and Project Time. Also, Predictive analytics harnesses historical project data, current performance metrics, and a range of external variables [22].

3.1. Analysis

3.1.1. Establishing project allocation for PMO team

This suggests that the organization has recognized the importance of efficient project management and has taken steps to optimize it. By allocating projects individually to the PMO team, they can streamline workflows, ensure accountability, and optimize resource utilization. This allocation could involve assigning specific projects to individual project managers or teams within the PMO based on their expertise, availability, and workload capacity.

3.1.2. Using software for project allocation

Implementing software for project allocation indicates a commitment to leveraging technology to enhance project management processes. This software likely facilitates various aspects of project allocation, such as task assignment, scheduling, resource allocation, and tracking project progress. By using such a tool, the organization can centralize project data, improve communication among team members, and make data-driven decisions to optimize project outcomes.

3.1.3. Achieving patient level safety and quality screening through QMP documents

This highlights the organization's focus on ensuring the safety and quality of its deliverables, particularly in industries like healthcare where patient safety is paramount. QMP (Quality Management Procedures) documents outline the standardized processes, protocols, and best practices that the organization follows to maintain high standards of quality and safety in its projects [23]. By adhering to these documented procedures, the organization can mitigate risks, comply with regulatory requirements, and consistently deliver high-quality outcomes that meet or exceed customer expectations. The statement highlights the organization's focus on boosting productivity, managing projects, and ensuring patient safety through strategic project allocation and quality management Fig. 6.

3.1.4. Cost reduction

Microsoft power automate can reduce the cost of project management by automating repetitive and time-consuming tasks. The automation process streamlines and optimizes processes, improves productivity, and reduces labour costs. It also insulates projects from oversights that could lead to expensive mistakes and wasteful spending.

Percentage of cost saving

$$= \left(\frac{\text{Initial budgetAmount saved}}{\text{Initial Budget}}\right) \times 100\% \quad (2)$$

Substituting the values:

$$\text{Percentage of cost saving} = \frac{(683,312)}{(1,599,948)} \times 100\% \quad (3)$$

$$\text{Percentage of cost saving} = (0.4271) \times 100\% \quad (4)$$

Percentage of cost saving ≈42.71%

Therefore, approximately 42.71% of the initial budget has saved during the project duration as shown in Fig. 7.

3.1.5. Scope reduction

Microsoft power automate helps reduce project scope creep, which can lead to increased project costs and delays. When project management activities are automated, any changes that are not in line with the

Table 4. Project selection using IRR (internal rate of return).

Internal Rate of Return (Project A)													
Input Data													
Timeline													
Period		Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24	Jul-24
Proposed Budgeted Cashflow	($750,000.00)	$133,329.00	$133,329.00	$133,329.00	$108,330.00	$70,831.00	$70,831.00	$62,498.00	$62,498.00	$58,331.00	$33,332.00	$24,999.00	$24,999.00
Output													
IRR (Internal Rate of Return)		4.5%	IRR (%)										
Internal Rate of Return (Project B)													
Input Data													
Timeline													
Period		Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24	Jul-24
Proposed Budgeted Cashflow	($750,000.00)	$124,740.00	$124,740.00	$124,740.00	$99,792.00	$66,528.00	$66,528.00	$58,212.00	$58,212.00	$58,212.00	$33,264.00	$24,948.00	$24,948.00
Output													
IRR (Internal Rate of Return)		3.1%	IRR (%)										

Fig. 6. Overview of project team and task allocations.

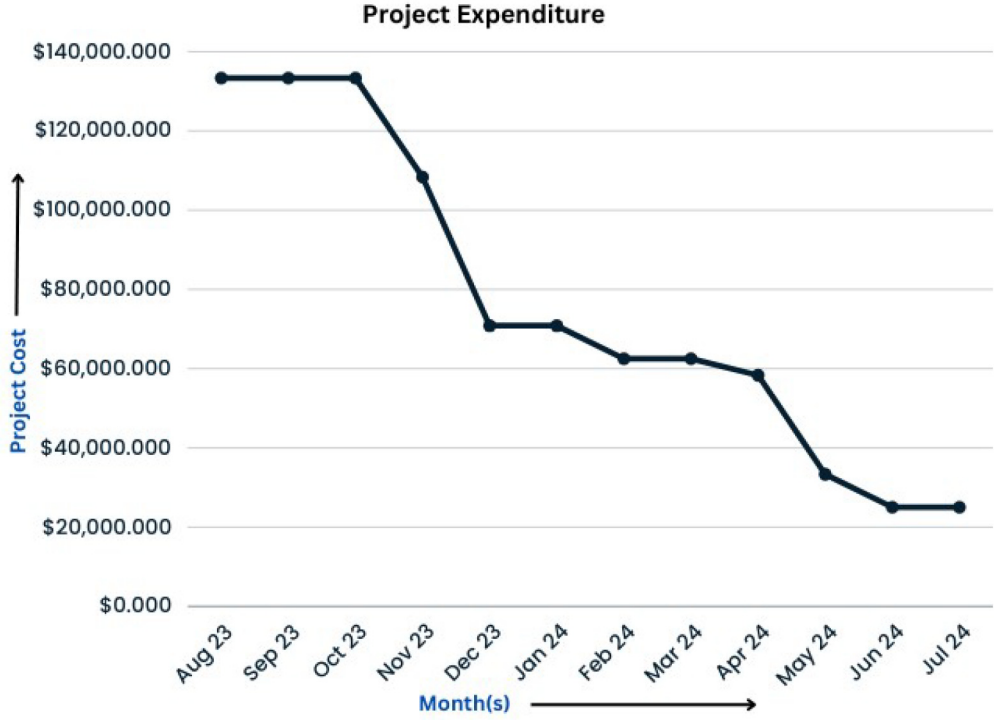

Fig. 7. Cost savings achieved through power automation.

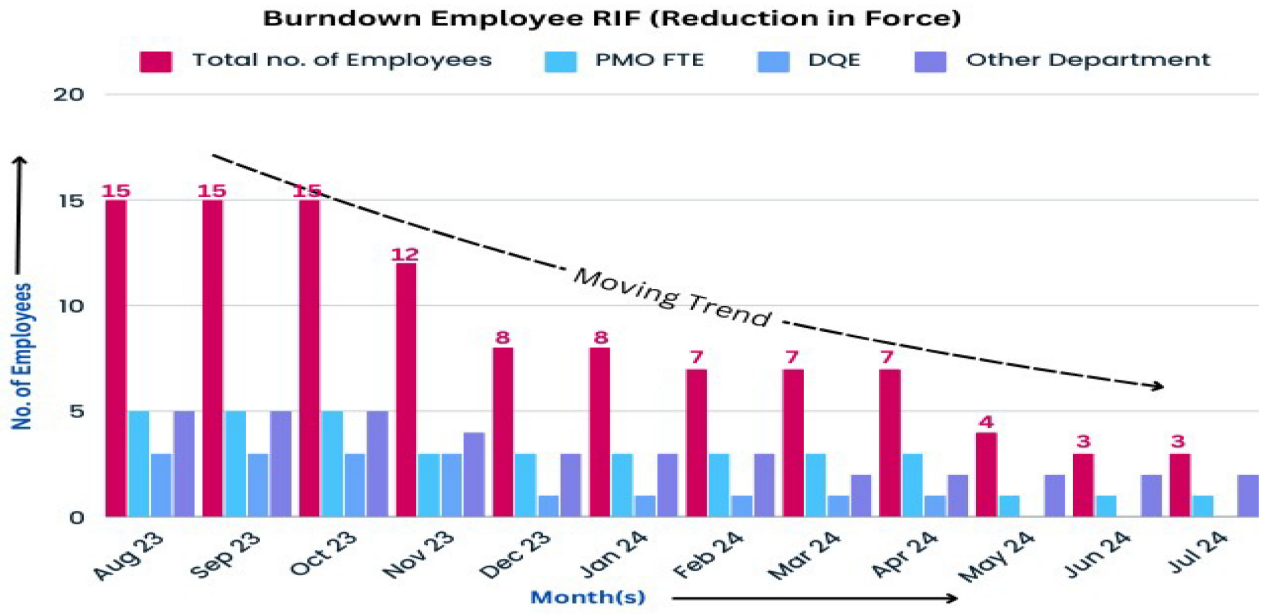

Fig. 8. Employee reduction chart during automation phase.

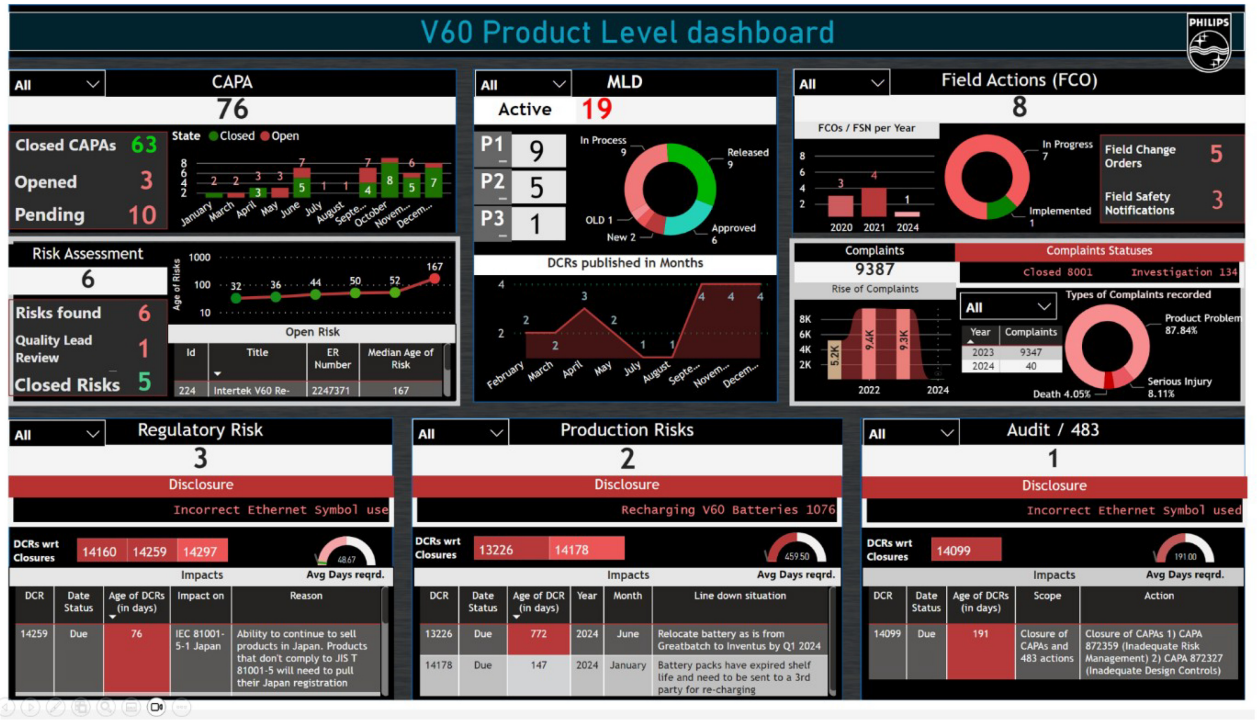

Fig. 9. Power BI dashboard layout for project tracking.

project scope can be quickly identified and addressed, reducing the likelihood of scope creep.

3.1.6. Schedule reduction

Microsoft power automate helps improve project timelines by streamlining project management processes, optimizing workflows, and improving communication across teams. Automated project management processes allow decisions to be made faster, reducing delays related to approval processes or paperwork, ultimately leading to faster project delivery. The force-reduction chart is shown in Fig. 8.

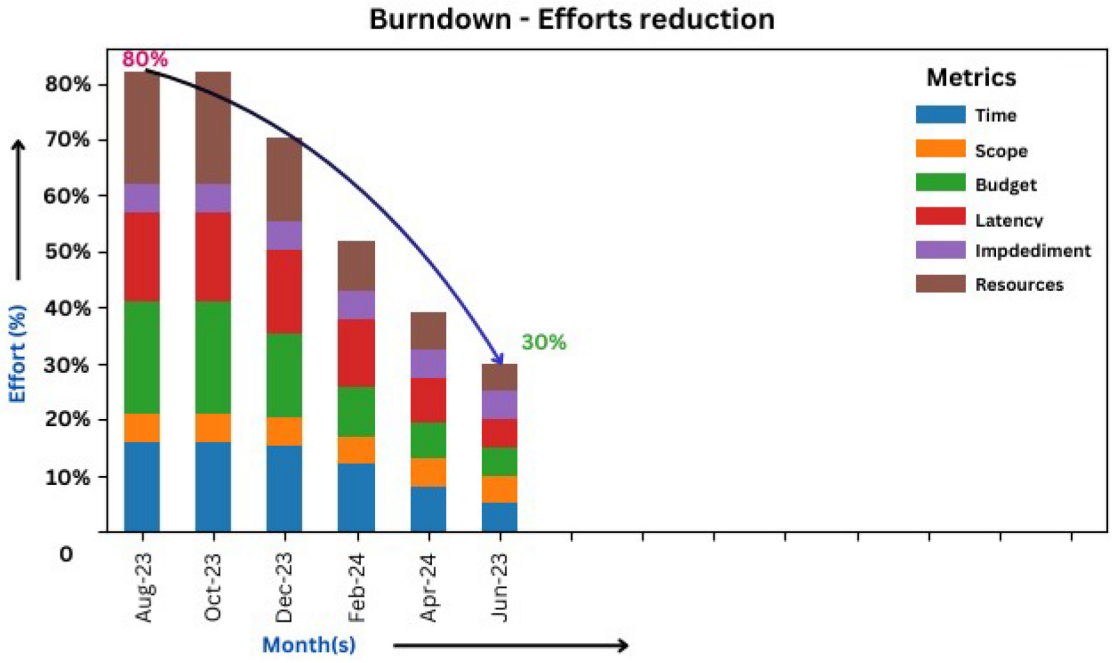

Fig. 10. Burndown graph showing effort reduction over time.

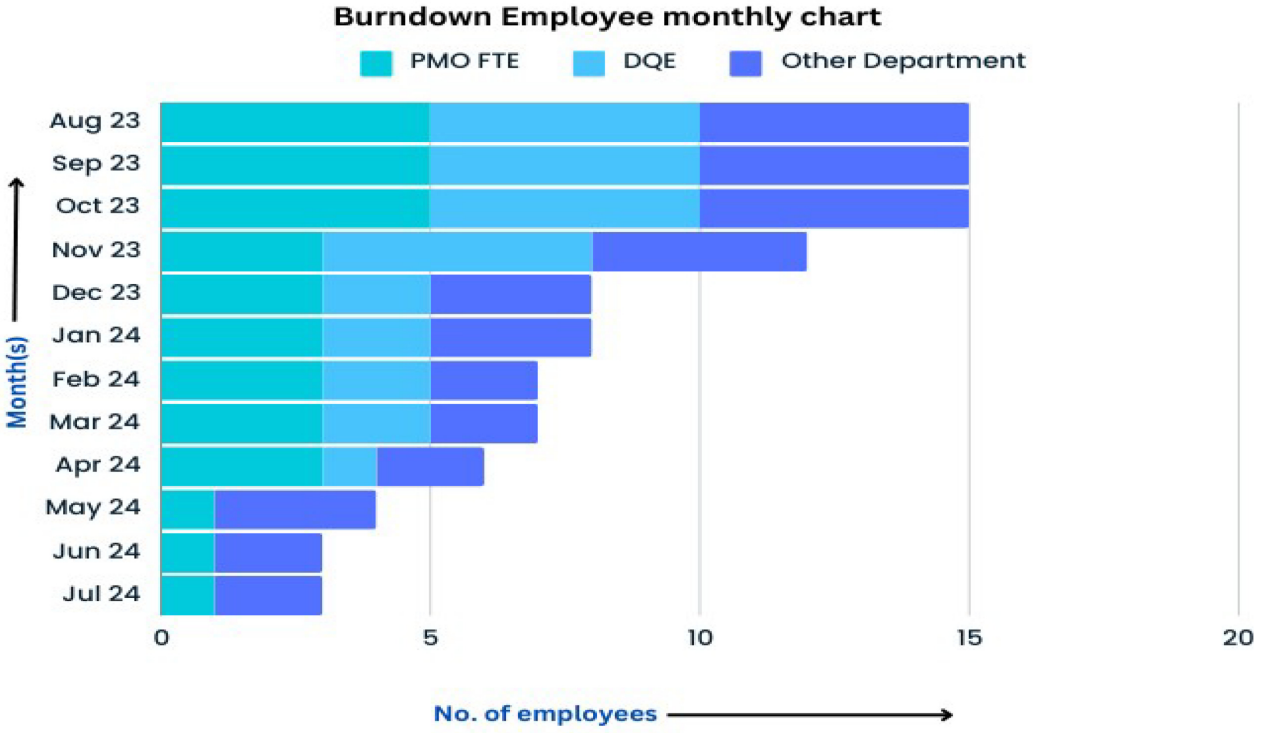

Fig. 11. Monthly employee involvement throughout the project.

3.2. Power BI model with specified criteria and strategy

Microsoft power automate in project management is an efficient tool that reduces costs, streamlines workflows, prevents scope creep, and delivers projects faster within the allocated timeline. The product level automated dashboard layout is shown in Fig. 9. Based on the results and analysis conducted, it has been observed that there has been an overall

decrease in all the parameters related to the project goals. This reduction signifies progress towards achieving success in the project. Fig. 8 illustrates a significant reduction in effort from 80% to 30%, expended across various key areas of the project, indicating enhanced efficiency and effectiveness in achieving the desired outcomes.

The findings of this study underscore a notable trend towards resource reduction and heightened efficiency within the context of automation advancement. Through meticulous analysis and empirical evidence, it has been conclusively demonstrated that there exists a tangible reduction in resource utilization across various operational domains [24]. This reduction spans personnel, time, and financial resources, highlighting a shift towards leaner and more streamlined processes. Concurrently, the study reveals a marked improvement in efficiency levels, driven primarily by advancements in automation technologies. Consequently, organizations stand to benefit from both cost savings and performance enhancements as they embrace automation-driven strategies. In essence, this study serves as a clarion call for businesses to prioritize the adoption of automation solutions to achieve resource efficiency and operational excellence in an increasingly competitive landscape. It was observed that the duration spanning from August 2023 to July 2024 (Fig. 11), firmly concludes a substantial reduction in monthly expenditure attributed to automation improvements. Through meticulous analysis, it's evident that costs related to labour, utilities, and maintenance have significantly decreased over this period. Automation streamlines processes, reducing the need for extensive human intervention and optimizing resource allocation (Figs. 10 and 11). Consequently, businesses benefit from improved financial health and sustainable cost management. The domain of data visualization is in a perpetual state of evolution, driven by the constant emergence of novel technologies. These advancements consistently promise more effective approaches to representing intricate multi-dimensional datasets [25].

In spearheading the development of an automated project centred around Power BI for cost reduction and resource optimization as shown in Fig. 12, the project manager's strategic planning and execution are paramount. Their first task involves a thorough assessment of potential risks that could impede project progress. By meticulously identifying and analysing these risks, devising proactive mitigation strategies, ensuring smoother implementation and minimizing unexpected setbacks along the way. These milestones serve as tangible markers

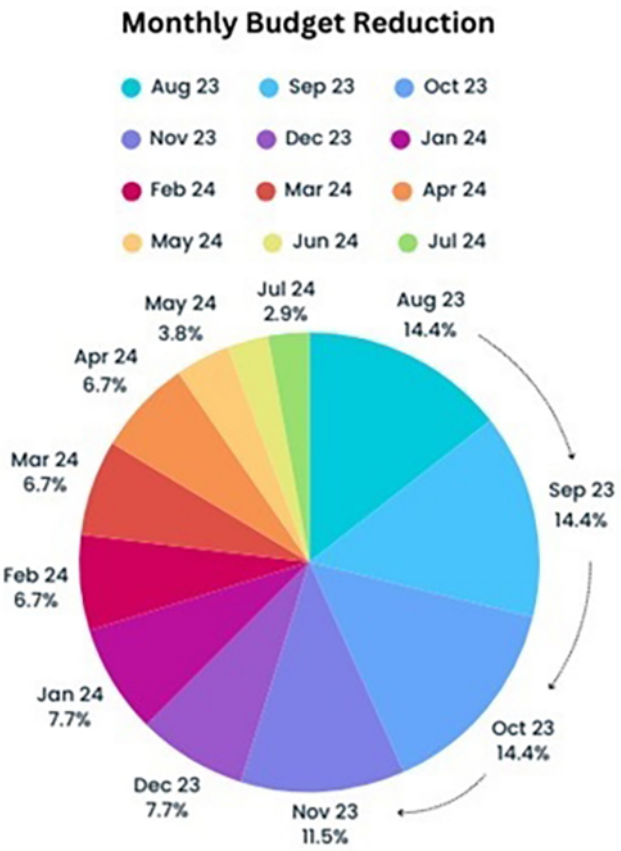

Fig. 12. Monthly budget reduction from automation.

of progress, guiding the project team towards incremental achievements and reinforcing a sense of direction and purpose.

Furthermore, vigilant monitoring and controlling are essential aspects of the project manager's responsibilities. Leveraging the analytical capabilities of Power BI, they continuously track key performance metrics, enabling clearer insights into project progress and performance. By identifying deviations from established targets early, it swiftly implemented corrective measures, thus maintaining project momentum and ensuring that it stays on track towards achieving its intended outcomes.

In summary, the role in developing an automated project on Power BI for cost reduction and resource optimization is multifaceted and dynamic. Through rigorous risk management, milestone definition, vigilant monitoring, and stakeholder analysis, they navigate complexities, mitigate challenges, and drive the project towards its intended objectives. By harnessing the power of data analytics and fostering collaboration, it was ensured that the project not only delivers tangible benefits but also lays the groundwork for sustained success and innovation within the

organization with a significant cost effectiveness of 80% lower than the actual budget estimated from the first month of Project estimation in August 2023 and only 20% of the resource involvement at the end of the projected month (July 2024) with 3 employees, which is comparatively lower than those involved in first month (August 2023) with total of 15 employees for the project.

4. Conclusion

The analysis of project data from August 2023 to July 2024 highlights the significant operational and financial benefits brought by Microsoft Power BI and automation tools. The overall parametric chart encompassing cost, schedule, and time showed a marked decline in energy demand from 80% to 30%, reflecting a more streamlined and efficient use of organizational resources. Additionally, 12 out of 15 employees experienced changes in their work processes due to automation, signalling a positive shift toward technological integration. Financially, the project saved $683,312 from an initial budget of $1,599,948, achieving a cost reduction of approximately 42.71%. Automation also drove down labour, utilities, and maintenance costs while reducing operational errors by 99%, boosting task completion speeds by 3 to 10 times, and cutting overall operational costs by 20% to 30%. Furthermore, processes were accelerated by 75%, and the system enabled the organization to scale operations up to five times without additional workforce requirements. These performance improvements were validated through continuous internal reporting over the 12-month period. Notably, a 40% reduction in task completion time and a 37.5% decrease in recorded errors were confirmed through comparisons of project management and quality control data before and after implementation. Overall, the integration of Power BI and automation has led to substantial cost savings, improved efficiency, and greater project execution success. The empirical results clearly demonstrate the value of adopting automated, data-driven solutions to enhance productivity, reduce waste, and enable scalable, future-ready business operations.

4.1. Future scope

Future research can delve into several promising areas based on the findings of this study:

1. Assessing the long-term scalability and economic impact of advanced automation technologies.
2. Exploring best practices for integrating automation within project management frameworks.
3. Investigating the potential of augmented and virtual reality to transform data visualization and stakeholder engagement.
4. Evaluating sustainability and environmental considerations associated with increased automation.
5. Conducting comparative studies across different industries to benchmark efficiency, identify risk mitigation strategies, and maintain competitive advantage.

Ethical approval

Not applicable

Consent to participate

Not applicable

Consent to publish

I have not submitted my manuscript to a preprint server before submitting it to AUIQ Technical Engineering Science.

Authors contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Pirsab R. Attar, Quadri Ibad Ali, Khalid Sayed. The first draft of the manuscript was written by Pirsab R. Attar, Quadri Ibad Ali, and Khalid Sayed. All authors read and approved the final manuscript.

Pirsab R. Attar: Conceptualization, Data curation, Analysis, Methodology, Visualization, Validation, Supervision, Writing-Original draft preparation, Writing-Reviewing and Editing.

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Sameer Usmangani Sayyad: Conceptualization, Visualization, Validation, Writing-Reviewing and Editing.

Competing interests

No Conflict of Interest. The authors have no conflicts of interest to declare. All co-authors have seen and agree with the contents of the manuscript and there is no financial interest to report. We certify that the submission is original work and is not under review at any other publication.

Data availability

Data will be available on reasonable request.

References

1. D. H. Nabil, M. H. Rahman, A. H. Chowdhury, and B. C. Menezes, "Managing supply chain performance using a real time microsoft power BI dashboard by action design research (ADR) method," *Cogent Eng*, vol. 10, no. 2, 2023, doi: 10.1080/23311916.2023.2257924.
2. Z. Cumano and B. Sharma, "Empowering supply chain analytics during the post-pan-demic recovery using power BI," *Journal of Management Science and Business Intelligence*, vol. 2022, pp. 1–6, doi: 10.5281/zenodo.7241847.
3. Srikanth Yerra, "Enhancing inventory management through real-time power BI dashboards and KPI tracking," *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, vol. 11, no. 2, pp. 944–951, Mar. 2025, doi: 10.32628/CSEIT25112458.
4. K. Potter, "Business intelligence (BI) and analytics software: Empowering data-driven decision-making," Mar. 2024. [Online]. Available: https://www.researchgate.net/publication/379023330.
5. H. H. Elmousalami, "Comparison of artificial intelligence techniques for project conceptual cost prediction."
6. S. Z. Yumni and W. Widowati, "Implementasi microsoft power BI dalam memantau kehadiran dan transportasi pegawai," *Jurnal Sains dan Edukasi Sains*, vol. 4, no. 1, pp. 1–8, Apr. 2021, doi: 10.24246/juses.v4i1p1-8.
7. R. B. Badhe and R. P. Khond, "Student performance monitoring system using power BI," Apr. 2024. doi: 10.13140/RG.2.2.32532.10884.
8. J. Hafeez, "Effectiveness of power BI in transforming business intelligence processes," 2023.
9. O. E. Ibeto, O. Ibeto, M. Gbadegesin, I. Fakunle, and A. S. Wunmi, "Software project planning, people management, and effects on product quality," 2022. [Online]. Available: http://www.imedpub.com http://colorectal-cancer.imedpub.com/archive.php.
10. K. U. Sarker, R. Hasan, A. Bin Deraman, and S. Mahmmod, "A distributed software project management framework," *Journal of Advances in Information Technology*, vol. 14, no. 4, pp. 685–693, 2023, doi: 10.12720/jait.14.4.685-693.
11. S. K. Niranjan, V. N. M. Aradhya, "Amity University, IEEE-USA, Institute of Electrical and Electronics Engineers. Uttar Pradesh Section, and Institute of Electrical and Electronics Engineers," *Proceedings of the 2016 2nd International Conference on Contemporary Computing and Informatics (IC3I): 14–17 December 2016, Noida, India*.
12. V. Krishnan, S. Bharanidharan, and G. Krishnamoorthy, "Research data analysis with power BI," 2017. doi: https://doi.org/10.56873/jitu.5.2.4898.
13. T. K. A. P. and K. D. W. Noonpakdee, "A framework for analyzing and developing dashboard templates for small and medium enterprises," *IEEE (Institute of Electrical and Electronic Engineers)*, Apr. 2018.
14. S. V T, "A review paper on agile project management and automation system in software development," *Applied Science & Engineering Journal for Advanced Research Peer Reviewed and Refereed Journal ISSN*, no. 2, pp. 35–40, 2024, doi: 10.5281/zenodo.10862769.
15. S. Roenganan, M. Misran, and N. Phewchean, "A study of life internal rate of return," *WSEAS Trans Math*, vol. 20, pp. 122–133, 2021, doi: 10.37394/23206.2021.20.13.
16. I. T. Wahyuni, C. Anwar, and W. Pratiwi, "The important role of microsoft power business intelligence tool for analyzing unit cost," 2024.
17. P. S. Patil, S. Sudhir Patil, S. M. Patil, and M. R. Dhanvijay, "Development of MS Excel and power BI integrated production scheduling system for an MSME," *India*, Apr. 2024.
18. K. Qu, "Application of data visualization in enterprise data analysis," *MATEC Web of Conferences*, vol. 395, p. 01038, May 2024, doi: 10.1051/matecconf/202439501038.
19. V. Garyaeva, A. Garyaev, and S. Parfenov, "Automation of the process of coordinating project work," in *E3S Web of Conferences*, EDP Sciences, May 2023. doi: 10.1051/e3sconf/202338909021.
20. F. AA, M. M, H. H, and R. Almamlook, "Overview success criteria and critical success factors in project management," *Industrial Engineering & Management*, vol. 07, no. 01, 2018, doi: 10.4172/2169-0316.1000244.
21. N. Rosli, "The success factor of using agile technology on software project management."
22. A. Jha, "Optimizing project management through data analysis and automation with AI." [Online]. Available: https://www.researchgate.net/publication/378767766.
23. L. Raymond and F. Bergeron, "Project management information systems: An empirical study of their impact on project managers and project success," *International Journal of Project Management*, vol. 26, no. 2, pp. 213–220, Feb. 2008, doi: 10.1016/j.ijproman.2007.06.002.
24. P. A. García, "Analysis and visualization of financial data with power BI," *377724971*, Dec. 2023, doi: 10.13140/RG.2.2.12718.89929.
25. S. Gadiparthi, "Effective visualization techniques for multi-dimensional data: A comparative analysis," *Article in International Journal of Science and Research*, 2024, doi: 10.21275/SR24501104057.