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Business Intelligence Dashboard Visualization Design for Project Performance Monitoring and Strategic Decision-Making Support

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Keywords
business intelligence dashboard; interactive visualization; data integration; cost control.

ABSTRACT
In today's competitive business era, fast, data-driven decision-making is critical to the success of organizations. Companies in the Event Contractor sector face challenges in managing complex data, as spreadsheet-based reporting systems are prone to input errors, outdated information, and manual calculation errors, leading to decreased profits and lost business opportunities. This research aims to design and implement a Business Intelligence Dashboard visualization for project performance monitoring to support strategic decision-making. The research applied a system design and development methodology that includes analysis of user needs and integration of data from various sources, using the Vercellis framework as a development approach. The designed dashboard displays key metrics such as project costs, profit and loss, and sales performance in an easy-to-understand visual format, allowing management to conduct evaluations faster and more accurately. The results show that the implementation of the Business Intelligence Dashboard reduces decision-making time from 7-14 working days to less than 7 working days, while increasing profit margins from 28% to 36.4% through better cost control and project evaluation. Integration of multiple data sources and interactive visualization features, including drill-down and filtering functions, allows for more in-depth data analysis and assessment. This research contributes to the development of an effective Business Intelligence Dashboard visualization design to improve project performance monitoring and strategic decision-making, as well as demonstrate how interactive visualizations can improve operational efficiency and business growth.

INTRODUCTION

In today's business environment, data-driven decision-making is vital, especially for companies handling extensive and complex data. Business Intelligence (BI) has become essential, integrating tools and applications that allow real-time data analysis and insights to support informed decision-making. Dashboard Design is a significant aspect of BI, presenting data in an accessible manner to quickly highlight opportunities, patterns, and risks, thereby enhancing operational understanding and strategic planning (Golestanizadeh et al., 2023; Tumbas et al., 2020).

A company specializing in event contractor, confronts challenges in strategic decision-making. Currently, sales tracking relies on Excel, resulting in slow access, prolonged recording times, and increased potential for input errors (Kaur & Lowe, 2025; Zahra & Prasetyo Utomo,

2023). This fragmentation across multiple worksheets complicates weekly reporting and further complicates data analysis, leading to inaccuracies in sales metrics, including profit evaluation. These inefficiencies may culminate in decreased profitability and market share due to poor decision-making rooted in inaccurate data (Agetia & Rahmanio, 2022; Cintya Nender & Bumi Kellen, 2022). To thrive in the competitive exhibition sector, timely and effective data-driven strategies are crucial.

Several studies have examined the application of Business Intelligence and data visualization in various organizational contexts. Seto and Yosef Daryanto (2023) demonstrated that Microsoft Power BI can reduce processing time by 50% faster and help management make future estimates and decisions, with the order process flow decreasing by 54% from 3.42 hours to 1.55 hours. Albara (2021) showed that visualization using Microsoft Power BI makes it easier to make business policy decisions. Kongprasert and Garrett (2021) applied data visualization tools for lean inventory management in an industrial tool distributor in Thailand, demonstrating significant improvements in operational efficiency. Studies by Widjaja and Mauritsius (2019) and Orlovsskyi and Kopp (2020) developed dashboard design approaches to improve data analytics and decision-making processes. Furthermore, research by Yiu, Yeung, and Cheng (2020) examined the impact of business intelligence systems on profitability and risks of firms, finding that BI implementation positively affects firm performance through better decision-making capabilities. However, these studies predominantly focus on manufacturing, logistics, and general business contexts, with limited attention to the specific challenges faced by the event contractor industry, which has unique characteristics such as project-based operations, tight deadlines, and high variability in project costs and revenues.

In the context of event contractor companies, the need for integrated project performance monitoring is particularly acute (Joergensen & Zaggl, 2024; Villeneuve & Bouchamma, 2023). The industry operates on a project-by-project basis with significant cost variations, requiring real-time visibility into project profitability, cost overruns, and resource allocation. Research by Hosseinzadeh, Rostamzadeh, and Šaparaukas (2021) emphasized the influence of innovation and marketing strategy on market-oriented activities, highlighting the importance of data-driven decision-making in dynamic business environments. Similarly, Mikalef et al. (2020) examined the role of information governance in big data analytics-driven innovation, while Božič and Dimovski (2019) studied business intelligence and analytics use, innovation ambidexterity, and firm performance from a dynamic capabilities perspective. These studies affirm the strategic value of BI but do not specifically address project-based service industries with complex cost structures and time-sensitive decision-making requirements.

The novelty of this research lies in several aspects. First, this study specifically addresses the unique challenges of the event contractor industry by designing a Business Intelligence Dashboard tailored to project-based performance monitoring, an area that has received limited attention in academic literature. Second, unlike previous studies that focus on standalone BI implementation, this research develops an integrated visualization framework that combines multiple data sources including project cost data, sales data, and general ledger information into a unified dashboard for comprehensive project performance monitoring. Third, this study demonstrates how interactive visualization features, including drill-down and filtering functions, can be effectively utilized to reduce decision-making time and improve profit

margins through better cost control and project evaluation, providing empirical evidence of BI's tangible business impact.

The research gap identified in this study is the lack of systematic investigation into Business Intelligence Dashboard design for project performance monitoring in the event contractor sector. While existing studies have examined BI applications in various industries, limited research has specifically addressed the integration of project cost data, sales performance metrics, and profit analysis into a unified visualization platform tailored to the unique needs of project-based service companies. The absence of empirical evidence on the effectiveness of BI dashboards in improving decision-making efficiency and profitability in this specific context provides the basis for this research.

This study aims to develop a BI Dashboard to monitor project performance and enhance insights into sales, costs, and profitability, ultimately supporting management in achieving sustainable growth and competitive advantage. The benefits of this research are both theoretical and practical. Theoretically, this study contributes to the development of Business Intelligence literature, particularly regarding the application of interactive visualization for project performance monitoring in service-based industries, and enriches the understanding of how data integration and visualization can improve organizational decision-making processes. Practically, this research provides benefits for management in making faster and more accurate strategic decisions through data-driven insights, for operational teams in identifying cost overruns and profit opportunities early, and for future researchers as a foundation for further studies on BI dashboard implementation in project-based organizations.

METHOD

The research methodology development used was the design and development research method (RAD). This method focuses on the design, implementation and evaluation of BI dashboard visualization as a project performance monitoring tool and supports decision making.

In designing the dashboard design, the researcher uses the Vercellis framework. The Vercellis framework is a systematic approach designed to support Business Intelligence (BI) and data mining processes. This framework helps transform raw data into strategic insights suitable for decision making.

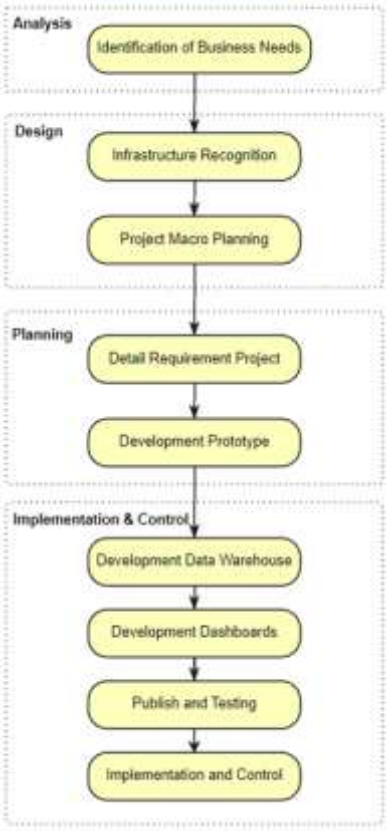

Figure 1, BI dashboard design standard model (Vercellis Method)

Source: Adapted from Vercellis Business Intelligence Framework

Visualization Design Development

The proposed method in this research consists of three parts, namely data collection method, project performance monitoring dashboard design method and development method. The method of designing the project performance monitoring dashboard refers to the Vercellis standard model by making changes on the analysis side to determine the parameters

Proposes a dashboard design methodology for strategic decision making based on project performance monitoring as follows (while still referring to Vercellis):

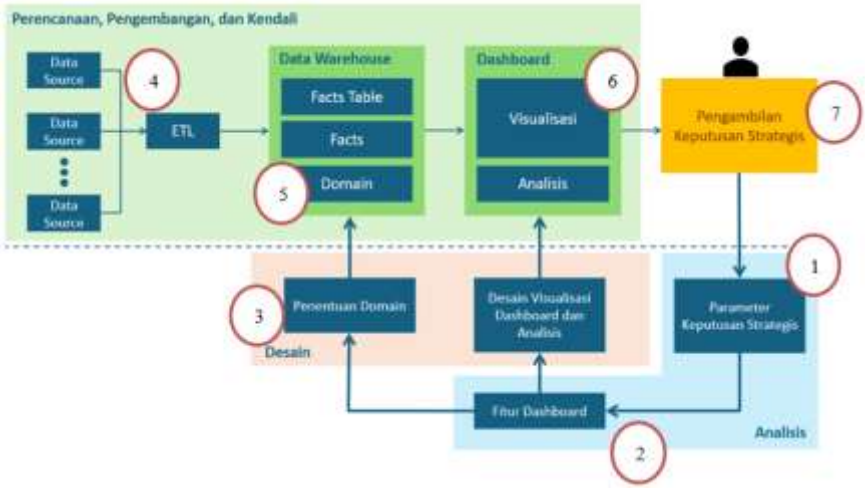

Figure 2. Dashboard Design Development Steps

Source: Author's elaboration based on Vercellis Framework (2026)

RESULT AND DISCUSSION

The process needed to make strategic project decisions before implementing visualization dashboards takes 7-10 working days, with the following flow comprehensive discussion.

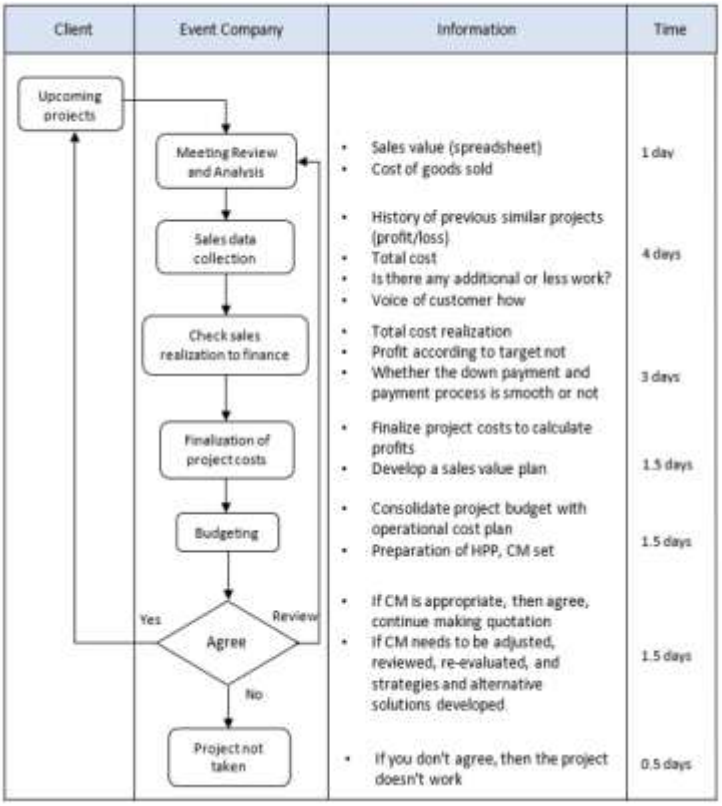

Figure 3. Project Decision Making Flow Before

Source: Author's elaboration based on company business process analysis (2026)

In the data retrieval process apply the concept of data mining.

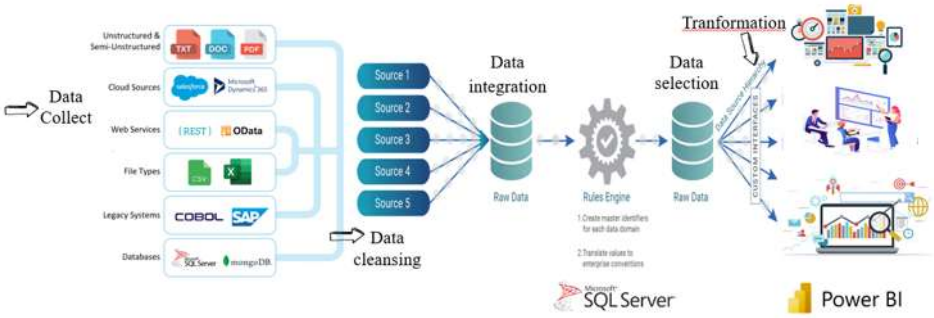

Figure 4. Stage of obtaining data sources

Source: Author's elaboration based on data mining process (2026)

After implementing business intelligence, as well as data processing by creating a data warehouse, the project planning decision-making process has become faster, less than 7 working days (Noruozzadeh, 2021; Wahyuddin & Radiyah, 2023).

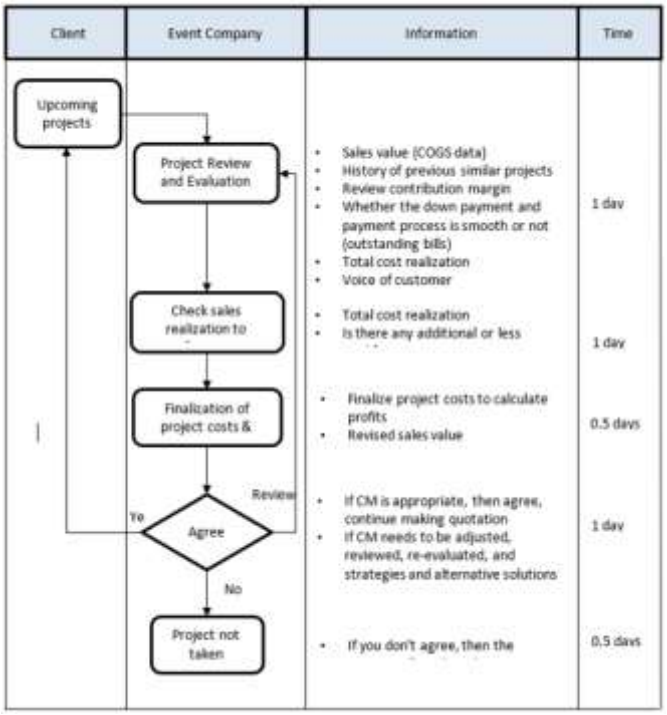

Figure 5. Project Decision Making Flow After

Source: Author's elaboration based on BI dashboard implementation results (2026)

Figure 5 is a flowchart of the decision-making process after utilizing BI dashboard visualization. With the completeness of information and a more effective data processing process and less time in integrating data, it can cut the evaluation and review time 50% faster than before.

These results support research (Seto & Yosef Daryanto, 2023) which shows that Microsoft Power BI can reduce processing time 50% faster and help management make future estimates and decisions. In the study, the order process flow using Microsoft Power BI, decreased by 54% from 3.42 hours to 1.55 hours. This result supports the findings of (Albara, 2021) and (Kongprasert & Garrett, 2021). Visualization using Microsoft Power BI also makes it easier to make business policy decisions (Albara, 2021). Although in the research conducted by the author there are still shortcomings from previous research, namely not using time series algorithms in the forecasting process which can contribute to computational techniques by comparing accuracy values using the Mean Absolute Percentage Error (MAPE) and Mean Squared Error (MSE) formulas and applying Artificial Neural Network (ANN) to improve data accuracy. In addition, there are also other supporting journals such as “Improving Data Processing Efficiency using Power BI: A Case Study” (Journal of Management and Computer Science, 2020); a case study of a company using Power BI to improve its data processing capabilities. They used Power BI to optimize their data processing workflow, which resulted in a significant reduction in processing time. The result was that using Power BI reduced data processing time by 60% in terms of:

1. Data reduction: reducing the size of the data model by loading pre-summarized data. This technique is effective for improving efficiency by increasing the granularity of fact tables, although there is a trade-off in the loss of data detail.

2. Use of Filters at Multiple Levels: apply filters at the visual, page, or report level to control the data displayed according to analysis needs.
3. Removal of Unnecessary Columns: improve report performance by limiting the number of columns to only those required in the data model.
4. Use of Slicers and Parameters: Speed up development time by adding filters, using parameters, and utilizing other Power BI features.

By applying these techniques, the efficiency of data processing in Power BI can be improved, resulting in more responsive, informative reports and improving data quality by 25%.

Figures and Tables

In developing the visualization dashboard, several tables were created that were key in the transformation process from database to visualization.

Table 1. Work In Progress Recording Table Design

No.	Data Attributes	Type	Long	Information
1	Project No.	*Varchar*	150	Project Number
2	Project Name	*Varchar*	550	Project Name
3	Client	*Varchar*	350	Client Name
4	Date Event	*Date*		Project Implementation Date
5	Venue	*Varchar*	250	Project implementation location
6	Category	*Varchar*	150	Project Category (Special, Official, EO Services, Backdrop, etc.)
7	PE	*Varchar*	150	Sales Name (Project Executive)
8	Sale	*Varchar*	150	Sales Value per project
9	HPP	*Varchar*	150	Value of Cost of Goods Sold per project
10	CM	*Varchar*	150	Cost Margin or profit value
11	%	*Varchar*	50	Margin percentage
12	Information	Varchar	150	Additional information as notes from project implementation, if any
13	YTD Sales	Varchar	150	Current year sales value
14	HPP YTD	Varchar	150	Value of Cost of Goods Sold for the current year
15	Month	Varchar	50	Event implementation month
16	Year	Varchar	50	Year of event implementation
17	Event Category	Varchar	150	Local, National or International Project Category
18	Remarks	Varchar	150	Event Category Alias: EXH, SP. Project, Official, ACT, Custom, Improve, Pinjam Bendera (KSO)

Source: Author's elaboration based on company data analysis (2026)

The existing project evaluation report data is tidied up and made more concise, but does not reduce the information provided. The form of the report after cleansing is:

Table 1. Project Evaluation Report Recording Table Design

No Job	Client	Event Name	Job Type	Sales	Event Date	Sales	HPP	Mark %	Actual HPP	Actual Sales	Actual %

Source: Author's compilation based on company existing report format (2026)

There are additions and reductions of fields and standardization of field names that have the same meaning, so that when a query is created and data is retrieved, the field name in question is only 1 field. From the improvement process, the following table is produced:

Table 2. Project Evaluation Report Recording Table Design after improvement

Project No	Client	Project Name	PE	Date Event	Sales	%	HPP	Venue	Remarks	CM	Information	Event Category

Adding fields

Source: Author's elaboration based on data cleansing and standardization process (2026)

From the previous table, there is a reduction in fields that actually should be listed once but contain real or actual data, and are not repeated. This helps facilitate the review progress to be more effective and time efficient. The table design is as follows:

Table 3. Project Evaluation Report Table Design

No.	Data Attributes	Type	Long	Information
1	Project No.	*Varchar*	150	Project Number
2	Client	*Varchar*	350	Client Name
3	Project Name	*Varchar*	550	Project Name
4	PE	*Varchar*	150	Sales Name (Project Executive)
5	Date Event	*Date*		Project Implementation Date
6	Sale	*Varchar*	150	Sales Value per project
7	%	*Varchar*	50	Margin percentage
8	HPP	*Varchar*	150	Value of Cost of Goods Sold per project
9	Venue	*Varchar*	250	Project implementation location
10	Category	*Varchar*	150	Project Category (Special, Official, EO Services, Backdrop, etc.)
11	Remarks	Varchar	150	Event Category Alias: EXH, SP. Project, Official, ACT, Custom, Improve, Pinjam Bendera (KSO)
12	CM	*Varchar*	150	Cost Margin or profit value
13	Information	Varchar	150	Additional information as notes from project implementation, if any
14	Event Category	Varchar	150	Local, National or International Project Category

Source: Author's elaboration based on improved table design (2026)

To connected data with general ledgers, create table general ledgers as below:

Table 4. GL table design

No.	Data Attributes	Type	Long	Information
1	Date	*Varchar*	150	Transaction date
2	Source No	*Varchar*	250	Source from BS, BPK, JV
3	Description	*Varchar*	550	Project Expenditure Cost Details
4	Project No	*Varchar*	150	Project Number
5	Cost	*Varchar*	150	Costs recorded in the database

6	Account Name	*Varchar*	250	Chart account types based on expenses incurred
7	Cost Category	*Varchar*	150	Categories of expenses incurred (salary, vehicle rental, fuel, meal allowance, overtime allowance, supporting costs, tips, catering, credit, other costs)
8	Project Name	*Varchar*	550	Project Name
9	Event Category	Varchar	150	Local, National or International Project Category
10	PE	*Varchar*	150	Sales Name (Project Executive)
11	Month	Varchar	50	Month of recorded project cost expenditure

Source: Author's elaboration based on general ledger data integration (2026)

Results

Visualization dashboard interface design after development are:

Nama Project	Penjualan	Sum of HPP	Average of % Profit	Sum of CM
75 Set Meja Lockable	22500000	1537136	93,2%	20962864
ALLPACK ALLPRINT	400000000	188781666	52,8%	211218334
ALLPRINT Indonesia	35000000	21458507	38,7%	13541493
Apkasi Expk 2024 (Kab. Kudus)	27240000	25875990	5,0%	1364010
Apkasi Expo 2024 (Kab. Musi Rawas)	63063064	50752559	19,5%	12310505
Cosmobeaute	33000000	1836000	94,4%	31164000
Custom Asia Bike Jakarta	20530000	9132976	55,4%	11397024
Custom Solartech	127440000	88800640	30,6%	38639360
Desain Pavilion Pengurusan Lanjutan Perizinan Januari-April 2024	1475049373	1398800000	5,2%	76449373
ENGINEERING MINING	10425000	3162093	69,7%	7262907
Fasilitas Electric dan Power Indonesia 2024	12510000	4231136	66,2%	8278864
Fasilitas Food Hotel Indonesia	25000000	12776037	48,9%	12223963
Total		**39351640519**	**35,9%**	**9559912499**

Figure 6. 2024 sales data summary view

Source: Author's dashboard visualization output (2026)

Figure 6 is a display of the 2024 sales recap that has been mapped by sales value, HPP % profit and CM. It can be seen that CM YTD is 35.9%

Figure 7. Project costs per project

Source: Author's dashboard visualization output (2026)

Figure 7 is a decomposition tree chart that maps between the project name and the project costs incurred during the project. From the data it appears that the largest cost is in the Pavilion project and the largest cost is accommodation.

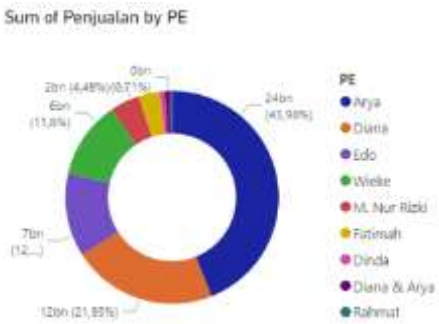

Figure 8. Sales graph per Project Executive

Source: Author's dashboard visualization output (2026)

In Figure 8, the sales graph by each Project Executive (PE). From this visualization, management can assess which PE has the most, so it deserves more appreciation. However, it is still compared to the total sales and total contribution margin given.

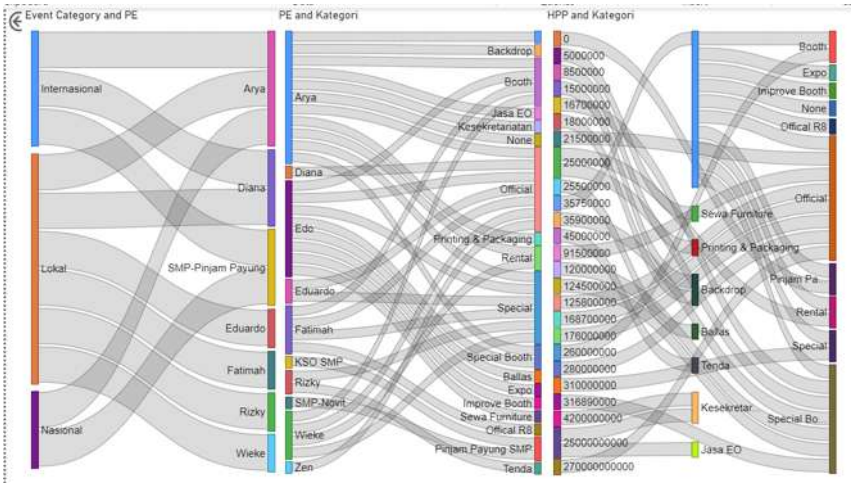

Figure 9. Distribution of event categories and PE

Source: Author's dashboard visualization output (2026)

The image above shows the distribution of projects based on exhibition categories with Project Executive and sales categories.

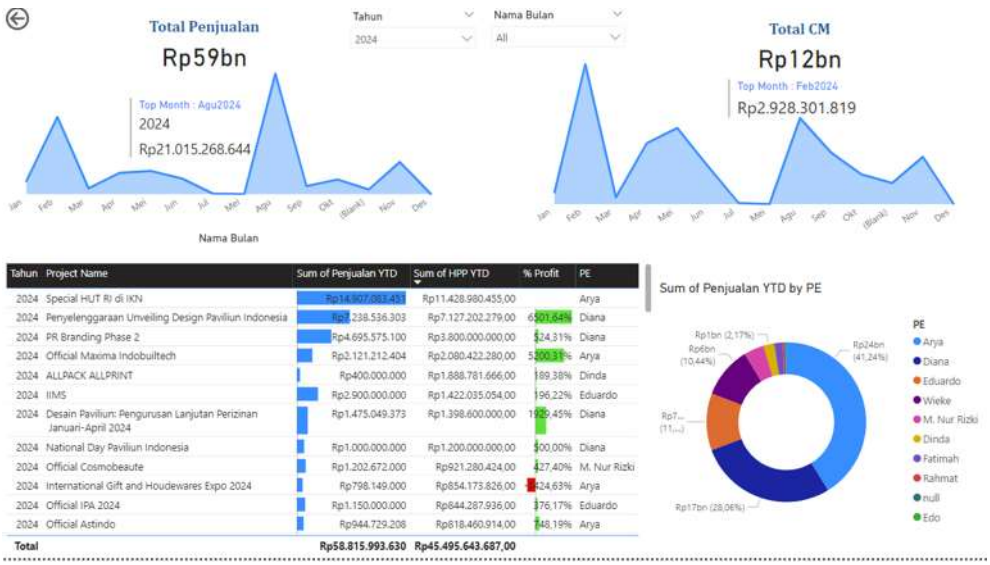

Figure 10. Total Sales and CM graph for the period 2022-2024
Source: Author's dashboard visualization output (2026)

Figure 10 is a dashboard of sales and average total contribution margin since 2022-2024. It can be seen that the highest sales in 2024 were in August. We check the data, in that month there were National and International projects.

CONCLUSION

The findings of the research on designing the project performance monitoring dashboard to aid strategic decision making are as follows: Enhanced Decision Making: The use of Business Intelligence dashboards facilitates quicker and more precise decision-making through clear and informative data visualizations. Enhancement of Data Management: This thesis demonstrates that improved data management can detect market opportunities and project risks sooner, an organization's ability to respond to market fluctuations. Proactive Risk Identification: Enhanced data processing enables organizations to detect project problems and risks sooner, safeguarding project viability, minimizing potential losses, and strengthening business resilience. Enhancements resulting from this study: Decrease in Evaluation Duration: The time taken for project evaluation is cut down from 7-14 working days to under 7 working days, enhancing efficiency in decision-making. Incorporation of interactive elements in the dashboard, including drill-down and filtering functions, enabling users to perform a more thorough analysis and assessment of the presented data.

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