

Designing A Power BI-Based Visitor Data Visualization For Museum Musik Indonesia As A Basis For Managerial Decision-Making

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Abstract

Museum Musik Indonesia (MMI) plays a strategic role in preserving Indonesia's musical heritage, but its accumulated visitor data remain static figures in reports and have not been turned into information for managerial decision-making. This study aims to identify the profile and pattern of visits to MMI and to design a Power BI-based visitor data visualization as a managerial decision-support tool. This applied, descriptive quantitative study used 128 visit records for January–June 2026 from the museum's guest book, supplemented by interviews with management to map information needs. The data were processed with descriptive statistics in Microsoft Excel and then visualized with Microsoft Power BI. The results show that university students were the dominant category (53.1%), followed by general visitors (25.8%), communities/institutions (10.2%), school students (7%), lecturers/teachers (2.3%), and unspecified (1.6%). A total of 68.8% of visits came from Malang City. Visits peaked in June 2026 (41.1%) and were lowest in January 2026 (2.3%), indicating a link to the academic calendar. The dashboard presents category composition, domicile distribution, and monthly trends on a single page, and can therefore support seasonal marketing, stronger academic partnerships, and wider promotion. The dashboard has not yet been tested with users, and the data cover only six months.

Keywords: data visualization, visiting pattern, dashboard, managerial decision-making, Power BI



INTRODUCTION

Museums function as memory institutions that preserve cultural values, document artifacts, and provide information for the public and researchers (Mudin, 2025). These preservation and education functions can be sustained only if a museum is able to attract public visits and manage its operations effectively (Nurdin, 2016). Museum Musik Indonesia (MMI) in Malang City, a specialist museum that documents, preserves, and exhibits Indonesia's musical heritage, faces the same challenge. Visitor data give an indication of the level of public participation, the effectiveness of programs, and visitor interest (Khoirunnisa, 2024). However, such data have generally remained static figures in monthly or annual reports, without further analysis to obtain deeper insights.

The literature positions visitor data as a source of information for understanding the experiences, preferences, and behavior of museum visitors (Isnaini, 2025). Good visitor management has a positive effect on visitor satisfaction (Septian et al., 2025). Time-series analysis using Moving Average and Prophet can produce museum visit forecasts for operational planning (Amelia et al., 2026), while the analysis of large-scale visitor data can identify visiting patterns and inform strategies for visitor engagement (Alfidyah, 2025).

For visitor data to be useful, the information needs to be presented in an easily understandable form. Data visualization serves both as a medium of communication and as an analytical tool that improves users' understanding when making decisions (Erlangga et al., 2026), as does the selection of an appropriate technique (Anwar et al., 2026). Suitable visual representations help users recognize important patterns and assess information more accurately, and they turn complex data into visual narratives that support strategic decisions (Susanti & Abdurahman, 2025). The quality of managerial decisions is influenced by the accuracy, relevance, and timeliness of information (Noviyanto et al., 2025), and data-driven and analytical approaches enable organizations to improve the accuracy of their decisions (Sulistyawati, 2024). In public services, data visualization has also been reported to increase transparency and accountability (Jayanti & Khadija, 2024).

In the museum context, Perdana (2020) developed a visitor dashboard for the Teknoform Museum in Surabaya, while Razzini (2022) examined 598 museums in Italy using dashboards, key performance indicators (KPIs), and benchmarking to support management decisions. At MMI, Salim (2025) developed a digital guest book system so that visit data have begun to be documented, but these data have not yet been analyzed and visualized for managerial needs. Research with this approach on specialist music museums remains very limited.

This study was designed to bridge the gap between the availability of visitor data and its use as a basis for managerial decisions at MMI. The research questions are: (1)

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what are the profile and pattern of visits to MMI based on the available historical data, and (2) how can a dynamic visitor data visualization be designed to improve time efficiency in managerial decision-making. The objectives are to identify and describe the profile and pattern of visits to MMI, and to design and implement a visitor data visualization that presents strategic information for museum management. The contribution of this study is an empirical picture of the visitor profile of a music museum and a dashboard design that other museums with similar data can adapt.

RESEARCH METHOD

A. Research Design and Location

This is an applied study with a descriptive quantitative approach, because its aim is to solve the practical problem of using visitor data at MMI. The study was conducted at Museum Musik Indonesia, Jalan Soekarno Hatta Indah IV No. 18, Malang City.

B. Data and Instruments

Primary data consisted of managerial information needs and a description of the data recording system, obtained through interviews with museum management guided by an interview guide and through observation. Secondary data were historical visit data for January–June 2026 obtained by documenting the museum's guest book archive, totaling 128 visit records. One record is one visit entry in the guest book, and the percentages in the results section are calculated against the number of these entries. The variables analyzed were visitor category (university students, general visitors, community/institution, school students, lecturers/teachers, and unspecified), area of origin, and month of visit. Visitor category was determined from the column for institution of origin or the name of the community/group/media and from the address recorded in the guest book.

C. Analysis and Design Stages

The research consisted of four steps. First, the data were compiled and grouped by the relevant variables. Second, totals, percentages, averages, and highest and lowest values were calculated using Microsoft Excel. Third, management's information needs were mapped to visualization types suited to the characteristics of the data, as shown in Table 1. Fourth, the grouped results were visualized as an interactive dashboard using Microsoft Power BI.

Table 1: Mapping of Managerial Information Needs to Visualization Techniques

Information need	Visualization technique	Rationale
Brief overview of visit conditions (total, monthly average, top category and top origin)	Metric card (KPI card)	Gives management a quick glance

Information need	Visualization technique	Rationale
Visitor category composition	Donut chart	Shows the proportion of parts to the whole
Distribution of areas of origin	Horizontal bar chart	Many cities, so labels need space; identifies targets for promotion beyond the city
Monthly visit trend	Line chart	Shows change and seasonal patterns directly
Exploring data as needed	Power BI slicers (year, month, category, domicile)	Allows filtering without opening raw data

RESULTS AND DISCUSSION

A. Visitor Profile by Category

The composition of the 128 visit records for January–June 2026 is presented in Table 2.

Table 2: Visitor Composition by Category

Visitor category	Number	Percentage
University students	68	53.1%
General visitors	33	25.8%
Community/Institution	13	10.2%
School students	9	7%
Lecturers/Teachers	3	2.3%
Unspecified	2	1.6%
Total	128	100%

University students were the dominant category, accounting for more than half of all visits (53.1%). The dominance of students shows MMI's role as a destination for research and learning among academics, and it is consistent with the even semester, when students typically complete coursework, research, or field visits. General visitors, in second place, show that MMI remains of interest to the public beyond academic purposes.

B. Distribution by Area of Origin

The domicile distribution covers several areas of origin, as shown in Table 3

Table 3: Visitor Distribution by Area of Origin

Area of origin	Number	Percentage
Greater Malang	88	68.8%

Area of origin	Number	Percentage
Outside Malang (Domestic)	37	28.9%
International	3	2.3%
Total	128	100%

Based on Table 3, most visitors came from Malang City (68.8%), so MMI still depends heavily on local visits. Visitors from outside Malang came from 24 cities or regions, with Surabaya the largest (6 entries; 4.7%), followed by Pasuruan (4 entries; 3.1%) and Bogor (3 entries; 2.3%). Other places, such as Solo, Bojonegoro, Palembang, Medan, Jakarta, Ambon, Sorong, Sumbawa, Bima, and East Kalimantan, contributed only 1–2 entries each. Three international visitors were recorded, two from Italy and one from the Netherlands (2.3%). This pattern indicates that promotional reach beyond Malang remains limited and incidental. By domicile, three visits from abroad were recorded, namely Italy (2) and the Netherlands (1), or 2.3% of the total. This finding shows that MMI is beginning to be known by international tourists, albeit on a very small scale.

C. Temporal Pattern of Visits

Monthly visit trends are presented in Table 4.

Table 4: Monthly Visit Trend, January–June 2026

Month	Number of visits	Percentage
January	3	2.3%
February	11	8.6%
March	6	4.7%
April	30	23.4%
May	25	19.5%
June	53	41.4%
Total	128	100%

From Table 4, the average number of visits per month is 21.3. June 2026 was the peak month (53 visits, 41.1%), about 2.5 times the monthly average, which indicates a surge just before or during the semester break and the mid-year school holidays. January 2026 was the lowest month (4 visits, 3.1%), possibly related to the start of the year or the final examination period of the odd semester. The three months of April–June account for 108 visits (83.7%), whereas January–March account for only 21 visits (16.3%). Visits rose from March to June, with a slight dip in May before a sharp surge in June. This pattern indicates that visits to MMI are influenced by the academic calendar and holiday seasons. Because the data cover only six months and do not yet include an event log,



the cause of the June surge, for example group visits or particular activities, cannot yet be confirmed.

D. Power BI-Based Data Visualization Design

Based on the patterns found in the descriptive analysis, management's information needs were mapped to the visualization techniques in Table 1. The dashboard, titled "Dashboard Data Kehadiran Pengunjung" (Visitor Attendance Data Dashboard), was designed as a compact one-page layout (*single-page overview*) with the four sections shown in Figure 1.

The top section contains four slicers (year, month, category, and domicile) and four metric cards, namely total visits, monthly average, top category, and top origin. The middle section contains a donut chart of visitor category composition and a horizontal bar chart of total visits by domicile. The bottom section contains a line chart of the monthly trend alongside three summary cards, namely the top city outside Malang, the number of international visitors, and the peak month. All visuals are interlinked, so management can explore the data as needed without processing raw data in Excel. Future development could add visuals for visits per day and event impact once data recording has been completed.

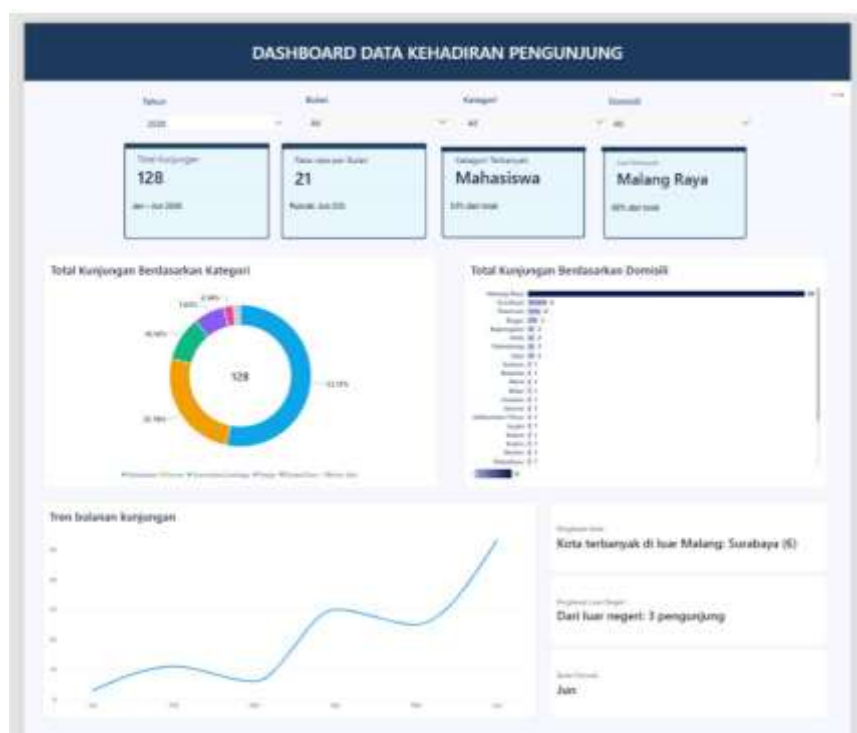


Figure 1: Visitor data visualization dashboard of Museum Musik Indonesia, January–June 2026

This design places the most concise information at the top and the detailed information at the bottom, so that management can obtain an overall picture at a glance. The slicers allow the data to be read by month, by category, or by area of origin without changing the basic layout.

E. Implications for Managerial Decision-Making

The findings have strategic implications for MMI management, summarized in Table 5.

Table 5: Summary of Findings, Implications, and Recommendations

Finding	Implication	Recommendation
University students 53.1%	The academic community is the main source of visits	Strengthen partnerships for study visits, research, and internships with universities in Malang
Malang 68.8%; Surabaya (4.7%), Pasuruan (3.1%), and Bogor (2.3%) highest outside Malang	The visitor base is concentrated and promotional reach beyond the city is limited	Direct promotion to cities that have already shown initial interest
April–June 83.7%; January 3.1%	Visits fluctuate with the academic calendar	Plan seasonal promotion and programs for quiet periods, for example post-holiday education programs and promotion to campuses
International visitors 2.3%	MMI is beginning to be known by international tourists	Treat the international segment as a long-term promotion target

The Power BI dashboard that was designed has the potential to speed up decision-making compared with manual analysis based on static reports. This is consistent with the literature, which holds that presenting information in an easily understandable form, including through visualization, improves decision quality (Jabar et al., 2025).

F. Limitations

First, the data cover only six months, so seasonal patterns cannot yet be confirmed and need to be verified with at least three years of data. Second, the guest book does not yet record age, gender, occupation, purpose of visit, arrival time, group size, or an

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event code or name, so demographic and event-impact analyses cannot yet be presented quantitatively. Third, incomplete entries and illegible handwriting may affect the accuracy of the grouping. Fourth, the analysis is descriptive and therefore does not include forecasting, and the dashboard has not yet been evaluated by users from museum management.

CONCLUSION

This study identified the profile and pattern of visits to Museum Musik Indonesia for January–June 2026 and designed a Power BI-based visitor data visualization as a basis for managerial decision-making. University students were the dominant category (53.1%), visitors were predominantly from Malang City (68.8%), and visits peaked in June 2026 (41.1%) with the lowest point in January 2026 (3.1%), which indicates a link to the academic calendar. The dashboard presents category composition, domicile distribution, and monthly trends, and can be used by management to formulate seasonal marketing strategies, strengthen academic partnerships, and expand promotion.

Further research is recommended to: (1) replace the current recording with a digital system, for example one based on QR codes or tablets, with additional fields for age, gender, occupation, purpose of visit, arrival time, group size, and event code; (2) use at least three years of data so that patterns are more stable; (3) compare with other museums; (4) develop a forecasting feature, for example with Moving Average and Prophet; and (5) evaluate the dashboard with users from museum management.

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