# An Interactive Dashboard System for Budget Allocation Using Power BI

**Paranya Mingsamorn[1], Nontachai singhuang[2],**
[1] Department of Digital Business Technology, Suphanburi Vocational College, Thailand.
[2] Department of Information System and Business Computer, Faculty of Business Administration and Information Technology, Rajamangala University of Technology Suvarnabhumi, Thailand.

| Article Info | ABSTRACT |
|---|---|
| | This study's objectives are to develop a dashboard system for budget allocation using Power BI and to assess the effectiveness of the dashboard in presenting budget allocation data through Power BI. It was a research sample adopted of 50 individual executives, planning and budgeting officers, and concerned personnel from Suphanburi Vocational College. Purposive sampling techniques were used in collecting the sample. The research tools used were: 1) Dashboard system 2) Evaluation form Data were analyzed by calculating means and standard deviations. The results revealed that The designing of budget allocation dashboards With the use of Power BI tool has enhanced the efficacy of presentation and analysis of financial information. The system combined different sources of financial data and processed them to put complex traditional approaches into simpler formats in modern budget management. The system enabled users to keep real-time monitoring and experiences in analyzing budgetary information. The overall evaluation of the dashboard system made by all staffs, including the executives, the officers on planning and budgeting, and other concerned personnel at Suphanburi Vocational College, shows that they are satisfied overall ($\bar{x}$ = 4.45, S.D. = 0.46). The data also revealed that users find the system easy to use and the information visualization attractive to categorize both at very high rates. These findings indicate that Power BI really drives efficiency in budget allocation and also brings transparency into the organization's resource management process. |

***Corresponding Author:***

Paranya Mingsamorn
Department of Digital Business Technology, Suphanburi Vocational College
279 Phra Phanwasa Road, Tha Phi Liang, Mueang, Suphanburi, Thailand
Email: paranya.m@spvc.ac.th

## 1. INTRODUCTION

As of now, data is driving any organization forward; without good management and presentation of such data, their operations can be rendered ineffective. Budget allocation is one such area that necessitates considerable planning to ensure limited resources are used most efficiently. The common problem shared by different organizations during budget allocation is the conventional methods that have been used, and which still hold the nature of being complex, rather than straightforward textual documentation, and not conducive to effective decision making, e.g., reliance on tables or numerical reports-is confused for good trend analysis and assessment of current situations. It dramatically affects the efficiency and transparency of budget management operations in most organizations [1].

This seek really sets itself apart from the mundane tricks of reporting and analytics: Power BI, which is widely known as the data visualization and analytics tool created by Microsoft, upholds into a tool even more adored in this day. Above all, it promises to bring different kinds of data together in one place and convey the same message through rich, digestible, interactive dashboards that can take away weightiness in ways by which critical data could be passed across the organization- from executive level to operational level-and

beyond-reducing complexity and making messaging clear into the hands of the user. In connecting to data sources such as databases, Excel spreadsheets, ERP systems, and real-time data sources, the software is independent in its ability to allow organizations to use accurate and timely information to support organizational decision-making, analysis, and reporting [2]. Therefore the developed interactive data display for budget allocation using Power BI is very essential. It will definitely modernize budget oversight efficiency through the installation of technology. The designed system allows organizations to view budget allocation results on real time by clearly and transparently presenting the same-case scenarios including graphs, cross-category expenditure comparisons, and forecasts on future spending trend analyses.

Such budget allocation involves various intended purposes within the organization by providing many important roles to actualize and direct them. On the contrary, an effective budget management actualizes the strategic objectives set for the organization in all these resource allocations, thus fostering transparency and operability in the organization as it concerns effective budget management. Effective budget allocations could possibly be identified as factors increasing an organization capability to support high-impact projects, developing human resources, and a pool of emergency resources [3]. Effective process in budgeting management would relate to being adequately dependent on as well as meaningful data. It plays a crucial part for such tools being capable to fuse data synthesized from multiple sources walking the easier visualization path. Power Bi can cure the ailments of budget management-that is, slow data collection and errors caused by manual computation.

In this scope, the Suphanburi Vocational College uses Power BI to create a dashboard system that presents the budgeted allocation information for the 2025 fiscal year. Such a brilliant approach will help the top-level executives to those at lower management understand rapidly the financial data like spending and revenue forecasts, and the future expense trend analysis which decreases budget deficit risks. It will be an informative decision-making tool for executives and stakeholders as well making information-accessing functions at the organizational level easier.

## 2. OBJECTIVE OF RESEARCH
2.1 To develop a dashboard system for budget allocation using Power BI.
2.2 To evaluate the effectiveness of the Power BI dashboard in presenting budget allocation data.

## 3. LITERATURE REVIEW
An interactive data presentation system for budget allocation takes several theories and research areas into consideration, particularly affecting the system design and processes for effective organization budget management. The theories to be discussed hereafter are grouped into three major areas, namely: data visualization, budget management, and information technology in support of the decision-making process.

The theoretical framework of data visualization embodies a variety of methodologies and schemata for the effective communication of data visually. This field will draw upon cognitive psychology, design principles, and applications to improve understanding and enlightenment in addressing complex data sets. The following items relate to the aspects of data visualization theory.

Cognitive Processing in Visualization

According to dual-processing theory (System 1-System 2), effective visualizations should cater to both intuitive and analytical thinking, which enhances user engagement and comprehension [4].

Perceived cognitive load highly influences user preference; therefore, they prefer simpler and enjoyable visualizations [5].

Practical Applications and Techniques

Data visualization is indeed one of the most important aspects of materials informatics when it comes to identifying data structures and biases before machine learning input [6].

Using different formats, from interactive visualizations to others, creates different contexts and contexts in health and environmental studies, for better communication and understanding [7].

Design Guidelines and Frameworks

Task-based visualization recommendation systems were created that help practitioners select visualization techniques based on specific data and task requirements [8].

Empirical study birthed several design guidelines that would enhance the efficiency of visualization when addressing common issues in which designers increasingly encounter [9].

Although the bulk of attention is on the most effective visualization techniques, excessive use of such methods should be seen with caution [10].

Budget theory defines the frameworks and principles of budget preparation within the budgetary administration and evaluation of an organization or government entity. Budget theory is contextualized by political, economic, and behavioral dimensions that define the process toward budgets. Some of the salient

emerging concerns in budget theory would include political influences, management practice, and how human behavior affects the budget.

Budget Politicization

Government prioritization will partially depend on how well the bottom requirements from top-most supporters overlap one another and may go as far as spending people's priorities entirely ignoring all other contending factors put in the economy and globalization by [11].

The theory of political budgeting may definace construing an alteration in arts and aggregates but it is broader under general budget category to clues towards politics and budgeting [1].

Best Practice in Budgetary Administration

Indeed, effective budgeting would take care in organizing investments ahead for expanding versatile state administration [12].

Flexibility would apply in altering conditions through a change in budgetary norms-from theoretical conditions; such a case falls within budget policy justifying a socio-economic design within evolving conditions of the economy or change (Titarchuk, 2023). Human Behavior in Budgeting

On the contrary, most significant behavioral anomalies in budget execution arise from agency theory on conflicting measures [13].

Thus, internal conflict and ego would require motivational psychological dispositions towards improved budgeting practices [14].

It is what theory may build as a secure peaton of economic relationships.

Information Technology in Decision-Making

The application of information technology in the support of decision-making in budget management is now an essential part of the framework of creating more effective organizations. Examples of these tools are the current Power BI [15].

Decision Theory: This theory states decision-making process in environments of incomplete information in which information technology can facilitate real time data access to executives for highly assured endpoints [16].

Data Analytics Theory: This formed the support of financial decision-making through bringing in the making of very valuable insights through technology. That is concerned with having tools that could be trend analyzers and easy outputs such as in the real time dashboards [17].

Related research

Power BI, being used in organizations for budget management, is found to be an aid for the accuracy and transparency of budget allocation. The data is presented on dashboards, which gives an overview to executives and allows monitoring in real-time [18]. Krishna et.al. [2] discussed technology use in the budget process and found that by using interactive data visualization tools such as Power BI, one can save time for reporting and tracking spending. This has increased the efficiency of decision-making concerning budgeting in organizations. Rinkesh Gajera [19] report highlights that Power BI enhances real-time cost tracking and visualization in construction, enabling project managers to make timely decisions. It reports that 85% of industry respondents experienced improved budget allocation and resource management through this integration.

In conclusion, applying Power BI in budget allocation brings out clearer and more transparent forms of data visualization for effective and faster decision making through real-time data analysis. Such budget management will enhance efficiency in budget management, ensuring that budgets are accurate and aligned with organizational goals.

## 4.    RESEARCH METHOD

The population or sample group consists of professional individuals in execution, planning, and budgetary officers as well as personnel related to them at Suphanburi Vocational College. The sample group certainly comprises 5 executives, 5 planning and budget officers and 40 related personnel from Suphanburi Vocational College pertaining to their role in budget allocation.

Designing and Developing Research Instruments

1. Data Requirement Analysing

Investigate the purpose of the above research to examine the kind of data required for the production of the questionnaires and dashboard system.

2. The Formulation of a Questionnaire (Questionnaire Development)

Collect and review all necessary documents, literature, and research for data collection requirement purposes. Construct research instrumentation to measure the efficacy of a dashboard: a questionnaire consisted of a 5-point Likert scale covering these areas: Completeness of information,  Accuracy of reports, Ease of use, Visual appeal of data presentation, Clarity in report communication. Submit the created instrument to appointed advisors, then make necessary amendments following their observation inputs. Content validity

(Validaty) of the questionnaire by calculating the Index of Item-Objective Congruence (IOC) through three experts' reviews for each version, denotes necessary revisions. Assess the internal reliability of the questionnaire by implementing it in a similar sample group representing the actual sample of respondents, using Cronbach's alpha coefficient and improving it before using the final version. Quality Testing of the Research Instrument. The instrument should have an IOC value between 0.67 and 1.00. The test showed a Cronbach's alpha coefficient of 0.87, indicating high reliability, indicating the whole questionnaire's high reliability.

3. Process of Developing Dashboards

Development of an interactive dashboard system for budget allocation using Power BI by researchers using research tools including personal computers with Windows 10 Pro, 8 GB RAM, Core i5 CPU and Power BI Desktop Version: 2.124.1554.0 program with the following steps: 1) Data Collection: This includes bringing the budgets relating to expenditures and revenue services from Excel file-format sources into the system. Retrieving data from the Planning and Budgeting Unit database. 2) Data Cleansing: This type of data is usually cleansed by Replacing null values with "0"(zero). Altering field names into exact consistent names in order to define relations among them and analyze data. 3) Data Modeling Data relationships are modeled across data tables into an appropriate data model that describes how these diverse entities connect to one another. 4) Visualization Design : The different possible forms of the modeled output will be: Graphs, Tables, Cards, Slicers. This will ensure optimal user effectiveness and the best representation of data. 5) Iterative Development : The system will continuously operate in iteration and improvement based on the feedback gotten from the planning and budgeting experts and people who use the system in real life. Changes will affect accuracy in the data and relationship improvement in the datasets. 6) Usability testing : The system is tested with real users such as top executives, financial officers, and budget planning personnel. This phase evaluates usability on the dashboard along with the accuracy and clarity of presentation.
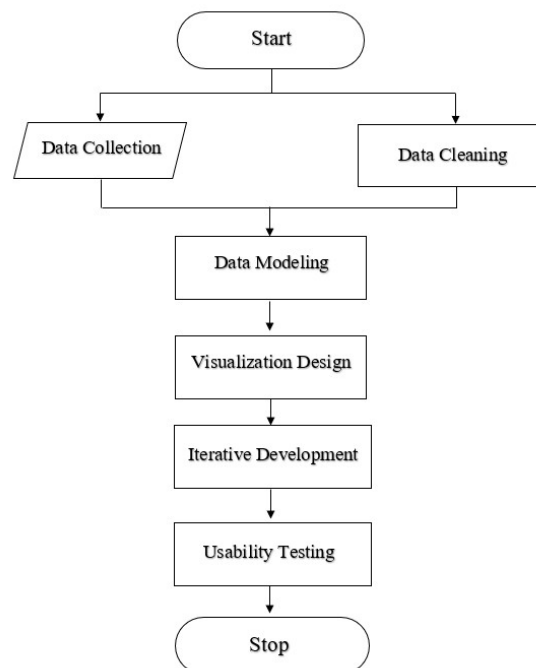


**Figure 1.** Dashboard Development Using Power BI

Data Collection : The Inquiry Currently ongoing budget allocation data for the fiscal year 2024 (Excel files or report documents) will be collected from the Planning and Budgeting Unit, the Planning and Integration Division, and the Finance Unit under the Resource Administration Division of Suphanburi Vocational College. From May to September 2024, this data collection activity will be done for preparing the Budget Allocation Dashboard for fiscal year 2025.

Evaluation

1. Compare traditional information presentation methods (document reports) with dashboard-based presentation formats.

2. Use statistical analysis to assess satisfaction levels, focusing on the mean and standard deviation.

## 5. RESULTS AND DISCUSSION

5.1 The development of an interactive dashboard system using Power BI for budget allocation has been designed to align with user requirements, as shown in Figure 2 - Figure 4.

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### 3. งบหน้ารายจ่ายการจัดสรรงบประมาณ ประจำปีงบประมาณ พ.ศ. 2568 จำแนกตามผลผลิต

| หมวดรายจ่าย/แผนงาน/งาน/โครงการ | งบประมาณที่ได้รับจัดสรรจากผลผลิต | | | | | | | รวม |
|---|---|---|---|---|---|---|---|---|
| | ปวช. | ปวส. | ระยะสั้น | นโยบาย/อื่นๆ | อุดหนุน | เงินรายได้ | เงินรายได้ ป.ตรี | |
| 1. งบบุคลากร | - | 1,696,200 | - | 29,875,200 | 5,137,280 | 2,752,776 | | 39,461,456 |
| 1.1 เงินเดือนข้าราชการ | - | - | - | 26,405,400 | - | - | | 26,405,400 |
| 1.2 เงินประจำตำแหน่ง | - | - | - | 1,064,400 | - | - | | 1,064,400 |
| 1.3 เงินวิทยฐานะ | - | - | - | 2,039,000 | - | - | | 2,039,000 |
| 1.4 ค่าจ้างประจำ | - | - | - | 366,400 | - | - | | 366,400 |
| 1.5 เงินเดือนพนักงานราชการ | - | 1,638,000 | - | - | - | - | | 1,638,000 |
| 1.6 ค่าจ้างชั่วคราวรวมค่าครองชีพ | - | - | - | - | 4,717,510 | 2,388,106 | | 7,105,616 |
| 1.7 ประกันสังคม | - | 58,200 | - | - | 419,770 | 364,670 | | 842,640 |
| 2. งบดำเนินงาน | 150,000 | 3,599,910 | 36,000 | - | 2,100,000 | 4,392,460 | 948,100 | 11,226,470 |
| 2.1 ค่าตอบแทน | - | - | - | - | 1,800,000 | 2,070,000 | 860,000 | 4,730,000 |
| 2.1.1 ค่าสอนพิเศษ | - | - | - | - | 1,500,000 | 1,850,000 | 850,000 | 4,200,000 |
| 2.1.2 ค่าธุรการนอกเวลา | - | - | - | - | 300,000 | 170,000 | - | 470,000 |
| 2.1.3 ค่าตอบแทนล่วงเวลา | - | - | - | - | - | 50,000 | 10,000 | 60,000 |
| 2.2 ค่าใช้สอย | 110,000 | 1,316,910 | 16,000 | - | - | 265,000 | 46,100 | 1,754,010 |
| 2.2.1 ค่าใช้จ่ายเดินทางไปราชการ | - | - | - | - | - | 150,000 | 36,100 | 186,100 |
| 2.2.2 ค่าเช่าทรัพย์สิน | - | 1,199,910 | - | - | - | - | - | 1,199,910 |
| 2.2.3 ค่าซ่อมแซมยานพาหนะ | 33,000 | 56,000 | 16,000 | - | - | 75,000 | - | 180,000 |
| 2.2.4 ค่าซ่อมแซมครุภัณฑ์ | 50,000 | 50,000 | - | - | - | 40,000 | 10,000 | 150,000 |
| 2.2.5 ค่าบริการเก็บขยะ | 12,000 | 6,000 | - | - | - | - | - | 18,000 |
| 2.2.6 ค่าจ้างเหมาทำป้ายโฆษณา | 15,000 | 5,000 | - | - | - | - | - | 20,000 |

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| หมวดรายจ่าย/แผนงาน/งาน/โครงการ | งบประมาณที่ได้รับจัดสรรจากผลผลิต | | | | | | | รวม |
|---|---|---|---|---|---|---|---|---|
| | ปวช. | ปวส. | ระยะสั้น | นโยบาย/อื่นๆ | อุดหนุน | เงินรายได้ | เงินรายได้ ป.ตรี | |
| 2.3 ค่าวัสดุ | 40,000 | 1,109,000 | 20,000 | - | - | 85,460 | 42,000 | 1,296,460 |
| 2.3.1 วัสดุสำนักงาน | - | 132,000 | - | - | - | 20,000 | 2,000 | 154,000 |
| 2.3.2 วัสดุการศึกษา/วัสดุฝึก | - | 667,000 | - | - | - | 25,460 | - | 692,460 |
| 2.3.3 วัสดุเชื้อเพลิงและหล่อลื่น | - | 180,000 | 20,000 | - | - | 20,000 | 40,000 | 260,000 |
| 2.3.4 วัสดุก่อสร้าง | 20,000 | 20,000 | - | - | - | 20,000 | - | 60,000 |
| 2.3.5 วัสดุไฟฟ้า | 20,000 | 40,000 | - | - | - | - | - | 60,000 |
| 2.3.6 วัสดุงานบ้านงานครัว | - | 70,000 | - | - | - | - | - | 70,000 |
| 2.4 ค่าสาธารณูปโภค | - | 1,174,000 | - | - | 300,000 | 1,972,000 | - | 3,446,000 |
| 2.4.1 ค่าไฟฟ้า | - | 1,000,000 | - | - | - | 1,800,000 | - | 2,800,000 |
| 2.4.2 ค่าน้ำประปา | - | 150,000 | - | - | - | 150,000 | - | 300,000 |
| 2.4.3 ค่าไปรษณีย์ | - | 14,000 | - | - | - | 10,000 | - | 24,000 |
| 2.4.4 ค่าโทรศัพท์ | - | 10,000 | - | - | - | 12,000 | - | 22,000 |
| 2.4.5 ค่าบริการอินเตอร์เน็ต | - | - | - | - | 300,000 | - | - | 300,000 |
| 3. งบลงทุน | - | 13,227,600 | - | - | - | 920,890 | 18,900 | 14,167,390 |
| 3.1 ค่าครุภัณฑ์ | - | 11,500,000 | - | - | - | 920,890 | 18,900 | 12,439,790 |
| 3.1.1 ฝ่ายบริหารทรัพยากร | - | - | - | - | - | 140,090 | - | 140,090 |
| 3.1.2 ฝ่ายแผนงานและความร่วมมือ | - | - | - | - | - | 183,000 | - | 183,000 |
| 3.1.3 ฝ่ายพัฒนากิจการนักเรียนนักศึกษา | - | - | - | - | - | 93,900 | - | 93,900 |
| 3.1.4 ฝ่ายวิชาการ | - | - | - | - | - | 503,900 | 18,900 | 522,800 |
| 3.1.5 ชุดปฏิบัติการเทคโนโลยีไร้สายฯ | - | 2,500,000 | - | - | - | - | - | 2,500,000 |
| 3.1.6 ชุดปฏิบัติการคอมพิวเตอร์โปรแกรมเมอร์ฯ | - | 3,000,000 | - | - | - | - | - | 3,000,000 |
| 3.1.7 ชุดปฏิบัติการครัวร้อน | - | 2,000,000 | - | - | - | - | - | 2,000,000 |

**Figure 2.** Traditional Budget Allocation Data Presentation Format
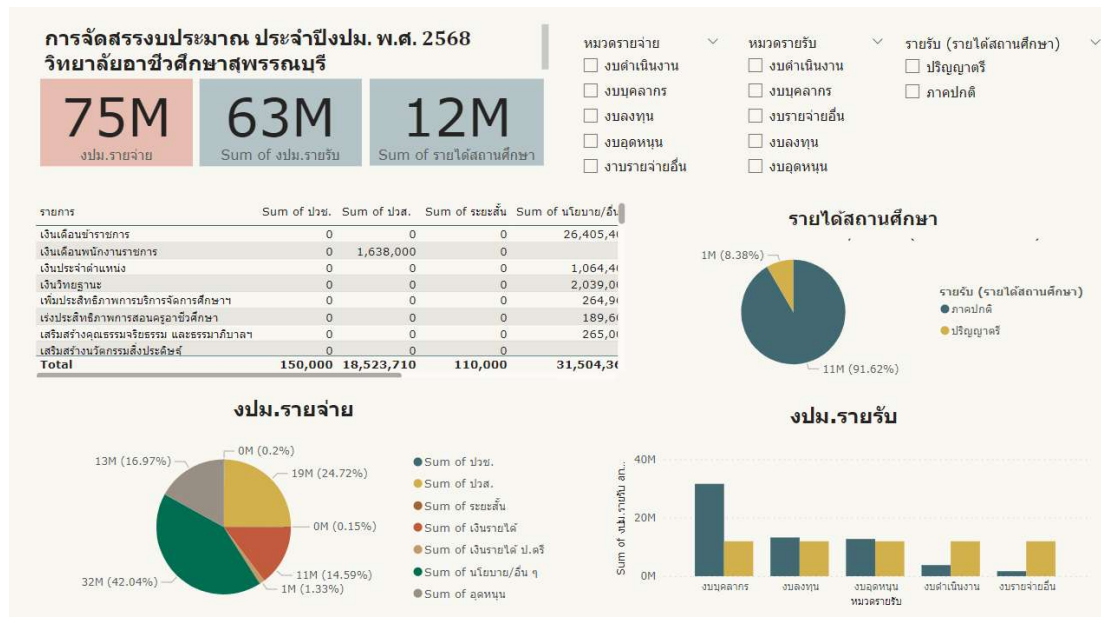
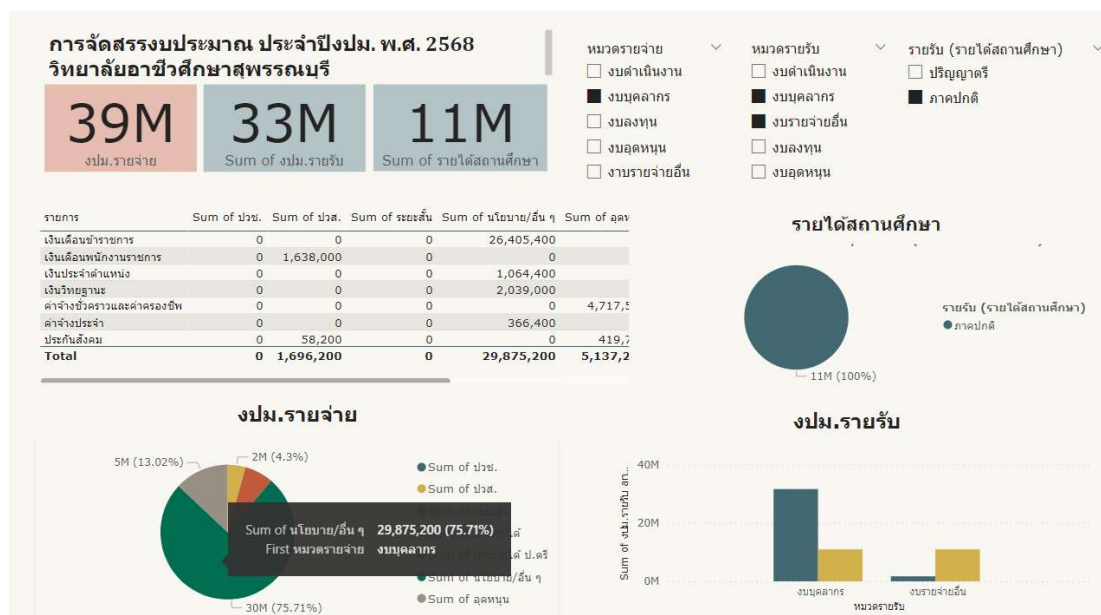**Figure 3.** Interactive Dashboard Development on Power BI for Budget Allocation



**Figure 4.** Show in-depth revenue and expense ratio data with interactive dashboards on Power BI.

5.2 Evaluation of Dashboard Usage for Presenting Budget Allocation Information Using Power BI

**Table 1.** Evaluation Results of Dashboard Usage for Budget Allocation Using Power BI

| Evaluation Aspect | Mean ($\bar{x}$) | Standard Deviation (S.D.) | Level |
|---|---|---|---|
| Completeness of information | 4.32 | 0.42 | High |
| Accuracy of reports | 4.47 | 0.48 | High |
| Ease of use | 4.52 | 0.56 | Highest |
| Visual appeal of data presentation | 4.54 | 0.51 | Highest |
| Clarity of report communication | 4.41 | 0.34 | High |
| Overall Satisfaction | 4.45 | 0.46 | High |

According to Table 1, the evaluation results of the dashboard usage for budget allocation by Power BI show that it is rated high in overall effectiveness ($\bar{x}$ = 4.45, S.D. = 0.46). Details of the ratings include: the highest level of data presentation visual appeal ($\bar{x}$ = 4.54, S.D. = 0.51); ease of use also rated at the highest ($\bar{x}$ = 4.52, S.D. = 0.56); the reports accuracy rated high ($\bar{x}$ = 4.47, S.D. = 0.48); high rating on clarity of communication ($\bar{x}$ = 4.41, S.D. = 0.34) and high rating on completeness of information ($\bar{x}$ = 4.32, S.D. = 0.42). These results are presented in descending order.

6.    **CONCLUSION**

Thus the current assignment demonstrated that a dashboard system has a considerable effectiveness in showing the actual process of budget allocation data using Power BI dashboards. The created dashboard makes a real-time visualization through Power BI features and manages other complex processes of budget handling while transferring important information to executives through friendly formats such as graphs, tables, and slicers.The development of applicable designs results in actual user needs for easy and efficient management and analysis of financial data. This is consistent with the results of studies by Krishna Kishor [2]; [20]. Leveraging dashboards created using Power BI to model well clear and understandable visual data presentation is part of enhancing decision-making procedures and detailed data analysis, thus improving users' efficiencies in absorbing and decision making [4]; [5]. Budget Transparency: Since showing performance-related spending through interactive dashboards would make the organization more accountable and transparent internally, it remains very much aligned with the tenets of budget management theory, where everything has to be clear in every context regarding budget allocation and administration [13]. Budgeting by way of the dashboard system enables the analysis and adjustment of budgets because of future changing conditions such as the estimated trends of spending or risk minimized for financial situations [14]. Decision Theory: Thus the Power BI dashboard makes it easier to decide better at the time when data is missing by providing reliable real-time data to relevant personnel and executives [15]. Data Analytics Theory: It provides a way dashboards can be applied by supporting the presentation of deep insights into the state of affairs in an easily understandable and analyzable format, for instance comparing expenditures across categories or making predictions for future trends, thus improving the budget allocation process markedly [17]. Explore the utilization of dashboards to improve forecasts regarding budget expenditures within various contexts to avert financial risks. Suggestions for Future Research.

The evaluation results that accompany dashboard data for budget allocation through Power BI have also contributed to a user satisfaction level that is rated as fairly good. The highest rating has been given to variables concerning the report accuracy that consider completeness of information and clarity in report communication, though visual attractiveness of data presentation along with ease of use were also marked "highest." Moreover, the entire accounting system functions as an executive analysis of anticipated future spending trends while aiding decision-making at the strategic level and giving better transparency in budget processes allocation. This is also aligned with a research carried out by Gagah, Maulidin, Amirul, Mukminin, Hidayat. [21] which measured the utility of Power BI dashboard for reporting documents on scholarship at the highest levels.

Policy recommendations : 1. Supported using visualization drivers like Power BI in terms of budget management uplift to be more precise, transparent, and efficient, especially in real-time data analysis and trend

forecasting of expenses. 2. Encourage the gathering and management of high quality and absence of errors source budget data, thus enhancing the display of reports and results in dashboards. 3. Training of employees engaged in the use of dashboard systems like data analysis and using Power BI tools to improve management effectiveness.

Explore the utilization of dashboards to improve forecasts regarding budget expenditures within various contexts to avert financial risks. Suggestions for Future Research. Research Limitations An important condition to be met for assuring good performance of a dashboard system in effective reporting is the requirement for quality and completeness in the source data. In the presence of flawed or incomplete data, much weakened performance of the system would be anticipated.

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