

**A COMPARATIVE STUDY OF INTERACTIVE DASHBOARDS
FOR BUSINESS INTELLIGENCE
WITH LOOKER, TABLEAU, AND POWER BI**

BY

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CERTIFICATION

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Date

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Date

DEDICATION

I dedicate this report to almighty God for the Grace he gave me to finish my project work, my parents Dr. And Mrs Ogah, my Colleagues who were a constant source of inspiration and support throughout my project work and my project supervisor ENGR. DR. E. Olaye. This project would not have been successful without their love, encouragement and support and for that I am extremely grateful.

ACKNOWLEDGEMENT

I would like to express my gratitude to God almighty for seeing me through my industrial training. My parents Dr. and Mrs Ogah and my supervisor DR. ENGR. E. OLAYE for their valuable contribution towards my FINAL YEAR PROJECT. They have been instrumental in providing guidance and support throughout the project duration and their contributions have been critical to its success.

I would also like to thank my course-mates for their continuous support, motivation, and assistance throughout my project. Their effort has been essential in providing the necessary resources, inspiration and information for m project. Thank you for your contribution and your support.

TABLE OF CONTENT

DEDICATION	III
ACKNOWLEDGEMENT	IV
TABLE OF FIGURES	VII
ABSTRACT	VIII
CHAPTER ONE	1
INTRODUCTION	1
BACKGROUND OF THE STUDY	1
Research Gap or problem	Error! Bookmark not defined.
Rationale	Error! Bookmark not defined.
AIM	2
Objectives	2
Scope of the Study	3
1. Tool Capabilities:	3
2. Ease of Use and Learning Curve:	3
3. Features and Customization Options:	3
4. Collaborative Analytics:	3
5. User Feedback Analysis:	3
6. Best Practices and Recommendations:	4
7. Documentation and Reporting:	4
Limitations	4
1. Evolution of Tools:	4
2. User Experience Subjectivity:	4
3. Dataset:	5
4. Tool Versions:	5
Relevance of the Study	5
1. Informed Decision-Making:	5
2. Resource Optimization:	5
3. Enhanced User Experience	5
4. Tailored Business Intelligence Solutions:	6
5. Best Practices Guidance:	6
CHAPTER TWO	7
LITERATURE REVIEW	7
RELATED WORKS	7
SUGGESTION BY THE AUTHORS	9
META ANALYSIS TABLE	11
CHAPTER 3	14
METHODOLOGY	14
Research Design:	14
Participant Selection	14
Selection of Visualization Tools	15
Data Collection:	15
Data sets:	15
User Feedback:	16
Tool Comparison:	16
ETHICAL CONSIDERATION	16
1. Informed Consent	16
2. Data Privacy and Confidentiality	16
3. Participant Withdrawal	16

Limitations	17
CHAPTER 4	18
RESULT	18
Results and Findings	18
FIGURE 1:	18
FIGURE 2:	19
FIGURE 3:	20
Detailed comparative analysis report outlining the strengths and weaknesses of looker, Tableau, and Power BI.	22
Suggest best practices for organization derived from the analysis.	26
CHAPTER 5	28
CONCLUSION AND REFERENCE	28
Conclusion	28
.....	28
REFERENCE	29

TABLE OF FIGURES

FIGURE 1.....	18
FIGURE 2.....	19
FIGURE 3.....	20
FIGURE 4.....	21
FIGURE 5.....	21
FIGURE 6.....	22
FIGURE 7.....	23
FIGURE 8.....	24
FIGURE 9.....	24
FIGURE 10.....	25

ABSTRACT

In the contemporary landscape of business intelligence (BI), the choice of interactive dashboard tools plays a pivotal role in enabling data-driven decision-making processes within organizations. This study conducts a comprehensive comparative analysis of three leading BI tools: Looker, Tableau, and Power BI, with a specific focus on their interactive dashboard capabilities.

The research aims to provide insights into the strengths and weaknesses of each tool, aiding organizations in making informed decisions regarding their BI tool selection. Key aspects examined include user interface and ease of use, data connectivity, visualization capabilities, data modeling and transformation features, collaboration and sharing functionalities, integration with advanced analytics and machine learning, cost considerations, customization and extensibility options, as well as support and community resources.

Methodologically, the study adopts a mixed-methods approach, combining insights from user survey feedback with data gathered from expert users in data analytics and data science, providing a well-rounded view of the tools strengths and weaknesses.

Findings from the study are expected to contribute valuable insights to both academic research and practical decision-making processes within organizations seeking to leverage BI tools for enhanced data analytics and visualization. Ultimately, the comparative study aims to empower stakeholders with the knowledge needed to select the most suitable interactive dashboard solution for their specific business intelligence needs.

CHAPTER ONE

INTRODUCTION

BACKGROUND OF THE STUDY

The landscape of Business Intelligence (BI) has witnessed significant transformations with the increasing demand for real-time insights and interactive dashboards. Organizations today are faced with the challenge of selecting the most suitable BI tool that aligns with their specific business needs. Looker, Tableau, and Power BI have emerged as leading contenders in this space, offering advanced features for creating interactive dashboards and visualizations.

While individual reviews and comparisons of BI tools exist, there is a noticeable gap in comprehensive studies that directly compare Looker, Tableau, and Power BI in the specific context of interactive dashboard creation for Business Intelligence. This study seeks to fill this gap by providing a thorough examination of these tools, focusing on their application in real-world scenarios.

The reason for this comparative study arises from the need to provide organizations with an informed perspective on the strengths and weaknesses of Looker, Tableau, and Power BI in the context of interactive dashboards for Business Intelligence. Each tool brings unique features to the table, and a comprehensive analysis will help decision-makers select the tool that best fits their requirements.

AIM

The primary aim of this study titled “**A Comparative Study of Interactive Dashboards for Business Intelligence with Looker, Tableau, and Power BI**”, is to provide valuable insights for businesses seeking an appropriate BI tool by offering a comprehensive comparison of Looker, Tableau, and Power BI. The findings will assist decision-makers in selecting the most suitable solution based on their specific requirements, ultimately enhancing their business intelligence capabilities.

Objectives

The primary objectives of this project are as follows:

1. To assess and compare the interactive dashboard creation capabilities of Looker, Tableau, and Power BI.
2. To evaluate the ease of use and learning curve associated with each tool for dashboard development.
3. To analyze the features and customization options available for creating interactive visualizations.
4. To determine the suitability of each tool for different business intelligence scenarios.

Scope of the Study

1. Tool Capabilities:

A. Evaluate and compare the interactive dashboard creation capabilities of Looker, Tableau, and Power BI.

B. Assess the tools' abilities to handle diverse datasets, including real-time data, complex relationships, and varied data sources.

2. Ease of Use and Learning Curve:

A. Analyze the user interface of each tool to determine its ease of use and intuitiveness.

B. Evaluate the learning curve associated with Looker, Tableau, and Power BI for users with varying levels of experience in BI and dashboard creation.

3. Features and Customization Options:

A. Examine the features offered by each tool for data connectivity, visualization creation, and customization of interactive dashboards.

B. Compare the flexibility and customization options available in Looker, Tableau, and Power BI to meet specific business intelligence requirements.

4. Collaborative Analytics:

A. Evaluate the collaboration features of Looker, Tableau, and Power BI, including sharing and collaborative editing of dashboards.

B. Assess the tools' capabilities to facilitate teamwork and data-driven decision-making within organizations.

5. User Feedback Analysis:

A. Collect user feedback from individuals with varying levels of experience in BI and dashboard creation.

B. Analyze user preferences, satisfaction, and challenges faced during the evaluation to understand the practical implications of using each tool.

6. Best Practices and Recommendations:

A. Derive best practices for utilizing Looker, Tableau, and Power BI based on comparative analysis and user feedback.

B. Provide recommendations for organizations seeking to optimize their BI implementations and choose the most suitable tool for their specific needs.

7. Documentation and Reporting:

A. Present a detailed comparative analysis report outlining the strengths and weaknesses of Looker, Tableau, and Power BI.

B. Create interactive dashboards using each tool for various datasets, showcasing their capabilities.

C. Compile a user feedback analysis report, offering insights into user preferences and challenges.

Limitations

1. Evolution of Tools:

The study acknowledges that Looker, Tableau, and Power BI are continually evolving, and new features may be introduced after the study period.

2. User Experience Subjectivity:

User feedback is subjective and may vary based on individual preferences and familiarity with specific BI tools.

3. Data set

The data sets used in the study may not cover all possible scenarios, and the findings may be influenced by the selected data sets.

4. Tool Versions:

The study is based on the versions of Looker, Tableau, and Power BI available at the time of the analysis, and any updates or changes to the tools may not be accounted for.

Relevance of the Study

1. Informed Decision-Making:

Organizations constantly seek effective BI tools for informed decision-making. This study is relevant as it provides a detailed comparison of Looker, Tableau, and Power BI, enabling decision-makers to choose the tool that aligns best with their specific business intelligence requirements.

2. Resource Optimization:

Selecting the right BI tool is crucial for resource optimization. Understanding the strengths and weaknesses of Looker, Tableau, and Power BI helps organizations allocate resources effectively and make informed decisions regarding software investments.

3. Enhanced User Experience: the study's focus on the ease of use and learning curve of Looker, Tableau, and Power BI is relevant for organizations aiming to enhance user experience. This knowledge can influence the selection of a BI tool that fosters user adoption and productivity.

4. Tailored Business Intelligence Solutions:

Businesses operate in diverse environments, and the relevance of this study lies in its examination of Looker, Tableau, and Power BI across various scenarios. This enables organizations to tailor their business intelligence solutions to specific industry needs.

5. Best Practices Guidance:

The derivation of best practices and recommendations from the study is relevant for organizations seeking guidance on optimizing their BI implementations. This insight contributes to efficient utilization of resources and a more effective BI strategy.

CHAPTER TWO

LITERATURE REVIEW

RELATED WORKS

A comprehensive examination of related works provides valuable insights into the current state of research and development in the field of applications in interactive dashboard creation. This review encompasses a variety of studies, publications, and projects comparing BI tools, identifying gaps in the current knowledge.

1. **“Comparative study of data visualization tools in BigData analysis for business intelligence” by Pandey, A., Sharma, I., Sachan, A. and Madhavan, D.P. (2022)**

This paper explores applications of Data Visualization used in sectors such, as Big Data Analytics business operations and websites to name a few and thoroughly assesses the available tools for use in this area of study we found it challenging to pick between Power BI Tableau Zoho Analytic Celonis MS Excel and Dataiku DDS but we managed to make a decision. This study evaluates the utilized and widely available visualization tools, for handling extensive data sets by providing an overview of the key features and attributes of the tools that were examined.

Principal points

The authors provided various pros and cons for the different data visualization tools listed I.e (Power BI, Tableau, Zoho Analytic, Celonis, MS Excel, and Dataiku DSS), and then gave an insight on scenarios where each of the different visualization tools can be used.

Limitations

1. Limited sample size
2. biased user feedback

2. “The comparison study of the development of enterprise dashboard” by Gowthami & Pavan Kumar (2017)

This document provides an overview of Business Intelligence (BI) software options, for creating a dashboard in a business environment. It discusses used BI tools such as SpagoBI, Power BI, Tableau, QlikSense and Jaspersoft based on their user friendliness available training support and initial costs. Furthermore a sample dashboard was created using Power BI to showcase its effectiveness, in visualizing business data.

PURPOSE

The business intelligence tools mentioned were evaluated to create a dashboard, for a company with a focus specifically placed upon business research and potential implementation of these tools for analyzing business data.

LIMITATIONS

1. Subjective opinions
2. Limited sample size.

3. “Comparison study of the development of Self-Service Business Intelligence between Power BI and Tableau desktop” BY Rafif, M.F. (2019)

In this regard, the researcher made a comparative study in order to analyze the two most famous SSBI tools available in the market based on several experts' recommendations and articles such as Gartner Quadrant. This is because, after going through many articles discussing the pros and cons of some SSBIs, not even one gives the explanations using standard parameters. The datasets from

secondary data would be analyzed by the researcher using Microsoft Adventure Works database 2017 in order to conduct deeply comparison study analysis. Several parameters will support this research as the comparison goal. Based on a few references, the researcher limits the research to compare between two most famous SSBI tools: Power BI from Microsoft Corporation and Tableau.

SUGGESTION BY THE AUTHORS

Based on the research result, the researcher has several recommendations:

1. The next researcher can develop a comparative study of the development of Self Service BI using real data or primary data.
2. The next researcher can complete the limitation of this research such as comparing based on whole parameters that already existed from the expert and further parameters. It is because all about technology will be growing rapidly.
3. A further researcher can conduct the analysis from the server database such as Azure, Amazon Redshift, Oracle, or SAP.

4. Comparative Analysis of Data Visualization Tools: Power BI and Tableau BY Rupesh M Parthe (2023)

This research paper will seek to provide a detailed and comparative analysis of two popular tools, Power BI and Tableau, being used for business analytics and data visualization. This article clears up the main differences between them, concerning pricing structure, user interface, integration options, visualization capabilities, data modeling, and ETL capabilities, collaboration features, and mobile app functionality. By researching these areas, this research tries to guide organizations in making a proper decision between Power BI and Tableau, according to their needs and specific requirements.

5. A Comparative Study Of Large-Scale Network Data Visualization Tools BY Prakash Joshi (2018)

This ARTICLE tries to contrast three Data Visualization tools: Gephi, Pajek, and NodeXL. They discussed mainly what each tool can do, what each is best at, and when to and when not to use each. Using the right tool, therefore, saves us a lot of time by making the task easy and gets the work done using a minimal number of resources, but also helps to get the best results. The comparison will be carried out based on what Visualization features each tool has, how each tool computes different graph features, and how Compatible and Scalable each tool is. In the process, I used different Network data sets and tried to calculate certain features of the graph and wrote the findings

META ANALYSIS TABLE

S/N	AUTHOR	YEAR	TITLE	METHODOLOGY	RESULT	LIMITATIONS
1	Pandey, A., Sharma, I., Sachan, A. and Madhavan, D.P.	2022	Comparative study of data visualization tools in BigData analysis for business intelligence	The study explore a shipment dataset from Kaggle using six different data visualization tools: Tableau, Power BI, Zoho Analytics, Dataiku DSS, Celonis, and MS Excel.	The evaluation of each software package's dashboard development reveals strengths and limitations.	Limited sample size, biased user feedback
2	Gowthami & Pavan Kumar	2017	the comparison study of the development of enterprise dashboard	All the tools that have been compared are SSBI Tools. It was based on the ease of use, support in terms of training and minimal initial cost.	a sample dashboard has been developed using one of the tools which are Power BI to demonstrate the feasibility of the same for the Business data	subjective opinions and limited sample size.

					visualization.	
3	Rafif, M.F.,	2019	Comparison study of the development of Self- Service Business Intelligence between Power BI and Tableau desktop	Data collection, observation,data processing, discussion and conclusion	In this research, the researcher is focused on the comparison study using apple to apple data comparison	The study was not done with real or primary data
4	Rupesh M Parthe	2023	Comparative Analysis of Data Visualization Tools: PowerBI and Tableau	The study highlights key differences in pricing structure, user interface, integration options, visualization capabilities, data modeling and ETL capabilities, collaboration features, and mobileapp	While Power BI offers strong integration with the Microsoft ecosystem and a variety of pricing options, Tableau excels in ease of use and extensive data exploration	Limited Scope, Bias in Data Collection and Subjectivity in Evaluation

				functionality.	capabilities.	
5	Prakash Joshi	2018	A Comparative Study Of Large-Scale Network Data Visualization Tools	The comparison is based on what Visualization features each tool has, how each tool computes different graph features, and how Compatible and Scalable each tool is	The end report discusses which tool can be best to use given the size of dataset, the problem we are trying to solve, the resources we have and the time we can spend.	Methodological Limitations, data Availability and subjectivity in Evaluation

CHAPTER 3

METHODOLOGY

This chapter details the methodology used in conducting an observational study of business intelligence tools for data visualization. The methodology encompasses the study design, data collection methods, data entry procedures, result analysis, ethical considerations, and limitations.

Research Design:

The research adopts a mixed-methods approach integrating quantitative and qualitative research methods for a comprehensive analysis.

Participant Selection

Selection Criteria FOR THE SURVEY

The participant selection process aimed to include a diverse sample from data analyst and various data scientist of the target population. Participants were selected based on the following criteria:

1. **Background:** Participants were required to be currently enrolled in or affiliated with the world of data analysis and visualization
2. **visualization Proficiency:** Participants were selected to represent a range of visualization levels, including participants on different skill levels and experience in the visualization world.
3. **Age and Gender:** Participants of different ages and genders were included to ensure a diverse sample were collected.

Selection of Visualization Tools

Criteria for Selection

The selection of BI tools was based on several criteria to ensure their relevance, availability, and suitability for data visualization:

1. **Relevance:** BI tools selected for this study were those commonly used or recognized for their application in data visualization. Models like POWERBI, looker and tableau were chosen for their widespread use and applicability in data visualization world.
2. **Availability:** BI Tools that were readily available and offered a wide range of coverage were preferred to ensure practicality and ease of use.
3. **Suitability:** Selected BI tools were those that had demonstrated effectiveness in generating high-quality and had features tailored data visualization were selected.

The three mentioned above can be considered the leading brands in the field out of the five mentioned by Gartner Inc., with Power BI being the vast majority shareholder in the market. Gartner Inc. has been following the Business Intelligence field with a yearly review, with Power BI being the clear market leading tool since the 2000's. Gartner's 2022 report shows the most popular tools in use in the business management market.

Data Collection:

Data sets:

- A. Collect diverse data sets representing different industries and use cases, ensuring they cover real-time data, complex relationships, and varied data sources.
- B. Curate data sets that allow for thorough testing of Looker, Tableau, and Power BI across multiple scenarios.

User Feedback:

A. Design a user feedback survey to collect responses from users with varying levels of experience in BI and dashboard creation.

B. Include questions on ease of use, satisfaction, challenges faced, and preferences related to Looker, Tableau, and Power BI.

Tool Comparison:

A. Create identical interactive dashboards using Looker, Tableau, and Power BI for each data set.

B. Evaluate the ease of use, features, and flexibility of each tool in the dashboard creation process.

C. Test the tools ability to handle real-time data updates and collaborative analytics.

ETHICAL CONSIDERATION

1. Informed Consent

Prior to participation, all participants were provided with detailed information about the study and were required to provide informed consent.

2. Data Privacy and Confidentiality

Steps were taken to ensure data privacy and confidentiality. Data was anonymized and stored securely to protect participants' identities and sensitive information.

3. Participant Withdrawal

Participants were provided with the option to withdraw from the study at any time without facing any consequences.

Limitations

1. Bias in Self-Reported Data

There was a potential for bias in self-reported data, as participants may have provided responses that they believed were expected of them rather than reflecting their true experiences.

2. Generalization

The findings of the study may have limitations in terms of generalization to broader populations or contexts, as the study focused on a specific sample of academic writers.

CHAPTER 4

RESULT

Results and Findings

I created visualizations on various data set with the visualization tools I listed above (tableau, power bi and looker studio). I would be showing the visualization created for two of those data set.

The first of which is “**number of internet users in different countries per year**”

TABLEAU VISUALIZATION

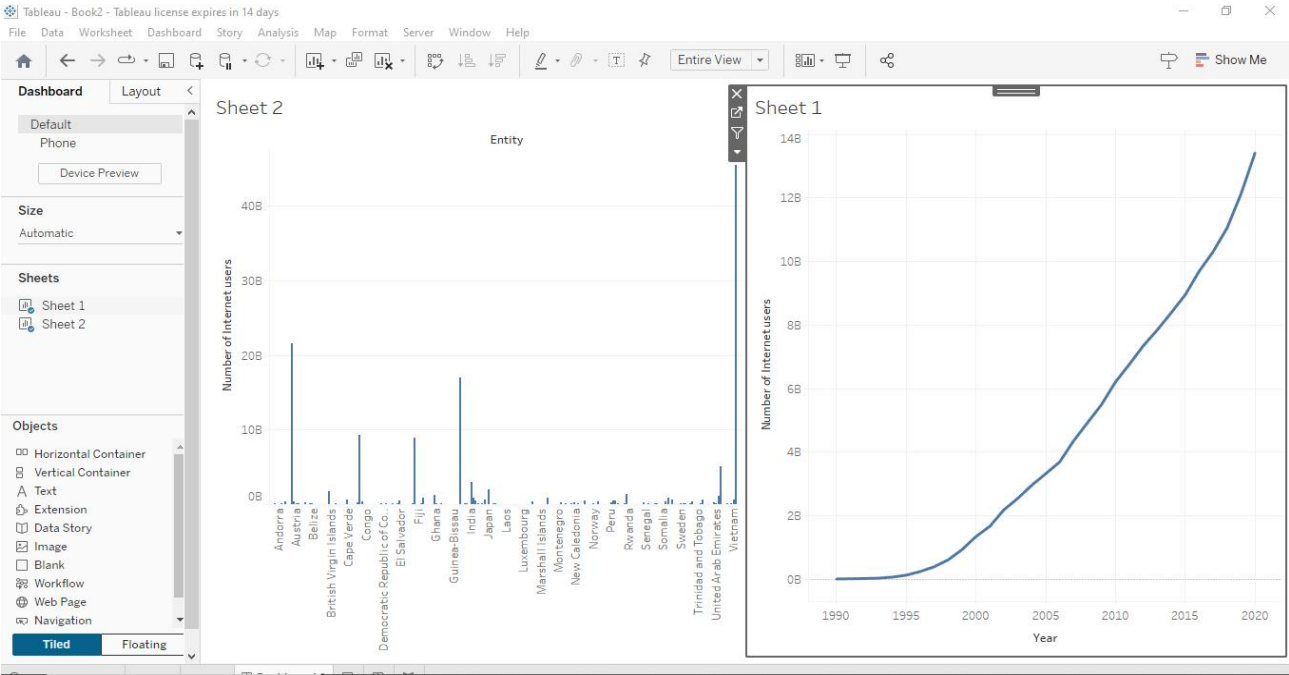


FIGURE 1: shows the visualization of the data set with tableau while creating the dashboard

LOOKER STUDIO VISUALIZATION

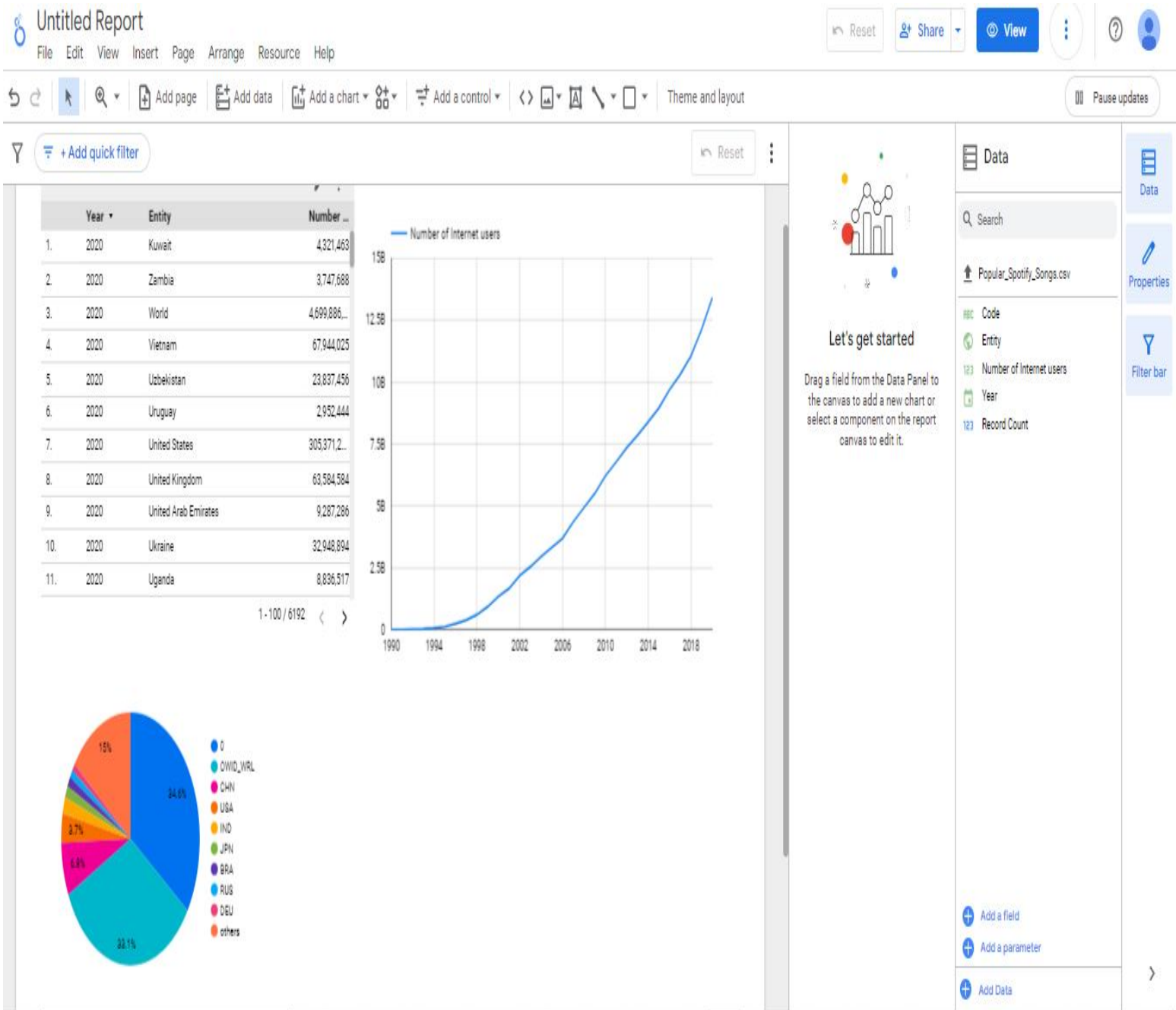


FIGURE 2: shows the visualization of the data set with looker studio while creating the dashboard

POWER BI

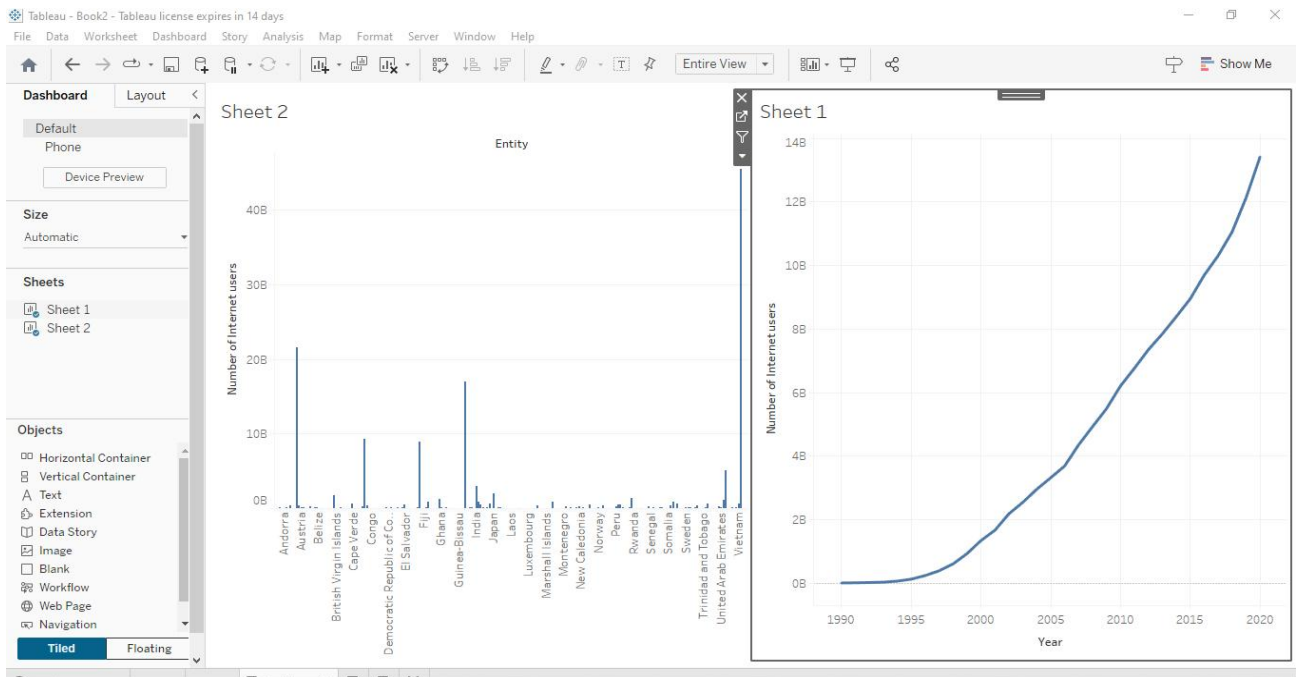
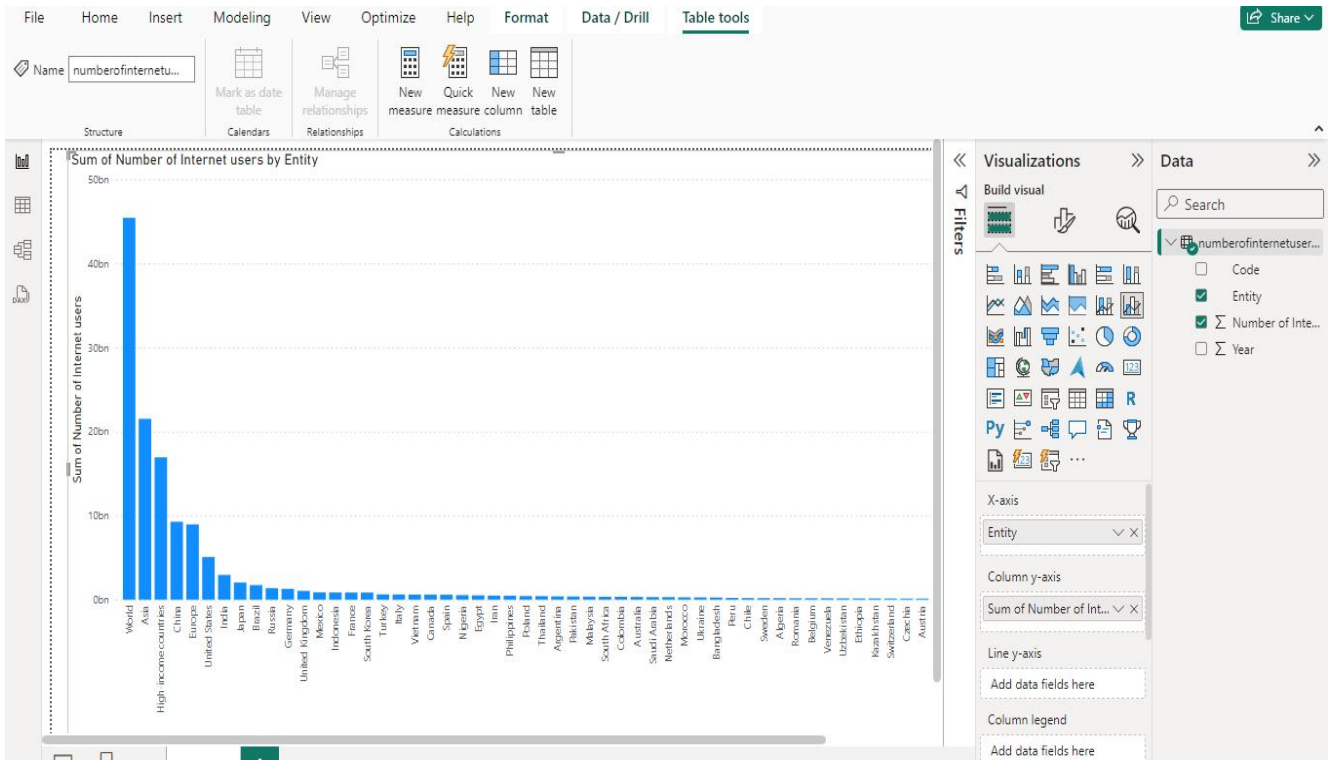


FIGURE 3: shows the visualization of the data set with Power Bi while creating the dashboard

The second dataset is “Popular spotify songs”, which is shown below

Tableau Visualization of the data set

Track Name	Artist(s)	Released Year	Released Month	Released Day	Spotify Streams	Apple Music	Deezer	Shazam	BPM	Key	Mode	Danceability	
Seven (feat Latto, Jung Kook)	Drake	2023	7	14	553,147,141,381,703	43	263	45	10	826	125 B	Major	80
LALA	Myke Towers	2023	3	23	1474,48,133,716,286	48	126	58	14	382	92 C#	Major	71
vampire	Olivia Rodrigo	2023	6	30	1397,113,14,000,3974	94	207	91	14	949	138 F	Major	51
Cruel Summer	Taylor Swift	2019	8	23	7858,100,800,840,817	116	207	125	12	548	170 A	Major	55
WHERE SHE BAD	Bad Bunny	2023	5	18	3133,50,303,236,322	84	133	87	15	425	144 A	Minor	65
Sprinter	Dave, Central Cee	2023	6	1	2186,91,183,706,234	67	213	88	17	946	141 C#	Major	92
Ella Baila Sola	Jhay Cortez, Esli Aguilar	2023	3	16	3090,50,725,980,112	34	222	43	13	418	148 F	Minor	67
Columbia	Quevedo	2023	7	7	714,43,581,493,78	25	89	30	13	194	100 F	Major	67
fukumean	Gunna	2023	5	15	1096,83,95,217,315	60	210	48	11	953	130 C#	Minor	85
La Bebe - Rvrs	Peso Pluma	2023	3	17	2953,44,553,634,067	49	110	66	13	339	170 D	Minor	81
un x100to	Bad Bunny, Jhay Cortez	2023	4	17	2876,40,505,671,438	41	205	54	12	251	83 F#	Minor	57
Super Shy	NewJeans	2023	7	7	422,55,58,255,150	37	202	21	5	168	150 F	Minor	78
Flowers	Miley Cyrus	2023	1	12	12211,115,1.317E+09	300	215	745	58	1,021	118	Major	71
Daylight	David Kushner	2023	4	14	3528,98,387,570,742	80	156	182	24	1,281	130 D	Minor	51
As It Was	Harry Styles	2022	3	31	23575,130,2.513E+09	403	198	863	46		174 F#	Minor	52
Kill Bill	SZA	2022	12	8	8109,77,1.163E+09	183	162	161	12	187	89 G#	Major	64
Cupid - Twi	Fifty Fifty	2023	2	24	2942,77,496,795,686	91	212	78	6	0	120 B	Minor	78
What Was I Thinking	Billie Eilish	2023	7	13	873,104,305,468,83	80	227	95	24	1,173	78	Major	44
Classy 101	Feid, Young Miko	2023	3	31	2610,40,335,222,34	43	100	54	14	187	100 B	Major	86
Like Crazy	Jimin	2023	3	24	596,68,363,369,738	8	104	23	2	29	120 G	Major	63
LADY GAGA	Gabito Ballesteros	2023	6	22	332,26,864,448,42	11	163	10	4	0	140 F	Minor	65
I Can See You	Taylor Swift	2023	7	7	516,38,521,352,48	73	119	42	1	150	123 F#	Major	69

FIGURE 4: shows the data set for the popular spotify songs data

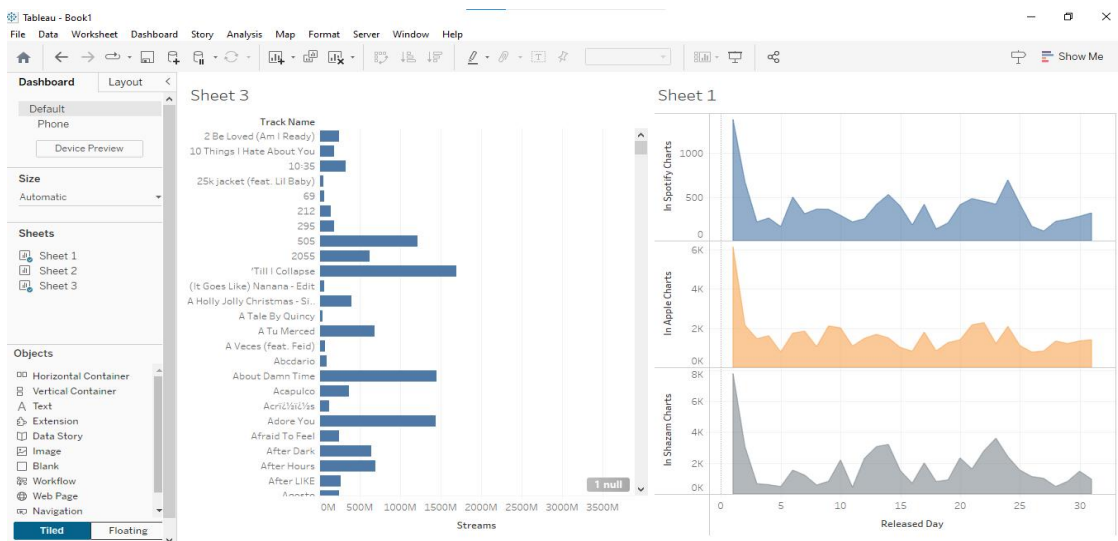


FIGURE 5: shows the visualization process of the data set above while creating the dashboard with tableau

Power bi visualization

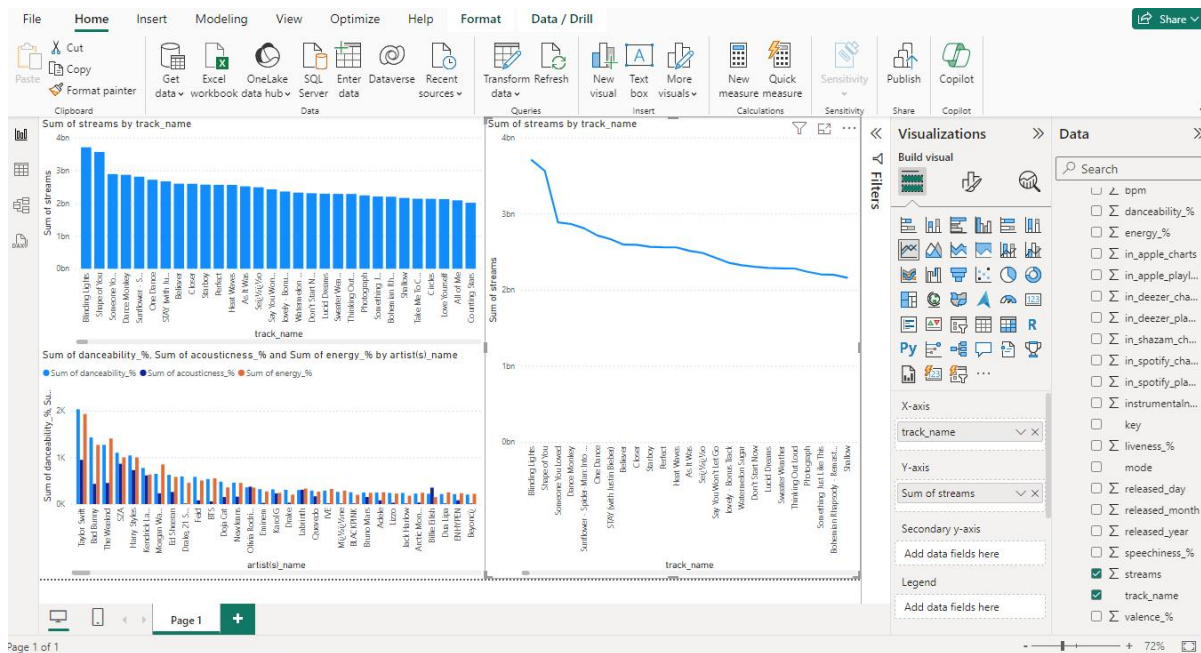


FIGURE 6: shows the visualization process of the data set above while creating the dashboard with Power Bi

Detailed comparative analysis report outlining the strengths and weaknesses of looker, Tableau, and Power BI.

This study combines insights from hands-on testing and user feedback surveys to evaluate the strengths and weaknesses of Power BI, Tableau, and Looker. Both approaches align to provide a comprehensive understanding of these business intelligence (BI) tools across several dimensions.

1. User Interface and Ease of Use

A. Power BI: The hands-on testing revealed Power BI's intuitive interface, familiar to users of Microsoft Office, with easy drag-and-drop functionality. Survey respondents echoed this, noting that Power BI is user-friendly and accessible, even for inexperienced users.

B. Tableau: Both testing and surveys confirmed that Tableau’s visually appealing and intuitive interface makes it easy to use. Users appreciated the smooth experience when creating complex visualizations, with survey respondents giving it high marks for ease of use.

C. Looker: Looker’s more technically oriented interface requires a steeper learning curve, as reported in both the hands-on testing and user survey. However, it is preferred by users who need more complex customization, a feature highlighted in both methodologies.

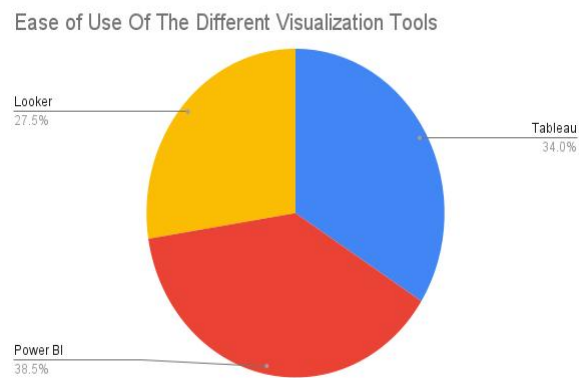


FIGURE 7: shows the result gotten from the survey for the ease of use feature

2. Visualization Capabilities

A. Power BI: Hands-on testing found Power BI to offer extensive visualization options, with the ability to create custom charts and interactive dashboards. Survey participants confirmed this, highlighting Power BI's strength in crafting insightful visualizations.

B. Tableau: Tableau excelled in visualization capabilities, a strength confirmed by both testing and user feedback. Survey respondents were particularly satisfied with Tableau’s wide variety of chart types and detailed customization options, which allow for highly interactive visualizations.

C. Looker: Both testing and survey results showed that Looker is strong in visualization but requires more customization compared to Power BI and Tableau. Users needing advanced customization found Looker to be a powerful tool, albeit more challenging to use.

PIE CHART SHOWING VISUALIZATION CAPABILITIES

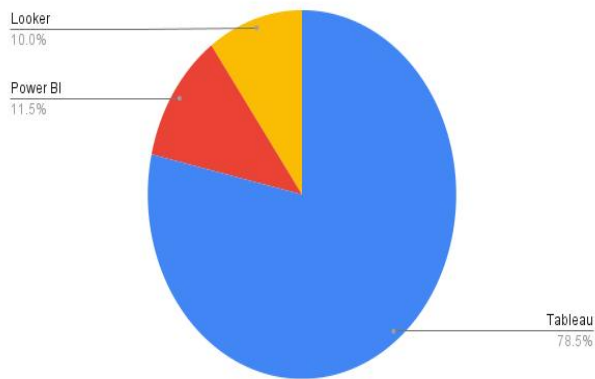


FIGURE 8: shows the result gotten from the survey for the visualization capabilities feature

3. Data Modeling and Transformation

A. Power BI: Hands-on testing revealed that Power BI’s strong data modeling features, powered by Power Query and DAX, allow for complex data transformations. Survey respondents appreciated this capability, with many citing it as a standout feature of Power BI.

B. Tableau: While Tableau is limited in data modeling, relying mostly on pre-modeled data, survey respondents confirmed this limitation. Users typically use Tableau for its visualization strengths, rather than for data modeling or transformation.

C. Looker: Looker’s data modeling capabilities stood out in both the hands-on testing and the survey. It allows users to build complex data models directly within the platform, a feature praised by more technically advanced users.

Data Modeling Chart Of The Visualization Tools

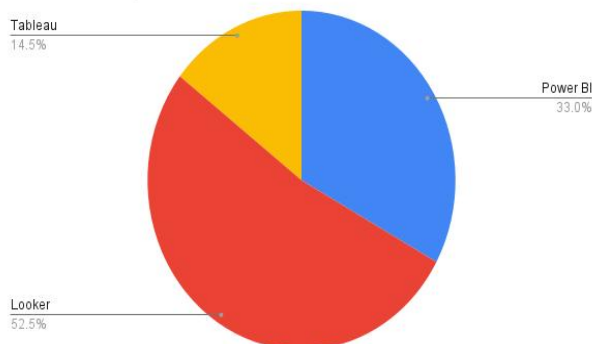


FIGURE 9: shows the result gotten from the survey for the data modelling feature

4. Sharing and Collaboration

A. **Power BI:** Integrated with Office 365, Power BI facilitates seamless sharing and collaboration on reports and dashboards, a feature validated in both the hands-on testing and survey feedback. Users appreciated the ability to easily share work across teams.

B. **Tableau:** Tableau provides strong collaboration tools through Tableau Server and Tableau Online, enabling teams to work on shared projects. Both testing and survey responses emphasized this feature, making Tableau a favorite for collaborative work.

C. **Looker:** Looker also supports centralized collaboration, but the survey and testing revealed that it may require additional setup for user access control. This additional complexity was noted as a potential challenge, particularly for less experienced users.

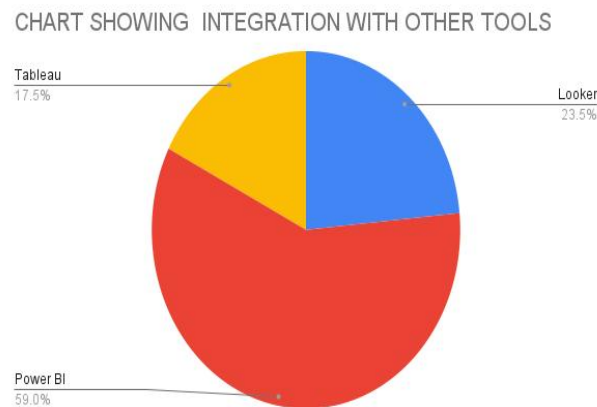


FIG 10: shows the result gotten from the survey for the integration with other tools feature

5. Satisfaction and Challenges

A. **Power BI:** Survey respondents were generally satisfied with Power BI, particularly for its integration with other Microsoft tools. However, some users reported performance issues when dealing with very large datasets, which was confirmed during hands-on testing.

B. **Tableau:** Tableau received high satisfaction ratings for its visualization capabilities, but both testing and surveys indicated concerns about its higher cost for larger deployments.

C. **Looker:** Users praised Looker for its powerful data modeling features, but both hands-on testing and the survey highlighted its technical complexity as a barrier for less experienced users.

The results are summarized in the table below:

ASPECT	POWER BI	TABLEAU	LOOKER
Ease of Use	User-friendly, Microsoft integration	Intuitive, visually appealing	Technical, requires customization
Data Connectivity	Data Connectivity	Wide range of data sources	SQL-based, API connections
Visualization Capabilities	Extensive, customizable charts	Robust, wide variety of charts	Requires more customization
Data Modeling	Strong with Power Query and DAX	Limited	Strong focus on data modeling
Collaboration	Office 365 integration	Tableau Server, Tableau Online	Centralized collaboration
Cost	Affordable, free desktop version available	Expensive for larger deployments	Mid-range pricing

Suggest best practices for organization derived from the analysis.

For organizations prioritizing quick adoption and ease of use, Power BI is the most suitable tool, particularly for those already utilizing Microsoft products. If strong data visualization is the primary goal, Tableau is recommended due to its advanced customization capabilities. For complex data modeling needs, Looker stands out as the best option, as it enables advanced transformations directly within the platform. Budget-sensitive organizations will find Power BI to be the most cost-effective solution, thanks to its diverse pricing tiers. Additionally, Power BI excels in integrating with

advanced analytics, offering robust compatibility with Azure Machine Learning and Python, making it an ideal choice for organizations looking to leverage advanced analytic capabilities.

CHAPTER 5

CONCLUSION AND REFERENCE

Conclusion

The comparative study of Looker, Tableau, and Power BI for interactive dashboard creation in the realm of Business Intelligence presented a comprehensive analysis of these tools' capabilities, user experiences, and practical implications. Through a mixed-methods approach, combining quantitative metrics and qualitative user feedback, the study aimed to provide valuable insights into the strengths and weaknesses of each tool.

The interactive dashboards created using diverse datasets allowed for a real-world evaluation of Looker, Tableau, and Power BI in handling various business intelligence scenarios. The user feedback survey provided perspectives from users with varying levels of experience, shedding light on the practical considerations and preferences in using these tools.

REFERENCE

1. Pandey, A., Sharma, I., Sachan, A. and Madhavan, D.P., 2022. Comparative study of data visualization tools in BigData analysis for business intelligence. IJRASET, 10, pp.2592-2600.
2. Rafif, M.F., 2019. Comparison study of the development of Self-Service Business Intelligence between Power BI and Tableau desktop (Case study: Microsoft Adventure Works).
3. Carey, S., Macaulay, T., & Clarke, L. (2018, December 12). The best analytics and business intelligence tools for enterprises in 2018. Retrieved from computerworlduk: <https://www.computerworlduk.com/galleries/applications/best-self-serveanalytics-software-for-enterprises-3635147/>
4. Joshi, P. (2018). A Comparative Study Of Large-Scale Network Data Visualization Tools.
5. Parthe, M. R. (2023, October 1). Comparative Analysis of Data Visualization Tools: Power BI and Tableau. *Interantional Journal of Scientific Research in Engineering and Management, 7*, 1-11. <https://doi.org/10.55041/IJSREM26272>
6. Jääskeläinen, P. (2023). Performance Reporting Tools, Integrability and Information Flow.
7. Savoska, S., & Bocevska, A. (2016). Data Visualization in Business Intelligent & Analysis– Analysis of First Positioned Tools According to Gartner’s Magic Quadrant in Ability to Execute.
8. Peddoju, S. K., & Upadhyay, H. (2020). Evaluation of IoT data visualization tools and techniques. *Data visualization: Trends and challenges toward multidisciplinary perception*, 115-139.
9. Skender, F. (2023). EVALUATING DATA VISUALIZATION TOOLS BASED ON IMPORTING AND PROCESSING TIMES. *International Scientific Journal Vision*, 8(2), 165-177.
10. Forbes Advisor. (2024). *Best data visualization tools of 2024*. Forbes. <https://www.forbes.com/advisor/business/software/best-data-visualization-tools/>