

Received: February 28, 2024 / Revised: March 25, 2024 / Accepted: April 23, 2024 / Published: May 09, 2024

A STUDY ON PERFORMANCE OF POWERBI IN DATA VISUALIZATION OF AN ORGANIZATION

Dr S Saravanan,

Assistant Professor - Crescent School of Business, B.S. Abdur Rahman Crescent Institute of Science and Technology, Chennai, orcid id: 0000-0001-5116-8071

Dr R Satish

Associate Professor-Department of Management Studies, St.Joseph's Institute of Technology, Chennai, orcid id: 0000-0002-3104-6429

ABSTRACT

Data visualisation has become an essential tool for businesses and organisations in the digital age. It supports their ability to identify patterns, communicate complicated information in an approachable manner, and generate well-informed opinions. The ability to visualise data has made Microsoft's powerful business intelligence tool, Power BI, well-known. The study evaluates Power BI's capabilities for data visualisation. An extensive assessment of Power BI's data visualisation capabilities in an organisational context is included in this research paper. This means analysing the data visualisation tool's user interface design, assessing its data integration capabilities, looking at the speed at which data is visualised, and analysing how well Power BI's data visualisation quality works. The study aims to identify the specific issues affecting Power BI's functionality and provide recommendations for optimising data visualisation practices in Power BI-using businesses. The study's focus is limited to Chennai-based IT companies. The primary data collection method is applied. Purposive sampling and a descriptive study methodology were used. The study's sample size is 160. The hidden layer that forms between certain demographic parameters and variables including performance speed, data visualisation quality, data integration capabilities, and user interface design was discovered using a neural network. It was discovered that, in addition to their technical prowess, the success of data visualisation tools such as Power BI is largely attributable to its user-centric design, performance efficiency, customisation flexibility, and collaboration features. It was determined that the components of User Interface Design, Data Integration Capabilities, Performance Speed, and Data Visualisation Quality combined collectively have a substantial impact on the overall efficacy and user satisfaction of data visualisation tools. According to the poll, performance speed—which includes efficient data loading, rapid report generation, and minimal lag—also plays a big role in determining user satisfaction. ←

Key words: Business intelligence, User Interface Design, Data Integration Capabilities, Performance Speed, Data Visualization

INTRODUCTION

A business intelligence (BI) platform called Microsoft Power BI gives non-technical business people the ability to gather, examine, visualise, and distribute data. Power BI is a flexible self-service tool that requires little prior



All the articles published by YUGATO are licensed under a [Creative Commons Attribution-NonCommercial 4.0](https://creativecommons.org/licenses/by-nc/4.0/) International License
Based on a work at <https://www.yugato.org/>

training because of its deep interaction with other Microsoft products and its user-friendly interface for Excel users.

Businesses and professionals utilise Microsoft Power BI as their go-to tool for data visualisation and reporting. Although business analysts frequently utilise the platform, it is also made to be easily navigable by non-data experts. The suite of related programmes that makes up Power BI is comprised of Power BI Desktop, Pro, Premium, Mobile, Embedded, and Report Server.

Although some of these apps are free, better metrics are available with paid subscriptions to the pro and premium editions. Users can download native mobile apps for Windows, Android, and iOS devices in addition to the Power BI Desktop client for Windows 10. Businesses that need to store data and reports on-premises can also use Power BI Report Server. A specific desktop programme, appropriately named Power BI Desktop for Power BI Report Server, is needed in order to use this version of Power BI.

Power BI is a self-service BI solution that gives employees access to data analytics capabilities. BI specialists and data analysts use it mostly to develop and visualise data before sharing reports with the rest of the organisation. Even without prior experience with analytics, users can still create reports and navigate Power BI. Management and department representatives use Microsoft Power BI to generate reports and projections that help sales and marketing and give management information on how each employee is progressing towards their goals or the department as a whole. Administrators can also assist in configuring installations, tracking usage, and licencing Power BI through the admin interface offered by Power BI.

Azure serves as the foundation for the Power BI architecture. You may link Power BI to a wide range of data sources. You may generate reports and data visualisations for your datasets with Power BI Desktop. To acquire continuous data for reporting and analysis, the Power BI Gateway establishes connections with on-premises data sources. The cloud service called Power BI Service is what's used to produce Power BI reports and data visualisations. No matter where you are, you can access your data with the Power BI mobile apps. Apps for Power BI are available for iOS, Android, and Windows. With Power BI, users can use automated machine learning capabilities to develop machine learning models, analyse words and patterns, and interface with Azure Machine Learning. As a result, Power BI tools can connect to several sources from Microsoft, Sales Force, and other providers with seamless integration. As a result, users can generate data subsets and apply analytics to them. backs the common data model. Popular on mobile devices, the function enables users to voice-request data and search for information using Microsoft's digital assistant in natural language. This gives programmers the application programming interfaces (APIs) and templates they need to combine Power BI dashboards with other programmes. synthetic intelligence. With Power BI, users can use automated machine learning capabilities to develop machine learning models, analyse words and patterns, and interface with Azure Machine Learning. As a result, Power BI tools can link to several sources from Microsoft, Salesforce, and other suppliers with seamless integration. As a result, users can generate data subsets and apply analytics to them.

The purpose of Microsoft Power BI is to find patterns in the data of an organisation. Connecting different data sources, cleaning and transforming the data into a data model, and producing graphs or charts to visualise the data are all made possible with the help of Power BI. You may share all of this data with other Power BI users in your company.

Free alternatives??

To gain a deeper understanding of the data within your company, utilise Microsoft Power BI. With the help of Power BI, you can join unrelated data sets, clean and transform your data into data models, and create graphs and charts to visually depict your data.

REVIEW

REVIEW OF LITERATURE

Vijay Krishnan, S Bharanidharan, G Krishnamoorthy(2017) Power BI has completely revolutionised the fields of analytics, data visualisation, and business intelligence. With Power BI, users can search for data, convert it, visualise it, and share the created reports and dashboards with others in their department or organisation, with the public, or both. Power BI is an online service. Power BI is being used by over 200,000 organisations in 205 countries as of February 2017. With a sufficient feature set and a free version, Power BI has emerged as a strong alternative for small and medium-sized businesses looking for a business intelligence platform. Power BI's Quick Insights function, which is based on an expanding collection of sophisticated analytical algorithms, is one of its novel features (Michael Hart, 2017).

Amrapali Bansal, A. K. Upadhyay (2017)

Building a BI solution in accordance with one of the self-service BI solutions was the aim of this work. One of the top experts in the field of MSBI, Microsoft, provides Power BI. There are two sections to this study. The theory package, which covers the BI and Self-service BI techniques to give readers a general understanding of these topics, is the first section. Additionally, it establishes the foundation for this research paper project's empirical section. Analysing BI and Self-service BI and their interrelationships was the first step in the research report. Next, the Microsoft BI solution was shown, and then the background information on Power BI was covered. This study's second section demonstrates how to use Power BI to create the best BI solution possible given the given business scenario. The mandatory procedures for developing a BI solution—which encompass the majority of the tool package's functionalities—were popularised during this testing phase. The end result of this study paper was a Power BI-built BI solution that satisfies the requirements. This study's observational case can serve as a helpful user manual for anyone who has concerns about MicrosoftPowerBI.

Geetha Bhargava Mandava (2018), The process of interpreting the value of data through a visual context is known as data visualisation, and it is a component of data analytics that is carried out following data correction. These days, **visualisation is more helpful in business intelligence and analytics across all domains**. There are various methods for visualising datasets, some of which are **dynamic** or **interactive**, and datasets can be represented visually in a variety of ways. This paper focuses on the process model, operations of Microsoft Power BI, types of data sources available in Tool, and its various related types of visual insights or context. It deals with the interactive visualisation of educational institution databases using Microsoft Power BI Tool with various modules.

The process of understanding the value of data through a visual context is known as abstract-visualization of data sets, and it is a component of data analytics that is carried out after data correction. This paper deals with the interactive visualisation of educational institution databases using Microsoft Power BI Tool with various modules. It focuses on process model, operations of Microsoft Power BI, types of data sources available in Tool, and its various related types of visual insights or context. These days, visualisation is more useful in business intelligence

and analytics in every field. There are different techniques for visualising the datasets, they can be in dynamic or interactive.

S. Widjaja and T. Mauritsius(2019), In this article, we show how the strategic management level can use a cloud-based dashboard with Power BI. The Vercellis framework, which consists of four primary stages—analyzing, designing, planning, implementing, and controlling—is the foundation upon which the dashboard system is being developed. One of the conclusions is that the most crucial step in producing accurate information is the data purification procedure. The user's engagement throughout the entire process, from design and analysis to result confirmation, will significantly enhance the necessary dashboard's quality. Furthermore, the purpose of the article is to investigate how Power BI might assist in decision-making beyond just using the dashboard. It was discovered that by using Azure Machine Learning Studio, Power BI can perform a higher level of business analysis (predictive and prescriptive). Users can create prediction models quickly by dragging and dropping module data and visualising the output of machine learning algorithms.

Prashant Dutta (2019), One of the most often requested databases for Power-BI has been AWS Redshift. In the domains of data warehouse and analytics, Redshift and Power BI are the industry leaders. In order to maximise user benefit, they made an effort to combine the two leaders onto a single platform. In-depth instructions on how to connect and configure Redshift and Power BI was provided in their article. A data warehouse's complex query creation produces reports that are utilised to streamline business operations, reach the best decisions, and even highlight potential benefits. A new idea known as a cloud-based data warehouse is emerging as an internal data warehouse becomes outdated due to the exponential growth of organisational data every day. AWS Redshift is the main participant in this cloud-based data warehouse. The next stage is to extract some analytical data from the Data-Warehouse after the data has been compiled there. This will help to improve business acumen, which will in turn increase revenue and efficiency. Several tools can be used to carry out the business analytics mentioned above. With regard to this, Microsoft Power BI is the industry leader. They attempted to examine how Microsoft Power BI functions in tandem with AWS Redshift in this essay.

Joshi , Ashwini Dubbewar(2021), A data-driven tool called business intelligence (BI) analyses data and gives managers, employees, and executives useful insights to help them make better business decisions. Three main facets of business intelligence are covered in this paper: data warehousing, business intelligence, and data integration. The study also focuses on business intelligence methods and technologies, which are useful for getting detailed information in a much more accessible style. Furthermore, the paper illustrates the two different concepts—big data and business intelligence—that coexist in the same sector and draws comparisons between them. The study also discussed the prospects for business intelligence going forward. Every technological advancement brings with it some benefits as well as drawbacks. Thus, this study has addressed merits and demerits. The future application of business intelligence was also covered in this paper. Therefore, when combined with BI, machine learning and enhanced analytics would yield enormous insights.

Gandhali Joshi, Jyoti Kharade(2020), Microsoft offers a business analytics service called Power BI. In order to comprehend the ETL process in Power BI, a study paper presented the connect, transform, and visualise method.

For the study article, a sales dataset from www.contextures.com was employed. This dataset includes daily statistics on goods, quantity, and price per unit. The dataset must first be loaded into Power BI, where it must then be transformed in accordance with the specifications and modelled to establish relationships between the various tables and enable data access between them. Making reports is the next step after data modelling in order to gain insights from the data. ETL procedure in operation The first step in BI is data extraction from the data source. In summary, ETL transforms unstructured data into structured data that can be utilised for analysis.

Maryam Mohdsaeed Abdulla, Zahra Al-Ansari(2022), This study examined the effects of the COVID-19 pandemic on online buying and e-commerce in three different nations: China, the US, and the UK. In the research, data from 2019—the year before the pandemic—and 2020—the year of COVID-19 peak—will be compared. This is accomplished by gathering information from 28 global databases and internet sources using the Google Scholar website. The two programmes used in the paper for data analytics and visualisation are Microsoft Power BI and Microsoft Excel. Microsoft Power BI was chosen as the data visualisation solution because it facilitates collaboration in an intuitive manner and can generate several sorts of visualisations, including pie charts and bar graphs. The three counties have seen an increase in online sales as a result of COVID-19. From \$1,232.6 to \$1,414.3 billion in China, from \$598.0 to \$791.7 billion in the US, and from \$89.0 to \$130.6 billion in the UK, it climbed. Furthermore, e-commerce has grown. The figures for China, the US, and the UK grew to \$2297.0 billion, \$795.0 billion, and \$180.0 billion respectively.

Palma-Ruiz JM, Torres-Toukoumidis A, Gonz  lez-Moreno SE, Valles-Baca HG(2022), In recent years, the media, sports, and technology sectors have all shown a growing interest in esports, or electronic sports, which have witnessed a tremendous rise in popularity. This study's goal is to offer an overview of the gaming market's recent development in three representative Eastern Asian, Western European, and North American countries from 2017 to 2019 along with growth estimates for the following five years. Descriptive, correlational, and forecasting studies were performed for this purpose in order to evaluate the links between important variables related to the expansion of the gaming business and to illustrate various approaches to data handling through data analytics. In Europe and North America, there is a positive association between GDP per capita and market revenues and players, however in Asia, the opposite is true, according to predictive analytics using MS Power BI. Moreover, a favourable correlation is observed between Google trends related to esports and the gaming industry's earnings.

Ashwaq Khazi , Atharva Bhawe , Shakti Tripathi , R. N. Shriwas (2023), Software created to retrieve, analyse, transform, and report data for business intelligence is known as a business intelligence tool. Without any prior SQL expertise, the user will be able to query the database via the platform's User Interface. This platform is useful for preparing data. The user can carry out tasks like data reduction, data transformation, and cleaning with the platform. Using graphical representations, it will also offer the functionality of exploratory data analysis. To protect privacy, find out if users of the internet are permitted to access digital things. installation of a worldwide system for the evaluation and archiving of access control lists. Based on role permissions, the system will carry out authorization checks and allow access as necessary. Joins between tables will be optimised to improve query performance. With the relationships preserved, the programme may convert CSV files and Excel databases to the appropriate relational databases. Businesses are able to link their databases and generate reports automatically

from them. Micro-services are used to broadcast reports to the appropriate authority. Through the diversification of business intelligence access and support for data-driven decision-making, this project offers enormous possibilities to any organisation or individual. Data can be provided with ease, reports can be prepared manually or automatically, grouped in dashboards, and shared with simplicity. Strong analysis tools are available for business analysts to use, making data exploration, discovery, and report creation simple. Live dashboards and reports enable data to be viewed and analysed in one location.

M. S. Singh and M. L. Jadhav(2022), The domains of analytics, data visualisation, and business intelligence have all seen radical transformation thanks to Power BI. Users may search for data, convert it, visualise it, and share the reports and dashboards they create with other users within the same department or organisation as well as with other users worldwide using Power BI, an online service. As of February 2017, over 200,000 organisations across 205 countries were using Power BI. The cutting-edge Quick Insights feature of Power BI is based on an expanding collection of sophisticated analytical algorithms. After uploading a data set to Power BI, this function may be used with a single click, and it automatically generates a variety of reports based on the analysis of the data without requiring human input. This also helps to minimise human error in statistical computations and methodologies, which might result in non-verifiable research. Excel spreadsheets can be entered into Power BI, making it an easy-to-use platform for research data analysis that is ready for deployment. The adoption of mobile-friendly analytics and business intelligence solutions has accelerated due to the coronavirus epidemic. These days, businesses everywhere want their staff and clients to have access to data and analytics from wherever. By 2024, the mobile business intelligence industry is expected to be valued over \$20 billion, based on Mordor Intelligence. Furthermore, it is anticipated that over 72% of all internet traffic will originate from mobile devices like smartphones and tablets. Therefore, from a commercial standpoint, deploying mobile-friendly BI platforms throughout your company in 2022 makes even more sense. This paper aims to demonstrate how a piece of research data may be swiftly transformed into a collection of shareable analytical reports and dashboards using Power BI.

S. Saabith, T. Vinothraj, and M. Fareez(2022), In this research, business intelligence technologies were examined as an improved option for corporate data analytics. The benefits of BI tools—such as timely solutions, single point access to data, improved relationships, improved performance, and deals with suppliers and customers—and their increased popularity in the modern corporate environment were covered in detail in this article. Also, a specific analysis of the relationships between BI techniques and other systems has been done for this study. In the end, they used a variety of criteria to assess ten well-known BI software products, which will aid present and future researchers in selecting high-quality BI tools for their work. The phrase "business intelligence" (BI) in business management describes the tools and software that are used to collect, make data and information about an organization's activities accessible, and analyse it. Business intelligence is the process of creating a mathematical model to extract, transform, manage, and analyse large amounts of data in order to obtain knowledge and information that will aid in making complex decisions. Decision support systems, data warehouses, and data mining are components of business intelligence. This study's main goal is to thoroughly evaluate business intelligence popularity tools.

Addepalli Lavanya, Sakinam Sindhuja, Lokhande Gaurav, Waqas Ali(2023), Data processing, analysis, and communication have all been transformed by data visualisation tools. The importance of presenting data in a clear, aesthetically pleasing manner has increased with the amount of data that is available. Because of this, data visualisation tools are now necessary for data analysis and decision-making in a variety of domains, such as business, medicine, the social sciences, and engineering. The purpose of their review article is to present an overview of the features, benefits, and drawbacks of the many data visualisation technologies that are currently available. The notion of data visualisation and its significance in the data analysis procedure are first presented. After that, we give a succinct overview of the development of data visualisation throughout history, showing how it went from static charts to dynamic, interactive visualisations. Next, they went over the various data visualisation methods that are available, such as network diagrams, heat maps, bar charts, line graphs, scatter plots, and tree maps. They gave instances of when and how to apply each form of visualisation to effectively show and understand data.

RESEARCH GAP

While many facets of data visualisation technologies, such as Power BI, have been studied in earlier research, some topics have not been covered, which served as the inspiration for this investigation. Notably, prior studies frequently lacked a thorough focus on the particular organisational issues and the overall Power BI performance evaluation. A great deal of prior research has focused on the capabilities and functionalities of data visualisation tools; however, it has not gone far enough in exploring the real-world problems that organisations face when using Power BI for data visualisation. This research attempted to close this gap by analysing not only the technical aspects of Power BI but also the larger organisational context, the user interface, the design of the data visualisation tool, the speed at which the data is visualised, and the efficacy of the data visualisation quality in Power BI. This study attempted to fill the research vacuum by providing a more comprehensive, organization-centric approach to comprehending and maximising Power BI's performance in data visualisation.

RESEARCH METHODS

IDENTIFIED PROBLEM

In today's data-driven business climate, organisations primarily rely on data visualisation technologies, such as Power BI, to transform raw data into meaningful insights. However, there may be significant differences between these tools in terms of effectiveness and efficiency, therefore it's getting increasingly crucial to understand Power BI's capabilities when it comes to data visualisation inside a company. This study aims to tackle this significant issue by looking at the factors that influence Power BI's performance and how they impact an organization's ability to use data for strategic decision-making. The study will especially look into the challenges that businesses have when using Power BI for data visualisation, such as problems with data integration complexity, scalability, and processing speed. It will also search for potential bottlenecks in the visualisation process and assess the effects of these limitations on the tool's overall performance. By gaining a comprehensive understanding of these issues, this research seeks to provide intelligent advice to businesses seeking to optimise their data visualisation capabilities and make informed decisions regarding the use of Power BI or other solutions.

NEED FOR STUDY

Businesses are relying more and more on data visualisation tools like Power BI for decision-making, which makes this study vital. Understanding Power BI's performance in relation to data visualisation is essential for identifying any potential roadblocks or barriers that companies may encounter. By addressing these issues, the study will provide valuable insights that will help organisations improve their ability to extract meaningful insights from data, streamline their data visualisation processes, and ultimately support them in making better strategic decisions—a crucial function in today's data-driven business environment.

OBJECTIVES AND SCOPE

Primary Objectives

- The objective of the Study is to study on performance of power BI in data visualization

Secondary Objectives

- To assess the User Interface Design of the data visualization tool
- To evaluate the Data Integration Capabilities in data visualization tools
- To investigate the Performance Speed of data of visualization tools
- To evaluate the effectiveness of Data visualization quality in Power BI

Assumptions

- The respondents to the survey are Power BI Data Visualization Technique users like data analyst, business analyst, data Scientist and Business users.
- Respondents provided answers to the best of their knowledge.

Constraints

The study's ability to examine particular facets of Power BI's functionality may be restricted due to financial, human, and tool access constraints. Time constraints may limit the scope and depth of data collection, analysis, and the capacity to monitor long-term performance trends for this project.

Limitations

- The study's sample size was set at 160.
- The data were exclusively collected by questionnaire only.

ANALYSIS AND DISCUSSIONS

Table 1: Demographic variables

Gender	Male	29%
	Female	71%
Age	Below 25	29%
	25-30	31%
	31-35	11%
	36-40	19%
	Above 40	10%
Education Qualification	Graduates	20%
	Post graduates	20%
	Diploma	18%
	Professional	24%

	Others	18%
Job title	Data Analyst	25%
	Business Intelligent Analyst	31%
	Data Scientist	21%
	IT Professional	14%
	Others	9%
Experience	Below 1 year	18%
	1-3 years	14%
	4-5 years	46%
	Above 5 years	22%

More number of responses were collected from users with 4 to 5 years of experience, so the generalization of the results can be without much bias. Also the number of respondents in young age is higher, nuances of the software and adaptation is generally more among this age group.

Table 2: User Interface Design

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Intuitive user interface	11%	13%	16%	44%	16%
Ease of navigation	10%	13%	22%	22%	33%
Clear layout	9%	18%	16%	40%	17%
User-friendly experience	15%	13%	13%	18%	41%
Better customization	12%	32%	18%	16%	22%

Of the user interface experiences its observed that people are more satisfied with customization option available in the software followed by the user friendly experience.

Table 3: Data Integration Capabilities

	Excellent	Good	Average	Bad	Poor
Seamlessly integrates	12%	13%	19%	22%	34%
Ease of import and transport	11%	24%	24%	30%	11%
real-time data integration	13%	14%	14%	19%	40%
Connect&blend data with multiple sources	19%	21%	20%	19%	21%
Data integration meets the data preparation requirements.	11%	12%	22%	26%	29%

When it comes to the data integration capabilities the ability to connect and blend the data with multiple sources is considered to be the best capability.

Table 4: Performance Speed

	Highly satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Highly dissatisfied
The data visualization tool generates reports and dashboards quickly.	9%	12%	23%	40%	16%
Efficient Loading and refreshing data	17%	14%	21%	20%	28%
No slowdown with large set data	9%	26%	31%	23%	11%
Minimal lag when interacting with visualizations	19%	16%	21%	26%	18%
(Speed and responsiveness) of the tool is satisfactory.	21%	20%	23%	14%	22%

More number of users are satisfied with the speed and responsiveness of the tool, also satisfied with the minimal lag while interacting.

Table 5: Data Visualization Quality

	Excellent	Good	Average	Bad	Poor
Presents data in a visually appealing manner.	17%	19%	21%	20%	23%
The charts and graphs in Power BI are easy to interpret and understand.	19%	17%	23%	20%	21%
Informative and insightful visualizations.	13%	24%	21%	19%	23%
Enhanced clarity of the data through its visualization features.	13%	13%	22%	25%	29%
Meets my data presentation needs.	19%	23%	19%	22%	17%

On the data visualization capability more users feel its meeting their presentation needs and also provides insightful visualizations.

Neural network to know the hidden layer connectivity for two demographic factors say Experience and job title with the factors User Interface Design, Data Integration Capabilities, Performance Speed, Data Visualization.

Neural network for User Interface Design:

Data analyst and more than 5 years of experienced users seem to have better influence to the hidden layer of neural network and in turn major influencers in turn on the expectations related to user interface design. The network proves more users agree towards the features utility with the user interface design.

Model seems to be considerable since the percentage incorrect predictions in training (21%) and testing (16%) doesnot have big variation.

Table 6: Model Summary: User Interface Design

Table 6: Model Summary: User Interface Design		
Training	Cross Entropy Error	55.656
	Percent Incorrect Predictions	21.1%
	Stopping Rule Used	1 consecutive step(s) with no decrease in error ^a
	Training Time	0:00:00.25
Testing	Cross Entropy Error	21.726
	Percent Incorrect Predictions	15.7%
Dependent Variable: UIDs		
a. Error computations are based on the testing sample.		

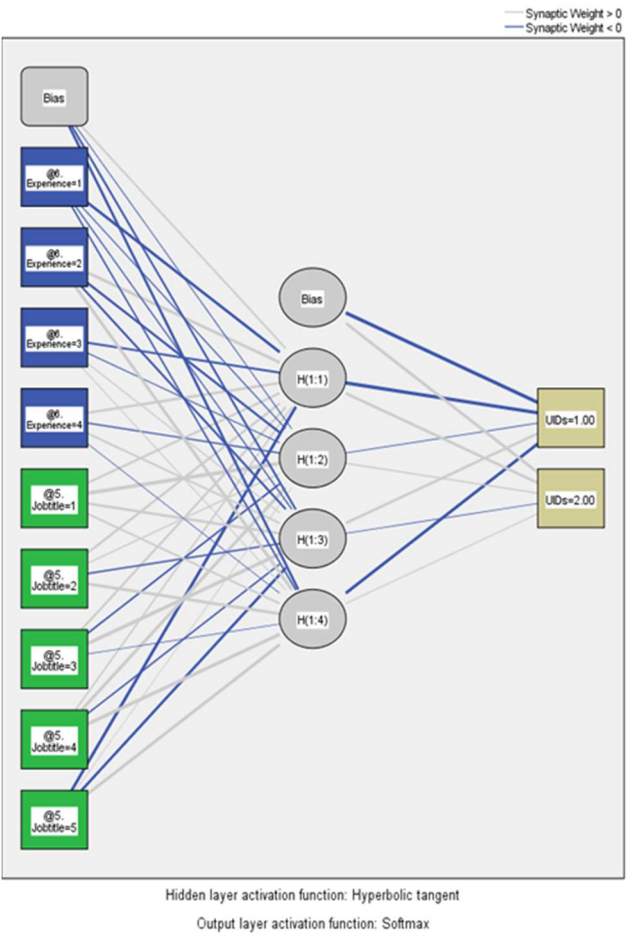


Figure 1: User Interface Design

Neural network for Data integration capabilities:

Table 7: Model Summary: Data Integration Capabilities		
Training	Cross Entropy Error	35.439
	Percent Incorrect Predictions	7.8%
	Stopping Rule Used	1 consecutive step(s) with no decrease in error ^a
	Training Time	0:00:00.31
Testing	Cross Entropy Error	16.427
	Percent Incorrect Predictions	13.6%
Dependent Variable: DICs		
a. Error computations are based on the testing sample.		

Model seems to be considerable since the percentage incorrect predictions in training (8%) and testing (14%) doesnot have big variation.

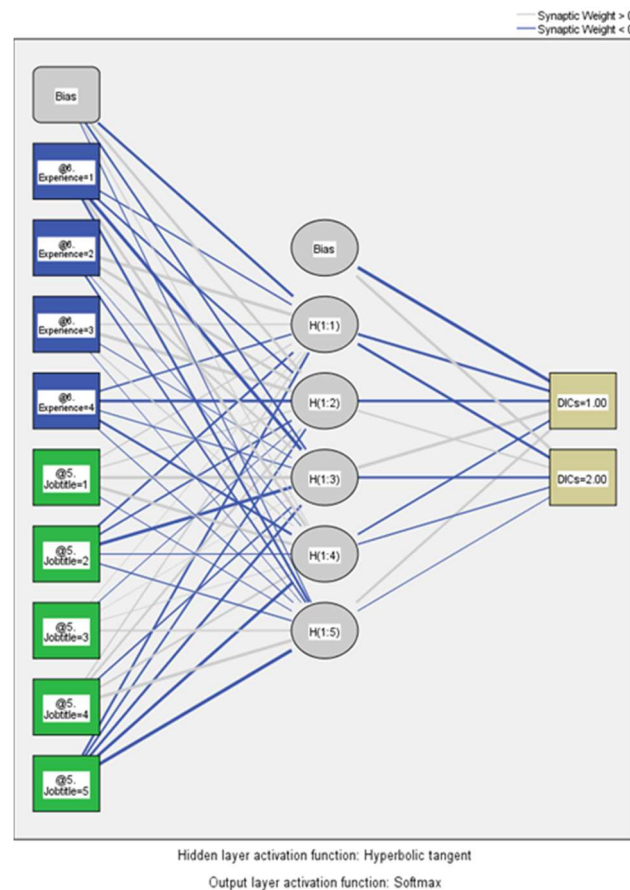


Figure 2: Data Integration Capabilities

Data analyst and Data scientists, 4-5 years of experienced users seem to have better influence to the hidden layer of neural network and in turn major influencers in turn on the data integration capabilities.

Neural network for Performance speed:

Business intelligent analyst, 1-3 years of experienced users seem to have better influence to the hidden layer of neural network and in turn major influencers in turn on the expectations of performance speed. More hidden layers are observed here.

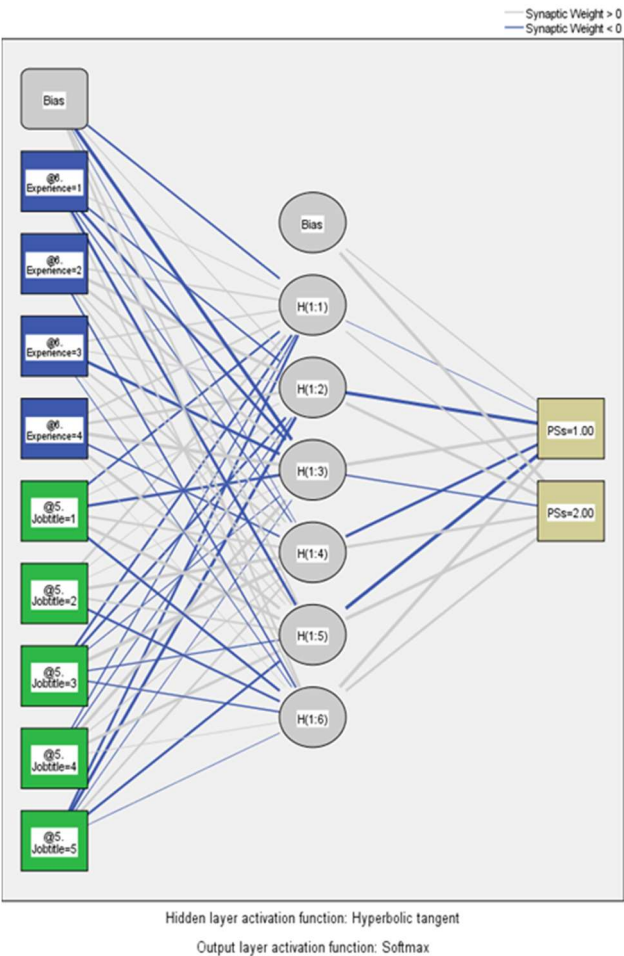


Figure 3: Performance & Speed

Table 8: Model Summary: Performance and speed			
Training	Cross Error	Entropy	37.715
	Percent Predictions	Incorrect	12.8%
	Stopping Rule Used	1 consecutive step(s) with no decrease in error ^a	
	Training Time		0:00:00.27
Testing	Cross Error	Entropy	18.009
	Percent Predictions	Incorrect	11.8%
Dependent Variable: PSs			
a. Error computations are based on the testing sample.			

Model seems to be considerable since the percentage incorrect predictions in training (13%) and testing (12%) doesnot have big variation.

Neural network for Data visualization:

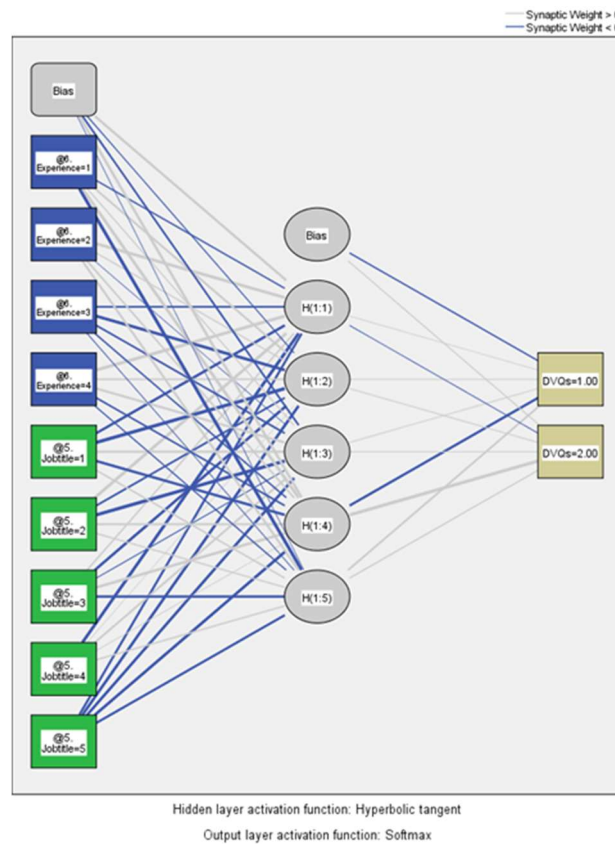


Figure 4: Data Visualization

1-3 years of experienced users seem to have better influence to the hidden layer of neural network and in turn major influencers in turn on the data visualization expectation.

Model seems to be not a perfect fit since the percentage incorrect predictions in training (35%) and testing (23%) have big variation.

Table 9: Model Summary: Data Visualization		
Training	Cross Entropy Error	68.914
	Percent Incorrect Predictions	35.2%
	Stopping Rule Used	1 consecutive step(s) with no decrease in error ^a
	Training Time	0:00:00.28
Testing	Cross Entropy Error	29.248
	Percent Incorrect Predictions	23.1%

Dependent Variable: DVQs
a. Error computations are based on the testing sample.

CONCLUSION

A comprehensive examination of Power BI's data visualisation capabilities has produced significant new insights into critical elements impacting user experiences. The aspects of User Interface Design, Data Integration Capabilities, Performance Speed, and Data Visualisation Quality combined together are proven to have a substantial impact on the overall effectiveness and user satisfaction of data visualisation tools. According to the poll, performance speed—which includes efficient data loading, rapid report generation, and minimal lag—also plays a big role in determining user satisfaction. It is quite well established that the success of data visualisation tools, such as Power BI, stems from both their technical prowess and user-centric design, performance efficiency, customisation flexibility, and collaboration features. These insights provide a foundation for businesses to prioritise and enhance their data visualisation tools to meet evolving user wants and expectations in the dynamic domain of data-driven decision-making.

FURTHER RESEARCH

When it comes to data visualisation tools, it is advisable to take a closer look at how cutting-edge technologies like artificial intelligence and machine learning can enhance user interface design and the user experience overall. In order to meet the increasing demand for varied and real-time data integration, future research should examine how data sources are evolving and how data integration capabilities might develop. Subsequent research endeavours may explore the analysis of industry standards and evolving client demands to propose novel ideas and improvements for customisation choices.

It is advisable to look into potential collaborative tool integrations for data visualisation systems when it comes to collaboration features. Future researchers may look into the value of features like interactive commenting, real-time collaboration, and shared workspaces in fostering productive and cooperative environments for data-driven decision-making.

REFERENCES

- Vijay Krishnan, S Bharanidharan, G Krishnamoorthy, Research Data Analysis with Power BI. 2017, 11th International CALIBER-2017. Anna University, Chennai
- Amrapali Bansal, A. K. Upadhyay, Microsoft Power BI. International Journal of Soft Computing and Engineering (IJSCE) ISSN: 2231-2307, Volume-7 Issue-3.
- Geetha Bhargava Mandava(2018) , Analysis and Design of Visualization of Educational Institution Database using Power BI Tool. Global Journal of Computer Science and Technology: Software & Data Engineering. Volume 1 Issue.
- S. Widjaja and T. Mauritsius(2019) , “The Development of Performance Dashboard Visualization with Power BI as Platform,” International Journal of Mechanical Engineering and Technology (IJMET). vol. 10, no. 5, pp. 235–249.
- Prashant Dutta (2019), Business Analytics using Microsoft Power BI and AWS Redshift. Int. J. Trend Sci. Res. Dev., vol. Volume-3, no. Issue-2, pp. 984–986

- Meet Joshi , Ashwini Dubbewar(2021), Review on Business Intelligence, Its Tools and Techniques, and Advantages and Disadvantages, International Journal Of Engineering Research Technology (IJERT). Volume 10, Issue 12 (December 2021)
- Gandhali Joshi, Jyoti Kharade(2020), Analyzing and Visualizing In Power BI. IJCSE. Vol. 6, Issue 26.
- Maryam Mohdsaeed Abdulla, Zahra Al-Ansari(2022), Using Microsoft Power BI and Data Visualization Tools to Study How Online Shopping was Affected During COVID19 Period: A Comparison in Three Countries Between 2019 and 2020. Proceedings of the International Conference on Industrial Engineering and Operations Management Istanbul, Turkey, March 7-10, 2022
- Palma-Ruiz JM, Torres-Toukoumidis A, González-Moreno SE, Valles-Baca HG(2022), An overview of the gaming industry across nations: using analytics with power BI to forecast and identify key influencers. Heliyon. Feb 15;8(2) :e08959.
- Ashwaq Khazi , Atharva Bhave , Shakti Tripathi , R. N. Shriwas(2023) , Data Visualization and Report Generation Tool: A Survey. IJERT. Volume 12, Issue 03.
- M. S. Singh and M. L. Jadhav(2022), Data Analysis and Visualization of Sales Dataset using Power BI,” International Journal for Research in Applied Science & Engineering Technology (IJRASET). vol. 10, no. 6, pp. 1749–1759,doi: 10.22214/ijraset.2022.44132.
- S. Saabith, T. Vinothraj, and M. Fareez(2022), Business Intelligence Tools-Systematic Review. International Journal of Research in Engineering and Science (IJRES), vol. 10, no. 10, pp. 394–408.
- Addepalli Lavanya, Sakinam Sindhuja, Lokhande Gaurav, Waqas Ali(2023), "A Comprehensive Review of Data Visualization Tools: Features, Strengths, and Weaknesses". International Journal of Computer Engineering In Research Trends (IJCERT),I,Vol.10, Issue 01,pp.10-20.