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**CHAPTER ONE**

**1.1 Introduction**

**1.2 Background**

Data visualisation is an important aspect of business intelligence that involves presenting data in a visual manner using charts, graphs, and other visuals that allow for clear understanding and interpretation of the data. The process includes using graphs, charts and other visuals to present information in an informative manner (Piin and Nagalingham, 2023,p858). Data visualisation or dashboard will allow stakeholders to identify trends and patterns in the organisation data, therefore using the dashboard to make informed decisions (Hamad *et al*., 2020,p38). Data Visualization provides an opportunity to present results from data analysis and allow users to interact with data and derive insights that can be used to improve business processes and performance (Jena, 2019,p20). Data visualisation software is often used to effectively manage and process business data.

Data Visualization is an important component of Business Intelligence. Business Intelligence involves various activities, technology stacks and softwares which focus on helping organisations gather, store, analyse and visualise their business data to support continuous operational and strategic decision (Mariani *et al*., 2018,p3517). According to Mehanović and Durmic (2022,p2), Business intelligence processes involve the following steps; data collection, data storage, data preparation, data analysis, data visualisation and insight generation. Business Intelligence (BI) system combines database management, data analysis and data visualisation to provide an intricate framework to process, analyse and visualise organisation data (Chongwatpol, 2016,p1781). By combining data mining, data storage and data visualisations, Organisations are able to improve their processes and performance and also leverage the information derived from data as a competitive advantage in the industry they operate (Fernandez *et al.*, 2014,p385). Incorporating data visualisation in an organization's business intelligence system allows the organisation to transform its raw data into valuable insights, leading to enhanced decision-making and increased success. Businesses can improve their efficiency and profitability by employing various data visualisation approaches and technologies to uncover hidden patterns, trends, and relationships in their data (Borkin *et al.*, 2013).

Marketing is an important aspect of any business and it involves creating and communicating brand offerings to potential customers in order to sell product or services for customers or clients (Gronroos, 2006). It plays an important role in increasing the relationship between business and their customers, understanding what they need and providing solutions or offering that will satisfy their customer needs and increase their loyalty. Marketing is important for businesses to promote their products or service, increase revenue and profitability for the business and also provide a unique selling proposition for business. Meanwhile, the act of marketing is encompassing and is not only focused on selling a product or service, instead, it involves creating value for customers by providing meaningful engagement and unique experiences with the brand (Sheth and Uslay, 2007).

The role of marketing in driving business success, generating awareness and demand for products and services cannot be overemphasised. Effective marketing strategies help businesses to reach their target audience, engage with customers, provide competitive edge over other players and establish a strong brand identity (Miles and Darroch, 2006). Marketing plays an important role in driving innovation, as it involves researching the latest trends in industry, understanding customer behaviour through interaction/engagement and also understanding competitive landscapes to identify opportunities for growth and also developing products or services that meet customer current or future needs (Tambunan *et al.*, 2022). Additionally, marketing contributes to growth and profitability of business enabling them to stay competitive, improve customer retention rate/loyalty and also maintain relevance in the face of their consumers (Nemkova, 2017).

Marketing Analytics involves the process of analysing marketing data and evaluating marketing activities to assess trends, opportunities and their impact on business growth and profitability. The process uses analytical softwares to store, analyse, visualise and monitor marketing key performance metrics (Branda *et al*. 2018). By tracking the marketing metrics and performance, businesses can optimise their spends, ad costs on marketing campaigns. Marketing analytics plays an important role in enhancing business performance (Lin, 2024).

With the advancement in technology, AI and the dynamic and competitive business environment, marketing is more important than ever. With the advent of digital technologies and social media, businesses have access to vast amounts of data that can be leveraged for targeted marketing campaigns, hyper-personalization of customer experiences, and real-time marketing performance tracking. The volume of data generated from online marketing activities is significant, driven by the increasing use of digital platforms and the increasing reliance on online channels for marketing purposes. Big data is the new oil, online social networks, sensor networks, mobile devices, and enterprise systems constantly generate large amounts of data related to consumer behaviour, market trends, ads and campaign performance Cheng and Lau (2015). This goes without saying that, there is a higher opportunity of improving marketing performance now than ever leveraging the large amount of data being generated every second.

Data has been leveraged in different ways to improve marketing performance, In the research of Luca *et al.* (2020), business and investing significantly in Data and BI technologies with the aim of improving the marketing performance allowing them to transform their business. With the help of data, companies hope to dive deep into understanding the complex nature of their customers' behaviour by leveraging automated monitoring systems of social media data allowing for a more informed decision like personalised campaigns, targeted ads and streamlines marketing strategies.

Additionally. Studies have shown the rising importance and application of big data in the marketing industry. Choi *et al*. (2018) in his research explained that big data analytics is applied in operations management to enhance sales forecast, improve marketing performance using analytical models. Similarly, Ngai *et al*. (2017) emphasised how big data analytics allow businesses to gather market insights to understand customer buying behaviour and streamline marketing strategies to meet the dynamic and evolving customer demands. The application of data analytics in marketing continues to drive innovation within the industry improving customer engagement, customer loyalty, and overall marketing performance for businesses. Data plays an important role in driving marketing performance and improving chances of business to succeed and stay ahead of their competitors. Often, businesses struggle to choose the right data analytics/visualisation software that would meet their needs and improve their decision making. Companies invest significantly in these software, hoping to better return on their investment. However, the wide range of available softwares in the market can be challenging and misleading. This research focuses on comparing data visualisation software and their effectiveness in driving marketing performance. The outcome of this research will assist marketing firms and businesses in making better choices of data visualisation tools that will be best suited for their use cases. By evaluating the strengths and drawbacks of two major data visualisation softwares, this study aims to provide insights to stakeholders, marketing managers and businesses.

**1.2 Problem Statement**

In this digital era where companies are leveraging data to make informed marketing decisions, data visualisation remains the most effective way to drive business process and performance. Companies spend a significant amount of money in setting their business intelligence system and a considerable amount is invested in data visualisation software as part of the integral component needed for any BI system. Due to the dynamic nature of businesses, a data visualisation software that works for one company might not necessarily fit the use case for the other company, hence, the challenges for companies lies in selecting the right software that suits their business needs. There are a number of data visualisation software in the market, among those, Tableau and PowerBI remains the two most popular choices often compared and used by companies, Although, Looker Studio (previously known as Google Data Studio) is now being widely adopted in Industry.

Despite the popularity of these two software, there is still a knowledge gap and no detailed comparison that shows their effectiveness and use particularly for driving marketing performance. Companies often rely on blog posts and other resources to make this decision and oftentimes do not make better judgement in determining which software is best for them. This gap makes it difficult for businesses to transform their data and generate valuable insights for their businesses. In addition, these software are used on a wide range of tasks and little to no research has focused on their specific use for analysing marketing data. This limited research means that companies may have been under-utilising each tool for marketing analytics and hence not getting a good return on their investment.

This research aims to fill this gap by focusing on comparative analysis of Tableau and Power BI and their impact on marketing performance. By analysing the key strengths, weaknesses, uniqueness of each feature and functionality and their effectiveness for marketing analytics, the study hopes to provide valuable insights that will help the companies in making better judgement and choice when it comes down to choosing data visualisation software for their marketing needs.

**1.3 Objective of the Study**

The goal of this research is to evaluate and compare the features and functionality of PowerBI and Tableau as Data visualisation software and assess its impact on marketing performance . This will be achieved through the following objectives:

1. To evaluate the features and functionalities of PowerBI and Tableau for marketing analytics.

2. To identify the key strengths and weaknesses of PowerBI and Tableau

3. To determine the impact of PowerBI and Tableau on marketing performance

**1.4 Research Questions**

The following research questions in line with the objectives will be answered:

1. What are the features and functionalities of PowerBI and Tableau for marketing analytics?

2. What are the key strengths and weaknesses of PowerBI and Tableau?

3. What is the impact of PowerBI and Tableau on marketing analytics?

**1.6 Significance of the Study**

This research contributes significantly to both academia and industry. In academia, the research will contribute to the existing body of knowledge by adding to the existing literature on business intelligence, Data Visualization and Marketing Analytics. It will also provide insights on how companies use data visualization tools to drive marketing performance. In Industry, the findings from this research will help organizations in making better decisions where there is a need for them to select data visualization software that aligns with their marketing needs.

**Chapter 2**

**Literature Review**

2.1 Definition of Business Intelligence

2.2 Introduction to Data Visualization

2.3 Principles and Practice of Data Visualization

2.4 Definition of Marketing

2.5 Impact of Data Visualization on Marketing Performance

2.6 Challenges of using Data Visualization Tools

**Chapter 3**

**Methodology**

**3.1 Introduction**

This section will explain the methodology of the research that has been adopted for this investigation which is going to make a comparative analysis of Tableau and PowerBI in terms of what impact these two can have on the marketing performance. This section will explain the step by step process for the comparative analysis.

**3.2 Research Design**

To conduct a comparative analysis, a mixed-method research design has to be employed conducting both quantitative (observation) and qualitative(survey) research methodologies. Employing a mixed-method approach is important for gathering both the measurable performance metrics (quantitative) and the user experiences and perceptions (qualitative). This dual approach ensures a thorough evaluation, addressing both the technical and practical aspects of each software.

This research will involve the use of marketing data extracted from Kaggle to simulate a real-world project. This data will then be visualized using both Tableau and PowerBI. Kaggle is the world's largest data science community with powerful tools and resources such as datasets and code and it is publicly accessible to everyone. Using Kaggle dataset will ensure that the research is based on realistic datasets, reflecting the metrics and insights marketers need in the real world.

The research design will encompass the development of dashboards in both software platforms. Post-development, users will evaluate the dashboards for usability, interactivity, and insights on marketing performance. Data will be collected through user surveys and direct observation. The findings will offer valuable insights into the functionalities and benefits of each software, aiding organizations in selecting the most suitable data visualization tool for enhancing marketing performance.

### **3.3 Software Architecture Model**

In this section, the system architecture model will be designed using UML (Unified Modeling Language) class diagrams to illustrate the components of the data visualization software (Tableau and PowerBI) and their interactions. This includes the User Interface (UI) layer, Application layer, Database layer, Integration layer, etc. The UML class diagram will serve as a blueprint for understanding the platform's functionality and the interactions between its components. The model aims to detail how each software operates, providing insights into the key components and their performance. The ultimate goal is to compare and understand the efficiency of each software, identifying which performs better.

**3.4 Dashboard Design**

In order to facilitate the comparative analysis between Tableau and PowerBI, specifically assessing their impact on marketing performance, there is a need to test each software and to do that a Dashboard will be designed. The design phase will involve developing dashboards on both platforms to visualize marketing data. Each dashboard will be designed to display key performance indicators (KPIs such as acquisition cost, adspend, cost per clicks etc and other customer insights important for marketing decision-making. Also, emphasis will be given to leveraging the unique features of Tableau and PowerBI to enhance data visualization and interactivity, aiming to provide actionable insights for optimizing marketing strategies.

Testing these dashboards is important as it enables thorough evaluation of their usability and effectiveness in real-world marketing scenarios. Usability testing will gauge user experience, interaction fluidity, and overall satisfaction through structured surveys and qualitative feedback. Additionally, observational data during testing will capture user behaviors and preferences, providing more understanding of how each platform supports marketing performance objectives. This approach ensures comprehensive insights into the strengths and limitations of Tableau and PowerBI in enhancing marketing operations, guiding organizations in selecting the most suitable tool for their specific needs.

**3.5 Data Collection**

Data collection process is important for a robust comparative analysis of data visualisation software. The data collection will involve two primary methods which are the use of surveys and also observations data. The usability, responsiveness, interactivity and performance data will be collected through detailed activity and survey forms. A random sample of 30 users will be selected to interact with the dashboard created and observation and data will be collected post-testing. In addition, A testing guide along with a survey will be administered to the respondents to allow them to interact with the dashboard and record their feedback. The combination of both the survey data with the observational data will be sufficient for understanding how the softwares performs in a real-world project management scenario.

**3.6 Feature Evaluation and Comparative Analysis**

In this section, the strengths and weaknesses of Tableau and PowerBI in relation to marketing performance will be analyzed and evaluated. The analysis will involve evaluating each software responsiveness, loading speed, interactivity and usability where one platform may outperform the other. The analysis will focus on the features and function of both softwares and how it is used for marketing analytics. The data gathered post-development and testing will be stored in a google drive. To analyze the data, Microsoft Excel will be used. Descriptive statistics methods will be used to analyze the data. The results of this analysis will be presented in tables and visualized with the aid of Bar and Pie charts ensuring that the findings are displayed in a structured and clear manner. This detailed evaluation will provide insights into which data visualization software best generates insight on the marketing data.

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