

Mapping Fiscal Landscapes: Understanding of Public Sector Finances through Data Visualisation

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Abstract. In an era of data-driven decision-making, transforming complex financial datasets into clear, actionable insights is essential for effective public-sector financial management. This paper explores the use of advanced data visualisation techniques to enhance transparency, accountability, and decision-making in public finance. Following a review of big data and visualisation literature, the study identifies limitations of traditional approaches for representing complex public-sector financial data. Using the Design Science Research framework, Tableau's advanced features, including Viz Extensions and Story Points, are applied to develop interactive financial dashboards through a systematic and iterative process. UK public-sector finance datasets from authoritative government sources are processed through an ETL pipeline to visualise key indicators, including revenue, expenditure, and fiscal balance. The dashboards incorporate WCAG guidelines and user-centred design principles to support diverse users. The resulting multi-page Tableau solution combines interactive visualisations with Story Points to communicate complex financial narratives effectively. Its effectiveness is evaluated in terms of decision-making support and its potential to improve transparency and accountability in public financial management. By integrating advanced visualisation techniques with accessible, user-centred design, the study provides a practical framework for evidence-based financial analysis and governance.

Keywords: Big Data · Data Visualisation · ETL Process · Public Sector Finance · Tableau Viz Extensions · Interactive Dashboards

1 Introduction

Big data has evolved since the 1970s from structured data management in relational databases to encompass the challenges of unstructured and semi-structured data. Defined by the "three V's" - volume, velocity, and variety - big data now involves managing massive, rapidly generated, and diverse datasets. At present, advancements in tools and methods are essential to deriving insights

from such data, thereby enhancing decision-making across sectors such as health-care, finance, and public governance [32,31,18,2,3]. The rise of internet connected devices and technologies like IoT, cloud computing, and distributed frameworks (e.g., Hadoop, Spark) has enabled large-scale data processing [15], [4,38,33]. Big data analytics has become pivotal to innovation and competitive advantage, with platforms such as NoSQL databases and data lakes addressing unstructured data. Technologies like natural language processing (NLP) and computer vision further enhance the extraction of insights from varied data sources. Data visualisation plays a critical role in making big data comprehensible. Visual tools such as scatter plots, bar charts, heatmaps, and interactive dashboards allow users to explore data dynamically, uncover insights, and engage more effectively. Platforms like Tableau, Python (with Matplotlib and Seaborn), and R (with ggplot2) have been integral to this evolution, with machine learning and AI increasingly automating insight generation and visualisation [35,39]. Dashboards consolidate data analysis and visualisation into user-friendly interfaces that support real-time exploration and informed decision-making. These tools are used across industries to monitor trends, analyse performance, and inform strategy. In the financial sector, visualisations like heat maps, correlation matrices, and network graphs aid in risk management and regulatory oversight [6]. This paper addresses public finance management by creating an interactive dashboard to visualise key indicators, including Public Sector Net Fiscal Balance, Revenue, and Expenditure. Using advanced visualisation techniques, including choropleth maps and waterfall charts, it aims to enhance transparency, accountability, and evidence-based decision-making, reshaping approaches to public sector financial governance [11].

2 Literature Review

The paper aims to create an interactive dashboard that visualises public sector revenue, expenditure, and net fiscal balance across the UK. This dashboard will enable stakeholders to identify regions of interest, highlight trends, and improve decision-making in public finance management. A systematic literature review underpins the theoretical foundation for this paper, focusing on the application of big data visualisation techniques to public finance analysis. Prior studies, such as [13], underscore the significance of data-driven insights and advanced visualisation tools like Tableau, R, and Python for handling complex financial datasets. This review identifies best practices and innovative approaches for dashboard design, emphasising usability, stakeholder engagement, and transparency in public finance.

A systematic approach, following PRISMA guidelines, aimed to identify high-quality scholarly works that inform the effective application of data visualisation techniques to public finance management. The research questions were designed to explore the role of big data and visualisation techniques in public finance management and decision-making. Here, we focused on how visualisation techniques transform complex datasets into actionable insights and on the best practices

for implementation. To explore the power of visualisation in facilitating understanding and decision-making.

After amalgamating the records and removing duplicates and those published before 2014, we were left with 62 unique records. We then scrutinised the titles and abstracts, filtering out pilot studies, editorials, non-journal articles, conference proceedings, books, posters, and studies published before 2014. Further refinement led to the exclusion of inaccessible records, studies lacking model performances and results, and those unrelated to our research questions. This iterative process culminated in the identification of 29 eligible records that met our inclusion criteria. Our report incorporates visual representations to enhance the understanding of our research process. Figure 1 provides a clear overview of the steps taken.

Figure 2 presents the source statistics, offering a comprehensive view of our research sources and the distribution of selected articles across different years,

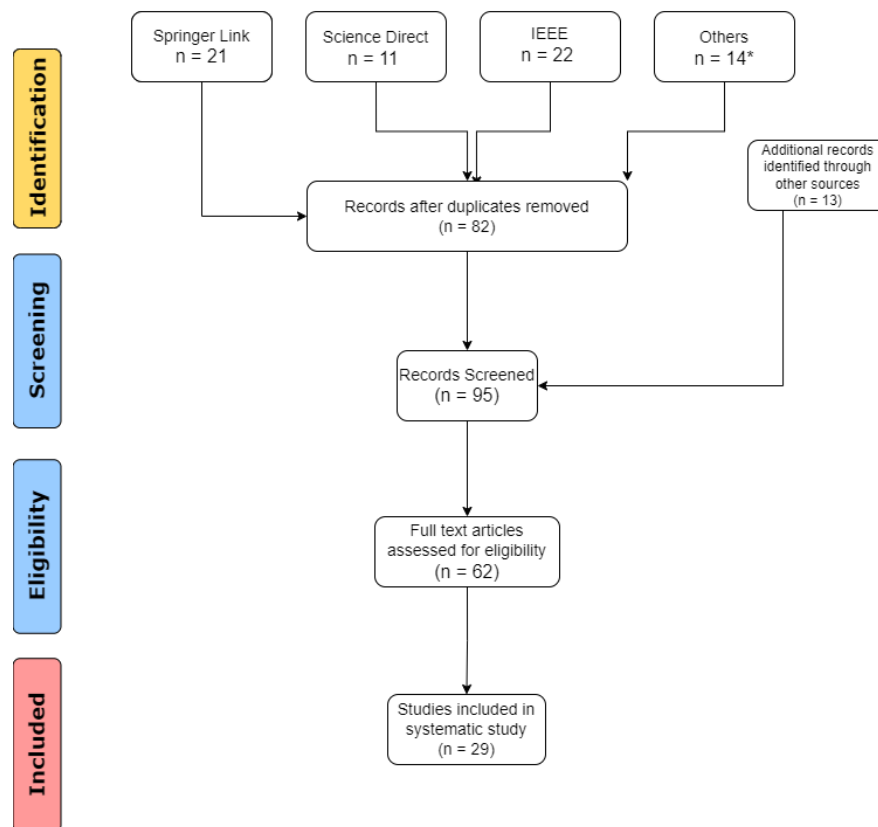


Fig. 1: PRISMA Chart detailing Literature Review Process

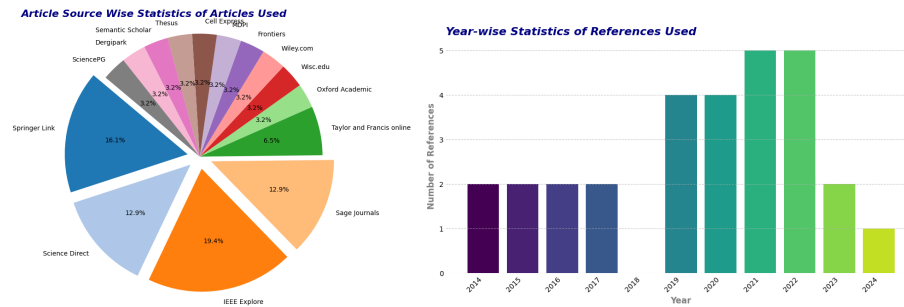


Fig. 2: Sources Of Articles Considered in Review Process

shedding light on the evolving landscape of research in data visualisation for public finance.

Big Data: Characteristics, Challenges, and Opportunities: Big data, characterised by its volume, velocity, variety, veracity, and value, represents datasets exceeding the processing capacity of traditional IT tools. Foundational work by [9] defines big data and highlights its challenges in domains like data representation, redundancy reduction, lifecycle management, confidentiality, energy management, and scalability. The study emphasises the importance of technologies like cloud computing, IoT, data centres, and frameworks such as Hadoop in the big data value chain, which spans data generation, acquisition, storage, and analysis. Challenges such as noise accumulation, spurious correlations, and computational costs require innovative solutions, including scalable algorithms and dimensionality reduction techniques [12]. The research of [16] and [17] explore the socio-technical potential of big data, addressing uncertainties in analytics, including biased training data and language ambiguities. They advocate for active learning, deep learning, and fuzzy logic to mitigate these issues. [27] identifies challenges in managing diverse and complex data types, emphasising the need for robust architectures and techniques like optimisation methods, machine learning, and social network analysis. Big data's dynamic nature presents opportunities for innovation across industries, including business, healthcare, and engineering [37]. However, persistent challenges, particularly data diversity and accuracy, demand resilient infrastructures and methodologies to unlock its full potential.

Data Visualisation: Transforming Insights into Action: Data visualisation bridges the complexity of big data by translating it into actionable insights. Research highlights its critical role in improving data comprehension, decision-making, and communication. [24] provides a comprehensive framework for visualising high-dimensional data, emphasising a visualisation pipeline involving data transformation, visual mapping, and view transformation. They highlight emerging areas such as uncertainty visualisation and call for research into real-time analytics. In the research [34] categorise visualisation techniques, identifying methods

like approximate and progressive visualisation, and challenges such as scalability and spatiotemporal analysis. Best practices include user-centric mapping, efficient integration, and appropriate technique selection.

Popular tools like Tableau, Python, and R offer unique strengths. Tableau is user-friendly, excelling in interactive dashboards with drag-and-drop functionality. Python provides extensive customisation through libraries like Matplotlib and Seaborn, while R, with ggplot2, excels in publication-quality graphics [26], [19]. Tableau's extensions offer non-standard visualisations to overcome limitations in public sector financial dashboards, addressing the need for tailored solutions.

Accessibility and Inclusivity in Visualisation : Dashboards must adhere to accessibility standards like WCAG 2.1, which addresses colour contrast, keyboard navigation, and non-text content [1]. Inclusive design principles guided by ISO 9241-210 ensure usability for diverse audiences, including individuals with disabilities [29]. Incorporating alternative text, ARIA attributes, and customizable options like adjustable fonts enhances accessibility. [22] proposes a model for accessible visualisation, emphasising inclusive user characterisation and rigorous testing with disability communities. Such approaches ensure dashboards are inherently inclusive rather than retrofitted for accessibility.

Interactive Dashboards: Cross-Sector Applications: Dashboards enable real-time decision-making and operational efficiency across healthcare, education, business, and the public sector. In healthcare, dashboards monitor patient metrics and medication adherence [10,46]. In education, they track performance and facilitate personalised learning [41]. In business, dashboards analyse KPIs and market trends, supporting nuanced decision-making. In the public sector, dashboards promote transparency and accountability, as seen in deficit reduction initiatives in the UK [14]. Their design must align with political theory and budgeting practices to support governance effectively.

Addressing Gaps and Advancing Visualisation in Public Finance: Current visualisation tools often fall short of representing complex public sector financial data. Tableau's visualisation extensions allow for advanced, dynamic dashboards tailored to specific analytical needs, bridging these gaps. This approach aims to enhance transparency, accountability, and governance in public finance through innovative data visualisation. By integrating advanced methodologies and inclusive practices, this paper enhanced understanding and management of public-sector financial data, fostering evidence-based decision-making and stakeholder confidence.

3 Methodology

This research outlines a systematic strategy for developing a dynamic dashboard tailored to the finance sector, leveraging data visualisation, analytics, and data warehousing. A user-centred design approach, grounded in agile principles and iterative development, was adopted. The process began with a comprehensive

review of existing literature and user needs, shaping the initial design requirements. Iterative testing and user feedback ensured the final dashboard met usability and analytical expectations. Reflective practice was employed throughout the development process to critically evaluate design decisions, focusing on their impact on usability and effectiveness.

The research employs the *Design Science Research (DSR)* methodology to develop and evaluate the interactive dashboard. DSR emphasises rigour and relevance, enabling the creation of practical, theoretically grounded artefacts. The methodology follows an iterative cycle of problem identification, objective setting, artefact design, and assessment. The DSR approach, rooted in the works of [30] and [25], facilitates a balance between theory and practice. It underscores the dashboard's functionality and usability, ensuring alignment with end-user needs. This research contributes to the information systems discourse by creating a practical artefact that bridges theoretical insights and real-world applications, demonstrating the suitability of DSR as the methodological foundation for this study [40].

Data Source and ETL Pipeline Design: The development of the dashboard is guided by a comprehensive set of functional and non-functional requirements that address both technical specifications and user expectations. Public-sector financial datasets, sourced from the Office for National Statistics (ONS), form the foundation of the analysis [28]. These datasets include Public Sector Net Fiscal Balance (PSNFB), Revenue (PSR), Expenditure (PSE), PSNFB Revision Dataset, Supplementary Datasets, and ITL1 Revenue Proportions. These datasets will undergo rigorous evaluation and processing to produce dashboards and interactive visualisations enabling in-depth exploration of UK financial trends.

A tailored ETL (Extract, Transform, Load) process, leveraging Python and Tableau Public, as shown in Figure 3 was designed to ensure efficient data integration and visualization. During the Extract Phase, data is collected from

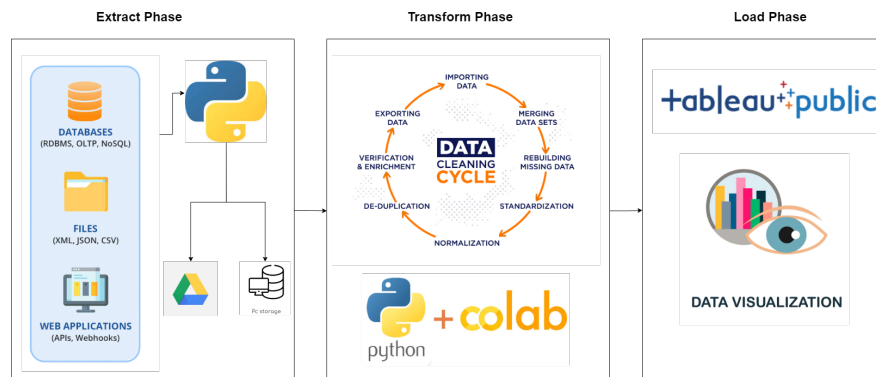


Fig. 3: Detailed Model of ETL Process

diverse sources, including databases, spreadsheets, APIs, and external feeds, using Python libraries like Pandas, requests, and pyodbc [36]. Temporary data storage is facilitated through Google Drive for collaboration and local PC storage for large datasets. In the Transform Phase, data cleansing, normalisation, and structuring are performed to ensure consistency and quality using Python's Pandas library and Google Colab for scalable processing and team collaboration. Finally, the Load Phase integrates cleaned data into Tableau Public, whose robust connectors and visualisation capabilities allow seamless data exploration and insight generation. This process demonstrates the evolution of ETL from traditional batch processing to a modern, real-time data integration system, critical for timely and accurate financial decision-making.

Standard Visualisation Techniques: Selecting visualisation methods is crucial in financial analysis, where precise and clear communication of insights is paramount. Common techniques such as time series plots, bar charts, heat maps, scatter plots, and line graphs are essential tools that allow financial analysts to depict trends, compare categories, visualise distributions, and explore relationships effectively. These widely used visualisations are indispensable for presenting complex data in an accessible manner. These foundational techniques establish the baseline for financial data analysis and communication, setting the stage for more advanced approaches.

Advanced and Novel Visualisation Techniques - Tableau and Viz Extensions: Tableau, a leading visualisation platform, extends beyond traditional charts with its advanced visualisation capabilities, including Viz Extensions. These innovations enable dynamic and interactive analyses, offering deeper insights into complex financial datasets. Advanced visualisation techniques in Tableau include chain diagrams, sunburst charts, radar charts, geospatial visualisations, bubble charts, and waterfall charts. Each plot type addresses specific analytical needs, such as illustrating hierarchical data (sunburst charts), comparing multiple variables (radar charts), mapping financial data geographically (geospatial visualisations), and analysing sequential changes in metrics (waterfall charts).

The Viz Extensions feature further enhances Tableau's adaptability, allowing users to integrate third-party visualisations like Sankey, chord, and network diagrams directly into dashboards. These tools provide more interactive and customisable options, enabling analysts to explore intricate datasets from diverse perspectives. For example, Sankey diagrams visually represent capital flows, while chord diagrams illuminate interconnections within a portfolio, facilitating comprehensive analysis and informed decision-making.

The figure 4 demonstrates the advanced Tableau plots and Viz Extension visualisations applied in this paper. These innovative visualisation approaches are employed to analyse the UK's public sector finance dataset, offering a deeper and more interactive understanding of the data. By leveraging these advanced techniques, the paper aims to enhance financial analysis and insight generation in complex analytical contexts.

Storytelling in Tableau Using Story Points: Storytelling in data visualisation serves as a powerful method to guide audiences through complex datasets, enabling them to uncover valuable insights. Tableau’s Story Points feature facilitates the creation of narrative-driven visualisations, making it particularly effective in public sector finance, where stakeholders must interpret intricate financial data for decision-making. Story Points allow users to segment datasets into a series of interconnected visualisations, each representing a distinct ”story point” that contributes to the overall narrative. This structured approach simplifies complex datasets, presenting information in manageable segments to enhance comprehension. Creating a narrative with Story Points involves:

- Establishing the Context: Providing an overview of the data to set the stage for analysis.
- Highlighting Key Insights: Emphasising critical findings to draw attention to meaningful data.
- Using Visual Cues: Leveraging design elements to emphasise essential details and patterns.
- Incorporating Interactive Elements: Allowing users to explore data dynamically and intuitively.

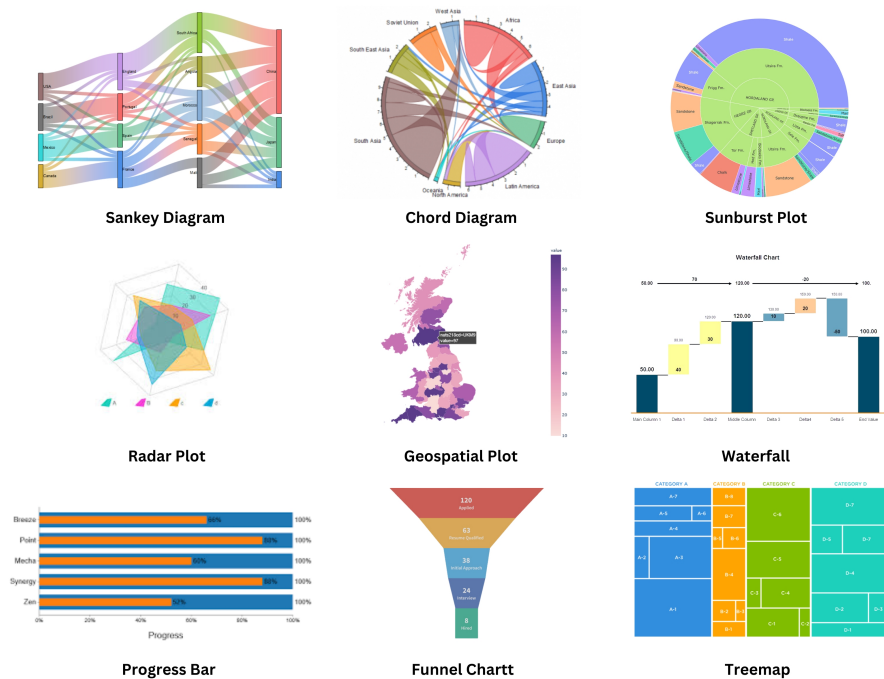


Fig. 4: Supported Plots in Tableau and Viz Extension

- Concluding with Actionable Insights: Summarising the narrative with practical takeaways to support informed decision-making.

This paper adopts a user-centred design approach to ensure accessibility for diverse users, including those with colour vision deficiencies. By avoiding red-green combinations, using high-contrast colours, and incorporating colour-blind-friendly palettes, the visualisations are designed to be inclusive. Tableau's Story Points enhance the dashboard by providing a narrative-driven analytical tool that not only presents data but also guides users toward meaningful insights. This methodology establishes a strong foundation for developing the Tableau dashboard, enabling inclusive and insightful public-sector financial analysis. The next phase focuses on implementing these principles, integrating data, and conducting iterative testing to refine the final tool.

4 Implementation and Investigation

Public Sector Finance Datasets Analysis: This section provides an in-depth analysis of UK public sector finance datasets, including revenue, expenditure, net fiscal balances, and supplementary financial data. These datasets, evaluated for structural integrity and research alignment, enable comprehensive insights into fiscal health and economic strategies across regions. Python was employed to preprocess and convert raw data into formats suitable for interactive visualisations and dashboards in Tableau. The integration of advanced visual analytics with public finance data enhances the understanding of complex relationships and trends, supporting informed policy-making and decision-making processes.

Information Visualisation and Visual Analytics: Information Visualisation (InfoVis) and Visual Analytics (VA) are critical tools in processing large datasets. InfoVis focuses on intuitive representations of data patterns using principles of human perception and interaction design [23]. VA combines computational power with human cognition to integrate preprocessing, visualisation, and automated methods such as machine learning, enabling trend prediction and complex analysis [45,21]. Inclusive and Universal Design principles ensure accessibility for all users, emphasising techniques like alt text, colour contrast, and clear labelling [20].

Design Philosophies and Accessibility: Universal Design (UD), Inclusive Design (ID), and Accessible Design ensure accessibility and usability for diverse user groups, including those with disabilities. UD follows principles like Equitable Use and Perceptible Information [5], while ID employs participatory methods to meet diverse user needs, such as enhancing visualisations for visually impaired users [42]. Accessible Design ensures compliance with standards like WCAG, incorporating features such as screen reader compatibility and keyboard navigation [47]. This combined approach promotes equity and inclusivity in visualisation design.

Colour Blindness in Data Visualisation: Colour blindness, affecting 1 in 12 men and 1 in 200 women, poses challenges in interpreting data visualisations. Specific

conditions, such as red-green deficiencies (Protanomaly, Deuteranomaly), complicate the differentiation of critical financial indicators like gains (green) and losses (red) [7]. Inclusive visualisations require avoiding red-green combinations, using high contrast, and employing textures, patterns, and colour-blind-friendly palettes. Tableau incorporates these strategies, ensuring effective data comprehension for users with colour vision deficiencies.

Accessibility Standards: The Web Content Accessibility Guidelines (WCAG) provide a global framework for creating accessible web content, focusing on perceivability, operability, understandability, and robustness [44]. Compliance is categorised into three levels: A, AA, and AAA. Complementary tools like WAI-ARIA enhance dynamic web functionalities for assistive technology users [43]. However, gaps in accessibility persist, such as inconsistent design patterns and inadequate colour contrast, emphasising the need for a holistic approach to ensure usability for all users [8].

5 Structured Approach to Dashboard Design

The structured dashboard design process emphasises a user-centred approach, progressing through key phases to ensure inclusivity, usability, and alignment with accessibility standards such as WCAG.

- **Phase 1: Initial Requirement Analysis** - Requirements are categorised under three areas—Distinguishable, Operable, and Interpretable—focusing on accessibility and usability. Essential features (Requirements) are distinguished from desirable enhancements (Wishes). This categorisation ensures the dashboard meets accessibility standards while accommodating user preferences.
- **Phase 2: Design Process and Requirement Understanding** - This phase delves into WCAG's principles to refine visual clarity, organisation, and user engagement. Emphasis is placed on content structure, alternative representations, and descriptive elements to ensure the design aligns with the diverse needs of users, including those with disabilities. Key metrics such as contrast ratios and text sizes are defined to maintain readability and accessibility.
- **Phase 3: Design Perception** - Eight prioritised design requirements focus on creating a user-centred and accessible interface, including maintaining high contrast ratios, using text alternatives for visuals, and presenting multiple formats (e.g., auditory cues). These elements enhance inclusivity and ensure the dashboard's broad usability.

5.1 Tableau Dashboard Design Plan:

The dashboard adopts a multi-page layout, with each page dedicated to specific financial aspects of the UK public sector: *Page 1: Overview of Public Sector*

Finances: – Summarises expenditures, revenue predictions, and regional tax insights using treemaps, geospatial charts, and progress bars. *Page 2: Detailed Expenditure Analysis:* – Examines regional and sectoral spending trends with network graphs, forecasts, and industry overviews. *Page 3: Tax Revenue Insights:* – Analyses tax distribution through chord diagrams, radar charts, and hierarchical sunburst visualisations. *Page 4: Strategic Insights and Forecasting:* – Combines tax and expenditure forecasts for long-term planning, using historical and predictive data.

The dashboard incorporates advanced visualisations like Sankey, chord, radar, and sunburst charts to enable comprehensive insights. To enhance accessibility, the Tableau 20 Colour Palette is employed, with an optional toggle for colour-blind-friendly palettes. Additional features include region-specific filters, interactive tooltips, and accessible navigation buttons, ensuring adaptability for all users.

5.2 Storytelling: Using Story Points:

This paper leverages Tableau’s Story Points to systematically visualise and communicate the intricate financial dynamics of the UK public sector. By employing Story Points as a narrative framework, the study presents key insights in a structured and engaging manner, thereby enhancing user comprehension and facilitating informed decision-making. The narrative begins with an analysis of regional fiscal imbalances, providing a foundational overview of economic disparities and fiscal dependencies across different regions. It then progresses to a detailed examination of revenue flows and sources, highlighting underlying economic inequities. Subsequently, the paper delves into government expenditure patterns, scrutinising spending priorities and budgetary efficiency. Temporal trends in fiscal balances are also assessed to evaluate the alignment between public spending and revenue generation over time. The narrative culminates in a synthesis of the findings, discussing their policy implications and offering actionable recommendations derived from the data. Each Story Point integrates annotations, explanatory text, and interactive features, enabling users to explore the data independently. This approach proves particularly valuable for evidence-based policymaking and strategic planning in the context of public sector finance.

6 Results

6.1 Detailed Dashboard Results

Dashboard 1: High-Level Overview of Public Sector Finances

This dashboard provides a macro perspective on the UK’s public sector finances, emphasising regional disparities in expenditures and tax revenues. The Line Chart shows a steady increase in managed expenditures across all regions, with a sharp rise after 2020. This spike reflects responses to the COVID-19 pandemic,

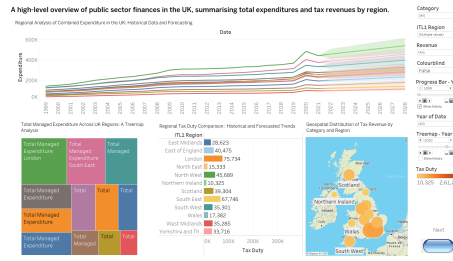


Fig. 5: Dashboard 1: A high-level Overview of Public Sector Finances

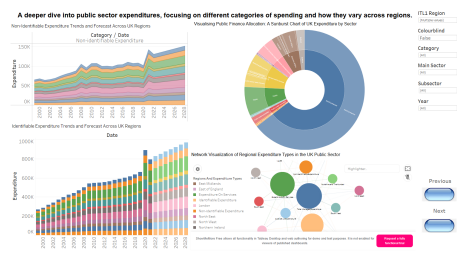


Fig. 6: Dashboard 2: A deeper dive into public sector expenditures

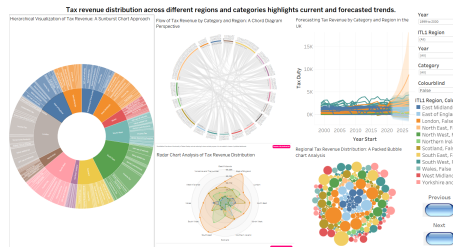


Fig. 7: Dashboard 3: Tax Revenue Distribution Across Regions and Categories

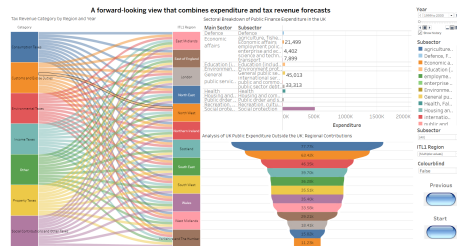


Fig. 8: Dashboard 4: A Forward-Looking View Combining Expenditure and Tax Revenue Forecasts

such as increased spending on healthcare and social protection. Economically vital regions like London and the South East exhibit the highest expenditures, with London surpassing £75 billion annually.

The treemap highlights that these regions also dominate tax revenue, contributing over 50% of the UK's total. This financial concentration underscores economic inequalities, as regions like Northern Ireland and the North East contribute significantly less. The **Map Visualisation** reinforces these insights, illustrating that tax revenues remain geographically concentrated in economically robust areas. This forecasted trend, showing public expenditure exceeding £600 billion by 2028, calls for strategies to address regional disparities in economic development and resource allocation.

Dashboard 2: Detailed Expenditure Analysis

This dashboard delves into the intricacies of public expenditure across categories and regions. The Stacked Area Chart reveals a consistent rise in non-identifiable expenditures, peaking post-2020, likely linked to emergency spending during the pandemic. The Sunburst Chart provides a hierarchical view of sectoral allocations, showing that social protection and health dominate public spending.

Social protection alone accounts for over 40% of the budget, reflecting the UK's commitment to welfare and public health services.

The Network Diagram highlights interregional spending relationships, particularly between London and the North West. This interconnectedness suggests a coordinated approach to fund allocation, yet it also raises questions about equitable distribution. The insights emphasise the need to balance spending priorities between welfare and regional economic stimulation, ensuring effective and equitable resource management.

Dashboard 3: Tax Revenue Distribution

This dashboard focuses on the distribution of tax revenues across regions and categories. The Sunburst Chart showcases income taxes and VAT as primary contributors to national revenue, with London generating nearly a third of income taxes. The hierarchical structure reveals disparities, with some regions relying more heavily on property or other taxes due to limited economic activity.

The Radar Chart highlights these disparities further, showing that London and the South East contribute disproportionately to tax revenues compared to regions like the North East and Wales. The Packed Bubble Chart emphasises the role of consumption taxes, particularly VAT, in overall revenue generation. This analysis underscores the need for fiscal policies that address regional disparities and diversify revenue sources to ensure sustainability and equity.

Dashboard 4: Forward-Looking Analysis

This dashboard integrates projections of expenditures and tax revenues to provide a strategic outlook on public finances. The Sankey Diagram visualises the flow of revenues by category and region, emphasising London's outsized contributions, particularly from income taxes. This regional dominance raises concerns about over-reliance on a few economic hubs.

The Funnel Chart highlights the distribution of external spending commitments, showing that London and the South East account for nearly 40% of such commitments. This imbalance signals the need to distribute financial responsibilities and investments more equitably to reduce over-dependence on specific regions. The forward-looking nature of this dashboard supports informed decision-making for sustainable financial planning.

6.2 Narrative Development Using Tableau Story Points

The narrative begins with a broad examination of the UK's fiscal landscape, laying the groundwork for understanding regional disparities in public finances. The story starts with a geospatial analysis of tax revenues, revealing the striking concentration of financial resources in London and the South East. These regions dominate tax contributions, generating over 50% of the UK's total revenue, while less economically robust areas, like the North East and Northern Ireland, lag sig-

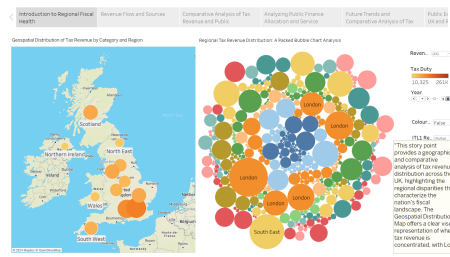


Fig. 9: Story Point 1: Introduction to Regional Fiscal Health

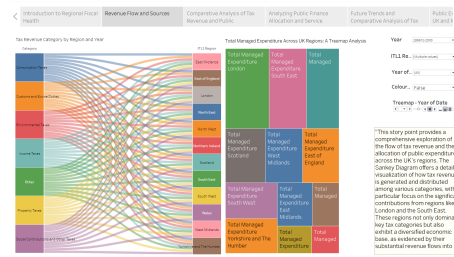


Fig. 10: Story Point 2: Revenue Flow and Sources

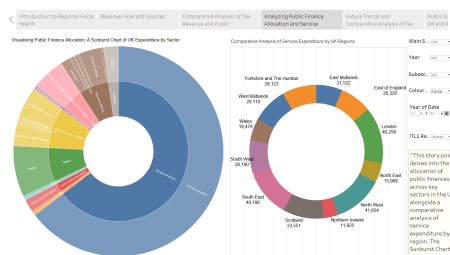


Fig. 11: Story Point 3: Analysing Public Finance Allocation and Service

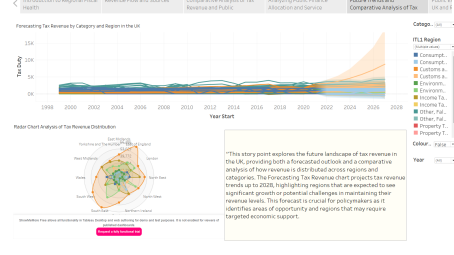


Fig. 12: Story Point 4: Future Trends and Comparative Analysis of Tax Revenue

nificantly. This foundational insight highlights the uneven economic distribution that shapes the nation's fiscal policies.

Building on this context, the narrative shifts to the allocation of public resources, exploring how tax revenues are translated into expenditures. A detailed sectoral analysis reveals the prominence of social protection and health services in public spending, with social protection alone consuming over 40% of the budget. The hierarchical view provided by the sunburst chart underscores the government's commitment to welfare, but it also raises questions about balancing welfare investments with initiatives that stimulate regional economic growth. The narrative deepens as the story examines interregional spending connections, illustrating how funds flow between economically strong and weaker regions.

As the narrative progresses, it delves into the disparities in tax revenue generation across regions and categories. By exploring income and consumption taxes, the analysis reveals how London and the South East dominate revenue contributions, while regions with limited economic activity depend on alternative tax sources, such as property taxes. These disparities are not merely fiscal but also political and social, emphasizing the need for tailored fiscal strategies that address regional inequalities without stifling national growth.

The story concludes with a forward-looking perspective, integrating forecasts for expenditures and tax revenues. The narrative draws attention to the risks of over-reliance on a few economic hubs, as illustrated by London's disproportionate contribution to both revenue and external spending commitments. It highlights the importance of diversifying revenue sources and redistributing financial responsibilities to ensure sustainable and balanced growth. By connecting historical trends with future projections, the narrative offers actionable insights for policymakers to navigate the complexities of the post-pandemic economic landscape.

This academic narrative weaves together data insights and visualisations to provide a comprehensive and nuanced understanding of the UK's public sector finances. It emphasises the interconnectedness of regional disparities, sectoral priorities, and long-term fiscal strategies, presenting a robust framework for addressing current challenges and planning for the future.

7 Conclusion

In this paper, we showcased the effective application of advanced data visualisation techniques, particularly leveraging Tableau and its Viz Extensions, to analyse and present UK public sector financial data. By addressing the limitations of traditional visualisation tools, the paper offered a more detailed and dynamic exploration of fiscal datasets. Integrating non-standard visualisations, such as Sankey and chord diagrams, and dynamic dashboards enriched the understanding of intricate financial relationships and trends. These enhancements significantly improved the decision-making process, making the insights more actionable for stakeholders. We made significant contributions by developing a highly customised, interactive dashboard tailored to the complexities of UK public sector finances. This dashboard introduced novel visualisation techniques, enabled by Tableau's Viz Extensions, to create informative and accessible visuals. Key features, such as colour-blind-friendly palettes and interactive elements, were incorporated to cater to diverse user needs. The iterative and agile development process, involving regular stakeholder feedback and continuous testing, was instrumental in ensuring the solution met technical and user requirements. Despite challenges, such as handling complex datasets and implementing real-time interactivity, the strategic use of Tableau's advanced features resulted in a robust and user-friendly tool. Future advancements could focus on enhancing interactivity by integrating machine learning algorithms for predictive analytics and automated insights. Expanding the scope of the dashboard to include more diverse datasets and financial indicators would provide a broader analytical framework for policymakers. Further exploration into advanced accessibility features, such as voice command navigation and other assistive technologies, could enhance inclusivity. Additionally, ensuring the scalability of the dashboard to manage larger datasets and more complex queries would prepare it for the evolving demands of public sector finance. These future directions not only promise to

improve the dashboard's functionality and usability but also contribute significantly to the fields of data visualisation and public sector financial management.

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