Comparative Analysis of Broadband Infrastructure in the United States and the United Kingdom

Shivaji Reddy Sama, Pavan Kumar Pujari, Bhanu Prakash Sajja, Nikhil Saka, Kishore Poojari

***Abstract*—This research paper presents a comparative analysis of broadband infrastructure in the United States and the United Kingdom, focusing on availability, usage, and speeds. Utilizing datasets containing information on population, broadband availability, usage, and speeds for each country, we aim to identify trends and disparities in broadband access between the two countries. Our methodology involves analyzing the provided datasets to compare broadband availability, usage, and speeds across both countries. Our findings indicate differences in broadband infrastructure and availability, with the UK having higher availability rates and faster download speeds, while the USA has experienced a greater increase in usage rates and faster average upload speeds. Based on these results, we offer policy recommendations to improve broadband access and quality in the United States and the United Kingdom.**

***Index Terms*—Broadband, comparative analysis, United States, United Kingdom, availability, usage, speeds, policy recommendations.**

I. Introduction

A. Background

The broadband infrastructure, serving as the backbone of today's digital economy and facilitating various applications such as data, voice, and video streaming, is essential for global competitiveness [1]. The United States (USA) and the United Kingdom (UK), as two countries with advanced economies and significant investments in digital infrastructure, provide an interesting comparison for understanding the dynamics of broadband development.

B. Problem

Despite the progress in broadband infrastructure, there remain disparities in availability, usage, and speeds between the USA and the UK. Identifying these disparities and understanding the underlying factors can inform policy recommendations for improving broadband access and quality[11].

C. Importance

Analyzing the broadband infrastructure in the USA and the UK can help to identify best practices, potential pitfalls, and areas for improvement in the development of broadband services. This comparison has implications for the digital divide, digital inclusion, and the overall quality of life in both countries[1].

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D. Method

This research uses datasets from the USA and the UK, containing information on broadband availability, usage, and speeds, to perform a comparative analysis of broadband infrastructure in both countries. The datasets are analyzed to identify trends and patterns in broadband availability, usage, and speeds.

E. Contribution/Results

The analysis highlights notable differences in broadband infrastructure and availability between the United States and the United Kingdom. From 2019 to 2020, the US experienced a more significant growth in broadband availability, while the UK maintained higher overall availability rates as well as faster average download and upload speeds. In addition, the US witnessed a greater increase in usage rates and more rapid median download and upload speeds.

Given these findings, we offer policy recommendations to enhance broadband access and quality in both the USA and the UK. Implementing these suggestions can support ongoing initiatives to bridge the digital divide and promote digital inclusion for all.

II. Related Work

A. *Diagnosing the Disconnected: Where and Why Do People in the United States Lack Broadband Internet Access?* [7]

- Problem: This study examines the factors contributing to the lack of broadband internet access in the United States, focusing on the underlying reasons and geographical disparities.
- Method: The paper employs a combination of statistical analysis and geographical information system (GIS) tools to explore the patterns of broadband access across the United States.
- Results: The study identifies socioeconomic, demographic, and geographical factors as significant determinants of broadband access, with rural areas and low-income households being disproportionately affected.

B. Demand-side programs to stimulate adoption of broadband: What works? [8]

- Problem: This research investigates the effectiveness of demand-side programs in promoting the adoption of broadband services in different regions.
- Method: The study utilizes a meta-analysis approach to review existing literature and assess the impact of various demand-side programs on broadband adoption rates.
- Results: The paper concludes that targeted programs, such as digital literacy training and subsidies for low-income households, can effectively boost broadband adoption rates in specific areas.

C. A Cross-Country Analysis of Fixed Broadband Deployment: Examination of Adoption Factors and Network Effect [9]

- Problem: This study investigates the factors influencing fixed broadband deployment and adoption across different countries, considering the role of network effects in shaping broadband markets.
- Method: he paper utilizes a combination of quantitative data analysis and econometric modeling techniques to examine the relationship between adoption factors and broadband deployment in a cross-country context.
- Results: The study finds that both demand-side and supply-side factors significantly affect fixed broadband deployment, with network effects playing a critical role in fostering broadband adoption and market growth.

D. The State of US Broadband in 2022: Reassessing the Whole Picture [10]

- Problem: This study reassesses the current state of broadband in the United States, analyzing the progress made in recent years and identifying the remaining challenges in achieving universal broadband access.
- Method: The paper employs a combination of quantitative data analysis and policy review to provide an updated overview of the US broadband landscape, considering factors such as availability, adoption, and quality.
- Results: The study highlights improvements in broadband access and speeds, but also emphasizes ongoing disparities in rural and low-income areas, indicating a need for continued policy efforts and investments to close the digital divide.

E. Explaining international broadband leadership [11]

- Problem: This study aims to understand the factors contributing to international broadband leadership, focusing on the role of policies and strategies in fostering broadband development.
- Method: The paper uses a combination of comparative case studies and policy analysis to investigate the factors driving broadband leadership in different countries.
- Results: The study identifies a range of factors, including market competition, investment in infrastructure, and supportive regulatory policies, as key drivers of international broadband leadership.

Based on the insights gained from these previous studies, our research seeks to provide a comparative analysis of the broadband infrastructure in the United States and the United Kingdom. By examining the differences in availability, usage, and speeds between these two countries, we aim to inform policy recommendations for improving broadband access and quality.

III. Methodology

A. Dataset description

For our analysis, we used multiple datasets containing information on broadband availability, usage, pricing, and speeds of USA and UK.

USA broadband data is obtained from sources such as Microsoft, FCC (Federal Communication Commission)[2], and Ookla[3].

UK broadband data is obtained from OFCOM (Office of Communications)[4].

Some important variables from these datasets are:

Microsoft, FCC, and Ookla dataset variables: [broadband availability, broadband usage, download speed, upload speed] of 2019 and 2020 for each county and state in the USA. This data has around 3,100 observations.

OFCOM dataset variables: [<2mbps availability, <5mbps availability, <10mbps availability, <30mbps availability], [Super Fast Broadband(SFBB) availability, Ultra Fast Broadband(UFBB) availability, Full Fibre availability, Average download speeds, average upload speeds] for years 2016-2021, for each of the 12 regions in the UK. This data has around 2,32,000 observations.

These datasets provide a comprehensive view of the broadband landscape in the USA and the UK, enabling us to perform a comparative analysis of availability, usage, and speeds across both countries.

B. Method

Our primary objectives are to compare broadband availability, usage, and speeds in the USA and the UK. To achieve these objectives, we calculate the following metrics:

a. Broadband availability rate: The percentage of the population with access to broadband services.

b. Broadband usage rate: The percentage of the population actively using broadband services.

c. Broadband speeds: The average download and upload speeds in each region.

Method application: We employ descriptive statistical methods to analyze the datasets and derive insights into the broadband landscape in the USA and the UK. The following steps are taken to conduct the analysis:

a. Data preprocessing: Cleaning, transforming, merging and organizing the datasets to ensure consistency and reliability in the analysis.

b. Descriptive analysis: Calculating and visualizing summary statistics, such as mean, median, and standard deviation, to describe the central tendency and dispersion of broadband availability, usage, and speeds using tools such as excel and tableau

By using these methods and tools, we can compare the broadband landscape in the USA and the UK, identify trends and patterns in broadband availability, usage, and speeds.

IV. Results

A. Broadband Availability and Usage

The comparative analysis of the USA and the UK revealed differences in broadband availability rates between the two countries. The UK had a higher broadband availability rate in 2019 (94.43%) compared to the USA (76.67% in 2019 and 84.04% in 2020). However, the USA experienced a greater increase in broadband usage rates from 27.91% in 2019 to 38.97% in 2020. Super-fast broadband (SFBB) availability in the UK has consistently increased, from 87.826% in 2016 to 95.328% in 2021. Additionally, ultra-fast broadband (UFBB) availability made remarkable progress, with an increase from 1.26% in 2016 to 61.38% in 2021.

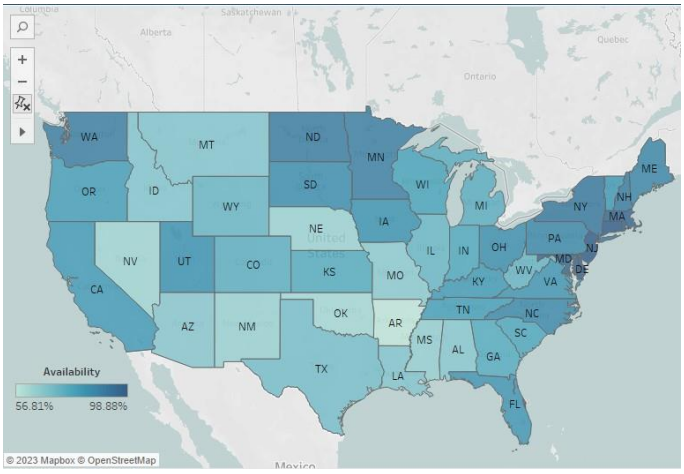

Fig. 1. Broadband Availability in USA

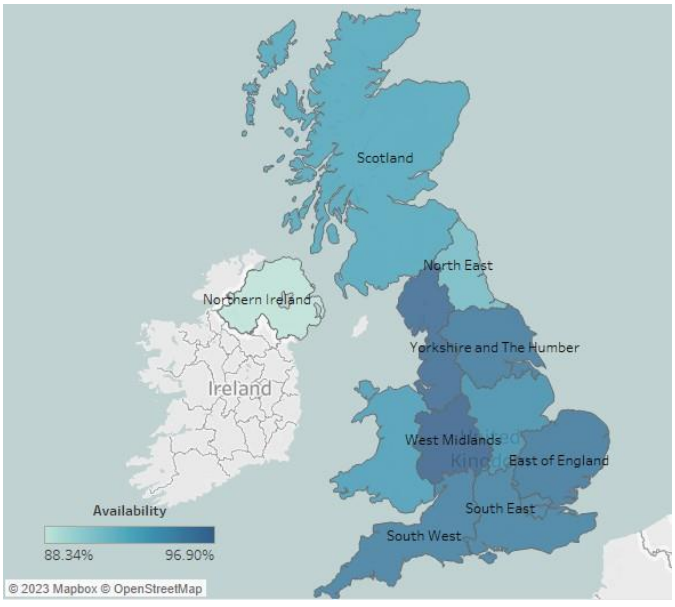

Fig. 2. Broadband Availability in UK

TABLE 1 – USA vs UK BROADBAND

	USA	UK
Total No. of Households	121,948,702	29,355,365
Broadband Availability	76.67%	94.43%
Average Download Speed (Mbps)	38	60
Average Upload Speed (Mbps)	9.82	6.50

B. Broadband Speeds

The analysis of broadband speeds indicated differences between the USA and the UK. In 2019, UK had the higher average download speed of 60 Mbps whereas USA had the average download speed of 38 Mbps , but the USA had a higher average upload speed (9.82 Mbps) compared to the UK (6.50 Mbps). The USA experienced a notable increase in median download speed from 30.09 Mbps in 2019 to 42.71 Mbps in 2020, and the median upload speed also increased from 8.709 Mbps in 2019 to 10.327 Mbps in 2020. The UK saw consistent increases in average download speeds from 36.76 Mbps in 2016 to 71.86 Mbps in 2020.

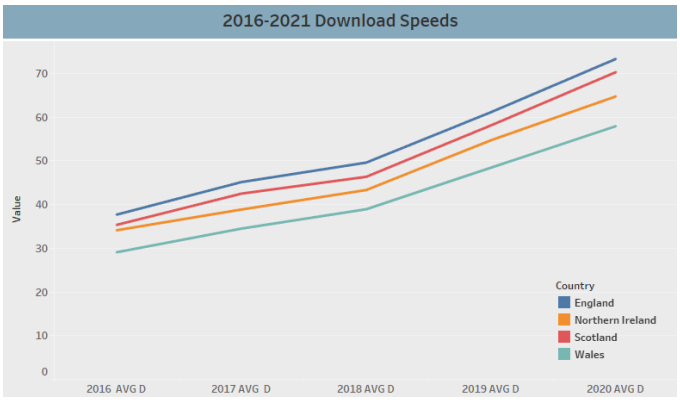

Fig. 4. Download Speeds in UK (2016-2020)

C. Policy Recommendations

Based on the results of the comparative analysis of broadband infrastructure in the United States and the United Kingdom, we offer the following policy recommendations to improve broadband access and quality in both countries:

1. Expand broadband infrastructure in underserved areas: To ensure that all citizens have access to high-speed internet services, both the USA and the UK should prioritize extending broadband infrastructure to areas with lower availability rates. This includes investing in the deployment of new broadband networks, upgrading existing networks, and exploring alternative technologies such as satellite and wireless broadband solutions.[12]

2. Enhance the quality of broadband services: Improving broadband speeds is crucial for keeping up with the increasing demands of the digital economy. Policymakers should encourage internet service providers (ISPs) to invest in network upgrades and adopt new technologies to provide faster and more reliable broadband connections. Additionally, governments can support research and development initiatives in telecommunications to advance new technologies and improve broadband infrastructure.[13]

3. Increase affordability of broadband services: Affordability is a key factor influencing broadband usage rates. Policymakers should work to ensure that high-speed internet services are accessible to all citizens, regardless of their income levels. This can be achieved by promoting competition among ISPs, offering subsidies and financial incentives to low-income households, and implementing regulatory measures to prevent anti-competitive practices and price gouging.[14]

4. Foster digital literacy and awareness: To increase broadband usage rates, it is essential to promote digital literacy and ensure that citizens have the necessary skills to navigate the digital landscape. Governments should invest in digital education initiatives, provide training programs for various age groups, and collaborate with non-profit organizations to promote digital literacy and awareness.[15]

5. Monitor and evaluate progress: Policymakers should establish benchmarks and performance indicators to assess the success of broadband policies and initiatives. Regular monitoring and evaluation can help to identify areas for improvement, track progress towards bridging the digital divide, and inform future policy decisions.[16]

By implementing these policy recommendations, the United States and the United Kingdom can work towards ensuring that all citizens have access to high-quality broadband services, promote digital inclusion, and foster a more inclusive and prosperous digital society.

V. Conclusion

In conclusion, this study has highlighted the critical role of broadband infrastructure in shaping the digital landscape and influencing access to high-speed internet services in the United States and the United Kingdom. Through a comparative analysis of broadband availability, usage, and speeds in both countries, we have identified significant differences and areas for improvement.

The UK having higher availability rates and faster download speeds, while the USA has experienced a greater increase in usage rates and faster average upload speeds. These differences emphasize the need for continued investments in broadband infrastructure and the implementation of targeted policies to address the specific challenges faced by each country. It is crucial for policymakers in both countries to continue investing in and improving broadband infrastructure, as the benefits of high-speed internet access extend far beyond individual households and businesses. As the digital landscape continues to evolve, ongoing efforts to bridge the digital divide and foster digital inclusion will play an increasingly important role in ensuring that both the United States and the United Kingdom can fully participate in and benefit from the digital economy.

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