

CHAPTER I

INTRODUCTION

1.1. Background

The development of information and communication technology (ICT) has profoundly impacted the way individuals interact with digital services and engage in economic and social activities. One of the most revolutionary innovations in recent years is the emergence of fifth-generation (5G) mobile network technology, which offers ultra-fast data transmission, ultra-low latency, and the ability to connect millions of devices simultaneously. Unlike its previous versions, 5G is not merely an upgrade but serves as the core infrastructure for future digital ecosystems, enabling the implementation of advanced technologies such as the Internet of Things (IoT), autonomous vehicles, augmented reality, and smart city systems [1][2].

In Indonesia, the rollout of 5G is advancing strategically, especially in major urban centers like Bandung, a city known for its growing digital innovation and creative economy. However, the development of 5G infrastructure across the country is still in its early stages, with many regions, including Bandung, facing challenges in terms of uneven infrastructure distribution and limited access to 5G coverage. As a result, the widespread adoption of 5G remains constrained, particularly in residential areas where access to robust 5G infrastructure is still limited. [3]. The process of technology adoption is often complex, shaped by a variety of factors, both technical and non-technical, that interact in different ways.

Everett M. Rogers' Diffusion of Innovations Theory explains that the adoption of any innovation, including 5G, is influenced by the characteristics of the technology, the communication channels through which information spreads, the social system, and the decision-making process of users. In the case of 5G, this theory emphasizes how factors such as the technology's perceived advantages, compatibility with existing systems, and ease of use influence adoption rates [4].

Infrastructure plays a fundamental role in the adoption of 5G technology. Unlike 4G, 5G demands dense networks of small cells, fiber-optic backhaul, and edge computing nodes to fully realize its potential. As outlined in Indonesia's Rencana Pembangunan Jangka Menengah Nasional (RPJMN) 2020–2024, the country has set ambitious goals to enhance digital infrastructure, with a planned investment of approximately IDR 435,2 trillion in developing telecommunications infrastructure,

including 5G networks.[5] However, despite these investments, the uneven distribution of this infrastructure across areas in Bandung remains a significant challenge. Many users, particularly those in residential and peripheral regions, still experience weak signals or lack access to 5G altogether. This disparity in infrastructure development limits users' ability to experience the full benefits of 5G, making them less likely to adopt the technology. Without a more widespread infrastructure, the anticipated digital transformation will struggle to reach its full potential.[6]

The adoption of 5G is closely linked to the readiness of users and the broader digital transformation process in Indonesia. If the adoption rate remains low, the country's digital transformation objectives, particularly in sectors such as online education, telemedicine, and smart transportation, will face significant challenges, as these sectors rely heavily on 5G technology. Economic barriers, including the cost of 5G-enabled devices and service fees, present a major case for adoption, particularly for lower-income users.[7] Even when 5G is available, users must perceive its value as outweighing the cost. If the costs associated with adopting 5G are too high, its uptake will be limited, affecting both the country's return on its substantial investment in 5G infrastructure and service providers' ability to deploy the technology effectively. The city of Bandung serves as a crucial point for this research, as it is a growing for digital innovation and faces unique challenges in implementing 5G, making it an ideal location to study the factors that influence 5G adoption and its impact on the broader digital transformation agenda in Indonesia.[8].

Regulation is another crucial factor in the adoption process. The Indonesian government has made strides in promoting 5G technology through strategic initiatives like the Indonesia Digital Roadmap 2021–2024 and the enactment of the Personal Data Protection (PDP) Law. However, local regulations, such as Mayor Regulation No. 1470 of 2018, which addresses Bandung's Smart City Master Plan, do not yet provide clear mechanisms to support 5G infrastructure deployment and user adoption. Regulatory uncertainties or a lack of local incentives could hinder the expansion of 5G services and decrease user trust in the technology. Bandung, as a growing center for digital innovation and urban development, is a critical location for this research. The city's emphasis on becoming a smart city, combined with its ongoing efforts to modernize infrastructure, makes it an ideal case study to explore the role of local regulation in the successful deployment and adoption of 5G

technology. Investigating Bandung provides insights into how local governance, regulation, and infrastructure development intersect to either accelerate or impede 5G adoption, offering valuable lessons for other regions facing similar challenges.[9][10].

Low 5G adoption rates may also affect broader smart city initiatives, such as smart traffic management, energy grids, and digital citizen services, all of which rely on the high-speed, low-latency capabilities of 5G networks. If large segments of the population do not adopt the technology, the sustainability and effectiveness of these smart city projects could be compromised. Therefore, 5G adoption must be viewed not just as a technological shift but as an essential component for the success of broader urban transformation strategies [11].

In conclusion, the adoption of 5G technology in Bandung City is influenced by a range of interrelated factors, including infrastructure availability, regulatory frameworks, user readiness, and economic factors. This study seeks to identify and analyze the key determinants of 5G adoption, with a background on regulatory management, infrastructure readiness, user capacity, and economic perceptions. The findings aim to contribute to the development of inclusive digital transformation policies, helping ensure the successful and sustainable adoption of 5G technology at both the regional and national levels.

1.2. Formulation of the problem

Based on several problems that have been described, the following problems can be formulated:

1. How do technical factors (speed, latency, network capacity) and non-technical factors influence the adoption of 5G technology among users in Bandung City?
2. How is infrastructure availability and network service quality affect 5G technology adoption among users in Bandung City?
3. How is awareness, technological knowledge, and user experience contribute to the decision to adopt 5G technology in Bandung City?
4. How is the adoption of 5G technology affect the readiness of telecommunications infrastructure in Bandung City?

1.3. Research Objectives

This research aims to:

1. The study aims to assess how 5G technology performs in enhancing the quality of telecommunications services in Bandung City, focusing on factors such as speed, latency, and network capacity.
2. The study aims to identify and analyze the technical and non-technical factors influencing the adoption of 5G technology among users in Bandung City.
3. The study aims to evaluate the effect of 5G technology adoption on the readiness and development potential of existing telecommunications infrastructure in Bandung City.

1.4. Scope of problem

The scope of this research are:

1. This research is limited to the Bandung City area.
2. This research takes a questionnaire survey from the community of 5G technology users in Bandung City
3. This research focuses on the analysis and level of adoption of 5G technology in Bandung City
4. The results of this study are limited to the conditions and situations of the Telkomsel network during the research period, so they do not cover changes or developments that occurred afterwards.

1.5. Hypothesis

This study proposes the following hypothesis:

1. Infrastructure availability has a significant influence on the adoption of 5G technology.
2. Technology awareness and knowledge have a significant influence on the adoption of 5G technology.
3. Network service quality has a positive influence on the adoption of 5G technology.
4. Service and device cost has a significant influence on the adoption of 5G technology.
5. Perception of Security and Privacy has a significant influence on the adoption

of 5G technology.

6. Potential and benefits offered by 5G have a significant influence on the adoption of 5G technology.
7. User experience has a significant influence on the adoption of 5G technology.
8. Social influence has a significant influence on the adoption of 5G technology.

1.6. Research Method

In this research, several methods were used, namely:

1. Literature Study
This stage aims to collect materials in the form of reference books, articles, supporting journals, and a strong theoretical basis for the methods to be used in this study.
2. Designing a Research Model
This stage uses a quantitative approach to analyze the performance and level of adoption of 5G technology among users in the city of Bandung.
3. Data Collection
This stage obtains data through a survey distributed to respondents who live in big cities and have used 5G technology and through measuring 5G network performance
4. Data Processing
This stage Data processing is carried out with the help of statistical software to ensure the accuracy and reliability of the analysis results.
5. Ordinal Logistic Regression Analysis
This stage uses survey data to analyze the relationship between the level of adoption of 5G technology and changes in user mobility. This will help identify factors that influence the use of 5G technology and its impact on mobility.
6. Report
At this stage, a report on the results of the research that has been carried out is prepared and conclusions are drawn from the results of the research.