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Utilization of Technology in Public Policy Making: Opportunities and Challenges

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Abstract

Public policy-making is a complex process that requires accurate and timely information to generate effective decisions. In the digital era, information technology has become a crucial tool in supporting this process. This article explores various technologies that can be utilized to optimize public policy-making, as well as the challenges associated with their utilization. Through this analysis, the article offers insights into how more effective strategies in implementing technology can enhance the efficiency and effectiveness of the public policy-making process. This article is the result of a literature review using a conceptual-traditional approach. Primary data in the literature review consists of journals related to the topic under study and some reports sourced from social media. The findings of this study indicate that technology utilization can play a key role in optimizing public policy-making. However, challenges such as limited access and capacity, privacy, and security issues, as well as technological access inequality need to be addressed to ensure that the benefits of technology can serve as powerful tools for creating better and more responsive public policies.

Keywords *— Technology, Public Policy, Big Data, Artificial Intelligence*

1. INTRODUCTION

Information technology has rapidly evolved and influenced all aspects of life. One of the benefits of the advancement in information technology is the increased accessibility across various sectors, including social, economic, educational, health, and governance [1]. The Internet of Things (IoT), cloud computing, big data, and artificial intelligence (AI) have all transformed the way people learn, connect, conduct business, and even engage in politics in this era of digitization. Therefore, to remain relevant and promote better governance, governments are beginning to adopt various information technologies [2]. Myeong & Jung even suggest that the integration of advanced information and communication technologies can expedite decision- making processes and enhance the effectiveness and transparency of administrative procedures [3].

The advancement of technology and the increasing volume of information are transforming the way business is conducted in many industries, including government. Public policy making is at the core of governmental functions aimed at creating justice, efficiency,

and societal well-being [4]. This process involves careful analysis of various data and information to produce effective policies that are responsive to the needs and aspirations of the community [5].

The use of technology in public policy making is a significant milestone in the evolution of modern public administration. Technology provides tools that enable governments to collect, analyze, and utilize data more effectively and efficiently [6]. The emergence of the concept of Evidence-Based Policy stems from the understanding that policies previously crafted were based solely on intuition, ideology, conventional wisdom, public opinion, and political interests without clear evidence. Currently, decision-making in Indonesia is more politically driven and based on popular policies rather than data, which could lead to more effective policies [7].

In recent years, there has been a surge in the use of technology to support the process of public policy making. Various platforms and applications have been developed to collect, analyze, and present data more efficiently. Technologies such as big data analytics, machine learning, and artificial intelligence (AI) have provided the ability to explore complex patterns in data, offer more accurate predictions, and support more effective and efficient decision-making [8].

The utilization of information and communication technology has provided new opportunities for optimizing the process of public policy making. However, along with these opportunities, several challenges need to be addressed to ensure that the use of technology in public policy making has a positive impact on society [9].

The use of technology in public policy making is not only relevant in Indonesia but is also a global concern. Countries around the world, including the United States, the United Kingdom, and South Korea, have leveraged technologies such as Big Data, AI, and participatory platforms to enhance transparency and effectiveness in public policy making [10]. In this context, Indonesia must draw lessons from the successes and challenges faced by other countries in integrating technology into policy processes [11]. Therefore, Indonesia's experience can contribute to the global discourse on the utilization of technology in public policy. Additionally, issues of data privacy, cyber security, and the ethics of technology usage are also major concerns in implementing technological solutions in the context of public policy making [12].

Pujianto mentions that the utilization of Big Data in Indonesia has begun to grow both in the business sector and in the public sector. The current challenges lie more in how companies optimize their data and regarding privacy violations, there is a need for legal certainty and understanding of ethics in the use of information technology [13].

In this increasingly interconnected and complex context, this article will explore the challenges and opportunities in the utilization of technology in optimizing public policy making. By understanding these dynamics, it is hoped that we can formulate more effective strategies for implementing technology to achieve sustainable and inclusive development goals[14].

2. RESEARCH METHOD

This study adopted a literature review approach, specifically using a conceptual-traditional method. This approach was chosen to synthesize and integrate existing knowledge and research findings on the utilization of information technology in public policy-making. The aim is to provide a comprehensive understanding of the subject by analyzing various perspectives from existing literature [15].

2.1. Literature Selection

The literature selection process began with a comprehensive search of academic databases such as Scopus, Web of Science, and Google Scholar. Keywords used in the search included "technology in public policy," "big data in governance," "artificial intelligence in policy- making," and "digital platforms for public policy." The search was limited to articles published between 2015 and 2023 to ensure the inclusion of recent developments and discussions in the field.

2.2. Inclusion and Exclusion Criteria

The inclusion criteria for selecting articles were as follows:

- Articles published in peer-reviewed journals or reputable conference proceedings.
- Studies that specifically discuss the application of technology in the context of public policy- making.
- Papers that provide empirical data, case studies, or theoretical insights into the challenges and opportunities associated with technological adoption in public governance.

Exclusion criteria included:

- Articles that focus solely on technological advancements without relating them to public policy.
- Papers with a primary focus on sectors outside governance, unless they provide relevant cross- sectoral insights.
- Non-English publications were excluded to maintain consistency in the analysis.

2.3. Data Categorization

The selected literature was categorized into three main themes:

1. **Technological Tools in Public Policy**: This category included studies discussing specific technologies like Big Data, Artificial Intelligence (AI), and participatory platforms, and their applications in public policy-making.
2. **Challenges in Technology Adoption**: Articles in this category focused on the barriers to implementing these technologies, such as infrastructure limitations, human resource capacity, and data privacy issues.
3. **Strategies for Effective Implementation**: This theme covered studies proposing solutions or strategies to overcome the identified challenges and enhance the benefits of technology in public policy.

2.4. Data Analysis

The analysis was conducted by systematically reviewing the content of the selected literature within each category. A qualitative content analysis approach was used to identify recurring themes, patterns, and gaps in the existing research. The findings were then synthesized to provide a holistic understanding of how technology can be leveraged in public policy-making, the challenges that may arise, and potential strategies to address these challenges.

2.5. Quality Assessment

To ensure the robustness of the review, each selected article was evaluated based on its methodological rigor, the relevance of its findings to the study's objectives, and its contribution to the existing body of knowledge. Only high-quality studies with strong empirical or theoretical foundations were included in the final analysis.

3. RESULTS AND DISCUSSION

3.1. Technology in Optimizing Public Policy Making

In the continuously evolving digital era, technology plays an increasingly crucial role in optimizing public policy making. Various technologies have emerged to facilitate this process, ranging from big data analysis to artificial intelligence (AI), and from online platforms to Geographic Information Systems (GIS). These technologies open doors to enhancing efficiency, accuracy, and transparency in policy making, enabling policymakers to make better decisions based on evidence.

3.1.1. Big Data Analysis

According to Dumbill, Big Data refers to data that exceeds the processing capacity of conventional database systems. Big Data technology is a technology that enables the processing of data characterized by large volume, high velocity of change/growth, diverse forms/formats, and inherent value. Data is too large and fast or does not fit the structure of existing database architectures, so alternative pathways must be chosen to process it and extract value from it.

Before the appearance of this technology, data processing was almost always carried out by programmers and was very time-consuming. This process aims to enable businesses, organizations, or individuals capable of processing such data to obtain deeper insights that will trigger decision-making and business actions based on those insights, rather than relying solely on instinct.

In the era of technology, comprehensive data with analysis is an important component that can support policy direction. Big Data technology can be widely utilized in the government sector. Some opportunities for utilizing Big Data in the public sector include

obtaining feedback and responses from the public through government service information systems or social media; as a basis for policy formulation and improvement of public services; and finding solutions to existing problems based on available data.

Big data technology provides significant opportunities in the digital transformation of public administration by providing large and diverse data resources. The use of big data technology can help governments make smarter, evidence-based decisions. Data from various sources, such as sensors, smartphones, and social media, can help governments understand the conditions, behaviors, needs, and issues faced by society.

In the context of public decision-making, referring to the decision-making theory proposed by Simon, the decision-making process is divided into four stages: intelligence, design, choice, and implementation. In the intelligence stage, the application of Big Data technology can assist decision-makers in identifying problems, needs, and ease of access to the data or information required. Several tools available for implementing Big Data can be utilized for this stage.

In the design stage, Big Data technology plays a role in facilitating decision-makers in designing solutions in the form of alternative problem-solving methods. In this stage, Big Data tools in the analytic phase, which are related to processing and processing, will transform data into several alternative problem-solving methods that can be used in decision-making.

Then, in the decision-making stage (choice), Big Data tools, such as prescriptive analytics, will provide recommendation choices, including the implications of each option offered. The benefits resulting from the application of Big Data technology at this stage will facilitate decision-makers in choosing solutions from several alternative problem-solving methods. Optional selection is done by considering the impacts that will be generated and the greatest benefits that can be obtained from the decision-making process. This method greatly assists decision-makers in producing high-quality and beneficial decisions for everyone.

Finally, in the implementation stage, decision-makers will also be facilitated in carrying out the realization process and supervision of the decisions made with the help of Big Data tools, which also work in the stage referred to as application. These Big Data tool stages will help visualize analysis report results and conduct periodic evaluations.

3.1.2. Participatory Platform

A participatory platform is a digital platform such as online discussion forums and electronic polls that enable active citizen participation in the policy making process, enhancing the legitimacy and responsiveness of public policies. Participatory platforms play a key role in the public policy making process by expanding the space for community participation in decision- making. Through these platforms, the public can actively engage in discussions, provide input, and share their views on issues relevant to the policies being formulated or revised. Alifa suggests that participatory platforms serve as new media facilities supporting people from various backgrounds to channel aspirations and participate indirectly in communicating with leaders or policymakers.

Participatory platforms enable broader participation, expanding the reach of participants from various societal layers and different geographical regions. Thus, these platforms create inclusive and democratic forums using people power strategies and public pressure to urge leaders to hear and more effectively consider the opinions and interests of the public.

Participatory platforms facilitate access to relevant information and data on policy issues, helping to enhance transparency in decision-making processes. Additionally, participatory platforms can serve as tools to facilitate collaboration between governments, civil society, the private sector, and other institutions. Through this cooperation, innovative solutions can be generated, and policy implementation can be enhanced through the utilization of broader resources and diversified perspectives.

Overall, participatory platforms open doors to a more inclusive, transparent, and collaborative policy making process, which in turn can lead to more effective and sustainable policies for the interests of the overall society.

3.1.3. Artificial Intelligence (AI)

The widespread use of Artificial Intelligence (AI) across various sectors provides governments with the rationale to leverage AI technology in governmental practices and the ecosystem of the public sector such as service provision and policy making, enabling rapid adaptation through introduction.

In relation to public decision making, AI can also be used by governments to generate more accurate forecasts and to simulate complex systems that allow experimentation with various policy options (Margetts & Dorobantu, 2019). AI can be used to automatically analyze data and generate policy recommendations based on patterns found within the data, thereby expediting the decision-making process.

3.2. Challenges in Utilizing Technology in Public Policy Making

The utilization of Information Technology in public policy making, especially data-driven public policies, can bring numerous benefits but also entails several challenges. Aryasa categorized four essential elements as challenges, namely: 1) technology; 2) Human Resources (HR); 3) processes; and 4) data.

Challenges from the technological aspect include limitations in access and capacity. Not all government institutions have sufficient access or capacity to adopt advanced technologies such as big data or artificial intelligence. The limitation of adequate technological infrastructure such as access to electricity and fast, stable internet is a major obstacle in implementing technology in the public policy process. Additionally, not all citizens have equal access to technology, increasing the risk of inequality in public participation. Unequal access to technology can result in disparities in community participation in policy making and access to public services improved by technology.

Data from the Ministry of Villages, Disadvantaged Regions, and Transmigration (Kemendes PDTT) in 2022 shows that there are still at least 4,982 severely disadvantaged villages in Indonesia. This number is equivalent to 6.65% of the total villages with the Village Development Index (VDI) totaling 74,955 villages. Different abilities regarding access to technological infrastructure make it difficult to collect and analyze accurate and up-to-date data.

Another challenge arises from the capacity aspect of Human Resources (HR). The implementation of this digital transformation requires experts with analytical and creative abilities, as well as skills in computer usage and access to online platforms. Workers are required to be competent in data analysis and technology. Education and training are necessary to enhance HR capabilities to keep up with digital technology advancements. Limitations in human resources with such skills can hinder the full benefits of data utilization. This can lead to difficulties in collecting, analyzing, and interpreting data correctly.

One form of challenge in the process aspect of utilizing information technology in public policy is data security and privacy issues. Data collection and utilization in public policy making present risks related to data privacy and security that need attention. Data security and privacy are vital assets in digital transformation. The most significant challenge is protecting data from cyber threats such as hacking, malware, and phishing attacks, as well as privacy issues arising from the storage, collection, and use of personal data.

From the data aspect, accessing data often requires extra effort due to the need for permission and licenses to legally access non-public data. Moreover, if there is sectoral ego among agencies as data owners. In Indonesia, data for various needs are available, but they are scattered, requiring more effort to obtain integrated national data. Additionally, regarding the lack of coordination between agencies, the utilization of information technology in data-driven public policy making requires cooperation between various agencies, yet there is still a lack of coordination and synergy among agencies.

3.3. Strategies to Overcome Challenges and Maximize Benefits

To address the complexity of challenges arising from the utilization of technology in the public policy process, well-planned strategies are needed to overcome barriers and maximize the benefits generated. Some strategies that can be applied include:

1. Investment in technology infrastructure: To address the issue of inadequate technological infrastructure, the government needs to allocate sufficient resources to strengthen its technology infrastructure and provide necessary training to personnel. Additionally, the government should ensure equitable access to technology. Efforts should be made to reduce the technology access gap so that all citizens can participate in the public policy making process. The government should collaborate with local governments to provide information technology development infrastructure, especially in the 3T (Frontier, Outermost, Disadvantaged) regions. Therefore, with the development of information technology infrastructure, the community can also be informed or involved in evidence-based policy making processes.

2. Providing training to the community regarding information technology skills: Through training provided by the government, the community will have the skills to utilize information technology. This aims to enable the community to understand and participate in data-driven public policy making processes to support Indonesia's global competitiveness.
3. Enhancing coordination among institutions: The government needs to facilitate synergy and coordination among institutions in utilizing information technology in data-driven public policy making.
4. Developing Privacy and Security Policies: The use of personal data should be with the consent of the individual concerned if it will be used by other parties. Misuse of information technology can pose privacy data issues. The security of citizens must be considered, and criminal actions that may arise due to the openness of information must be anticipated, especially those affecting national stability.

Clear and strict policies regarding data privacy and security are needed to protect public interests. So far, the implementation of information technology in Indonesia must comply with legislation that regulates data or information protection and limitations on its use, including the Electronic Information and Transactions Law, the Public Information Openness Law, the Banking Law, and the Consumer Protection Law. Building on this situation, the government needs to accelerate the enactment of the Personal Data Protection and Information Law to protect citizens' data, which is currently in the process of drafting a bill.

4. CONCLUSION

The findings of this study indicate that while the challenges in utilizing technology for public policy making in Indonesia are significant, efforts to overcome these barriers can provide valuable contributions to the global discussion on technological innovation in governance. Consequently, Indonesia can serve as a crucial case study in the application of technology in the public sector, offering insights that are relevant to other countries facing similar challenges.

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