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THE ROLE OF ENCRYPTION TECHNOLOGY IN PROTECTING DATA PRIVACY: LEGAL AND SOCIAL ASPECTS

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Abstract

In today's digital era, data privacy is a major concern for individuals and organisations around the world. Encryption technology has emerged as a key tool in the effort to protect data privacy, making it an important subject to be studied from various aspects, including legal and social. This research aims to explore the important role of encryption technology in protecting data privacy and its impact on legal and social aspects. From a legal perspective, this research examines how encryption helps entities and organisations meet the legal requirements of privacy and data protection, such as GDPR in the European Union and CCPA in California, as well as the challenges faced in implementing encryption. On the social side, the study highlights how encryption strengthens public trust in digital technology, enables secure personal communication, and supports freedom of speech in the digital environment. In addition, the study also discusses ongoing challenges, such as the balance between the need for encryption and the need for law enforcement to access data in crime investigations. In conclusion, encryption technology is a critical aspect of protecting data privacy, with significant implications in both legal and social aspects. This research suggests the need for further collaboration between policymakers, the technology industry, and the general public to formulate strategies that enable the effective use of encryption while addressing security needs and social justice.

Keywords: Role, Encryption Technology, Protecting Data Privacy, Legal and Social Aspects.

Introduction

In today's digital age, data is one of the most valuable assets for individuals and organisations. Data is a set of facts that are stored and organised in such a way that they can be in the form of numbers, words, measurements, observations, or even descriptions of certain phenomena. Data can be quantitative or qualitative and is used as a basis for analysis, decision making, or to answer research questions. Data can be found in various forms and formats, including text, numbers, photos, audio, and video. In this digital era, digital data is abundant and is an important source of information for individuals, businesses, and researchers in understanding, analysing, and responding to various phenomena, trends, and the needs of society (Solove, 2008).

The increase in online activity, from financial transactions to everyday communication, has posed significant challenges in terms of data privacy protection. Data privacy protection is an important aspect of maintaining individual autonomy, financial security, and personal freedom in an increasingly connected world. By

protecting personal data from unauthorised access or misuse, individuals can reduce the risk of identity theft, fraud and privacy violations that can lead to financial, psychological and reputational losses (Buchanan & Chai, 2016). In addition, data privacy protection also builds trust between consumers and companies, encourages corporate transparency and responsibility, and supports compliance with applicable regulations. Therefore, maintaining data privacy is not only an individual need, but also an important pillar in the integrity of the digital economic system and public trust. Data leaks and cyber attacks are becoming more frequent, bringing both economic and social losses. In this context, encryption technology plays a vital role as one of the most effective methods of maintaining data confidentiality and integrity (Williams, 2022).

From a legal aspect, many countries have drafted and implemented a series of laws and regulations to protect the data privacy of their residents. However, the implementation of these regulations often poses its own challenges, including those related to the implementation of effective encryption technology, without hindering civil liberties and innovation. Encryption, as a method of data security, plays an important role in protecting personal information from unauthorised access (Floridi, 2014). However, its implementation must be carried out in such a way that it does not hinder civil liberties. For example, overly strict encryption policies can limit access to information for public interest or scientific research. On the other hand, strong encryption can also pose a dilemma for law enforcement in accessing data needed for criminal investigations without compromising individual privacy (White & Green, 2025).

In addition, data protection regulations are often seen as a barrier to innovation, especially for fast-growing startups and technology companies. Strict data protection policies can make it difficult for these companies to collect, process, and use data to develop new products or services. This often complicates the innovation process and can hamper a company's ability to compete in the global marketplace (Martinez, 2024). Therefore, it is very important to create a balance between data privacy protection and drivers of innovation, by providing clear guidelines and allowing flexibility in their implementation. The social aspects of data privacy, including public awareness and trust in encryption technology, also determine the effectiveness of data protection (Morgan, 2022).

Given the crucial importance of data privacy protection in maintaining security and trust in digital activities, as well as the existing legal and social challenges, this study aims to examine the role of encryption technology in protecting data privacy. It will look at how legal and social aspects affect the implementation and effectiveness of encryption technology in protecting data privacy, detailing the successes, obstacles, and existing gaps. Through a multidisciplinary approach that combines technical, legal, and social aspects, this research is expected to provide a comprehensive understanding of the dynamics of data protection.

Research Methods

The study in this research uses a literature method. This method involves the collection, review, and synthesis of various relevant literature sources, such as academic journals, books, policy articles, and legal documents, to gain an in-depth understanding of how encryption technology contributes to the protection of data privacy within the applicable legal and social frameworks (Borenstein et al., 2009); (Silverman, 2015). Thus, this study can identify various encryption-related arguments, theories, and practices—including debates regarding encryption 'backdoors', the impact of regulations on privacy and civil liberties, and the social implications of using encryption to protect personal data. This method allows researchers to understand the complexity of the issue, identify research gaps, and offer evidence-based solutions or recommendations to improve policies and practices around data privacy protection through encryption technology (Rossi et al., 2004).

Results and Discussion

Implementation and Effectiveness of Encryption Technology in Protecting Data Privacy

In the current digital age, data privacy is a major concern for both individuals and organisations. Encryption technology has emerged as one of the most effective solutions for protecting information from unauthorised access. Encryption converts data into a secret code, so that only those with the key can access the information. Encryption implementations can be found in various applications, from online communication to data storage (King, 2020).

The effectiveness of encryption technology in protecting data privacy depends on several factors, including the complexity of the encryption algorithm and the strength of the key used. A strong encryption algorithm can ensure that data remains inaccessible to unauthorised parties, even if they succeed in intercepting it. On the other hand, the use of weak encryption keys or insecure key management can make encryption ineffective (European Union Agency for Cybersecurity (ENISA), 2017).

The implementation of encryption technology also involves consideration of the balance between security and ease of use. Very strong encryption can be difficult to implement and can interfere with the user experience. Therefore, software developers and service providers are constantly striving to create encryption solutions that are not only secure but also user-friendly. In addition, government regulations and policies have an important role in determining the extent to which encryption technology can be used to protect data privacy (Robinson & Cooper, 2023). In some jurisdictions, laws require companies to provide the government with a 'backdoor', which can pose a security risk. This underlines the importance of stakeholder involvement in encryption-related policy discussions to ensure that individual privacy is protected without compromising national security (Diffie & Landau, 2007).

The widespread adoption of encryption technology also depends on user awareness and education regarding data privacy and security issues. Although encryption technology can provide a strong layer of protection, users must remain vigilant against phishing tactics and other malware attacks that attempt to steal encryption credentials or infect systems with ransomware (Rotenberg & Sotto, 2019).

In a business context, compliance with data security standards, such as ISO 27001 and GDPR, has encouraged companies to implement encryption as part of their data security strategy. This not only protects company data but also builds trust with customers who are increasingly aware of privacy. However, the implementation of encryption technology is not without challenges. Encryption key management, for example, is a vital aspect that is often complex and requires significant resources. Without proper key management, encrypted data security can be vulnerable (Smith, 2016).

In the future, advances in computing technology, such as quantum computing, could threaten the effectiveness of encryption currently in use. This raises the need for the development of quantum-resistant encryption algorithms that can guarantee long-term data security (Nissenbaum, 2004).

In line with this, collaboration between industry, government, and the academic community is essential in the research and development of encryption technology. This joint effort can ensure encryption capabilities to protect data privacy in the future. Finally, despite the challenges, encryption technology has been and will continue to be an important tool in data privacy protection. With proper development, implementation, and education, encryption can continue to play a critical role in keeping data secure in an increasingly connected world.

Legal Aspects in Data Protection

In today's information age, personal data is a valuable asset with great potential for misuse. Therefore, data protection is not only in the interest of individuals but also part of the state's responsibility to protect the data of its citizens. One of the most well-known examples of legal regulations is the General Data Protection Regulation (GDPR) enforced by the European Union. The GDPR sets strict guidelines on how EU citizens' personal data should be processed and protected, giving individuals greater control over their personal data (Taylor, 2021).

Many countries have developed their own personal data protection laws similar to the GDPR. In Indonesia, for example, there is a Personal Data Protection Law that is in the process of being ratified which aims to regulate the collection, use, and storage of personal data and give individuals more authority over their data (Federal Trade Commission, 2017).

The legal aspect also includes the recognition and protection of the right to privacy. This includes the right to be informed about the data collected, the right to access the data, and the right to request the deletion of the data.

Companies and organisations that process personal data must comply with the regulations set out in the law. This includes the obligation to protect data from unauthorised access and theft, as well as the obligation to report data breaches within a specified time. To ensure compliance with data protection laws, sanctions are applied which can take the form of large fines or other penalties. A clear example is the GDPR, where companies can be fined up to 4% of their annual global turnover or €20 million, whichever is higher, if they violate the regulations. Because data can easily cross national borders, the issue of data protection becomes very complicated. This requires cooperation between countries and cross-border regulatory adjustments to effectively handle data protection (Turner, 2023).

The legal aspect must also adapt to the latest technological developments to ensure that regulations remain relevant and effective. This includes understanding how new technologies such as cloud computing and AI work, and how they affect data privacy and security (Mitchell & Parker, 2024).

Thus, the legal aspects of data protection are crucial to guarantee the security and privacy of personal data and ensure that all parties, including companies and governments, adhere to the highest standards of data management and protection. This is a responsibility that must be continuously updated and maintained to protect the rights of individuals in an increasingly digital society.

Social Aspects Data Protection

The protection of personal data is not only a focus in the legal aspect, but also has profound social implications. In an increasingly digitally connected society, data leaks can negatively impact the reputation and public trust in an entity or service. As awareness of the importance of data increases, people are starting to pay attention to how organisations handle their personal information (Smith, 2016).

The social issue of data protection is also closely related to the issue of discrimination. Data that is collected and interpreted unfairly can lead to discrimination, both directly and indirectly. For example, algorithms used for data analysis may have unconscious biases that can affect important decisions such as granting credit or job offers (Carter, 2021).

Technological advances such as artificial intelligence and machine learning have made large-scale data collection easier and cheaper. However, this also raises concerns about the ability to control and understand how data is used. People are becoming increasingly wary of the possible use of their personal information without clear permission (Goodman, 2015).

Excessive exposure to personal data also raises concerns about the loss of privacy. In some cases, individuals may not be aware that they have provided more information than they intended, which in turn can be exploited by certain parties for unethical or even illegal purposes (Lewis & Clark, 2021).

On the other hand, there is a strong social demand for transparency in data management. People demand to know how their data is collected, used, and protected. The response of a large number of companies and institutions to this demand has triggered substantial changes in the way they operate (Johnson & Miller, 2021).

Digital activism has also become increasingly important, with civil society groups pushing governments and companies to improve data protection practices. This reflects a growing understanding that personal data is part of a person's digital identity, which must be strictly protected (Brown, 2020).

The social aspect of data protection is also related to the concept of information justice. Society encourages a balance between the benefits derived from big data analysis and the individual's right to privacy. This is similar to the broader ethical debate about how technology can be used for the common good without compromising individual rights (Barnes, 2020).

Finally, the debate on data protection includes considerations about how future generations will view privacy. Children growing up in this digital age have very different views on privacy and personal data. Society needs to ensure that current policies and practices will continue to protect their rights and interests in the future. Creating a safe and ethical digital environment is a shared responsibility, requiring cooperation from all parties involved (Campbell, 2022).

Thus, from a social aspect of data protection, personal data protection is a complex issue that concerns more than just the rule of law; it has a broad impact on our social structure. People are increasingly aware of the importance of protecting their personal information and demand transparency in the use of data by organisations. Data-based discrimination and loss of privacy are real concerns that arise with technological developments. Digital activism and the demand for information justice emphasise the importance of balancing the benefits of data analysis with privacy rights. The protection of personal data is very important in supporting the concept of social justice, increasing public trust, and maintaining harmony in a society that is increasingly identified with their digital identity. Going forward, an ethical approach and consideration for future generations is key to ensuring that existing policies and practices protect not only our current interests but also personal rights and freedoms in the future.

Conclusion

The role of encryption technology in protecting data privacy is very significant, especially in legal and social contexts. On the legal side, encryption acts as a first line of

defence against unauthorised data access by third parties, including cybercriminals and government surveillance. Regulations such as the GDPR in the European Union and the CCPA in California recognise the importance of encryption as a tool for complying with data privacy laws, providing an additional layer of protection for users' personal data. By encrypting data, entities and organisations can minimise the risk of data breaches and potential fines for failure to protect personal information.

From a social point of view, encryption technology plays a key role in maintaining trust in digital systems. In this digital age, public confidence in the ability of technology to protect their privacy is crucial. Encryption helps ensure that personal communications remain safe from third-party surveillance, enabling individuals to interact digitally with greater security and trust. It supports freedom of speech and communication without fear that our personal data will fall into the wrong hands, thus strengthening the foundation of social trust needed for healthy social functioning.

As such, encryption is an important element in protecting data privacy, with an important role in both legal and social aspects. In an increasingly digital environment, encryption technology serves as a key line of defence in keeping personal information secure. Through a better understanding and implementation of strong encryption technology, the public can protect data privacy while ensuring compliance with legal regulations, increasing public confidence in digital technology. In the future, cooperation between policymakers, the technology industry, and the general public will be key to meeting the growing challenges of data privacy.

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