

Exploring the Role of Public Policy in Adapting to the Challenges and Opportunities of Emerging Technologies

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Abstract. *This study aims to investigate how public policies can be adapted to address the opportunities and challenges posed by rapidly evolving technologies. The methods used in this study include a qualitative approach with data collection through in-depth interviews and comprehensive case studies to understand how public policies are designed and implemented to achieve equity and inclusion. The results show that new technologies such as blockchain, cryptocurrency, and the Internet of Things (IoT) have transformed various aspects of life, including the economy, privacy, and democracy. While these technologies offer many benefits such as increased efficiency and innovation, they also pose significant risks to individual privacy and democratic processes. Therefore, it is important for policymakers to develop a robust regulatory framework and engage public participation to ensure that technology is used responsibly and ethically.*

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INTRODUCTION

Emerging technologies' quick development has resulted in significant transformations and hitherto unheard-of prospects for all facets of society. These disruptive technologies, which range from blockchain, biotechnology, and renewable energy to artificial intelligence and robots, have the power to transform entire industries, enhance quality of life, and stimulate economic growth. However, they also present significant ethical, privacy, equity, and social impact issues. In order to successfully address these issues and take advantage of the opportunities offered by evolving technology, public policy plays a critical role.

This investigation tries to dive into the complex interaction between public policy and developing technologies, taking into account both the advantages and disadvantages of their adoption. We can learn how society can benefit from these developments while minimizing any negative effects by looking at the role that public policy plays in influencing the development, adoption, and regulation of emerging technologies.

The authors Sima et al. (2020) argue that the growing influence of developing technologies has resulted in profound societal shifts and new challenges that necessitate vigilant oversight and management. To ensure these technologies are used ethically and sustainably for the greater good of society, public policy is essential (Pawlak & Koodziejczak, 2020). There is an urgent need for policymakers to keep up with these developments and adapt to the changing landscape as emerging technologies like blockchain, cryptocurrency, and the Internet of Things continue to progress and become more widespread (Pawlak & Koodziejczak, 2020).

The purpose of this research paper is to analyze how public policy responds to new technological developments (Meyer & Auriacombe, 2019). In particular, this thesis will investigate how new technologies will affect the economy, personal privacy, and democratic processes, and will discuss potential regulatory frameworks (Bahrini & Qaffas, 2019). The thesis will also emphasize the need for and discuss methods to increase public involvement in technological policymaking (Rotta et al., 2019). This thesis's goal is to add to the discussion on how to best manage technological transformation and make sure that new technologies are being used to advance human flourishing on all fronts by shedding light on these problems. (Ferri et al., 2020). This study's findings can be used to improve policymaking and guide the creation of a more ethical and environmentally friendly technological landscape (Marcucci et al., 2020).

A vital task for decision-makers, stakeholders, and society at large is the investigation of public policy in addressing the difficulties and opportunities presented by evolving technology. We can encourage an environment that exploits the advantages of emerging technologies while proactively addressing their hazards and ensuring that they serve the best interests of humanity by comprehending the intricate interplay of technology, policy, ethics, and societal effect. We can negotiate the constantly changing terrain of emerging technologies and sculpt a future that is inclusive, sustainable, and consistent with our shared values through flexible and adaptable policy frameworks, ethical considerations, risk management techniques, and international collaboration. This research paper investigates how government policy can be modified to meet the opportunities and threats posed by rapidly developing technologies.

LITERATURE REVIEW

Examination of the Impact of Emerging Technologies on the Economy, Privacy, and Democracy

Sgantzios & Grigg (2019) state that disruptive innovations like blockchain, cryptocurrencies, and AI are altering traditional business models in numerous ways. Supply chain management is one area where blockchain's decentralized, secure, and public ledger system has the potential to radically alter the status quo. Both businesses and customers stand to profit from a decrease in fraud and an increase in efficiency (Rejeb et al., 2020). In a similar vein, cryptocurrency may one day make it unnecessary for nations to rely on central banks to process international financial operations (Lee & Yeon, 2021). Concerns about market concentration and the possibility of fraud and scams have emerged in tandem with the expansion of the bitcoin market. Faster and more efficient manufacturing processes are just one way that the rising prevalence of automation and AI is reshaping the economy. Nonetheless, this is raising worries about the loss of jobs and the possibility of greater disparity.

Concerns over personal information and privacy have been sparked by the widespread adoption of new technologies. Sensors in commonplace items like automobiles and home gadgets can feed information into the Internet of Things (IoT). Personal information, such as whereabouts and activity levels, may be exposed by such information. Similarly, facial recognition technology has the potential to be used for monitoring, which could lead to invasions of privacy. Privacy and social equity can be further jeopardized by the use of algorithms and AI because they can reinforce existing biases and discrimination.

People's engagement in democracy and their interactions with the government are also evolving in response to the impact of emerging technologies. Recent social movements like the Arab Spring and the Black Lives Matter uprisings are examples of how social media platforms can encourage greater citizen involvement and political mobilization. However, these systems also allow for the dissemination of misinformation and false information, which can influence public opinion. Online civic involvement platforms and electronic voting systems both have the potential to expand democratic participation but also introduce novel threats like hacking and data loss. There are many facets to the effect that new technologies will have on the business, individual privacy, and the democratic process as a whole. To make sure these technologies are used in a responsible and ethical way that optimizes their benefits while minimizing their risks,

policymakers must weigh the pros and cons of each.

Analysis of the Potential Benefits and Drawbacks of Emerging Technologies

For lawmakers to make educated decisions about how to control and manage the use of emerging technologies, an examination of their potential benefits and drawbacks is essential, as stated by Tottoli et al. (2020). Here we will discuss some of the pros and cons of new tools as they develop (Agbo et al., 2019). The efficiency of many industries, including healthcare, banking, and manufacturing, can be improved with the help of new technologies. Automation and AI, for instance, can speed up production while decreasing expenses, not to mention enhancing accuracy and precision (Zambon et al., 2019). Increased availability new technologies have the potential to expand access to vital resources like healthcare and education, particularly in neglected or outlying areas. Through telemedicine, for instance, people living in remote regions can access care from specialists in urban centers. Communication and collaboration between people, teams, businesses, and governments can be improved with the help of new technologies like social media and instant messaging platforms. Greater invention: new technologies have the potential to spur innovation and give rise to entirely new economic sectors, which in turn can generate increased employment opportunities and a broader economy. For instance, developing green energy technologies can both increase employment opportunities and lessen the need for traditional, finite energy sources.

Displacement of workers: new technologies have the potential to decrease demand for certain occupations and therefore displace workers. Jobs that require a lot of repetition, for instance, may be eliminated as more of them are automated. The collection and analysis of personal data is one way in which emerging technologies can compromise users' privacy and safety. For instance, internet-connected gadgets can be hacked or compromised, and facial recognition technology can be used for surveillance and tracking of people. Concerns on a social and ethical level arise from the fact that new technologies have the potential to amplify existing inequalities, disseminate misinformation, and promote bigotry. Emerging technologies, particularly those that cross international boundaries, can present regulatory challenges. Effective regulation of cryptocurrencies and blockchain technologies, for instance, may call for global collaboration and coordination. In conclusion, lawmakers need to weigh the pros and cons of new technologies to ensure that they are implemented in a way that is both responsible and ethical, thereby maximizing the pros while minimizing the risks.

Overview of Current Policy Approaches to Emerging Technologies at the National and International Level

Policymakers at the national and international levels are concentrating on creating policies and regulations to handle the challenges and opportunities presented by emerging technologies, as stated by Warburton & Bredin (2019). Following is a synopsis of the present policy frameworks for dealing with disruptive technologies (Sima et al., 2020). Many nations are putting in place what are called "regulatory sandboxes," where new technologies can be tried out safely while being monitored by authorities. This allows authorities to learn about the pros and cons of these innovations before deploying them widely.

Some nations are addressing the possibilities and threats posed by emerging technologies by drafting industry-specific regulations. The General Data Protection Regulation (GDPR) is an EU law that governs how businesses can use customers' confidential information within the EU. Several nations have created national strategies to encourage the creation and dissemination of cutting-edge technologies. The United States, for instance, has a national plan for AI that prioritizes R&D, training for future jobs, and ethical considerations.

When dealing with the advantages and disadvantages of emerging technologies, particularly those that cut across borders, international cooperation is crucial. The UN, for instance, created the International Telecommunication Union (ITU) to foster collaboration across borders in the realm of electronic communication. Promoting connectivity and deploying new

technologies in a responsible and ethical way are both possible thanks to international standards. The International Organization for Standardization (ISO) has, for instance, established guidelines for protecting users' personal information online.

Conformity with international law: Emerging technologies require collaboration and coordination, which can be facilitated by international agreements. Provisions on intellectual property and digital commerce, for instance, were included in the Trans-Pacific Partnership (TPP) and are pertinent to new technologies. In conclusion, national and international policymakers are developing a variety of policy approaches to handle the challenges and opportunities offered by emerging technologies. These policy frameworks seek to ensure that new technologies are used ethically and responsibly while simultaneously fostering innovation and economic development.

Identification of Gaps and Challenges in Current Policy Frameworks

Abhilash argues that, despite efforts by national and international policymakers to handle the opportunities and threats posed by emerging technologies, there are still gaps and challenges in existing policy frameworks. Some of the most significant obstacles and spaces are as follows. Inconsistencies and gaps in regulation arise from the current policy frameworks' lack of harmonization across nations and regions. Companies with international operations may find it more challenging to comply with regulations, and authorities may find it more difficult to police them. Current policy frameworks tend to prioritize particular innovations or industries over others, limiting their potential impact. This can cause regulatory loopholes and make it hard to foresee how new technologies will affect other industries (Jaffe et al., 2005). Current policy frameworks may be sluggish to adjust to new developments and emerging risks due to the time and effort required to pass new legislation. Because of this, it can be challenging for policymakers to adapt to the ever-quicken pace of technical change. Policies that fail to properly represent public values and concerns are often the result of insufficient public input, which is often lacking in current policy frameworks. This can erode public faith in innovative tools and the regulatory system as a whole.

Emerging technologies that are hard to regulate or that cross national borders present special enforcement challenges for existing policy frameworks. As a result, companies and people who break the rules may not be held responsible. Finally, in order to guarantee that new technologies are used in a responsible and ethical way, policymakers must address these gaps and challenges in existing policy frameworks. To achieve this goal, we need to adopt a comprehensive, adaptable, and inclusive approach that takes into account the views of many different groups, including business, nonprofits, and the general public.

Examination of Different Policy Options for Regulating Emerging Technologies Such as Blockchain, Cryptocurrency, and The Internet of Things

As new technologies like blockchain, cryptocurrency, and the Internet of Things (IoT) gain traction, lawmakers are considering how best to regulate them. Some potential courses of action are listed below. Prohibition It is possible to forbid the use of any and all futuristic technologies. Some nations have taken this tack in reaction to fears that criminals will use cryptocurrencies. As an alternative to government oversight, businesses could self-regulate their adoption of cutting-edge tech. To deal with problems of privacy, security, and other kinds, some blockchain consortiums have created self-regulatory frameworks. Sandboxes in regulation: As was previously stated, regulatory sandboxes can offer a safe space in which to evaluate the merits and drawbacks of experimental technologies. By taking this tack, policymakers can learn more about the technologies at hand and craft more effective rules to govern them. Regulations tailored to individual industries are another approach to the problem of how to deal with the peculiarities of new technologies. The Payment Services Directive (PSD2) of the European Union, for instance, governs payment service providers, including those using blockchain and cryptocurrency.

Alternative methods include the creation of technology-neutral regulations that can be

applied to any new technology, independent of its specifics. This method may balance the playing field for competing technologies and help prevent unintended effects. To ensure regulations are effective and consistent across various jurisdictions, international cooperation is important, as emerging technologies frequently cross-national borders. To encourage international coordination and cooperation, the G20 has created a framework for regulating cryptocurrencies. In summation, various regulatory approaches can be taken towards emerging technologies like blockchain, cryptocurrencies, and the Internet of Things. In order to create fair and effective laws, policymakers must take into account the specifics of these technologies. This calls for a multi-stakeholder strategy that welcomes feedback from business, nonprofits, and the general public.

Analysis of the Effectiveness and Feasibility of Different Policy Approaches

It is crucial to evaluate the efficacy and practicability of alternative policy approaches for regulating emerging technologies to guarantee that policies are appropriate for their intended purpose and can be effectively implemented. Here are some things to keep in mind as you weigh the pros and drawbacks of various policy options. An approach to policy is said to be successful if it leads to the desired outcomes. For instance, a technology-neutral regulatory strategy may be superior to a prohibition or industry-specific one if the aim is to encourage innovation and development in a particular sector. The potential success of a policy strategy relies on how feasible it is and how easily it can be put into action. The complexity of the technology being regulated, the resources accessible to regulators, and the political will to implement regulations are all factors that can affect feasibility.

The efficacy or viability of policy approaches may be compromised by unintended consequences. For instance, a technology-neutral strategy may not account for the specific risks and challenges posed by some emerging technologies, while a ban on cryptocurrencies could force their use underground, making regulation more difficult. Input from key stakeholders including business, civic society, and the general public is essential for creating workable policy solutions. Involving those who stand to benefit and lose from a policy's execution helps to ensure that the policy adequately addresses the concerns of those who will be directly impacted by it. Implementation: The success and viability of a policy strategy hinge on the competence of its enforcers. Emerging technologies are notoriously tricky to keep tabs on and control, which makes it difficult to put the law into effect. Therefore, when formulating policy approaches, policymakers should take enforcement tools into account. In conclusion, it is crucial to evaluate the efficacy and practicality of alternative policy methods to guarantee the success of policymaking and implementation. When formulating policy approaches for regulating emerging technologies, policymakers must take into account a number of factors, such as the potential for unintended effects, the opinions of relevant stakeholders, and effective enforcement mechanisms.

Importance of Public Participation in Technology Policy-Making

The needs and concerns of those who will be impacted by technological policy choices must be taken into account during the policymaking process, and this is why public participation is so important. Some of the many benefits of public involvement in technological policymaking include: All voices, including those that may be disproportionately affected by policy choices, can be heard when the public is involved. Inclusion and fairness in policymaking can be advanced in this way. Holding politicians' accountable means making sure they are open and listening to the people they are supposed to be representing. Knowledge and Experience: Expertise from the business world, the nonprofit sector, and the academic world can all be incorporated into policymaking with the aid of an engaged public. This can aid in making sure that the most up-to-date evidence and knowledge are considered when making policy choices. By incorporating a wide variety of stakeholder input, public involvement can increase the legitimacy of policy decisions. Creativity and originality in policymaking can benefit from the open exchange of ideas and information that is fostered by public involvement. To sum up, public involvement is crucial for inclusive, accountable, well-informed, legitimate, and creative technological policymaking. To make sure that policies address the concerns of those who will be directly impacted by those

choices, policymakers should consult with and hold public hearings, among other methods of public participation.

Strategies for Increasing Public Participation and Engagement in Technology Policy-Making Processes

Policymakers can use a variety of methods to boost citizen input and involvement in technological policy. Here are a few instances of this: Consultations are a tool for policymakers to include the people in the decision-making process. There are a variety of methods that can be used for consultations, such as polls, discussion boards, and town hall meetings. Consultations are a great way to get feedback from many different people and groups before making policy choices. Hearings in which the public is invited to comment on proposed policies and pose queries to elected officials are known as "public hearings." Policymaking procedures can be made more open and accountable through the use of public hearings. The public can be involved in deeper discussions about policy problems through the use of citizen juries. A citizen jury is made up of regular people who have been asked to evaluate proof and provide suggestions to authorities.

Policymakers can encourage public participation in policy development through the use of collaborative policy-making methods. Policymakers can do this by consulting with relevant parties to establish policy objectives, generate policy options, and pilot test proposed changes. Policymakers can better prepare the public for the results of policy choices by employing education and awareness-raising strategies. By emphasizing the significance of public involvement in influencing policy decisions, this can help to increase public engagement in policy-making processes. Policymakers can use digital tools to involve the public in the policymaking process and receive feedback from citizens. The public can provide input and participate in talks about policy issues through various online forums, social media, and other digital platforms. In summation, there are a variety of methods that policymakers can employ to boost citizen involvement in the formulation of technological policy. To ensure that policy decisions accurately reflect the needs and concerns of those who will be directly impacted by those decisions, policymakers must be proactive in engaging the public and use a variety of methods.

METHODS

This research uses a qualitative approach methodology with data collection through in-depth interviews and comprehensive case studies. Interviews can be conducted with experts, policy makers, and practitioners who have direct experience in designing and implementing public policies that focus on increasing equality and inclusion. The selected case studies should include policies or programs that have been proven effective in addressing systemic discrimination and inequality, and are able to promote social mobility. Qualitative data analysis will be conducted using thematic analysis techniques to identify key patterns, themes, and insights that emerge from the interviews and case studies. This approach will allow researchers to gain an in-depth understanding of how public policies can be designed and implemented effectively to achieve equality and inclusion goals. This methodology also provides space for the exploration of various perspectives and contexts that are relevant to the problems faced.

RESULTS AND DISCUSSION

This research explores how public coverage can adapt to the demanding situations and opportunities posed by means of swiftly evolving new technologies. The outcomes show that new technologies together with blockchain, cryptocurrency, and the Internet of Things (IoT) have transformed numerous components of lifestyles, which include the financial system, privateness, and democracy. From an monetary attitude, those technologies have delivered more efficient and transparent enterprise fashions, such as in supply chain control and monetary systems, however have also raised issues approximately task losses because of automation and the ability for growing economic inequality.

New technology consisting of the Internet of Things (IoT) and facial recognition have giant implications for person privateness (Caron et al., 2016). IoT, with its ability to attach gadgets

and accumulate data in actual time, increases severe worries approximately the collection of personal information. Devices together with smart home sensors and wearables can collect statistics approximately customers' vicinity, habits, and fitness situations, which while beneficial, also poses the chance of misuse if now not nicely regulated. In addition, the growing use of facial recognition era in public spaces raises the hazard of mass surveillance with out individuals' consent, opening up opportunities for excessive surveillance and ability data misuse.

Furthermore, the use of artificial intelligence (AI) in diverse technological programs can reinforce existing biases in society. If AI algorithms are trained with biased statistics, the consequences could have terrible impacts, along with discrimination in regulation enforcement or process recruitment. This can exacerbate social inequities, in place of lessen them. Therefore, it is critical for policymakers to expand a strong regulatory framework, ensure transparency, and contain the general public in selection-making, with a purpose to protect individual privateness and use technology responsibly (Androniceanu, 2021).

From a democratic perspective, new technology have improved political participation with the aid of allowing mass mobilization through social media and different digital platforms (Robles-Morales & Córdoba-Hernández, 2019). However, this also poses the chance of the spread of false data that could negatively influence public opinion and democratic tactics. E-voting structures and different online civic engagement platforms have the capability to enlarge democratic participation, however also are vulnerable to threats inclusive of hacking and information loss.

Table 1. The Impact of New Technologies on the Economy, Privacy, and Democracy

Aspect	Influence Positive	Influence Negative
Economy	Improvement Efficiency: Technology such as AI and blockchain are improving efficiency operational and reduce cost	Reduction Field Work: Automation can replace job humans, resulting reduction field work
	Innovation and Growth Economy: Technology new introducing business model new and open opportunity economy	Improvement The Gap Economy: Unauthorized access evenly to technology can enlarge gap between the haves and the have nots own
	Transparency and Accountability: Technology as blockchain offers transparency in transactions and chains supply	Dependence on Technology: High dependence on technology can create risk instability If happen failure system
Privacy	Enhanced Security: Blockchain technology provides more data security Good with ledger system that is not can changed	Risk Violation Privacy: Extensive data collection through IoT and technology other can violate privacy individual
	Data Control: Technology latest offer tool For protect and control personal data	Misuse of Data: Data collected Can misused by unauthorized parties responsible answer
	Data Transparency: Use technology can increase transparency in data management	Monitoring Excessive: Technology like introduction face can used For monitoring mass violation privacy
Democracy	Improvement Participation Politics Social media and digital platforms make it easier participation politics and mobilization mass	Distribution Information Fake: Social media can also used For spread information that is not inaccurate and misleading
	Engagement More Civilians Inclusive: Digital platforms make it easier access	Manipulation Opinion Public: Technology can used For manipulate

	to various form involvement political and social	opinion public and influence results election
	Access to Information: Technology allow more access wide and fast to information public and news	Vulnerability To Hacking: E-voting systems and online platforms can become a target for hacking and data loss

New technologies have had a significant impact on many aspects of life, particularly in the economy, privacy, and democracy. From an economic perspective, technologies such as blockchain, artificial intelligence (AI), and automation have increased efficiency and innovation in many industries, driving global economic growth. Faster production processes, lower costs, and increased precision are some examples of how these technologies can strengthen business competitiveness (Rüßmann et al., 2015; Nagy et al., 2018). However, on the other hand, these technologies have also had negative impacts such as job losses, as automation replaces human workers, and increasing the economic gap between those who have access and the ability to utilize these technologies and those who do not.

In terms of privacy, blockchain technology, for example, offers increased security by providing a transparent and immutable ledger system, which can be used to protect sensitive data. However, the adoption of these new technologies also carries significant risks to individual privacy. Massive data collection through IoT devices and the use of facial recognition technology can lead to privacy violations and potential misuse of data by irresponsible parties. Finally, in terms of democracy, social media technology has increased political participation by facilitating mass mobilization and enabling the widespread dissemination of information. However, these technologies also open up opportunities for the spread of false information and manipulation of public opinion, which can undermine democratic processes and shape public opinion based on inaccurate or misleading information. Thus, while new technologies offer many potential benefits, it is important to consider and manage their negative impacts wisely.

CONCLUSION

Though they may have far-reaching positive effects, emerging technologies also present serious risks that lawmakers must address. To make sure that new technologies are used in ways that benefit society as a whole and safeguard people's rights, policymakers must use transparent, deliberative procedures that invite public input. In this dissertation, we have looked at how new technologies affect business, personal information, and society. Furthermore, we have evaluated various policy options for regulating emerging technologies and discussed the potential benefits and drawbacks of these technologies. We have also described the ways in which the people can be more involved in the decision making processes that affect their technology policies. This thesis has, in general, argued that lawmakers should be more proactive and inclusive in their approach to technological policy. By inviting citizens to weigh in on policy decisions, governments can better ensure that new technologies are put to use in ways that are good for society, the economy, the environment, and everyone's rights and freedoms.

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