

Postprint: The Phased Evolution, Logic, and Prospects of Global Information Policy Research Over the Past 50 Years

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Abstract

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Full Text

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50 Years of Global Information Policy Research: Staged Evolution, Logic, and Prospects

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Abstract: [Purpose/Significance] This paper combs through and clarifies the developmental logic behind the evolution of global information policy over the past 50 years, and identifies future research directions by looking back at history. [Method/Process] Using bibliometric analysis, knowledge mapping, and other methods, this study analyzes more than a thousand pieces of information policy research literature spanning over half a century to summarize and prospect the emergence, evolution, and future development trajectory of information policy. [Result/Conclusion] Based on characteristic changes in publication volume, keyword centrality and burstiness, and keyword clustering, the staged evolutionary process of global information policy research is delineated: the information society policy-led stage (1967-1985), the scientific and technical information policy-led stage (1986-1992), the technology diffusion policy-led stage (1993-1998), the Internet policy-led stage (1999-2005), the data governance policy-led stage (2006-2011), the social media policy-led stage (2012-2014), and the Internet of Everything policy-led stage (2015-present). The analysis reveals a profound interactive relationship between this staged evolution and the transformation of the information environment. In the future, the path-dependent nature of logical evolution will continue to drive information policy research to co-evolve with information technology and the information environment, addressing new regulatory challenges that comprehensive social informatization brings to information policy.

Keywords: information policy; evolutionary process; social informatization; information environment; development trend

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In recent years, global society has gradually entered ubiquitous information environments, where individuals and organizations are constantly in a “connected” state. Sensitive information such as personally identifiable information (PII) is being collected and analyzed on a massive scale [1], and information leakage incidents occur more frequently than before with serious consequences [2]. This has made information policy and its research more important than ever, both in practical application and academic value. For instance, the United States’ “National Information Infrastructure: Agenda for Action” [7] proposed in the 1990s represents a famous example that not only deepened the recognition of information policy’s value at the national, organizational, and citizen levels, but also provided a reference and model for information policy research worldwide.

Scholars at home and abroad have offered diverse conceptual definitions of information policy, though their connotations are largely similar. Based on the research focus of this paper, we adopt a comprehensive definition provided by S. Braman: information policy includes a series of laws, regulations, and the-

oretical statements concerning information generation, processing, circulation, access, and use, as well as other decisions and practices that affect society's information activities [8]. This conceptual connotation and the aforementioned examples all demonstrate the interactive transformation among information policy, information technology environment, and information society environment. Different historical development stages (for example, moving from industry-specific micro information environments to socially embedded macro information environments) require different information regulation models and content, and information policy inevitably undergoes a complex evolutionary process. However, few existing studies have analyzed and summarized the evolutionary logic of global information policy along a temporal trajectory, and the developmental 脉络 and evolutionary trends of global information policy since its inception have not been fully revealed. In an era of intensifying societal informatization that brings new transformations and challenges to humanity, exploring the concerns of information policy in each period and examining the path dependence of information policy evolution can help project future developments and guide research directions for the new era. This is another important objective that this study hopes to achieve by 梳理 ing the staged developmental history of information policy.

2 Research Methods and Data Processing

2.1 Research Methods

This study primarily employs quantitative methods from bibliometrics and visualization methods from knowledge mapping to analyze literature on information policy research published from the 1960s, when social informatization was proposed and began rapid development, through the 2020s. Specifically, we examine annual publication distribution, keyword centrality and burstiness across different years, and other indicators. By drawing cluster maps and 梳理 ing result changes, we divide information policy research into stages and reveal its evolutionary logic. The analysis also incorporates methods such as stage-based keyword clustering and keyword timezone distribution. For principles and significance of these methods, please refer to the literature [9], which will not be repeated here. All these methods can be implemented through the efficient, user-friendly, and widely adopted CiteSpace software in social sciences [10].

2.2 Data Sources

Since the West has historically been at the forefront of information technology development and entered the information society earlier to conduct information policy research, analyzing global information policy literature provides a more comprehensive and reasonable perspective. Based on the internationally renowned Journal Citation Reports (JCR) evaluation system, this study uses the Web of Science database. After multiple attempts, initial literature was retrieved using the title search point with "information polic" (*considering expression variants, the specific search term used was "information polic"*). The

initial source literature had high specificity (good precision) but slightly insufficient recall. Three methods were then employed to improve recall and expand the literature collection: supplementing literature from emerging information policy research fields that might be difficult to discover through "information polic*" alone, such as Data Governance; examining citing literature of highly cited or central documents through a "snowballing" approach to include relevant information policy studies; conducting additional searches via Scopus and Google Scholar, with deduplication to supplement the collection. After obtaining the combined literature set, we screened for relevance by examining titles, abstracts, keywords, and content of ambiguous cases, resulting in a final collection of 1,535 pieces of literature. All bibliographic feature data were uniformly obtained from the Web of Science Core Collection, ensuring good data quality while improving precision and recall. Additionally, the original retrieval results contained unreasonable document types; we included only research articles and conference papers with abstracts, excluding non-research types such as book reviews and editorials. Data finalization was completed in November 2021.

3 Global Information Policy Research Data Analysis Results

3.1 Annual Publication Distribution Analysis

As shown in Figure 1 [Figure 1: see original paper], the number of information policy research publications demonstrates a clear overall upward trend. An exponential trend line was fitted, clearly reflecting the accelerating growth of information policy research output, with excellent fit ($R^2 = 83.86\%$). The first article in the dataset, published in 1967, was "Guiding Principles for National Documentation-Information Policy in the Field of Science and Technology" [11], which opened the curtain for information policy as a specialized research field. Each peak in Figure 1 is annotated with the corresponding publication count. In the nearly 20 years that followed (1967-1985), annual publications numbered only in single digits. In 1986, information policy research publications first broke into double digits, reaching 23 articles. In 2004, they first exceeded 40 articles; in 2013, they first exceeded 60 articles; and in 2015, they first exceeded 100 articles. As time progresses, information policy research has become increasingly popular, with accelerating growth that shows no sign of abating. After breaking the 100-article annual threshold in 2015, yearly publications have mostly remained above 100. This trend has developed alongside the maturation of information technology and deepening social informatization, demonstrating a symbiotic and mutually prosperous relationship.

3.2 Node Centrality Analysis

Examining keyword centrality by year (see Table 1) reflects keyword importance during specific periods. The evolution of major keywords across different periods reveals the historical trajectory of information policy. Through burst

word detection methods, node burstiness analysis can be conducted (see Table 2). Abruptly emerging keywords often signify new research hotspots in corresponding periods and can, to some extent, predict trends for the next cycle.

4 Global Information Policy Research Staged Evolution Characteristics

Based on the data analysis results and specific content characteristics from the previous stage, this study divides the evolution of information policy into the information society policy-led stage (1967-1985), the scientific and technical information policy-led stage (1986-1992), the technology diffusion policy-led stage (1993-1998), the Internet policy-led stage (1999-2005), the data governance policy-led stage (2006-2011), the social media policy-led stage (2012-2014), and the Internet of Everything policy-led stage (2015-present). The specific characteristics of each stage are elaborated below.

4.1 Information Society Policy-Led Stage (1967-1985)

As shown in Table 3 and Figure 2 [Figure 2: see original paper], the general public began to truly access digital information, which not only propelled all humanity into the information society but also created the first opportunity for information policy research. The first commercially successful personal computer, the Altair 8800, was introduced in 1974, bringing the first revolution of social informatization and directly triggering a boom in information policy research. Microsoft, now familiar to global information users, was founded in 1975, followed by Apple in 1976. During this stage, both computer hardware and software achieved major, groundbreaking breakthroughs for personal use. For hardware, Intel was established in 1968 and launched its epoch-making microprocessor in subsequent years; the mouse, an accessory that brought convenient operation and enhanced user experience, was also invented in the same year. For software, MS-DOS, the earliest operating system for personal users, was developed in 1981; many later creative technologies that would transform the information ecology also began to sprout during this period, including graphical user interfaces, menu-based operations, and icons.

The formation of a new information environment built upon personal computers boosted the introduction of information regulations and researchers' attention to information policy research, ultimately enabling information policy research to develop into a specialized field and enter the information society policy-led stage. In 1981, the United States passed the Information Science and Technology Act, which required the establishment of the Information Policy and Information Institute as an independent agency within the federal government. The famous Bayh-Dole Act was also passed during this period.

During this stage, annual information policy research publications numbered only in single digits, which aligns with the characteristics of a research field in its infancy. To a large extent, this was also due to the limited development level

and penetration of information technology at the time, as well as its relatively low integration with society and capacity for societal transformation. Research discussions during this period focused primarily on standalone computers with niche applications, and when addressing the potential holistic transformation of information processing methods and workflows through informatization, the discourse remained prospective and speculative. Moreover, such discussions were often confined to macro-level management perspectives. Consequently, words with high centrality were mainly related to computer science and management. For burst words, this stage was characterized by policy considerations at the government level (Government Information Policy) and national level (National Information Policy), particularly focusing on the U.S. government (Federal Information Policy). The research examined how to regulate social information at the macro level through policy making. While U.S. information policy research occupied a central position, some studies also focused on other countries. For example, V. Rosenberg used Brazil as a case to explore information policies regulating information transmission and computer software/hardware in developing countries, arguing that information policymakers in developing nations needed to weigh different factors [12].

4.2 Scientific and Technical Information Policy-Led Stage (1986-1992)

Shortly before this stage began, Microsoft officially launched Windows 1.0 in November 1985, followed by Windows 3.0 in 1990—the first widely successful operating system among personal users and considered a revolutionary OS that laid an important foundation for society’s move toward informatization and digitization. Meanwhile, desktop personal computers entered the market in the second half of 1986. However, computers and their operating systems during this period still suffered from poor performance, limited functionality, and high prices, resulting in low coverage among individual and household users. They were primarily applied in scientific and technological research fields where they were most needed. Using information technology and means to acquire and preserve scientific and technical information became an important “weapon” for countries to develop their own science and technology, and the resulting issues of scientific and technical information transfer and confidentiality drove a new round of information policy research. This stage of information policy research focused on a traditional and typical field within information science—scientific and technical information—thus entering the scientific and technical information policy-led stage.

As shown in Table 4 and Figure 3 [Figure 3: see original paper], during this stage, countries generally faced urgent needs to develop science and technology and achieve national prosperity through technology. The main concerns were the collection, organization, and application of scientific and technical information, particularly patent information (European Patent) and scientific achievements. Consequently, information policy research largely revolved around these issues. For example, H. Y. R. Hwang’s research focused on South Korea’s policy, us-

ing Japan as a benchmark to propose countermeasures for improving economic competitiveness through better scientific and technical information policy [13].

Words with high centrality were mostly from scientific and technical disciplines such as chemistry, environmental science, and engineering. However, since information policy is fundamentally a humanities and social science consideration, words like political science and sociology also appeared. Among burst words, Information Age and Information Society emerged as leading indicators for subsequent research. In reality, however, society had not yet fully entered the information society; the main task was to provide information services for enterprises and research institutions engaged in scientific research and innovation. Notably, the first large-scale network virus—the Morris Worm—appeared in 1988, making people aware of the power of computer viruses. Since then, more and more viruses have been created and spread, sounding the alarm for inadequate computer security policies.

4.3 Technology Diffusion Policy-Led Stage (1993-1998)

As information technology steadily advanced and its usage costs gradually decreased, IT continuously diffused and penetrated various industries. The new stage of information policy research became linked with industry developments, entering the technology diffusion policy-led stage, as shown in Table 5 and Figure 4 [Figure 4: see original paper]. Industries more closely related to information, or those more dependent on information for service delivery, saw more discussions on information policy. The most typical research field was business. The study also found that the healthcare sector began discussing relevant information norms early on. For example, E. H. Kluge and D. M. Robinson both discussed health information stored in electronic medical records, arguing for a balance between accessing patient data and protecting personal privacy, seeking special paradigms for privacy, security, confidentiality, and access [14-15].

During this stage, information policy was increasingly used as a policy instrument. Researchers emphasized both the standardized application of information technology in industries (Information System, Information Technology Standards) and the formulation of corresponding regulations, proposing that information policy should be continuously improved alongside industry development. For instance, W. E. Moen's study attempted to improve uncoordinated, mixed, scattered, and unsupervised information technology standard policies, arguing that technical standards constitute an important component of information policy [16].

4.4 Internet Policy-Led Stage (1999-2005)

The Internet policy-led research stage maintained a relatively stable annual publication volume, generally above 20 articles, with a significant increase to 41 articles in 2004. Similar to the popularization path of standalone computers, the networking of computers underwent a long-term technological accumulation

process. Representative events included the 1996 World Network Computer Conference and President Clinton's subsequent announcement of a new five-year Internet plan. During this stage, not only the Internet but also satellite networks and digital television networks matured and entered households. In addition to the evolution of the Internet itself, Microsoft launched Windows XP in 2001—the first generation of OS not based on the DOS kernel—and AMD released the first desktop 64-bit processor in 2003. The leapfrog development of computer performance and comprehensive improvement of system usability together enabled more ordinary users to access the Internet through personal computers, rewriting the development process and behavioral patterns of human society.

Since the modern Internet accessed by the public did not mature until the late 1990s, although the Digital Millennium Copyright Act (DMCA), Telecommunications Act of 1996, and Data Protection Directive were enacted by the end of the 20th century, information policy research did not fully shift to address the series of problems brought by the booming Internet and explore corresponding solutions until after 1999. As shown in Table 6 and Figure 5 [Figure 5: see original paper], words like online, cyberspace, web-based, and similar terms increasingly appeared in information policy research. Due to the anonymity of cyberspace and the uncontrollability of information dissemination, ethical issues were discussed by more researchers and continuously appeared in research outcomes. Since cyberspace is not a private domain but a public sphere, information privacy concerns, particularly the protection of personal information, also attracted significant attention. Similar issues included intellectual property in cyberspace. The Internet space is not all bright; while bringing benefits, it also has many dark corners, making cybercrime a major concern for many studies. Meanwhile, the emergence of the network led to the vigorous development of e-commerce, and information policy expanded into new research areas to answer how to protect the interests of enterprises and consumers.

During this period, genomic research in biology also began to flourish and made significant progress, such as the completion of the basic human genome map in 2000 and the Human Genome Project in 2003. As a special type of genetic data, it is both objective bioinformatics data and personal privacy, making its rational use and necessary protection a research hotspot. Genomic Data appeared among the burst words of this stage. A typical study by M. Häyry et al. discussed core concepts of rights, obligations, privacy, autonomy, and confidentiality of genetic information, providing ethical guidelines and policy recommendations for this field [17].

4.5 Data Governance Policy-Led Stage (2006-2011)

At the beginning of this stage, information policy research output also showed a noticeable contraction, with only 18 articles published in 2006. This may be a characteristic of transitions between stages, requiring a process of contraction before expansion. From 2007 onward, annual publications stabilized above 40

articles, maintaining this trend until the end of the stage.

In the previous Internet policy-led stage, many transformations brought by information technology were often confined to specific fields or industries, resulting in many information silos, and information policy research focused on solving policy issues in concrete application scenarios. However, as shown in Table 7 and Figure 6 [Figure 6: see original paper], with the arrival of the open era, people hoped to break down information silos and connect data to form a unified information world. This openness was also manifested in more content entering cyberspace, making it a native space for information publication, particularly open-source content. This pushed information policy research into the data governance policy-led stage, which began to address fundamental issues in information circulation and use, attempting to establish a sound framework for information policy from the essential level of data governance, such as creating digital licenses, ensuring good user access, providing effective information protection, and even rising to philosophical considerations.

During this stage, more and more data, particularly micro-level data, appeared in cyberspace or was transmitted through networks, which could contribute to socio-economic development in multiple ways but could also cause harm if misused. Data privacy gradually replaced information privacy as a new hotspot. Information policy research also began to concern itself with new data sources, such as policy protection for newly emerging RFID data. As smartphones with positioning functions gradually entered public life, concerns about location data began to emerge even before widespread adoption. Early cloud computing policy research also appeared. The application of technical means in information policy received increasing attention, most notably encryption technology and cyber-attack prevention technologies. New changes also emerged in some industries, particularly unprecedented progress in e-government and considerable attention to telemedicine. Meanwhile, with the widespread arrival of the information society and the increasing number of information-embedded social life scenarios, information inequality became an increasingly prominent social issue and an important aspect of information policy research, especially how to improve or even bridge information poverty through policy to ensure equal information access and information literacy for all social members.

4.6 Social Media Policy-Led Stage (2012-2014)

Although social networking sites (SNS) had begun to sprout in the previous stage, they did not become a common focus of researchers' attention, mainly because mobile devices only became popular after entering the 2010s. Subsequently, the atmosphere for user participation in information creation became relaxed and free, and social media gradually flourished, with user-generated content growing rapidly in a short period. The enhanced popularity of information policy research is not unrelated to this development. As social media information and personal information began to pour in, the information society started to affect every member of the social network, pushing global information policy

research into the social media policy-led stage, as shown in Table 8 and Figure 7 [Figure 7: see original paper].

Compared with previous stages, the publication volume in the social media stage reached new heights, with 63 articles in 2013 and 75 in 2014. As more and more netizens joined the creation, collection, organization, and application of information, and with the vigorous development of social media, every user could easily voice their opinions. Even without actively publishing content, users continuously provided data to the outside world. Since everyone's large amounts of information began to be transmitted through networks, this was in fact a stage where privacy protection became increasingly challenging. Confidentiality of information and effective data protection became urgent issues to address. In the ubiquitous, always-connected cyberspace, how to ensure users' network information security, particularly protecting sensitive information, received widespread attention from researchers, with studies finding that countries with more extensive Internet usage paid more attention to cybersecurity [18]. Effective review and regulation of massive content in online social networks became a hot research issue [19]. Specialized cybercrime prevention programs also emerged, hoping to establish basic, consensus-based information behavior norms through global 联动 policies.

On the other hand, information policy research in this stage blossomed in full: as information silos were further broken, issues arising during data linkage received further attention, particularly how to implement holistic coordination and regulation. Under the trend of increasingly convenient global information transmission, researchers began to pay attention to regional differences and imbalances to formulate differentiated national policies. Some also focused on gender differences and the information needs of special groups, hoping to ensure equal information rights for all groups through information policy—an effort that actually continued the work of solving information inequality. For example, M. Sourbati examined the media access capabilities of disabled people in Europe and explored their relationship with multidimensional features of social inclusion policy [20]. This period also saw the first appearance of terms like Big Data, due to significant improvements in hardware performance and software computing power. Moreover, words like algorithm became highly central, with artificial intelligence algorithms still attracting attention for many regulatory issues today [21]. The maturation of cloud computing led to extensive discussions, with differentiation into various cloud spaces and specific discussions on cloud services, including private cloud, public cloud, and hybrid cloud.

4.7 Internet of Everything Policy-Led Stage (2015-Present)

In the Internet of Everything policy-led stage, with information technology iterating at an increasingly rapid pace, information policy research has entered its most prosperous period, breaking the 100-article mark in 2015. Each subsequent year has maintained around 100 publications, peaking at 124 articles in 2017. Looking back at the early stage when only a handful of articles were

published annually, the unprecedented attention to information policy research becomes evident. As shown in Table 9 and Figure 8 [Figure 8: see original paper], this stage features more keywords appearing at a faster pace, indicating that the advancement of the information society process cannot be separated from the regulation and protection of information policy.

If networks in previous stages still failed to break original physical limitations, the Internet of Everything stage has become one where everything is information and everything can be networked. Particularly with the addition of the Internet of Things (IoT) and sensor networks, objective entities previously considered non-living have joined human cyberspace, continuously generating massive amounts of data and making the global network increasingly vast and complex. In addition to sensor networks, the shipment volume of smart wearable devices has repeatedly hit new highs, with an increasing proportion of the public owning mobile devices. Mobile apps have gradually become part of people's lives, and social media platforms based on mobile devices have flourished. This makes it impossible for anyone to live in a digital society without information, and sometimes even to be "swept along" by information, significantly influencing information policy research content. How to enjoy the convenience brought by technology without causing harm to users from ubiquitous digital information is a question with both academic and practical significance.

Since everyone is continuously and uninterruptedly generating and having various types of information recorded, whether actively or passively—such as mobility data generated instantly and locally based on mobile devices—personal data preservation, privacy preservation, privacy protection, and privacy shield appear repeatedly in the analysis results. Considerations of cyberspace information security policy are particularly popular in this period, and Big Data privacy has become a new hotspot in information policy research. Researchers have developed multi-dimensional integrated models [22], with increasingly rich specific research topics receiving continuous attention, such as how to make information use and protection more personalized and differentiated, how to ensure data anonymization while enabling effective information utilization, how to implement access control to prevent data breaches, how to enforce privacy protection during data mining, and how to avoid illegal information theft through proper authentication.

On the other hand, the implementation of information security policies increasingly relies on emerging technical means, with diversified information security technologies receiving further attention from researchers. Among highly central keywords are information security-specific terms such as trustworthiness, transparency, k-anonymity, l-diversity, and homomorphic encryption. Meanwhile, with breakthrough developments in artificial intelligence technology during this stage, machine learning has been increasingly applied in information regulation implementation. Big data has also shown a distributed development trend, becoming a concern for information policy researchers, with MapReduce appearing among high-centrality keywords. Research from this period also shows

that information policy research is highly sensitive to emerging trends, with blockchain, which emerged only a few years ago, and smart home, which could only be truly realized in the Internet of Everything era, already becoming highly central topics.

Although in current contexts information increasingly equates to network information, digital information, or even information generated by social media and mobile apps, traditional information existing in or derived from physical entities still awaits regulation, most notably genetic information. With the deepening development of genomics and commercial applications of personal gene sequencing, privacy protection for this biological information data has also become a focus of information policy research. Among burst words in this stage appears direct-to-consumer genetic testing (DTC-GT), which researchers believe has insufficient attention to consumer privacy expectations and protection [24].

5 Global Information Policy Research Evolution Logic

Following the above discussion and the evolutionary trends of information policy, we can see that information policy has historically emerged to resolve information contradictions and conflicts, developing and flourishing alongside information technology development and information environment evolution. To further confirm this fundamental logic driving information policy research development, a timeline view was reconstructed (see Figure 9 [Figure 9: see original paper]) to display keyword clustering results. The core keywords of information policy research evolved from Internet, online privacy, and e-commerce in the 1990s, to cloud computing, data privacy, and data protection in the 2010s, and then to online social networks, Internet of Things, and differentiated privacy today. Each evolution of information policy research bears clear imprints of technological development. In each stage, researchers focused on solving current information dilemmas, particularly information contradiction issues causing social confusion. Although occasional forward-looking discussions beyond current realities can be seen in information policy research, studies that surpass technological development have rarely become mainstream in their time. Based on the path-dependent nature of information policy evolution logic, information policy will undoubtedly continue to co-evolve with information technology and the information environment in the foreseeable future.

Examining the historical process of information policy research reveals that, on the one hand, the real-world information environment, information technology, and information users determine or significantly influence the development process of information policy research. On the other hand, information policy research outcomes also exert direct or indirect influences on various elements of the information environment, particularly directly regulating human behavior in all aspects of information processes. Some studies even consider information policy as a human development paradigm [25]. However, information policy is imperfect in most cases; a policy's introduction usually cannot regulate all real contradictions or fit all real situations. During implementation, disconnections

between policy intentions and real information spaces may be discovered, or information contradictions may generate new variations under regulation, such as increasingly diverse and concealed cybercrimes. This provides ideas and basis for the improvement, adjustment, or termination of information policy research, enabling it to play a new round of normative roles for the defects of information technology and irrational behavior of information users, guiding the information society toward a more harmonious, stable, and orderly direction and ensuring comprehensive and sound protection for the information society in which humanity lives. In summary, the process of information policy emergence and development can be summarized in Figure 10 [Figure 10: see original paper].

6 Global Information Policy Research Future Prospects

Regardless of whether Moore's Law has failed [26], history has proven that technological updates will not stop and may even become more frequent and rapid. The trend of a new round of technological revolution is already visible, with technologies such as pattern recognition, virtual reality, social computing, and knowledge engineering being applied to varying degrees in daily life spaces. Some researchers have eagerly called this the Fourth Industrial Revolution [27]. Therefore, in the foreseeable future, information policy will undoubtedly be deepened again under the impetus of emerging technological revolutions. Issues such as the reasonable collection and use of data in the big data era, protection of user sensitive information in the mobile Internet era, media management innovation in the user-generated content era, and intelligent governance of artificial intelligence technology will all bring new opportunities to information policy research. Currently, AI algorithm regulation policy, 5G security policy, blockchain technology governance policy, and digital currency and wallet supervision policies are gradually becoming new hotspots in information policy research.

In recent years, many hotspot events have demonstrated the need for global informatization and its governance: the normalized prevention and control of COVID-19 has created research needs for optimizing governance policies on public information requests, crisis information communication, and disinformation dissemination; the Cyberspace Administration of China's fine on Didi [28] has created research needs on information violation "going global" and national data outbound security policies; the U.S. National Security Agency's intrusion and theft of key data from Northwestern Polytechnical University [29] has created research needs on safeguarding national information security and building strong national data security barriers. In an era where everything can be digitized, more and more hotspot events will continue to call for active promotion and strong support from information policy research.

In the longer term, just as it was difficult to imagine a decade ago that today's information environment would achieve ubiquity, mobility, differentiation, and interactivity, future technological developments may not be clearly foreseeable. However, regardless of what regulatory challenges information policy may face in

the future, examining the historical 脉络, characteristics, and development logic of information policy's staged evolution, we believe that three dimensions can provide answers for predicting future trends: in terms of problem sources, new information technology means and service methods will bring transformation opportunities and control crises to the global information society, with accelerated integration of information society, information users, and information technology providing a continuous and powerful driving force for the further development and prosperity of information policy research; in terms of implementation means, whether information technologies are still in laboratories or have entered real-world application scenarios, they can become the next commanding heights of information policy research while also being adopted by information policy as regulatory technical means to solve massive information monitoring and management tasks that are beyond human capacity; in terms of research purposes, all regulations on information activities and behaviors ultimately aim to promote the coordinated development of the information society and human society, particularly solving operational problems that cannot be spontaneously resolved in the information world. Meanwhile, we look forward to the next 50 years, when information contexts are ubiquitously embedded in all aspects of human life, work, and learning, and a highly informatized world will operate benignly, be effectively developed, and be fully protected within the framework constructed by the information policy system.

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Author Contributions

Zhou Qingshan: Proposed the research topic, designed the paper framework, revised and finalized the manuscript.

Cao Wenzhen: Determined the research plan, collected and processed data, drafted and revised the manuscript.

Staged Evolution, Logic and Prospect of Global Information Policy Research in the Past 50 Years

Abstract: [Purpose/Significance] This paper combs and clarifies the development logic behind the evolution of global information policy over the past 50 years, and points out future research trends by looking back at the past. [Method/Process] Using bibliometric analysis, knowledge mapping and other methods to analyze more than a thousand pieces of literature on information policy across more than half a century, this study summarizes and prospects the emergence, evolution and future development trajectory of information policy. [Result/Conclusion] Based on characteristic changes in publication numbers,

keyword centrality and burstiness, and keyword clustering, the staged evolutionary process of global information policy is divided into: the information society policy-led stage (1967-1985), the scientific and technical information policy-led stage (1986-1992), the technique diffusion policy-led stage (1993-1998), the Internet policy-led stage (1999-2005), the data governance policy-led stage (2006-2011), the social media policy-led stage (2012-2014), and the Internet of Everything (IoE) policy-led stage (2015-present). The analysis reveals profound interactions between the staged evolutionary process and the changing information environment. In the future, the path-dependent nature of logical evolution will continue to promote the co-evolution of information policy research with information technology and information environment, and address the evolving regulatory challenges that comprehensive informatization of society brings to information policy.

Keywords: information policy; evolutionary process; social informatization; information environment; development trend

Note: Figure translations are in progress. See original paper for figures.

Source: ChinaXiv — Machine translation. Verify with original.