Global Public Policy and Governance (2022) 2:283–305
https://doi.org/10.1007/s43508-022-00047-w

RESEARCH ARTICLE

Global digital governance: paradigm shift and an analytical framework

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Received: 9 May 2022 / Accepted: 25 August 2022 / Published online: 8 September 2022

Abstract

Global digital governance has been rising in response to a dual process of globalization and digitalization. Serving the innovation and application of digital technologies, global digital governance requires global cooperation to achieve economic benefits and cope with digital transformation challenges, covering issues, such as the Internet, digital tax, and trans-border data flow. The extant literature fails to answer why these challenges have been getting intense in recent decades and why the global governance responses to them may vary in different ways. This study argues that the transformation from protective immunity of digital platforms to Techlash against big tech triggered the rapid development of global digital governance. Following the paradigm shift argument, the paper further proposes an integrated framework to analyze the characteristics of the new model to explain the heterogeneity across global digital governance issues. The major constituent elements of this framework include the nature of the global commons (comedy or tragedy), global power structure (decentralized or centralized), and the governance regime (technocracy or democracy). This study applies the framework to analyze three cases of global digital governance issues and demonstrates its analytical power.

Keywords Global governance · Digital governance · Internet · Digital tax · Trans-border data flow

1 Introduction

Recent years have seen a trend of growingly intensified global governance highlighted by the following three issues. Firstly, despite the long-term stable operation of the global Internet all through the past 50 years, the global Internet governance

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institutions have been confronted with new challenges in recent years, characterized by the independence reform of the Internet Corporation for Assigned Names and Numbers (ICANN) from the supervision of the United States (US) government (Becker 2019). Secondly, being affected by the Snowden Incident in 2013, the "Safe Harbor Protocol" governing the trans-border data flow between the European Union (EU) and the US was revoked by the EU court, causing uncertainty between the two economies and leading to global reforms supporting data localization policies. How to reboot the trusted trans-border data flow has become one of the most urgent policy issues in the Group of 20 (G20), the World Trade Organization (WTO), and other Free Trade Agreements (Newman 2015). Thirdly, the exponential growth of the global digital economy and the rapid expansion of trans-national digital platform companies have intensified digital tax conflicts among countries. US federal government resists the tax imposed by other countries on global digital giants, like Google and Meta, while countries, like Ireland and Nordic states, also fight against global tax regulation as they favor low tax rates to attract investments from high-tech companies. However, the recent progress promoted by the Organization for Economic Co-operation and Development (OECD) still foreshadows the possible global consensus on the reform of global tax governance institutions in the near future (Christensen & Hearson 2019).

Similar issues could be seen universally in other fields. António Guterres, the United Nations (UN) secretary-general, established the "UN High-Level Panel on Digital Cooperation" in 2018 and issued a series of reports and reforms to promote global digital cooperation.[1] The World Economic Forum founded the "Global Consortium for Digital Currency Governance" in 2020 to achieve interoperable, inclusive, and trusted global digital currency.[2] The OECD issued "Artificial Intelligence Principles" in 2019, focusing on how governments and other actors can shape a human-centric approach of trustworthy artificial intelligence (AI).[3]

As the world is deeply connected through the Internet, not only the economic benefits of digital transformation demand global cooperation but also the growing social and political challenges need to be responded collectively by global stakeholders, both of which lead to what we call "global digital governance" in the paper. Especially in recent years, the accelerating global digitalization process has seen intensified international governance conflicts covering issues like the Internet, trans-border data flow, digital tax, trans-national digital platforms, digital currency, and artificial intelligence. Given the heterogeneity across fields, these emerging global governance issues share a common characteristic as they all originate from the technical innovation and universal application of digital technology. Some of them have already entered into the core agenda of the UN, the G20, and the OECD while simultaneously being listed among the top priority policies in the US, the EU, China, and other countries.

[1] https://www.un.org/en/sg-digital-cooperation-panel
[2] https://www.weforum.org/communities/digital-currency-governance-consortium
[3] https://oecd.ai/en/countries-and-tools/stakeholder-initiatives

Given the rising importance of global digital governance in the international political and economic fields, the extant global governance literature mainly analyzed different issues separately, ignoring the general characteristics across issues and thus failing to see them as a holistic phenomenon that deserves an in-depth analysis. Two critical questions include: after more than 50 years of global digital transformation, why has digital technology innovation and application intensified global governance challenges at present rather than before? Given the paradigm shift process, what are the general characteristics of global digital governance? How could we conceptualize the current paradigm to cover different issues and simultaneously explain the connections among them? The paper will provide a preliminary discussion of these questions, forming a theoretical framework to illustrate the emerging global digital governance phenomenon.

This paper is organized as follows. Section 2 reviews the extant literature to point out the theoretical gaps concerning global digital governance. Given the ample studies on separate issues, few studies put them together and form a holistic framework, which regretfully fails to explain why the phenomenon arises at present and what are the general characteristics of the current paradigm. Section 3 firstly describes the evolutionary history to illustrate how the global governance institutions on the innovation and application of digital technology changed from "safe harbor" to "comprehensive regulation," describing the process of the paradigm shift. Sections 4, 5 conceptualize the paradigm of current global digital governance. Section 4 applies the "Issue-Actor-Mechanism (IAM)" model to the analysis of global digital governance, of which the three dimensions are equipped with specific indicators. Section 5 uses the cases of global governance of the Internet, digital tax, and trans-border data flow to illustrate the applicability of the IAM model. Section 6 concludes this paper.

2 Literature review: global governance and digital governance

2.1 Paradigm shift of global governance

The academic research on global governance has attracted particular interest in recent years as most of the literature considers that we have entered a new era of a paradigm shift in globalization (Barnett et al. 2021). Following the international political-economic theory, global governance was conventionally understood as the creation of formal institutions by states to deal with affairs beyond geographic boundaries, of which the most typical cases were the establishment of the International Money Fund, World Bank, or World Trade Organization after World War II (Kennedy 2009; Avant et al. 2010; Pegram & Cueto 2015). As the process of globalization deepened, three trends were proposed to characterize the paradigm shift of global governance.

Firstly, global governance issues expanded from national security and international trade to cover a range of fields, like climate change, energy crisis, biodiversity conservation, and digital transformation (Raustiala & David 2004; Young 2010). Secondly, the major players of global governance diversified from states and intergovernment organizations to multi-stakeholders, including enterprises, associations,

non-government organizations, and decentralized communities (Lake 2010; Nye 2014). Thirdly, the global governance regimes grew from formal rules through intergovernment negotiations to include various policy tools, such as public–private partnership, self-regulation, and experimentalist governance, forming a "regime complex" in different fields (Raustiala & Victor 2004; Jia & Zhang 2022).

Despite the ample study on the description of the paradigm shift of global governance, they seldomly explained why such changes happened (Gehring & Faude 2013; Gehring & Oberthür 2009). As a result, it was impossible to persuasively explain whether the current paradigm of global governance could effectively respond to the growing challenges. The theoretical gap is more evident in the field of global digital governance, which is characterized by the multi-stakeholder and regime complex structure.

2.2 Rise of global digital governance

The importance of digital governance grew as the digital transformation deepened. Despite its broad definition, digital governance refers to the governance of digital technology, emphasizing the challenges caused by the process of digitalization (Flyverbom et al. 2019; Jia & Zhang 2022). Some hotly debated issues include privacy infringements, the digital divide, and algorithmic discrimination, among others (D'Agostino & Durante 2018; Wirtz & Müller 2019).

Given that digital technology, with the Internet as a typical symbol, is technically beyond the geographic boundaries of sovereign countries, many digital governance issues would theoretically have externalities, framing themselves as global rather than domestic governance issues (Voronkova et al. 2020). Table 1 lists the current global digital governance issues discussed by the extant literature, based on which two common goals can be summarized.

On one hand, global digital governance aims to achieve scale effects in the international market by realizing unification or interoperability on the technical or institutional level (Claessen 2020; Whitford & Anderson 2020). For example, since the value of the Internet increases exponentially with the scale, the goal of global Internet governance would be to standardize the technical protocols among countries. On the other hand, global digital governance aims to coordinate the behavior of different stakeholders to respond to the governance risks of digital transformation across fields (Liu et al. 2013; Stuurman & Lachaud 2022). Some critical and urgent risks include the spread of fake news, the irresponsible development and application of artificial intelligence, the shock of employment structure, and the pervasive tax invasion of trans-national digital platforms.

The extant literature has provided detailed case studies of specific global digital governance issues. However, there is still scant research to integrate these scattering cases in a holistic perspective, leaving some critical questions unanswered, two of which are our concerns in this paper. On one hand, why is global digital governance intensified in recent years rather than before? Despite the heterogeneous evolution history of different issues, most of them are becoming hotly debated and being prioritized in domestic and global governance fields these years. On the other hand,

Table 1 Research topics of global digital governance

Topic areas	Technical types	The main problem	Representative literature
Global governance of digital technology	Internet	Global management of Internet Protocol standards	Tassey et al. 2009; Claessen, 2020
	Artificial intelligence	Externality, ethics, subjectivity, and other risks	Sweeney, 2013; Acemoglu & Restrepo, 2020;
	Blockchain	Law lag and malicious use risk	Goldfeder et al. 2018; Zīle & Strazdiņa, 2018
	Algorithm	Rule "black box" and discriminatory risk	Edwards & Veale, 2018; Huq 2019
	Robotics and Automation systems	Decision-making "black box", responsibility risk	Noorman & Johnson, 2014; O'Sullivan et al. 2019
	Quantum computing	Data security risk	Fedorov et al. 2018; Molina et al. 2021
	Internet of things	Data security risk	Xi & Ling 2016; Kim 2017
	Digital Finance Technology	Privacy risk and system vulnerability risk	Zetzsche et al. 2020; Ozili 2020
Global governance of the digital industry	Digital currency	Legal lag and anti-money laundering risk	Cumming et al. 2019; Whitford & Anderson, 2020
	Cross-border data flow	Consistency of data rights protection rules	Kong, 2010; Aaronson 2019
	Digital tax	Rational distribution of tax base and tax avoidance risk	Corkery et al. 2013; Peng 2016
	Digital platform	Platform power risk	Cutolo & Kenney 2021
	Sharing economy	Distribution and labor protection	Schor & Attwood-Charles 2017; Wu & Li 2019
	E-commerce	Intellectual property protection	Zhou 2021
	Online false information	Public opinion governance and ideology management	Clayton et al. 2020; Molina et al. 2021

Source: summarized by the authors

following the paradigm shift theory of global governance, how can we conceptualize the framework of global digital governance to analyze the common structure and general characteristics of the current paradigm? Both the questions cannot be answered without a holistic perspective to consider them as a whole.

3 Paradigm shift of global digital governance: from safe harbor to Techlash

The global digital transformation originated from the invention and commercialization of the Internet. Although it is obvious that the application of digital technology would provoke governance challenges at present, the intervention by states to regulate digital technology was largely boycotted by stakeholders in the early times. It was not until very recently that we started to see a global trend to strengthen the regulatory accountability of digital platforms. To answer why global digital governance is intensified in recent years rather than before, we need to review the history of digital development and the evolution of global digital governance.

3.1 How did law make "Silicon Valley"?

Although conventional explanations for the success of Silicon Valley focused on the confluence of capital and human resource, Anupam Chander emphasized the role of protective laws in helping develop the digital industry in the US (Chander 2014). In his opinion, the laws providing the "safe harbor" for the Internet intermediary platforms from collateral liabilities contributed to their success. Other countries consecutively established similar protective institutions when they followed the Silicon Valley model, leading to a globally tolerant regulatory environment toward digital platforms and digital technology.

The legal questions concerning the development of Internet intermediary platforms focus on whether they should be held liable for unlawful contents originating from third parties and, if so, what kind of liability should be imposed (Mann & Belzley 2005). In the early days of the commercialization of the Internet, American courts gave a diverging response to these questions, as reflected in cases, like *Cubby, Inc. v. CompuServe, Inc.*[4] and *Stratton Oakmont, Inc. v. Prodigy Services Co*.[5] However, as Internet intermediaries, like search engines and social networks, emerged and functioned in a more complex way than outdated computer bulletin boards, the legal framework offering them limited liability or even immunity was finally established at the turn of the millennium.

In the US the Communications Decency Act (CDA) was enacted in 1996. Section 230(c)(1) of the CDA stated that "No provider or user of an interactive computer service shall be treated as publisher or speaker of any information provided

[4] Cubby Inc. v. CompuServe Inc., 776 F. Supp. 135 (S.D.N.Y. 1991).
[5] Stratton Oakmont Inc. v. Prodigy Services Co., 1995 WL 323,710 (N.Y. Sup. Ct. 1995).

by another information content provider," thus largely providing the digital platform protection from collateral liabilities. However, CDA did not extend its coverage to copyright infringements, which was addressed by the enactment of the Digital Millennium Copyright Act (DMCA) in 1998. Specifically, Sect. 512 of the DMCA provided "conditional safe harbor from liability" as long as intermediaries did not have "actual knowledge" of the infringements, did not directly benefit from the infringements, and had a notice-and-takedown policy. Under the two legislations, the US courts chose to interpret the article of CDA and DMCA broadly to reinforce the legal frame. For example, the 4th Circuit ruled in *Zeran*[6] that knowledge-based distributor liability was a subset of publisher liability and therefore was also foreclosed by Sect. 230.

The rationales behind the protective institutions toward digital intermediary platforms were twofold. On one hand, innovation and industry development were concerned. In *Configuring the Networked Self*, Julie Cohen argues that "gaps and inconsistencies within the system of legal rights, institutional arrangements and associated technical controls…protect the play of everyday practice," which "create[s] opportunities for experimentation by a wide variety of participants where creative practice flourishes" (Cohen 2012). Following Cohen, Balkin commented that "immunities or safe harbor rules for intermediaries create discontinuities in digital enforcement regimes (Balkin 2012)." In their view, the limited intermediary liability allowed people to play with information and culture, thus fostering innovation in the gaps in the coverage of copyright laws. Additionally, by criticizing the gatekeeping theory, Zittrain stated that the legal framework would also reduce innovation costs, further promoting the Internet's generative nature (Jonathan & Zittrain 2006). On the other hand, free speech rights were used to support the "safe harbor" governance regimes. Although it had been widely accepted that the rise of the Internet promoted free speech, the liability imposed on digital intermediary platforms would also suppress the speech because of the concern of collateral censorship. If Internet intermediaries were held liable for online contents, they were likely to "over-delete" the speech of third parties as they did not have the capacity to distinguish unlawful speech from lawful, resulting in a "chilling effect" (Schauer 1978).

The EU legal frameworks followed the footsteps of the US regimes. The Electronic Commerce Directive (ECD) adopted the basic idea of Sect. 512 of DMCA, offering safe harbors from liability for specific intermediary activities. However, the EU differs from the US in its so-called horizontal approach, applying safe harbor to cover any kind of unlawful content, including copyright infringements and defamations. Therefore, the safe harbor institution originating from the US and spreading to other countries established a *laissez-faire* global governance regime for digital platforms and, more generally, digital technologies.

Although the broad immunity the legal frameworks offered to Internet intermediaries was defended for innovation and free speech, it was actually a "policy choice" at the cost of other stakeholders, including the infringed copyright holders or the defamed persons. The "choice" was reasonable in the 1990s when the digitalization

[6] Zeran v. America Online, Inc., 129 F.3d 327 (4th Cir. 1997).

process had just begun, and the Internet intermediaries were relatively small. However, after nearly 30 years of rapid development, the social impacts of digital platforms have profoundly changed as they became big, casting doubts on the suitability of the protective legal frameworks at present.

3.2 How did "Techlash" happen?

Despite the development and convenience that digitalization has brought about, there has been a continuing decline in trust in the technology industry in the past ten years, according to the Edleman Trust Barometer poll 2021 (Edelman 2021). Even in the US, the trust in the technology sector has fallen from 78% in 2012 to 57% in 2021 (Brookings 2021). A similar result could be seen in Pew Research Surveys showing the top 3 worries of people were privacy intrusions, cybersecurity risks, and misinformation campaigns (Pew Research Center 2020).

The declining trust in technology is in sharp contrast with the early days when the commercialization of the Internet had just begun, and immunity was broadly provided for the digital intermediate platforms. The two rationales supporting the safe harbor governance institutions gradually became invalid nowadays. On one hand, the innovation argument failed to hold as the digital market gradually became oligopolistic or monopolistic. The leading platforms, which were once open and free, started to restrain latecomers or enclose the community. On the other hand, the free speech argument also failed as the digital platform had turned itself from a "many-to-many" neutral intermediary to a "bottleneck" that could exploit the architectural advantages to manipulate the contents exposed to users, with the Cambridge Analytic incident on Meta as a typical example. As Balkin stated, Internet intermediaries, which once claimed to be the democratized digital infrastructure of speech, had become "the infrastructure of surveillance and speech regulation" (Balkin 2014).

The critics on digital platforms reflect the new social attitudes toward the innovation and application of technology, especially digital technology. This was symbolized as the term "Techlash" became the runner-up in Oxford Dictionary's 2018 word of the year, meaning the "strong and widespread negative reaction to the growing power and influence that *large* technology companies hold" (Oxford Languages 2018). The definition echoed the comments of Balkin in Julie Cohen's book, *Configuring the Networked Self,* when he stated that "gaps in legal and technological enforcement might benefit the powerful far more than the powerless" (Balkin 2012). The leading digital platforms were far more powerful than their counterparts born in the industrial revolution. According to *Economist*, Meta and Alphabet were responsible for nearly 80% of news publishers' referral traffic. In 2017 they claimed around 80% of every new online-ad dollar in America. Alphabet dominated as much as 85% of online-search-ad revenue worldwide. Amazon controlled some 40% of America's online commerce (Economist, 2018).

Although being "Big" is not the problem, being anti-competitive, addictive, and damaging to democracy (also known as BAADD) are, as *Economist* stated (Economist 2018). Both Meta and Alphabet were found to unfairly leverage traffic to their affiliates against competitors. The catered content was designed to attract people,

especially teens, to spend more time on the screens. Fake news and filter bubbles were not only reinforcing political polarization but also dismantling the traditional norms and orders. Additionally, big digital platforms were also found to be the largest tax invaders across countries, causing the dilemma proposed by Thomas Piketty as "Earth must be owned by Mars".

Additionally, Techlash was more than a negative reaction against large technology companies but the technology itself. However, it did not necessarily mean that the public was boycotting technology or decreasing their use of technology, both of which were not the truth, according to polls (Robert et al. 2019). Instead, it was a reversion from the broad protective immunity institutions established in the late 1990s to the regulatory governance institutions demanding proposals to control technology, especially Big Tech. In other words, rather than focusing on innovation and free speech, people care more about their privacy, the competitive market, the tax, and democracy at present, all of which were largely ignored in the former governance institutions. In this background, we started to realize the rise of global digital governance as a natural response to "Techlash."

3.3 How do states remake technology and big tech globally?

Given the changes from protective immunity to Techlash, governments are increasingly intervening with digital governance to counteract the dangers of the unregulated process of digitalization (Medhora & Letwin 2022). We have seen a global trend to strengthen the regulatory pressure on technology innovators and implementers. The existing literature mainly summarized the reform from three perspectives by focusing on economic, political, and social values.

Firstly, economic regulations, including anti-trust or taxes against incumbent digital platforms, are widely adopted across countries. Take the anti-trust regulation as an example. The EU has long been considered the pioneer in modernizing the anti-trust rules against large digital platforms, with the recent Digital Market Act and Digital Services Act clearly classifying the "gatekeeper" standards and demanding an upper limit of 10% penalty of their global sales if found guilty. The US has also updated its anti-trust and competition laws in the digital industry since 2020. Besides some influential cases, like FTC vs. Meta and Epic Games vs. Apple, the House Judiciary Committee proposed four legislative drafts in Oct. 2020 to confront the four major anti-competitive strategies adopted by incumbent digital platforms, including self-preferentiality, hostile merge and acquisition, network effects renting and user lock-in effects.

Secondly, digital sovereignty and digital national security are increasingly emphasized globally. Ever since the Snowden incident in 2013, other countries have realized the potential threats of the US by leveraging its digital hegemony to spy on global data flows. To ensure national security and ensure the outgoing data could be provided with the same level of privacy protection as it was in domestic environments, more and more countries started to claim digital sovereignty with data localization as a typical policy. However, the digital sovereignty policy to impede or even

forbid the trans-border flow of data would possibly harm the global development of the digital economy and even balkanize digital globalization.

Thirdly, digital social impacts have been universally emerging across fields, demanding global regulatory intervention and governance cooperation. The influence of fake digital news on ideology and political propaganda, the echoing chamber effects caused by intelligent recommendation algorithms, the ethical risks of discrimination and differentiation, as well as the long-standing problem of the digital divide are all typical examples of social challenges provoked by the pervasion of digital technologies. Different countries would adopt varying strategies to confront the social challenges according to their traditional norms or histories. However, given the connectivity of the Internet and the fluidity of information, the digital application in one country would probably have social impacts in another country, resulting in the effects of externality.

The paradigm shift from Safe Harbor to Techlash suggests the rise of global digital governance as a general phenomenon across countries, which explains why it happens at present rather than before. Still, the following question describes the characteristics of the current paradigm given the heterogeneity across issues. Despite the scattering discussion of different global digital governance issues, we need a holistic framework to conceptualize the phenomenon to explain the similarity and correlation among them.

4 Characterizing the current paradigm: an analytical framework of the IAM model

Although the Techlash paradigm of global digital governance could be summarized as the response against the development of digital technology and industry, the heterogeneity across issues in governance actors, regimes, and results still calls for a holistic analytical framework to characterize the paradigm. Theoretically speaking, the framework is required to compare multiple global digital governance issues to illustrate their similarity and diversity. Without an analytical framework, we can only discuss these issues separately, ignoring their correlations and mutual influences.

Following the theoretical framework of "issue-actor-mechanism (IAM)" proposed by Xue and Yu, we argue that it could also be applied to the analysis of global digital governance (Xue & Yu 2017). The IAM model suggested analyzing global governance from three dimensions, including the governance issues that go beyond the sole goal of national security to cover more problem structures, the governance actors that include not only the states but also multi-stakeholders, and the governance mechanisms comprised both the formal institutions and informal approaches. It should be noted that the IAM model might not be the only framework to analyze the paradigm of global digital governance, and it is also not the goal of this paper to prove, empirically or theoretically, that the IAM model is better than other frameworks, both of which could be valuable work for future research. However, given that most of the extant literature analyzed the global digital governance issues separately without any holistic framework being proposed, the IAM model could act as a starting point to see the overall picture of the rising phenomenon.

Despite its applicability, the IAM model did not provide detailed indicators which could be used to measure or explain each dimension in the background of global digital governance. To be specific, firstly, for the "issue" dimension, what are the common characteristics of global digital governance issues, and how could we distinguish their differences? Secondly, for the "actor" dimension, despite the widely accepted idea that multi-stakeholders are included in global digital governance, how could we describe their relationship to show the correlation and difference? Thirdly, for the "mechanism" dimension, what are the main characteristics of the interaction among stakeholders to achieve governance goals? By elaborating on the three dimensions, we extend the IAM model into an analytical framework to describe global digital governance.

4.1 Dimension of "Issue": global commons comedy or global commons tragedy?

The rationale supporting the dimension of "issue" is the rational choice model, suggesting that the governance modes must match specific issues' demands. Therefore, the IAM model argues that global governance research should firstly classify the issues according to their characteristics.

We can find multiple criteria to categorize global governance issues from different theoretical perspectives, and a classical and particularly relevant typology is that developed by the public economics literature in which the issues can be classified into two categories, i.e., *commons comedy* and *commons tragedy*. For *commons comedy*, the classic paper by Carol Rose stated that for issues having "returns to scale" qualities, the individual use of the commons would expand, rather than deplete, the collective wealth (Rose 1986). The rationale supporting the logic of *commons comedy* is because the individual use of the commons would enhance the *sociability* of the members, leading to the increase of trust and mutual dependence, which are critical to cooperation. To be compared, the concept of *commons tragedy* follows a hypothesis of atomized individualism by stating that the individual use of the commons would lead to the depletion and collapse of the collectives because of free-rider effects (Hardin 1968).

Despite its explanatory power in the fields of public economies, the dichotomy of *commons comedy* and *tragedy* has not been introduced to the analysis of global governance with few exceptions. For example, according to Rodrik, although cross-border spillovers do not always call for international rules, the canonical cases of global governance mainly deal with two sets of issues: global commons and "beggar-thy-neighbor (BTN)" policies (Rodrik 2020). While global commons emphasize more on commons comedy when states cooperate, a BTN policy produces an income transfer to the home country from the rest of the world while producing global inefficiency as a by-product. From the dichotomy, BTN policy could also be understood as *commons tragedy*, meaning that the rational choice of the home country would result in global inefficiency, which harms the home country in return.

Therefore, the dichotomy of *global commons comedy* and *global commons tragedy* is applicable to categorize global governance issues, including digital issues (Buchanan & Yoon 2000). Additionally, it should be noted that the classification of

governance issues is not static, and the characteristics of one specific issue would probably change from *comedy* to *tragedy* or vice versa when the environment changes. For example, in Sect. 5, the case study of global Internet governance illustrates a change from global commons *comedy* to *tragedy* after Snowden Incident.

4.2 Dimension of "Actor": decentralized or centralized power structure?

The second dimension of the IAM is "actor," for which Xue & Yu (2017) emphasized the importance of the diversity of actors' identities in global governance. Unlike the traditional state-centrism argument, the IAM model recognized the role of multi-actors in providing governance resources and relieving information asymmetry, among others. As the coverage of global governance expands to more diverse areas, such as climate change, forest resources, and sustainable development, the multi-actor perspective has gradually been recognized and accepted. Despite the consensus, the relationship among these actors in multiple areas might differ, resulting in new complexity of global governance.

The analysis of the relationship among multi-actors was common in traditional international political economies, which generally focused on the power structure among states (Halabi 2004). The extant literature acknowledged resource, information, and legacy as three main factors affecting states' power (Binderkrantz et al. 2015; Zihua et al. 2019). Based on these factors, the power structure among states could be summarized into two categories, i.e., *decentralized* or *centralized*. A decentralized power structure suggests that different states would have diverging advantages in the form of resources, information, or legacy, leading to a relationship of mutual dependence. In contrast, a centralized power structure suggests that few states are more privileged in the bargaining process, and these core states would largely decide the global governance agreements.

With the increasing importance of multi-actors in global governance, the power structure analysis should be extended to cover non-governmental actors. On one hand, non-government actors might have advantages in governance information, resource, or legacy over states in specific fields. For example, the complexity and dynamics of Internet technologies made it difficult or even impossible for states to intervene in the governance of the global Internet. At the same time, the technical community of scientists, engineers, and social activists has dominated the governance process in the early days of the development of the Internet. On the other hand, non-government actors could become the new center and form a centralized power structure to frame global governance. For example, with the commercialization process of the Internet, big digital platforms holding the architectural power have grown into the new bottleneck, meaning that they could also unleash the centralized power to affect the process of global digital governance.

4.3 Dimension of "mechanism": technocracy or democracy?

The third dimension of the IAM model to analyze global digital governance is "mechanism," concerning how different stakeholders interact with each other

to realize a common goal. By tracing the development history of international organizations, researchers argued that *technocracy* and *democracy* had pervaded both the institutional design and perception of international organizations since their inception and had always stood in fruitful tension (Peters & Peter 2012). *Technocracy* means that stakeholders with technical advantages would have priority in deciding the modes and results of global digital governance, following a functionalism rationale. *The democracy* mechanism suggests the stakeholders should follow a democratic process filled with negotiation and compromise in which the political process would largely decide the modes and results.

Both mechanisms would have advantages and disadvantages, as widely recognized in the extant analyses of global governance (Alawattage & Elshihry 2017; Scholte 2011). Although the *technocracy* mechanism is efficient in solving specific governance problems, it is also criticized for its ignorance of governance values and lack of representativeness. Despite its advantages in inclusiveness and legacy, the *democracy* mechanism is usually blamed for its delay or corruption.

The dichotomy between *technocracy* and *democracy* could also be introduced into the analysis of global digital governance as cross-cutting issues. On one hand, originating from the innovation and application of digital technology, lots of functional problems, like the realization of unified standards or protocols, will emerge, and it largely relies on the *technocracy* mechanism to solve these problems. On the other hand, with the digitalization process becoming pervasive and fundamental, more and more political issues, like human rights or national securities, are deeply involved in the discussion of global digital governance, leading to the demands of *democracy* mechanism.

Based on the theoretical deduction above, we have conceptualized the analytical framework to describe the characteristics of global digital governance. Table 2 lists some typical cases which would match most of the combinations of the three dimensions. For example, global governance on AI is characterized by *global commons comedy*, *the decentralized power structure,* and *the democracy mechanism*. The governance challenges of AI are universally seen across countries, and no single actor could dominate the governance process. Additionally, the governance goal is forming binding rules rather than self-regulation initiatives, and the accomplishment of this goal requires political negotiation and consensus. Similarly, global governance on digital platforms is characterized by *global commons comedy*, *the centralized power structure,* and the *democracy mechanism*. The governance challenges of digital platforms are becoming international with the globalization process of digital giants becoming trans-national companies. Countries, such as the US and China, from where digital giants originate, or the EU, where the biggest market is located, all aim to form binding rules rather than technical principles in the global governance of digital platforms. To further prove the applicability of the framework, we choose four cases for further discussion, e.g., the global Internet governance before and after Snowden Incident, global digital tax governance, and global trans-border data flow governance (See Table 2).

Table 2 The IAM Model and the Global Digital Governance Cases

Issue	Global commons comedy				Global commons tragedy			
Agency	Decentralized		Centralized		Decentralized		Centralized	
Mechanism	Technocracy	Democracy	Technocracy	Democracy	Technocracy	Democracy	Technocracy	Democracy
Case	Global internet governance before Snowden incident	Global governance on AI		Global governance on digital platforms	Global internet governance after Snowden incident	Global digital tax governance		Global trans-border data flow governance

5 Case study: global internet, digital tax, and trans-border data flow governance

5.1 Global internet governance before and after Snowden incident

Based on the Advanced Research Projects Agency Network (ARPANET) established by the Defense Advanced Research Projects Agency of the US Department of Defense, which was designed to exchange information between mainstream computers, Robert Kahn and Vinton Cerf developed TCP/IP protocol in 1974 to remake ARPANET into an open network allowing communication among any computers that adopted the protocol. As more computers were connected together across borders, a global Internet gradually formed firstly among scientists and universities. Later in 1989, Tim Berners-Lee invented the WWW protocol allowing hypertext documents to be viewed by browsers, a function decisively accelerating the commercialization of the Internet and pushing it to the general public. It was until then that the global Internet became the critical infrastructure of global digitalization, which deserved governance attention.

Functionally, the goal of global Internet governance is to maintain Internet connectivity across countries, a typical "*global commons comedy*" phenomenon with increasing returns to scale. Every state that accepts the protocol would enjoy the benefits without causing costs to others. For the dimension of *actor* and *mechanism*, the governance of global domain names typically reflected the characteristics of global Internet governance. Domain names were the identical numbers of specific websites which could be recognized by others on the Internet, the value of which grew exponentially as the Internet expanded globally. At the very beginning of the Internet, the governance power of the domain names was largely held by the scientists' community who were using and running the network even if it was initiated as a project in ARPANET, affiliated with the US government. After the Internet expanded its reach to the general public, the application for domain names to get into the network grew exponentially, which could no longer be operated manually by scientists. It was at that time that the US government wanted to regain its controlling power on domain names. However, the scientists' community took the Internet as global commons instead of the property of the specific government. It, therefore, refuted the US government and established the ICANN as a non-profit private organization to be in charge of the global governance of domain names, showing clearly the characteristic of the *decentralized* governance power structure and *technocracy* mechanism.

However, the establishment of the ICANN did not mean that political power did not impact the governance of domain names. The US government still owned the legal right to monitor the management of the ICANN though its intervention was barely seen through these years. With the globalization of the Internet, the political power of the US was further challenged by other countries, especially after Snowden Incident in 2013. Snowden Incident clearly exposed how the US government secretly spied on other countries' data by leveraging its influence on large digital platforms. Confronted with the national security risks,

other countries challenged the legal power of the US government on the ICANN by threatening to break off the network and quit the Internet, thus changing the "global commons comedy" to "global commons tragedy." After Snowden Incident, joining or staying on the Internet had become a cost rather than a benefit as the US could leverage its power to risk other countries' national security. To alleviate other countries' concerns and maintain the stability of the Internet, the US government finally guaranteed the independence of the ICANN in 2016 but simultaneously restricted the capacity of other countries to intervene in the management of the ICANN, leading to the rise of the global private governance model (Becker 2019). The independence reform of the ICANN maintained and even strengthened the *decentralized* power structure and *technocracy* mechanisms in global Internet governance as no single country could dominate the governance process of domain names.

5.2 Global digital tax governance

Global digital tax governance has been one of the most hotly debated international issues in recent years. The accelerated development of the digital economy has profoundly challenged the traditional global tax regimes in two ways. On one hand, the innovation and application of digital technology allowed international companies to run global businesses online without establishing offices locally, which impeded the traditional tax rules requiring that only local establishments could be taxed, a principle named "nexus rule." On the other hand, the big trans-national digital companies had successfully eroded their tax base by exploiting the holes of global tax regimes with "tax haven" countries charging low or even zero tax rates to attract investments. As digital companies could easily use the intellectual property transactions to evade the tax base of the country where the value was created, they had become the largest tax evaders globally. An investigation report from Fair Tax Mark in 2019 stated that Amazon, Google, Apple, Facebook, Microsoft, and Netflix had evaded 155 billion dollars in the past ten years, of which Amazon ranked first, paying only 3.4 billion dollars with 12.7% tax rates compared with a general of 35% tax rates in the US (Fair Tax Mark 2019).

Despite the global tax challenges in the digital era, it was not easy to coordinate stakeholders to take collective action. In essence, the country that adopted a lower tax rate would exploit "free-rider" effects when other countries agreed to cooperate on tax policies, like the minimum tax rates. As every country would concern about other countries' speculation behavior, no one would join in global tax agreements and compete to set a lower tax rate, causing "race to bottom" consequences. Therefore, global tax governance is a typical "*global commons tragedy.*" Additionally, as tax sovereignty empowers every country to adopt tax policies independently and even a small country with a lower tax rate would become the loophole of the global regimes, it is natural to see a *decentralized* power structure of global tax governance. However, the characteristics of "*global commons tragedy*" and "*decentralized* power structure" did not necessarily mean that global digital tax governance would

fail inevitably. The recent development promoted by the OECD proved a promising future for global digital tax governance cooperation.

The OECD was historically the main international institution in charge of global tax reform. Since the very beginning of the twenty-first century, the OECD had started to deal with the tax competition and tax haven problem but with limited success until the rise of the digital economy. In 2013, the OECD launched the Base Erosion and Profit Shifting (BEPS) project and issued 15 action plans, the first of which concerned the tax challenges of the digital economy. Between 2018 and 2020, the OECD consecutively issued three reports each year and finally proposed a two-pillar digital tax reform framework. Pillar one focused on the redistribution of tax rights to modernize the "nexus rule" in the digital economy, while pillar two tackled the tax evasion problem, especially those of trans-national digital companies. Although the OECD provided a promising technical solution to global digital tax reform, it did not necessarily mean the global digital tax governance followed a rationale of *technocracy*. Instead, it was the political process that determined the results of global digital tax governance.

There were two political conflicts in global digital tax governance reform. On one hand, countries with low tax rates would have conflicts with others when a minimum tax rate regulation was adopted. For example, although the EU was an active actor in global digital tax reform, Ireland and Nordic countries repeatedly objected to the EU solution proposed by France, who was eager to impose a digital tax on transnational digital platforms. On other hand, given most of the largest digital companies were from the US, the digital tax reform also reflected the conflicts between the US and other countries. Therefore, the ostensible technical issue of tax reform was actually a political issue that demanded negotiation and compromise. That is why the OECD expanded itself to establish an inclusive framework in 2016 to widely invite as many countries as possible to draft and monitor the implementation of the proposal. Until 2021, about 140 countries had been involved in the inclusive framework, which successfully absorbed appeals from developing countries and finally helped realize the global consensus, resulting in the *democratic* regimes in global digital tax governance.

5.3 Global trans-border data flow governance

Thanks to the global connectivity of the Internet, digital data could easily flow across borders with nearly zero cost. However, as countries established different domestic data governance institutions, the trans-border data flow was restricted across countries, leading to the demands of global governance to balance domestic regulation and global development. In the history of global digital development, the global trans-border data flow had not been a critical issue until the broke of the Snowden Incident, which revealed the data eavesdropping behavior of the US government. Out of the national security concern, other countries started to restrain or even cut off the trans-border data flow, causing it an important global governance issue in recent years.

From the dimension of "issue," the global trans-border data flow governance is a typical *global commons tragedy* phenomenon. Any country that restrains the outgoing flow of data could ensure its national security while also enjoying the benefits of other countries relaxing the limits on trans-border data flow. Therefore, a rational choice for an individual nation is not to join in global governance, which would lead to global inefficiency. However, this does not necessarily mean that global trans-border data flow governance would be doomed to fail. The dimensions of "actor" and "mechanism" could provide new opportunities.

The aims of global trans-border data flow governance are two folded. On one hand, the data governance institutions of different countries may become homogenized to realize a unified standard. For example, Japan has gradually modified its domestic law to make it similar to that of the EU, therefore realizing the institutional homogeneity between the two economies where digital data could flow freely. On the other hand, when data governance institutions across countries cannot be homogenized for cultural or historical reasons, they can achieve mutual recognition of their institutions to ensure the outgoing data would be provided equivalent protection to domestic laws. The typical case of mutual recognition was the "Safe Harbor" agreement between the US and the EU in 2000. The agreement provided a framework under which the EU signed contracts directly with trans-national digital platforms headquartered in the US to require them to abide by EU data governance rules, while the Federal Trade Commission of the US worked as a supervisor to enforce the implementation of the contracts. Although neither the EU nor the US changed their domestic data governance institutions, they still realized the trans-border data flow.

Both cases discussed above illustrated the *centralized* power of actors, like the EU and the US. Actually, the global governance of trans-border data flow consisted of multi-bilateral agreements with the EU and the US as the influencing stakeholders, rather than multilateral agreements for which different countries needed to form consensus simultaneously. Given the institutional power of the EU and the US in the bargaining process, they were placed in the center of the power structure and would largely decide the outcomes of the global governance of trans-border data flow.

As for the dimension of *mechanism*, the global trans-border data flow governance had not been dominated by *technocracy* until now. Although the scientists and engineers' community are developing advanced technologies (e.g., privacy computing and federal learning) to balance the needs of data flow and data protection, it is the global institutions, such as the G20 and the WTO, that matter in framing the governance of global trans-border data flow. Whether they would successfully achieve consensus largely depends on the underlying political process, showing the characteristics of the *democracy* mechanism. Take the G20 Osaka summit in 2019 as an example. Despite the consensus on the new concept of "Data Free Flow with Trust" among the EU, the US, China, Japan, and many other countries, India, Indonesia, and South Africa still refused to sign the statements. The main concerns of the three countries were not technical problems but rather the potential political and economic risk caused by data free flow across borders, illustrating the *democratic* characteristic of global trans-border data flow governance.

6 Conclusion

Confronted with the dual process of globalization and digitalization, it was inevitable to see the rise of global digital governance. Some international think tanks have proposed to establish a "Digital Stability Board (DSB)" for a Digital Bretton Woods (Emanuele 2021), imitating the establishment of the "Financial Stability Board" after the global financial crisis in 2008. Although it is arguable whether the establishment of DSB is appropriate, the importance of global digital governance is undeniable when we have frequently seen hotly debated issues, such as the global governance of the Internet, digital tax, trans-border data flow, digital currency, and AI, in recent years.

The extant literature usually took these issues separately and thus largely ignored a holistic analysis to see the connections among them. However, as a ubiquitous global phenomenon originated from the innovation and application of digital technology, both the timing when they become important and the conceptualization of the analytic framework deserve attention, for which the article has provided a preliminary discussion. For the former question, the rise of global digital governance should be put into the background of the paradigm shift from the immunity protection institution established in the late 1990s to the rise of Techlash as an emerging ideology in recent years. Then we can fully understand the importance of global digital governance as an inevitable historical evolution rather than a temporary political-economic incidence. Based on the explanation of the paradigm shift, the latter question mainly concerns the characteristics of the current paradigm, for which the IAM model provides one possible analytic framework to conceptualize global digital governance. We enrich the three dimensions by categorizing "issue" into *global commons comedy* or *tragedy*, "actor" into *decentralized* or *centralized* power structure, and "mechanism" into the *technocratic* or *democratic* process. Based on the analysis of three cases, including the global governance of the Internet, digital tax, and trans-border data flow, the article shows how the IAM model could be used to describe and compare the characteristics of diverse global digital governance issues.

Despite the preliminary discussion of the article, lots of questions remain unanswered. Why do some global digital governance issues succeed while others fail to achieve international cooperation? What factors and how would they affect the performance of global digital governance across issues? Who would play the major role in the form and reform of global digital governance regimes, the professional organizations, like the OECD and the ICANN, or the international political institutions, like the UN? How would the rise of global digital governance affect the process of globalization? All of the above questions are worthy of continuing and extensive research in the future, while the current article help kick off the discussion.

Funding This work was supported by the [Key Projects of Philosophy and Social Sciences Research, Ministry of Education (CN)] under Grant [21JZD036].

Declarations

Conflict of interest No potential conflict of interest was reported by the authors.

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