Digital technology governance: developing countries' priorities and concerns

Digital Pathways Paper Series

Toby Phillips, Beatriz Kira, Andrea Tartakowsky, Jonathan Dolan, *and* Putu Natih

BLAVATNIK SCHOOL OF GOVERNMENT
UNIVERSITY OF OXFORD

Digital Pathways at Oxford

Toby Phillips and Beatriz Kira,
Digital Pathways at Oxford, University of Oxford,
Andrea Tartakowsky and Putu Natih,
Department of Social Policy and Intervention, University of Oxford,
and Jonathan Dolan,
Future State

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Abstract

This paper discusses the technology policy priorities of policymakers and subject-matter experts in developing countries, based on a quantitative analysis of an online survey of digital policy experts from different countries and regions, and a qualitative analysis of interviews and focus-groups with government global experts in technology policy. Our main findings are that, first, policymakers around the world are concerned with a broad range of technology-related policy priorities, but developing countries are primarily concerned with issues more closely related to how digital technologies can affect economic development. Second, international cooperation is critical to achieving some technology policy goals, but there are also relevant domestic constraints that may be more salient or important (eg political and technical obstacles). Further, there is evidence of a power imbalance between developed and developing countries in setting the international agenda, with low- and middle-income countries feeling that these forums do little to contribute to their technology policy goals. Finally, we identified that policymakers perceive coordination among nations that have similar levels of technology development (eg regional collaboration) as a pathway to improving technology policy.

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1. Introduction

This paper discusses the technology policy priorities of policymakers and subject-matter experts in developing countries. We argue that policy issues which prevent developing countries from harnessing the opportunities of new technologies are not just questions of domestic policy: they often require concerted international cooperation and multilateral coordination.

Due to technological advancements in transportation, logistics, and information flows, geography is becoming less important for many transactions, and interactions – including trade, mobile finance, knowledge-sharing, and even illicit activities – increasingly take place across borders (Meltzer, 2015). Many pressing concerns of the digital age can therefore only be effectively tackled by cross-border collaboration and sharing mechanisms. Yet, global discussions about technology policy are dominated by a small number of countries and are based on the priorities of developed nations, as we will discuss in this paper.

The debate has been narrowly focused on the priorities of the United States, the European Union, or China, and often leaves behind the interests of billions of people living in middle- and low-income countries (Bradford, 2019; Jackson, 2019). This is partly due to the fact that much of the global discussion on these issues takes place within international organisation contexts, which continues to be dominated by a small number of actors in global bodies (Chenou, 2014; Gruber, 2000). Furthermore, many of the world's biggest private sector players are based in more developed countries, further increasing the comparative influence of high-income players in this debate (Jackson, 2019; McDonald & Mina, 2018).

The findings presented in this paper are based on a quantitative analysis of an online survey of digital policy experts from different countries and regions, and a qualitative analysis of interviews and focus-groups with government global experts in technology policy.

Our main findings are that, first, policymakers around the world are concerned with a broad range of technology-related policy priorities, but developing countries are primarily concerned with issues more closely related to how digital technologies can affect economic development. Second, international cooperation is critical to achieving some technology policy goals, but there are also relevant domestic constraints that may be more salient or important (eg political and technical obstacles). Further, there is evidence of a power imbalance between developed and developing countries in setting the international agenda, with low- and middle-income countries feeling that these forums do little to contribute to their technology policy goals. Finally, we identified that policymakers perceive coordination among nations that have similar levels of technology development (eg regional collaboration) as a pathway to improving technology policy.

Although this paper does not intend either to be a comprehensive document on policy priorities of all developing countries or to be prescriptive about the appropriate role of the international community, it is meant to provide two useful additions to the literature. First, it contributes to a more informed dialogue with and between developing country policy makers on technology policy issues. Second, it serves as a call to action to the global community to engage in technology governance dialogue with a nuanced understanding of the diversity of policy priorities in low- and middle-income settings.

2. Research methodology

This paper summarises the findings of a seven-month consultative process with stakeholders working in and for developing countries, including governmental policymakers, representatives from the civil society and NGOs, academics and researchers, and the private sector. The research was guided by three key questions:

1. What are the technology policy priorities for developing countries in the digital age?

2. What are the facts that enable or hamper technology policy making in developing countries?

3. How do international cooperation and coordination shape national technology policy agendas, and does this help advance the priorities of developing countries?

The answers to these questions required the collection of information that adequately represented the views of digital policy experts from developing countries, but also demanded deeper insights on particular points than those we would capture through a standardised questionnaire. For this reason, we opted for using a mixed-method approach. Our analysis is primarily based on inputs gathered through an online survey and complemented by direct interviews and focus group discussions.

In an effort to focus this research on the perspectives of developing country policy makers, data collection efforts emphasised data quality over quantity. As such, the survey was distributed only to specific individuals and well-known networks of technical experts. The direct interviews and focus groups were conducted with a targeted group of survey respondents as a way to add depth to the data.[1]

2.1 Online survey responses

The online survey was available online between February 2019 and August 2019. The sample of targeted experts were selected with the criteria of currently being or having in the past been involved in digital technology policy making, policy analysis, policy regulation, or policy research, preferably with experience working in and for developing countries. Experts were contacted and invited to participate via email.[2] The questionnaire consisted of 37 questions combining multiple selection (23) and open-ended questions (14).[3] The full questionnaire is presented in Appendix II.

[1] Not all interviewees were survey respondents. Some of them were contacted as a result of survey respondents' recommendations. See Section A1 in the appendix for more details about the profile of survey respondents.

[2] 165 participants received a direct link to the survey. Further invitations were sent via an anonymous link which was shared with 2 small networks of technical experts.

[3] Among those who started and finished the survey within the same day (85 respondents), the average time to complete the questionnaire was 26 minutes.

Over the consultation period we obtained 105 individual responses. 92% of respondents identified themselves as experts on low- or middle-income countries (see Table 1).[4] The most common respondents were government officials (41%), followed by academics and researchers at universities or think thanks (21%), and members of international organisations (19%).[5]

Table 1: Number and percentage of respondents by income classification of their country of primary expertise[6]

Income classification of country of primary expertise	Number of respondents	Percentage of respondents	Percentage of respondents who could be classified
Low or middle income	68	65%	92%
High income	6	6%	8%
Not possible to classify	31	30%	-
Total	**105**	**100%**	**100%**

It is important to note that the low number of observations within certain categories of world regions (eg Middle East and North America) or stakeholder groups (eg Civil Society) makes it difficult to conduct statistically significant subgroup analysis. This is one of the reasons we combine low- and middle-income country expertise into a single group for analysis. Even then, the analysis section of this paper mainly presents results based on the whole sample of 105 respondents, unless we observe interesting statistically significant findings in subgroups of participants.[7]

2.2 Direct interviews with participants

In addition to the survey responses, eight semi-structured interviews were conducted between March and May 2019 with seven survey respondents and one additional expert recommended by a survey respondent. All interviewees had primary expertise in a developing country. The interviews were conducted remotely (by phone or VoIP system) and had the purpose of obtaining deeper insights on the main obstacles and opportunities for technology policy in developing countries, as well as adding depth and specificity to some of the interviewees' survey answers. The direct interviews also offered some diversity of both geographic and stakeholder perspective.

[4] Our study considered 'low- and middle-income countries' to be all countries classified as 'low-income economies', 'lower-middle-income economies', and 'upper-middle-income countries'. These groupings followed the World Bank country classifications by income level 2019-2020, available at: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups (last accessed: 13 January, 2019).

[5] See Table A.3 in Appendix I for more details.

[6] A number of respondents did not identify an individual country but a region of expertise or global expertise. Only 74 out of 105 respondents could be classified either as experts on a specific low- or middle-income country (68 participants) or on a high-income country (6 participants). This was the classification that we used to understand whether the participants' responses varied with the income level of their country (or region) of expertise along this report. Appendix I contains more information on the geographical split of respondents.

[7] In some cases we merged regions or stakeholder-group categories so as to estimate statistics based on larger samples. These cases were indicated in the analysis of the data in Section 4.

Interviewees were representatives of five different stakeholder groups: Academia or Think Tank (3), International Organization (2), Civil Society (1), the Private Sector (1), and Government (1). Their expertise was spread across six different countries or regions: India (3), Philippines (1), Tanzania (1), Sub-Saharan Africa (1), Latin America and the Caribbean (1), and East Asia and Pacific (1).

2.3 Focus group discussions

Four separate focus group discussions were conducted in March 2019. Each focus group discussion lasted approximately 50 minutes and was conducted with country delegations from Djibouti, Gabon, Kenya, and Rwanda in the margins of a technology policy workshop. Together these four conversations included 21 current governmental policy makers representing multiple government functions, including:

- 8 representatives from ICT Ministries of the respective countries
- 5 representatives from ICT / Utility Regulatory Authorities
- 4 representatives with technology portfolios within other Line Ministries (eg Education and Trade)
- 4 representatives from other government functions

2.4 Additional testimonies

In addition to the three primary data sources explained above (online survey, direct interviews, and focus groups), the Pathways for Prosperity Commission hosted a discussion in April 2019 in Washington, DC with 21 participants from across sectors on the sidelines of the World Bank/IMF Spring Meetings. This event was an opportunity to draw in more voices to the consultative process – particularly from the civil society sector – and to solicit reactions to the initial findings of the survey data. Some of the opinions expressed by these participants have been used to strengthen the analysis of particular points in this paper.

3. Governing a globalised digital industry

In an era of unprecedented levels of interdependence, nations that are at the centre of networks – whether they be financial markets, operational value chains, or information networks – are shaping governance across the world. Our work builds on the relevant literature in political science, law, development studies, and internet studies by discussing the implications of multilevel governance for the power, position, and the role played by developing countries in technology-related policymaking.

Most norms and rules that govern the digital economy have been formulated either by private industrial actors, technical committees, or domestic policymakers in particularly powerful states or actors (eg the United States, China and the European Union) (Jackson, 2019). In the context of the EU, Bradford (2019) calls it the 'Brussels effect', whereby companies adopt EU rules in order to be able to participate in the common market, and then impose them across their global businesses to minimise compliance costs. These rules are also often adopted by other governments or international organisations. A good example of the 'Brussels effect' is the European Union General Data Protection Regulation (GDPR), which is fast becoming a global standard for data governance (Bradford, 2020). GDPR is spreading worldwide, not only because it has been shaping the terms of service and privacy policies of multinational companies such as Apple, but also because several countries have been enacting almost identical provisions as a way to ensure they are allowed to send and receive data from Europe.[8]

This raises particular issues of how less-powerful states can have a voice in these cross-border technology debates, as many of them have no say in the development of the rules, or ongoing governance around them (Bache & Flinders, 2016, p. 4). Indeed, policy outcomes depend not just on states, but also on private actors and international organisations - such as the World Trade Organization (WTO), the International Monetary Fund (IMF), and World Bank (WB) – which can have significant effects in steering domestic policy (Slaughter, 2017).

This paper recognises that many state and non-state players coexist and compete for influence also in the technology policy debate. These players are linked through a complex network that transcend the borders of a single state. But they are not in an equal position. The framework proposed by Farrell and Newman (2019) shows that global networks of informational and financial exchange generate enduring power imbalances among states. According to the authors, the US and other developed countries have been leveraging their position as 'focal points' of interconnected networks to achieve their strategic aims. Being a central node in a global network confers a strategic advantage that they term 'weaponised interdependence' (Farrell & Newman, 2019). So far, this framework has been used to show the emergence of strong systematic inequalities in two issue areas (finance and information), but has not yet been applied to technology policy more broadly.

[8] See Greenleaf (2018) for a review of data privacy standards and laws around the world and the influence of GDPR.

Critical legal scholars studying globalisation have also pointed to the existence of patterns of 'dominance' whereby key notions in international policymaking reflect legal and political concepts and ideas from powerful nations. Santos (2002) describes the process of 'globalised localism', wherein ideas and materials from certain nations are adopted and applied at various transnational contexts. In practice, according to the author, some powerful states are extending their reach over the globe and successfully transporting their national approaches to the international sphere and structuring the rules in more peripheral nations (Santos, 2002). Similarly, Roberts (2017) challenges the 'universalism' of international law, arguing that some states and regions have come to dominate international forums and disproportionately influence their rule-making process. According to Roberts (2017), any of the legal doctrines, principles, concepts, and treaty provisions are a product of specific academic and professional institutions situated predominantly in developed countries. For example, access to the most international institutions setting the rules at the global level is open only to a minority of professionals with degrees from a limited number of academic centres based in richer nations – what Schachter (1977) has called the "invisible college".

While recognising that some centres of power are still exerting disproportionate influence in the technology policy debate, our work also acknowledges that the geopolitical order is now shifting to greater multipolarity, greater competition, and increased need for cooperation amongst different states. In this context, the relative hegemony of US and other developed countries have been giving way to emerging global powers such as China and Russia. As argued by Roberts (2017), this diffusion of power may favour coalitions of non-dominant countries. The future of international governance of technology is, therefore, going to be shaped around "many constellations of states that will vary across fields and issues" (Roberts, 2017, p. 15).

Our research is not only focused on issues at the international level. The conceptual tools of traditional domestic policy are ill-suited to deal with the multilevel interactions that take place in the governance of digital technologies. Strong network effects and 'winner-takes-all' dynamics are cementing the position of powerful gatekeepers; companies that have emerged in the last decade are now among the largest corporations in the world (Khan, 2018). Digital platforms (which do not provide services themselves) dominate traditional sectors, and users' data is quickly becoming one of the most economically important inputs to production (Mayer-Schönberger & Cukier, 2013). Existing regulatory frameworks (such as for competition policy and taxation) are not equipped to deal with this rapidly changing landscape. Without new analytical frameworks and decision tools, policymakers are left applying 'analogue' approaches to entirely new problems (Zanatta & Kira, 2018; Ranchordás, 2015).

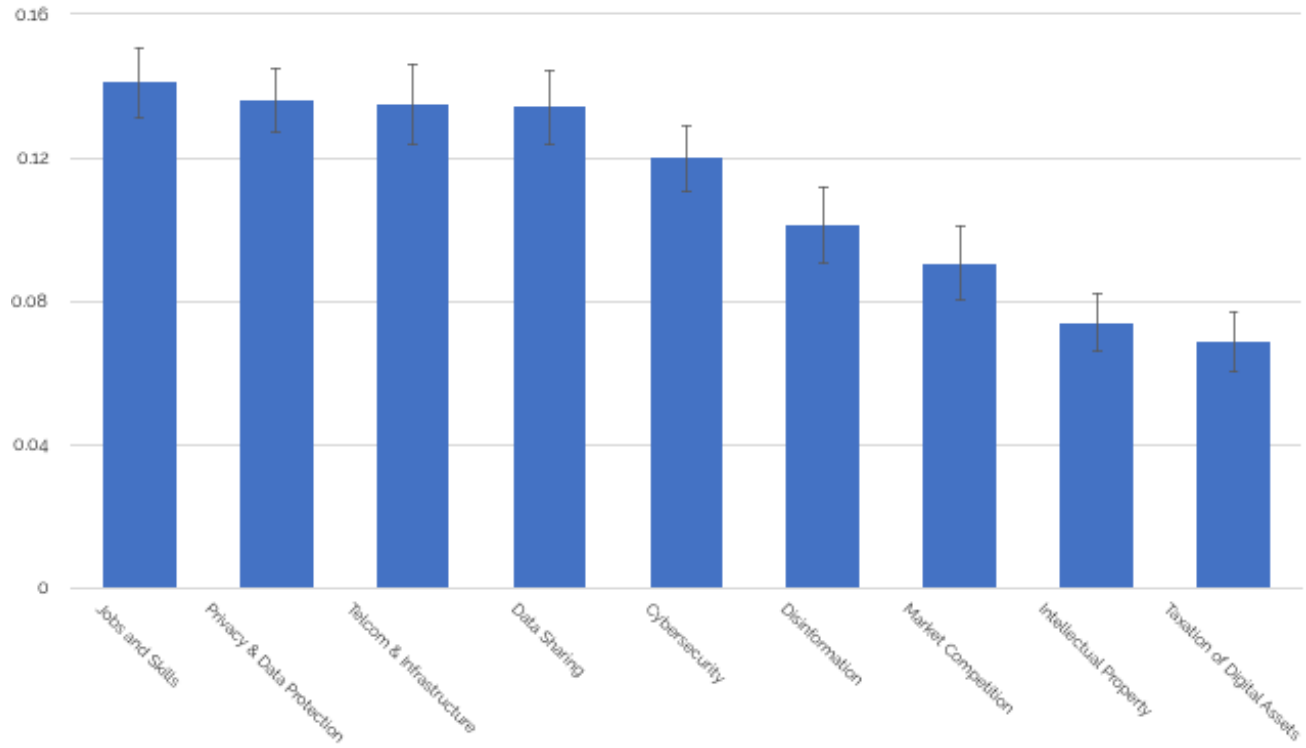
4. Results

We collected data across three main lines of enquiry. To begin, we wanted to identify technology policy priorities for developing countries in the digital era. From there, we seek to understand the factors that enable or hamper the pursuit of these priorities. And finally, we ask how international coordination and cooperation contribute to these goals and shape the national technology policy agendas in developing countries. This section presents the results observed for each of these questions.

4.1 Technology policy priorities for developing countries

Survey respondents were first asked to take a moment to reflect on the most pressing technology-related issues facing their country or region.[9] All 105 survey respondents were then asked to rank a list of nine given policy priorities according to their relative importance. Several methods were used to obtain an aggregate measure of individuals' relative rankings, and the resulting ranking of importance was robust to all of them. The mean of the normalised rank sum weights for each policy priority ordered by level of importance, as well as their 95% confidence intervals, are presented in Figure 1.

Figure 1: Ranking of tech policy priorities by normalised rank sum weights, mean and 95% confidence intervals



[9] The survey asked three sequential questions to identify policy priorities: (i) in order to have a set of standard responses, respondents were first asked to rank a preset list of policy issues; (ii) after ranking the preset list, respondents were given the option to identify whether there were "other" policy priorities they think will be important for their country or region over the next three years; (iii) lastly, if participants acknowledged "other" policy priorities, they were given an open ended opportunity to add up to three additional policy priorities.

Technology policy areas seem to fall into four main levels of importance. First, respondents systematically considered that "jobs and skills", "privacy and data protection", "telecommunications and infrastructure", and "data sharing and interoperability" are the most important policy areas for developing countries. Second, "cybersecurity" appears as slightly less important than the previous four, while "disinformation" and "market competition" hold the third level of importance. Finally, the lowest ranked policy areas were "intellectual property", and "taxation of digital assets".

We also ran separate analysis of the policy-priorities based on the income-level of the country of expertise.[10] We found that for respondents whose main country of expertise is a high-income country, "privacy and data protection" and "cybersecurity" are the policy areas with highest scores. This result was statistically significant and suggests a divergence of priorities from those of experts in developing countries who consistently rated economic issues ("jobs and skills" and "telecommunications and infrastructure") as their top priorities.

Qualitative data from the focus groups revealed that increasing access to ICT infrastructure and, more specifically, promoting universal access to broadband was a key policy priority for all four focus groups. This emphasises the importance of "telecommunications and infrastructure", one of the four main policy priorities mentioned in the online survey. For example, in the focus group with Kenyan government representatives, the first respondent in the group noted that the country has *"a legal framework for access to information for all and a National broadband strategy"* and the next two respondents in the group reinforced this point, citing the countries' top priorities as *"technology infrastructure"* and *"ensuring all Kenyans have access to ICT infrastructure and services"*.[11] Similarly, the focus group participants from Djibouti informed that one of the main ICT Ministry's key technology strategy documents currently focuses on *"internet coverage for the country"*.

The importance of "jobs and skills", which was the highest ranked policy issue in the survey, was also mentioned by three different interviewees. In particular, they focussed on the untapped potential for digital technology to improve labour market outcomes. For instance, a current Indian government employee reported that only three percent of the current labour market in India has formal skills certifications and, despite growth of GDP, the job market is stagnant. The interviewee emphasised how technology can help upskill people, create authenticated skills certificates, and provide a platform to bridge the current gap between *"skills – which are just an input…and the job market"*. An interviewee from an India-based think tank reinforced the point that labour markets have evolved to a point where traditional educational models with linear relationships between *"learner"* and *"worker"* no longer work, and that society must move to a more cyclical relationship between these two states where individuals go back and forth every few years. In the interviewee's own words: *"that actually requires the entire system, from schools to colleges and education systems, to revolve around individuals. And to revolve around the fact that it's about me, the individual, my capacity to learn something new, practice that under a mentorship, go do a job, use data as a working station, and then go back to learn something"*. This interviewee also highlighted that technology makes this type of dynamic upskilling possible and that "micro-credentials" are essential to this new model.[12]

[10] See Section A2 of Appendix I for this analysis and more details on the ranking of policy priorities.

[11] Kenya Focus Group participants, March 2019 (conducted in Kigali, Rwanda).

[12] Interview with Indian think tank respondent.

It is also unsurprising to see both "data sharing and interoperability" and "privacy and data protection" among the top policy priorities for the survey respondents, based on how frequently it was raised during the individual semi-structured interviews. The same interviewee from an Indian think tank who discussed the importance of micro-credentials also noted that "*people are waking up to the issue of data*," given the exponential growth in the collection, storage and use of personal data. As a dominant model for technology governance in South Asia, India has introduced the Data Empowerment and Protection Architecture (DEPA), becoming a key driver of the conversation about technology governance in this region.[13]

Apart from identifying what technology policy aspects are a priority for developing countries, we also aimed to understand how confident countries are that these policy priorities are achievable in practice. For that reason, survey respondents were asked: **to what extent do you believe your technology policy priorities are likely to be resolved in a way that benefits your country?** The responses were measured on a continuous scale between 1 and 5, where 1 represents "highly unlikely", 5 represents "highly likely" and 3, the middle point, represents "could go either way". The results for this question are reported in Table 2.

Table 2: Mean and 95% confidence intervals for likelihood that technology policy priority will be resolved in a beneficial way

Statement	No. of respondents	Mean	95% confidence interval	
To what extent do you believe your technology policy priorities are likely to be resolved in a way that benefits your country?	98	3.52	3.35	3.69

Based on Table 2 above, we can see that respondents are relatively uncertain about whether their countries' policy priorities can be resolved positively or negatively (mean=3.52). The result is not entirely uncertain – the mean is above 3 at a 0.05 level of significance, and so respondents in aggregate do seem to lean towards optimism.

4.2 Obstacles and enablers of technology policymaking

With the purpose of understanding the relative importance of key national and international actors in technology policy, survey respondents were asked to name the organisations and institutions that play the most formative role in technology policymaking in their countries of expertise. They could select as many options as they wanted from a predetermined list of actors, and were also given the possibility to add others. Table 3 summarises the answers for this question, including the actors added by respondents themselves.

[13] For more information on DEPA, see https://indiastack.org/depa/. It is worth noting that data governance has been a particularly thorny issue in India, and personal data protection, in particular, has been subject to a lot of regulatory debate, including in India's Supreme Court (for more details see Misra, 2019).

Table 3: Number and proportion of respondents for whom each organisation plays the most formative role in technology policy-making

Organisation or institution	No. of respondents	Percentage of respondents
National government	87	82.86%
National private sector	45	42.86%
International bodies	43	40.95%
International private sector	37	35.24%
Universities / academia	29	27.62%
Think-tanks	23	21.90%
Civil society	22	20.95%
Regional or local government	16	15.24%
Regional organisations	15	14.29%
E-health networks*	3	2.86%
Lobbyists*	1	0.95%
Media*	1	0.95%
Security agencies*	1	0.95%

*Actors added by respondents

As Table 3 informs, most of the respondents (83%) consider that national governments play the most formative role in technology policy-making. With a considerably lower number of mentions, surveyees considered that the national private sector (43%), international bodies such as the World Bank, IMF, OECD, etc., (41%), and the international private sector (35%) are also important actors in technology policy-making. The fact that the two most mentioned actors are national actors (national governments and the national private sector) suggests that developing countries still consider that technological policy is mainly a domestic matter.

This is also supported by the data on the factors hampering technology policymaking. Survey respondents were asked to identify the one or two most significant obstacles to achieving policy priorities for each of the policy priorities they had previously identified as the most relevant. Table 4 presents the percentage of respondents who reported that a certain obstacle (listed in the columns) is an important barrier to achieve a determined policy priority (listed in the rows), among all those respondents who considered that this policy priority is relevant in their regional or country-context.[14] Respondents could nominate up to two obstacles per policy priority.

[14] It is important to note that the total number of respondents in each row (the denominator of the percentage number) varies across policy areas. This is because only respondents who chose that policy as a top-5 priority were required to identify obstacles. Also, as the respondents could choose more than one obstacle for each policy area, the rows in Table 3 do not sum 100%.

Table 4: Main obstacles identified for each group of policy priorities

Policy Priorities	Obstacles				
	Lack of funding or resources	Political obstacles	Bureaucratic obstacles	Technical obstacles	Lack of international cooperation
Jobs and skills	65.82%	31.65%	24.05%	20.25%	11.39%
Privacy & data protection	22.37%	47.37%	21.05%	42.11%	23.68%
Telcom & Infrastructure	60.27%	27.40%	34.25%	28.77%	12.33%
Data sharing	22.67%	37.33%	45.33%	46.67%	18.67%
Cybersecurity	38.24%	32.35%	11.76%	45.59%	32.35%
Disinformation	9.26%	72.22%	11.11%	48.15%	14.81%
Market competition	8.11%	62.16%	40.54%	8.11%	21.62%
Intellectual property	16.67%	41.67%	29.17%	29.17%	25.00%
Taxation of digital assets	8.70%	60.87%	21.74%	21.74%	34.78%

Political obstacles were the most significant ones, identified as the main barrier in the context of five policy areas: privacy and data protection, disinformation, market competition, intellectual property, and taxation. For two policy areas (jobs and skills, telecom and infrastructure), funding was the major obstacle. For other two areas (data sharing and cybersecurity), technical obstacles were the most often cited. In contrast, bureaucratic obstacles and lack of international cooperation were not identified as the main barriers to any policy area. In fact, international cooperation was the least relevant obstacle for three policy areas (jobs and skills, telecom and infrastructure, and data sharing), indicating that these are mainly considered matters of domestic policy.

In order to identify the sources of international influence, survey respondents were also asked to select the country or countries that they considered to be models for technology policy for their country of expertise. From a predetermined list of options, the most common answers were the European Union (60%) and Estonia (51%), followed by India (23%), the United States (22%), Rwanda (17%) and China (15%). We also found that respondents were more likely to nominate influential countries from within their own geographical region. For instance, respondents who are experts in sub-Saharan Africa tend to mention Rwanda as a model country significantly more (50%) than those who are experts on other regions (6%).[15]

[15] This result was statistically significant at 95% confidence level. See Tables A.5 and A.6 in Appendix I for more details.

4.3 The role of international cooperation

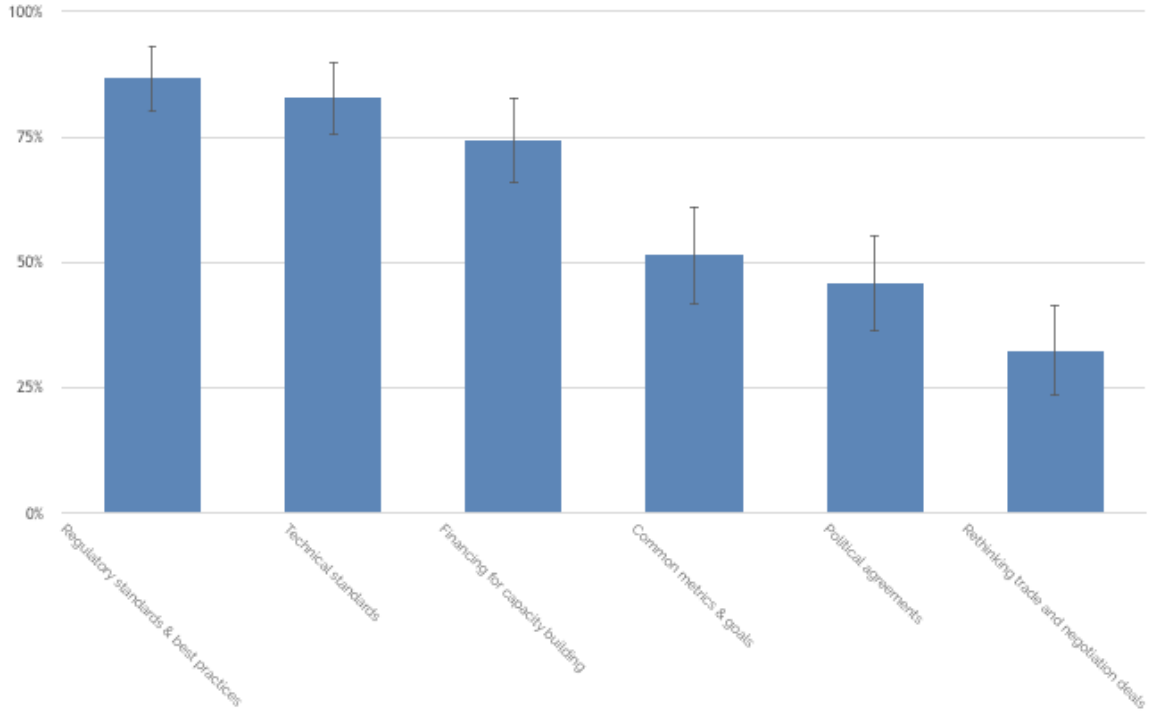
In order to identify the perspectives of experts on the role of international coordination in shaping technology policy, survey respondents were asked an open-ended question about whether they believed international coordination was needed to achieve their country's technology policy goals. About 67% of respondents (70 individuals) answered this question. After analysing their free-text responses, we grouped them into three categories (Table 5). The majority of categorised responses (62%) believed international cooperation was important to achieving their country's goals, and a further 35% thought it was important in certain specific areas (but not necessary across the board).

Table 5: Number and percentage of respondents who consider that international cooperation can help their countries to achieve their technology policy goals

Would international cooperation help your country achieve its goals?	No. of respondents	Percentage of respondents	Percentage of valid answers
No	2	1.90%	2.94%
Yes	42	40.00%	61.76%
Only in certain areas	24	22.86%	35.29%
No information	35	33.33%	-
Do not know / unclear	2	1.90%	-

To further understand the perceived importance of international coordination, we asked respondents which specific roles and functions are most useful from international fora. Some predetermined options were given and respondents could select all those that apply. Additionally, we had an open question for respondents to report other ways in which international coordination could be helpful for achieving technology policy goals. Figure 2 summarises the responses.

Figure 2: Percentage of respondents that believe these types of international cooperation will help countries achieve their technology policy priorities, with 95% confidence intervals



As Figure 2 shows, the three most-commonly selected roles for international cooperation were: regulatory standards and best practices (87%), technical standards (83%), and financing for capacity building (74%). A significantly lower proportion of respondents reported that establishing common metrics and goals (51%) and obtaining political agreements (46%) are useful areas for international cooperation. Rethinking trade and negotiation deals obtained an even lower number of mentions (32%). This is also supported by qualitative data. As highlighted by one interviewee, "*setting standards to enable interoperability, building indigenous capacity, infrastructure, and public-private-partnerships with technology companies are all things that can use international partnerships*". Also, when respondents were asked to mention explicit episodes when international cooperation was helpful for their countries, the most mentioned case was "GDPR and privacy policy" followed by "best practices and standards".

4.4 Regional-level cooperation

When analysing the list of other roles for international coordination, we identified an interest in strengthening and consolidating regional digital markets, which was mentioned by one respondent through the open questions of the survey, but also emerged clearly from the focus groups and the semi-direct interviews.[16] Two of the four focus groups – one with Rwandan and one with Kenyan policy makers – mentioned the importance of regional coordination. The Kenyan group noted the role of UNCTAD in focusing efforts of individual countries to develop a "single digital window" for trade and commerce.

In an interview, a former African ICT Minister pointed out that international coordination plays a role in "*identifying comparative advantages for countries to focus on and avoid counterproductive competition between countries*". This same respondent then explained in an interview that this comment was specifically in reference to aspirations across the African continent to build a single digital market in Africa. He explained that there is a risk that current states will begin to compete for core competencies, like software and hardware development, to a point where it undermines the single digital market goals of the region. In this case, the interviewee mentioned the importance of relevant regional bodies, like the African Union or the UN's Economic Commission for Africa, in playing a mediating or organizing role, thereby helping set a vision for a single digital market and avoiding potentially competitive behaviour of specific states.[17]

Moreover, a Latin America Regional expert explained during an interview that the main weaknesses in pursuing the regional digital market is the lack of interconnectedness to promote better regulations. In Latin America, he explained, infrastructure is relatively strong, as is the pool of human resources in the technology sphere, but many countries lack regulations that would strengthen digital economy functions like e-commerce, defining rules for e-payments across borders, and strengthening cybersecurity.[18] The idea of regional cooperation was further highlighted by a civil

[16] See Table A.8 in the appendix for details about the roles for international coordination.

[17] Interview with a participant who agreed to be quoted without attribution, April 9 2019 (conducted in Washington, DC).

[18] Interview with a participant, 29 March 2019 and 3 April 2019 (conducted by phone).

society representative from South Asia who works with the Association of Southeast Asian Nations (ASEAN) on regional economic integration. He noted that ASEAN's broad agenda of economic integration is increasingly including work on an integrated digital economy. The participants' description of the relationship between ASEAN member countries, ASEAN as a regional body, and global coordinating bodies again reinforced the idea that regional coordination is currently a focus of developing countries.[19]

4.5 Convergences and divergences in international cooperation

We also asked respondents about real-life examples of how international cooperation has helped countries to implement positive changes to technology policy.[20] The most mentioned policy areas were data protection regulation (10 mentions), best practices and standards (8 mentions), and technical and infrastructure-related guidance (7 mentions). Also, six respondents reported that international cooperation in the area of research and innovation produced positive changes in their countries of expertise. As some of our respondents were experts in e-health, it is not surprising that six of them also mentioned "health policy diffusion" as an important area for international coordination.

Finally, we asked respondents for practical examples of conflicts produced by international guidance on technology policy.[21] Five out of 17 respondents reported a conflict that was produced because of a misalignment between the interests of international institutions or organisations and the interests of the domestic policymakers themselves. In many of these cases, this was directly associated with different regulatory preferences. For example, a respondent from India mentioned: "*International guidance to purely allow private players in electronic payment was in conflict of India's interest in creating our own national electronic payment digital rails*". Another survey participant who reported to have experience on global technology policy indicated: "*the push to adopt TRIPS-Plus (trade-related property rights) provisions through both FTAs (free trade agreements) and by joining a number of WIPO treaties, drastically limited the policy space of developing countries in the field of IP*".

Additionally, market competition problems, such as international technology standards or global regulations favouring certain providers and producing market power, were mentioned by four of our respondents. For instance, as a respondent from East Asia and the Pacific described: "*when the international guidance becomes very specific (eg software, technology platform), it opens up conflicts of interest which prevents competition. But the government is mandated to create a fair playing field and not favour any specific vendor*".

[19] Interview with a participant, 17 May 2019 (conducted by phone).

[20] Less than half of the sample of respondents (42 individuals) provided at least one example, while the rest left the question unanswered. See Table A.9 in Appendix I for more details.

[21] See Table A.10 in Appendix I for more details.

Another area of conflict, that was mentioned in three cases, was misaligned interests between the national private and public sector. For instance, a different respondent from India reported tensions between the domestic private sector and the public sector regarding accessible internet connection: "*a centrally consumerist and private sector led conception of the Internet and its governance, coming largely from the US, though having its good points, also led to a lot of problems with developing Internet/digital governance frameworks in my country*." Another respondent who identified himself as a global IT security expert reported antagonistic positions regarding cybersecurity: "*cybersecurity issues are extremely common, as interests are so diverse, and some parties actively block progress*".[22]

[22] Other areas that were mentioned as conflicts were: misaligned interests between national and subnational governments on the adoption of international standards, and path dependency from local actors who are reluctant to change.

5. Discussion

5.1 There is a spread of policy priorities among policymakers

This research revealed that policymakers are concerned with a broad spread of technology related policy issues. This is evidenced by the fact that all policy issues presented in the survey were considered relevant by a significant group of respondents, i.e. all policy areas were ranked among the top five priorities by at least a quarter of respondents; no policy area was universally considered unimportant.[23]

The relative importance of each policy issue, however, is not uniform across respondents. Respondents whose main country of expertise is a high-income country had different top priorities from the experts in low- and middle-income countries, who were more concerned with "jobs and skills" and "telecommunications and infrastructure" (see Section 4.1). This suggests that while developed countries are more focused on protecting their data and digital infrastructure, experts from developing countries are primarily concerned with issues more closely related with how digital technologies can affect economic development.

The plethora of policy goals are difficult to pursue all at the same time. Policymakers in developing countries are struggling to address the multiple, and often competing, policy goals of the digital age. Our research identified uncertainty regarding how likely it is that these policy issues will be resolved positively, for both developing and developed countries (see Table 2). Moreover, as suggested by the relevant literature, many emerging rules governing the digital age are not fit for purpose in low- and middle-income countries (eg Jackson, 2019; Bradford, 2019).

5.2 What is the role of international cooperation?

The data described in Section 4.3 indicates that international actors are important in technology policymaking. However, at the same time, these actors are not currently perceived as the most relevant players shaping technology policymaking. In fact, our survey reveals that local actors are perceived to have the most formative role.

There is an apparent contradiction here: international coordination seems to be both vital, and yet unimportant, except in a narrow range of areas. We believe there are three possible explanations for this result. First, there may only be a small number of issues that require international coordination. Second, respondents may see their countries as "agenda takers" (not "agenda setters"), and so only identify international coordination as being relevant for issues that are already on the international agenda. Third, it may simply be the case that international coordination is a necessary but not sufficient condition for achieving technology policy objectives (and the main binding constraints are at the domestic level).

[23] See Table A.4 in Appendix I for the details of how many respondents ranked each policy priority among the top five priorities.

To the first possible explanation, a large part of "international cooperation" is the exchange of technical standards and regulatory best practice (Raustiala, 2002). In particular, when it comes to developing countries, we can infer that many policymakers would feel unprepared to address policy issues emerging from digitalisation due to the lack of guidance and institutions to address them. Indeed, technical standards and regulatory best practice were much more frequently selected as important by survey respondents (over 80%, compared to 32% for international trade negotiations, see Table 4).[24] It is possible that only a small subset of issues can be solved or improved by international standards. For example, addressing the cross-border technicalities involved in cybersecurity networks requires international coordination, but laying out domestic telecommunications infrastructure may not. We also know that the thematic policy priorities of policymakers differ between high income countries and lower income countries (Section 4.1). In low- and middle-income countries the focus is more on harnessing economic opportunities and building out infrastructure. If these priority issues are not the areas that are amenable to technical and regulatory standardisation, then international cooperation may have little to offer in aggregate.

While low- and middle-income countries are more interested in economic issues, our results show that richer nations are more focussed on managing risks around privacy, data protection, and cybersecurity.[25] This brings us to our second possible explanation for ambivalence around international coordination, because it is dominated by a small number of countries. The literature in the field suggests that emerging models of technology governance are now crystallising around a few centres of power, and in practice, developing countries have little influence over these emerging international norms. This is the concept of 'weaponised interdependence' discussed in Section 3, in which "the most central nodes are not randomly distributed across the world, but are typically territorially concentrated in the advanced industrial economies" (Farrell & Newman, 2019).

Table 4 shows that international coordination is most often identified as a solution to the topics that are already of primary interest to rich agenda-setting nations (for instance, cybersecurity and privacy). This supports the interpretation that policymakers in individual developing countries may see themselves more as "agenda takers" rather than "agenda setters". As argued by a survey respondent from Latin America, "*harmonisation through standards and international treaties may bring benefits, but tends to be hugely detrimental to developing nations, due to the imbalance of power in international negotiations*". As a result, it is possible developing country policymakers view international coordination as a mechanism to resolve the narrow slice of issues that are a priority for richer countries. For example, the EU's GDPR has been used as a model for privacy policy in many developing countries (Greenleaf, 2018), including the data protection legislation approved in Kenya in November 2019, and provides a good example of this supply-driven approach to international coordination. Unsurprisingly, when we asked for examples of how international cooperation has helped countries to implement positive changes to technology policy, the most mentioned policy area was also privacy and data protection (see Section 4.3).

[24] At 95% confidence level. See Figure 2 in Section 4.3.

[25] See Figure A.1.

The final possible explanation for ambivalence in the findings around international coordination is simply that it may not be the most binding constraint for achieving technology policy objectives. Our data suggests that developing countries are facing many domestic obstacles to advance their policy priorities. In fact, according to Table 4, political obstacles were considered the most relevant obstacles for five of the nine policy issues provided in the survey.[26] Lack of funding or resources were mentioned as the most pressing obstacle for two policy issues (jobs and skills; and telecommunications and infrastructure), and technical obstacles for another two (data sharing and cybersecurity). This indicates that while international coordination is undoubtedly important, as discussed above, there may be more pressing domestic constraints related to technology policy that currently require the attention of policymakers.

5.3 A call for regional cooperation

From this perspective, it is unsurprising that a common theme revealed by the research was the interest in strengthening and consolidating coordination among regions and countries that have similar levels of technology development. All respondents that identified countries in Latin America as models for technology policy were experts from Latin America. Rwanda was considered a model country significantly more by respondents from sub-Saharan Africa (50%) than experts from other regions (6%). Rwanda was also identified as a good model by two (2) of the three (3) focus groups with non-Rwandan participants.[27] Thus, at least for sub-Saharan Africa and Latin America there seems to be a strong identification of 'regional heroes' and call for cooperation between developing countries.

In this context, regional and sub-regional fora emerged repeatedly in our consultations as a solution to address the priorities of developing countries. There could be many reasons behind it. One is simply that regional fora are already delivering technical support tailored to the needs of their constituent countries, as highlighted by several respondents. Looking to the future, regional coordination also has the potential to amplify the voices of smaller countries, as larger groupings would represent larger populations and markets than any one country alone. Countries will also find they have more common interests with countries in the same region and, as argued by Roberts (2017), situations of diffuse global power are likely to favour coalitions of like-minded countries. The future of international governance of technology is, therefore, going to be shaped around "many constellations of states that will vary across fields and issues" (Roberts, 2017, p. 15). Thus, the future of international coordination on technology may increasingly be based on shared interests and ideologies, and not only on geographical proximity or the agenda of powerful nations.

[26] Note: the question did not specify *domestic* political obstacles, and so participants may have selected this option to describe international politics. However, in the context of the question – put alongside other domestic constraints like funding, and distinct from a separate "international coordination" option – we interpret it to be about domestic politics.

[27] It is important to note that these workshops were held in Kigali, Rwanda, which might have influenced respondents in their identification of model countries.

6. Conclusion

This study has examined the results of a consultation combining quantitative and qualitative methods to identify the perspectives of policymakers on technology governance. Our focus was squarely on the needs and priorities of developing countries. This research provides new insights into technology policy priorities and the role of international coordination in achieving those policy goals.

Overall, this study has yielded three important findings regarding technology policymaking in developing countries. First, we found there is a spread of technology-related policy priorities concerning policymakers around the world, but while developed countries are more focused on protecting their data and laying out digital infrastructure, experts from low- and middle-income countries are primarily concerned with issues more closely related to economic development.

The second main finding is that even though policymakers consider international cooperation critical to achieving their countries' objectives, this is not true for all technology policy issues and there are relevant domestic obstacles to address. The research also adds to the literature on power imbalance between developed and developing countries, providing evidence that low- and middle-income countries do not perceive international coordination as a particularly fruitful avenue for technology policymaking.

Finally, this study identified an interest from developing countries in strengthening and consolidating coordination among nations that have similar levels of technology development. We found that policymakers and developing countries believe that regional collaboration and collaboration between like-minded countries could help to design solutions that are better tailored to the specific needs of developing countries.

Regulation of the digital economy will continue to grow in importance on the global agenda, and the resulting governance mechanisms will be pivotal for those seeking to make the most of the opportunities on offer. The business models and digital architectures designed by firms can have far-reaching impacts on the prospects for economic growth, and these are inherently shaped by the regulatory environment.

However, it is worth mentioning that our conclusions are based on the experiences and perceptions of a relatively small number of policymakers at a specific point in time. The findings are open for consideration in other contexts and time periods. In particular, since this consultation process was conducted, the technological landscape has continued to shift, and policymakers' priorities have been upended by the Covid-19 crisis.[28] Rather than viewing this study as the definitive answer on what particular *issues* are important, it is more instructive to understand how current *processes* are serving – or not serving – the interests of different countries.

[28] For two examples at the intersection of these areas, see Kira (2020) and Soon-Shiong, Qhotsokoane, and Phillips (2020).

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Appendix I - Complementary Data

A1. Profile of survey respondents

The online survey was available online between February 2019 and August 2019. During this period, we obtained 105 validated individual responses. Respondents were asked to identify the country in which they have primary expertise. If respondents were completing the survey without reflecting on any specific country, they were asked to either select "global" expertise or the specific region in which they have primary expertise. In total, 85 respondents (approximately 82% of the total sample) identified either a specific country or a specific region of expertise, while 19 respondents selected "global" expertise, and one respondent left geographic expertise blank. Table A.1 shows the regional distribution of respondents that identified expertise in either a specific country or a specific region:

Table A.1: Number and percentage of respondents by self-reported regions of expertise[29]

Region of primary expertise	No. of respondents	Percentage of respondents
East Asia & Pacific	18	17.31%
Europe & Central Asia	4	3.85%
Global	19	18.27%
Latin America & Caribbean	21	20.19%
Middle East & North Africa	1	0.96%
North America	1	0.96%
South Asia	20	19.23%
Sub-Saharan Africa	20	19.23%
Total	**104**	**100%**

Given that developing country technology policy experts were the primary audience for the survey, it is not surprising to see lower response rates from individuals with primary expertise in North America and Europe. That said, developing countries of Central Asia and the Middle East & North Africa are admittedly underrepresented in the survey sample.

Table A.2 presents the classification of respondents according to the country or region they declared to have expertise in. 42 participants reported to have either global or regional expertise (with countries within that region belonging to different income groups) and, therefore, were not allocated to any income group. It is worth noting that most of the statistical analyses of this paper were made by simply distinguishing between high-income countries and low- or middle-income countries (as reported in Table 1 of Section 2.1) to increase the number of observations we could include. This is because collapsing low and middle-income countries into the same category made it possible to include regional experts in Sub-Saharan Africa and North America that would otherwise be left out.

[29] One of the respondents did not report any country or region of expertise.

Table A.2: Number and percentage of respondents by income classification of their country of primary expertise[30]

Income classification of country of primary expertise	No. of respondents	Percentage of respondents	Percentage of valid responses
Low income	10	10%	16%
Lower-middle income	29	28%	46%
Upper-middle income	18	17%	29%
High income	6	6%	10%
Not possible to classify	42	40%	-
Total	**105**	**100%**	**100%**

In addition to identifying geographic expertise, all survey respondents were required to identify the stakeholder group to which they belonged. Table A.3 shows the distribution of respondents by stakeholder groups. The most numerous stakeholder group of respondents was government officers (41%), followed by academics and researchers at universities or think thanks (21%) and members of international organisations (19%).

Table A.3: Number and percentage of respondents by stakeholder type

Stakeholder type	No. of respondents	Percentage of respondents
Government	43	40.95%
Academic / think tank	21	20.00%
Civil society	4	3.81%
International organisation	19	18.10%
Private sector	16	15.24%
Other	2	1.90%
Total	**105**	**100%**

It is important to note that the low number of observations within certain categories of world regions (eg Middle East and North America) or stakeholder groups (Civil Society) makes it difficult to get statistically representativeness for the estimation of certain subgroup indicators presented. For this reason, the analysis section of this paper mainly presents results based on the whole sample of 105 respondents, unless we observe interesting statistically significant findings in subgroups of participants.[31]

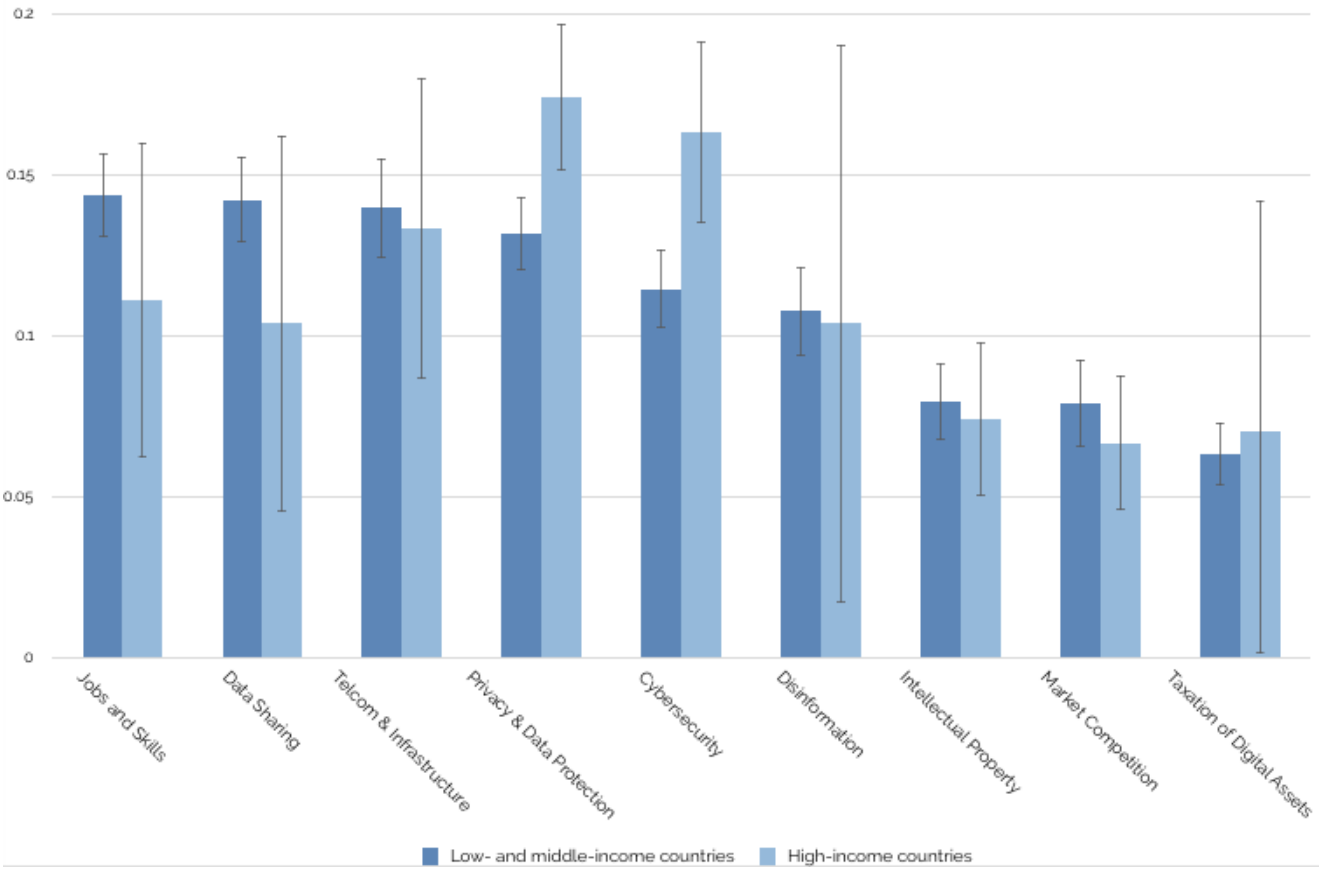
[30] Unfortunately, given that a number of respondents did not identify an individual country but a region of expertise or global expertise, only 74 out of 105 respondents could be classified either as experts on a developing country or a high-income country. The definition of 'developing country' includes all low- and middle-income countries as identified by the 2018 World Bank country classifications, available at: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519.

[31] As reported in Section 4, in some cases we merged some of the region or stakeholder-group categories so as to estimate statistics based on larger samples.

A2. Ranking of policy priorities by income level of the country

In order to better understand how the income level of the country of expertise has an influence on what our respondents consider to be a technology policy priority, we estimated the mean of the normalised rank sum weights for each policy priority for the group of participants from low- and middle-income countries and the participants from high-income countries separately.[32] These means, as well as their 95% confidence intervals, are presented in Figure A.1.[33]

Figure A.1: Ranking of policy priorities by income level of country of expertise



From Figure A.1, it is clear that privacy and data protection, and cybersecurity ranked significantly higher for respondents from high-income countries, and that these are the areas with the largest means, followed by telecommunications and infrastructure. This indicates that only telecommunications and infrastructure would be among the three most salient technology policy areas mentioned by our sample experts, regardless of the levels of income of their countries of expertise.

[32] https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups (last accessed: 13 January, 2019)

[33] The small sample size, and in consequence, the small number of mentions of some policy priorities within the group of high-income countries, make some 95% confidence intervals to be very broad, as the figure reports.

Table A.4: Number and percentage of respondents that ranked a given policy area among the top 5 priority areas

Policy area	No. of respondents	Percentage of respondents
Privacy & data protection	81	77.14%
Telcom & infrastructure	75	71.43%
Taxation of digital assets	25	23.81%
Data sharing	76	72.38%
Cybersecurity	69	65.71%
Market competition	38	36.19%
Intellectual property	26	24.76%
Disinformation	55	52.38%
Jobs and skills	80	76.19%

A3. Actors playing formative roles in technology policy

Survey respondents were also asked to select the country or countries that they considered to be models for technology policy in their countries of expertise. Because of their advanced developments in technology policy, six countries or regions were presented as predefined categories (China, Estonia, European Union, India, Rwanda and the United States), but respondents were also given the possibility of choosing "others" and then naming as many countries as they considered as models. They could also select the answer: "no country is a good model for my country's technology policy". Table A.5 below presents the number and percentage of responses for this question.

Table A.5: Number and percentage of respondents by country or area that they consider as a model for technology policy

Country	Number of respondents	Percentage of respondents
European Union	63	60.00%
Estonia	54	51.43%
India	24	22.86%
United States	23	21.90%
Rwanda	18	17.14%
China	16	15.24%
South Korea	3	2.86%
Autralia	2	1.90%
Bangladesh	1	0.95%
Chile	1	0.95%
Colombia	1	0.95%
Costa Rica	1	0.95%
Croatia	1	0.95%
Finland	1	0.95%
Germany	1	0.95%
Ireland	1	0.95%
Israel	1	0.95%
Italy	1	0.95%
Japan	1	0.95%
Malaysia	1	0.95%
New Zealand	1	0.95%
Singapore	1	0.95%
Sweden	1	0.95%
Uruguay	1	0.95%
No country is a good model	16	15.24%

Table A.5 above reveals that the countries and regions that accumulated the largest number of mentions were the European Union (60%) and Estonia (51%), followed not closely by India (23%), the United States (22%), Rwanda (17%) and China (15%). Interestingly, 15% of respondents considered that no country is a good model for their country of expertise and 12% chose "another country". We also found out that surveyees who are experts in Sub-Saharan Africa tend to mention Rwanda as a model country significantly more (50%) than those who are experts on other regions (6%),[34] and that all Latin American countries reported as models were mentioned by experts in Latin America.[35] However, not all developing countries acknowledged as models were reported by

[34] At 95% confidence level.

[35] However, we cannot apply statistical inference to the answers provided by respondents who chose "others" and the mentioned countries not included in the predetermined list of six countries.

surveyees who work on technology policy in the same region. For example, Bangladesh, South Korea and Malaysia were mentioned by respondents whose main expertise is in sub-Saharan Africa, while Singapore was chosen by an expert in South Asia.

The following t-test for proportions indicates that it is more likely to report that Rwanda is a model-country for technology policy (50% of responses) if the respondent is a technology policy expert in sub-Saharan Africa rather than a technology policy expert in any other region of the world (only 6.2% of responses).

Table A.6: T-test for the proportion of respondents who consider that Rwanda is the role-model country for technology policy

Two-sample test of proportions: respondent not from Subsaharan Africa: number of obs = 65
respondent from Subsaharan Africa: number of obs = 20

Group	Mean	Std. Err.	z	P>z	[95% Conf. Interval]	
Non-Subsaharan Africa	0.0615385	0.0298075			0.0031169	0.11996
Subsaharan Africa	0.5	0.1118034			0.2808694	0.7191306
diff	-0.4384615	0.1157086			-0.6652463	-0.2116768
	under Ho:	0.0948445	-4.62	0		

diff = prop(non-subs-africa) - prop(subs-africa) z = -4.6230
Ho: diff = 0

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(Z < z) = 0.0000 Pr(|Z| > |z|) = 0.0000 Pr(Z > z) = 1.0000

The qualitative evidence on model countries also identified Rwanda as a good model according to two of the three focus groups with non-Rwandan participants.[36] The Djibouti focus group noted that they look to Rwanda as a model in four specific respects: 1) the overall development of the ICT sector, 2) implementation strategies for ICT projects, 3) the creation of an institution that is responsible for the country's ICT strategy, and 4) the use of technology in the education sector. The Kenya focus group similarly identified Rwanda as a model on technology policy and noted that the two countries collaborate on policy development and on regional digital integration.[37] The Gabon focus group identified Estonia and China as good models for, and as partners in, achieving their technology policy goals.[38]

[36] However, it is relevant to note that the workshops were held in Kigali, Rwanda, which might have affected respondents.

[37] Djibouti and Kenya focus groups conducted in March 2019 in Kigali, Rwanda.

[38] Gabon focus group conducted in March 2019 in Kigali, Rwanda.

A4. The role of international cooperation

The survey also tested the influence of international actors in domestic policymaking. Respondents were asked to report their level of agreement with two statements: "*domestic decision-makers in my country are influenced by international technology policy conversations*", and "*current global conversations around technology policy are aligned with my country's priorities*". In both cases, the level of agreement with the statement was measured in a continuous scale from 1 to 5, where 1 was "strongly disagree", 5 was "strongly agree", and 3 was "neither agree nor disagree". Table A.7 presents the results for these two questions.

Table A.7: Mean and 95% confidence intervals for level of agreement with statements on international influences on national technology policy

Statement	No. of respondents	Mean	95% confidence interval	
Domestic decision-makers in my country are influenced by international technology policy conversations	100	3.54	3.34	3.74
Current global conversations around technology policy are aligned with my country's priorities	101	3.03	2.86	3.21

As Table A.7 informs, surveyees slightly agree that national technology policy is influenced by international technology conversations. Although this value does not seem to be very high (mean value of 3.54), it is still significantly different from 3, meaning that the respondents are not indifferent to the statement.[39] In contrast, survey respondents neither agree nor disagree with the statement that global conversations are aligned with their countries' priorities, revealing that they do not have a clear position on this point.[40]

In order to identify the perspectives of experts on the role of international coordination in shaping technology policy, survey respondents were asked in which ways international coordination could help developing countries to achieve their policy goals. Some predetermined answers were given and respondents could select all those that apply. Apart from the answers for the predetermined roles for international cooperation (presented in Figure 2 of Section 4.3), 16 respondents provided information on other ways international cooperation could help countries to achieve their technology priorities. In order to better analyse this information, we present their answers in full in Table A.8.

[39] As the table reports, this value is significantly different from 3 at 95% confidence level.

[40] Mean value of 3.03, not significantly different from 3 at 95% level of confidence.

Table A.8: Self-reported ways that international coordination can help countries to achieve their technology policy goals

Other roles for international coordination
Promote regional digital market
Pilot, test and scale interventions
Share best practices to address cyber security attacks. Share best practices for common laws on data protection
Identifying comparative advantages for countries to focus on and avoid counter productive competition between countries
It will bring to government the rich experience of the international partners
Financing for technology infrastructure
Stakeholder engagements and dialogue
Support to countries for the change management process that accompanies digitization
Not only financing for capacity. building, but also facilitating processes required for capacity building - such a the creation of peer to peer networks etc.
Enforcement of standards through international bodies - WTO, IMF, WB etc.
After financing for capacity building, its nurturing a space for networked/regional learning
Support indigenous institutions like Africa CDC with mandates and authorities to do what needs to be done like set standards. Unfotunately, we see resources expended in donor-intiated systems development and implementations
Leadership and strong political will
International cooperation can promote the development and use of global good technologies, set the global agenda for technology by setting targets, coordinate and align donors and investors, and facilitate knowledge sharing so that all countries benefit from research and interventions.

We also asked respondents about real-life examples of how international cooperation has led to positive changes to technology policy. Each respondent was able to mention one, two or three policy areas. Table A.9 presents a summary of mentions, rather than a summary of respondents.

Table A.9: Policy areas where international cooperation helped countries to implement a positive technology policy change, by number of mentions

Examples of international guidance that helped to implement a positive technology policy change in your country	Number of mentions
GDPR and privacy policy	10
Best practices and standards	8
Technical and infrastructure-related guidance	7
Research and innovation	6
Health policy diffusion	6
Regulation of e-commerce and e-payments	4
Training and skill transfer	4
Cybercrime and cybersecurity	3
e-government, public administration	3
Regulation of telecom industry	2
Broadband policy	2
Funding	2
Digital assets' property rights	1

Finally, we asked respondents for practical examples of conflicts produced by international guidance on technology policy. Only 17 out of 105 surveyees answered this question. We analysed the answers provided by each respondent, acknowledged the main sources of conflicts reported by them and produced conflict categories based on these sources. The information on types of conflicts and their respective number of mentions are displayed in Table A.10.

Table A.10: Types of conflicts produced by international guidance in technology policy, by number of mentions

Types of conflict caused by international cooperation in your country	Number of mentions
Misaligned interests between country and international organisations	5
Market competition problems	4
Misaligned interests between the country's public and private sector	3
Misaligned interests between the country's national and subnational levels	2
Path dependency of national actors	2
Cybersecurity conflict	2
GDPR conflict	2
Misaligned interests between country and international corporations	1
Corruption-related conflict	1
Conflict of non-interoperability of data	1
Fragmentation of similar initiatives within the country	1

Appendix II - Survey questionnaire

Q1. What is the country where you have primary expertise?

If you are not reflecting on any one specific country, please select "global" or identify the region in which you have expertise.

Note: When asked in this survey to reflect on "your country," you should respond with reflections based on the country or region identified here.

Thinking about the work that you do, please take a moment to **reflect on the most pressing technology issues** facing your country before advancing to the next section (Section 1 of 4).

Q2. The following list provides some commonly recognised technology policy issues but is not intended to be comprehensive. Please **rank the priorities** in order of relevance to you.

Use the mouse to drag and drop.

- ◻ Privacy and data protection
- ◻ Telecommunications and infrastructure
- ◻ Taxation of digital assets
- ◻ Data sharing and interoperability
- ◻ Cybercrime and cybersecurity
- ◻ Market competition
- ◻ Intellectual property
- ◻ Disinformation (eg fake news, bots, trolls, etc.)
- ◻ Jobs and skills

Q3. Beyond the technology policy issues identified above, are there other issues you think are important to address in the next three years?

- ◻ Yes
- ◻ No

Q4. Which other technology policy issues do you expect to address in the next years? Provide as much information as you find relevant.

Q5. As you reflect on these technology policy priorities, please identify in what ways **international coordination** could help achieve your goals. Please select all that apply.

- ◻ Regulatory standards and best practice
- ◻ Political agreements
- ◻ Common metrics and goals

[ctd.]

- ◻ Financing for capacity building
- ◻ Rethinking trade negotiation and deals
- ◻ Technical standards (eg interoperable data systems)
- ◻ I don't think international coordination is needed to achieve these goals
- ◻ Other

Q6. In which other ways could international coordination help?

Q7. To what extent do you believe your technology policy priorities are likely to be resolved in a way that benefits your country?

Highly unlikely Could go either way Highly likely

1 2 3 4 5

Q8 .What do you see as the 1 or 2 most significant obstacles to addressing your top policy priorities?

- ◻ Lack of funding or resources
- ◻ Political obstacles
- ◻ Bureaucratic obstacles
- ◻ Technical obstacles
- ◻ Lack of international coordination
- ◻ Don't know / not my field

Please take a moment to reflect on the most **important influences** on your country's technology policy priorities before advancing to the questions in the next section (Section 2 of 4).

Q9. Which countries do you think are generally considered as a good model (either by yourself or by others in your country) for your country's technology policy?

Please select all that apply.

- ◻ China
- ◻ Estonia
- ◻ European Union
- ◻ India
- ◻ Rwanda
- ◻ United States
- ◻ I don't know
- ◻ Other
- ◻ No country provides a good model

Q10. Which other countries are considered models for your country's technology policy?
Press Ctrl or Cmd and select all that apply.

Q11. Who are the individuals or organisations in your country that play the most formative role in technology policy decision-making?

Please select all that apply.
- □ National government
- □ Regional or local government
- □ International bodies (eg World Bank, IMF, OECD, etc.)
- □ National domestic private sector
- □ International private sector
- □ Universities/Academia
- □ Civil society
- □ Think-tanks
- □ Regional organisations (eg ASEAN, CEPAL, UNECA, etc.)
- □ Other

Q12. Which other individuals or organisations play a formative role in technology policy decision-making in your country?

Q13. To what extent do you agree with the following statements?

Domestic decision-makers in my country are influenced by international technology policy conversations:

Strongly disagree Strongly agree

1 2 3 4 5

Current global conversations around technology policy are aligned with my country's priorities:

Strongly disagree Strongly agree

1 2 3 4 5

The three **narrative questions** in the next section are optional. Please provide us with as many details as you consider necessary (Section 3 of 4).

Q14. Can your country achieve its technology policy goals on its own, or is international coordination needed? If international action is needed, can you describe what particular action would be useful? (Optional)

Q15. Can you provide an example of how international guidance enabled your country to implement a positive technology policy change? (Optional)

Q16. Can you provide an example where such guidance created conflict with other priorities in your country? (Optional)

Wrap Up: The following questions will help us deepen our research and better analyse our data (Section 4 of 4).

Q17. Which stakeholder group do you belong to?

- ◻ Government
- ◻ Academia/think-tank
- ◻ Civil society
- ◻ International organisation
- ◻ Private sector
- ◻ Other

Q18. Please select from the following list, the option that most closely describes the part of government for which you work.

- ◻ ICT Ministry
- ◻ Finance Ministry
- ◻ Executive Office or central government department
- ◻ Other line ministry
- ◻ ICT Regulator
- ◻ Foreign Ministry
- ◻ Other area of government

Q19. Which line of ministry?

Q20. Which area of government do you work in?

Q21. What is the name of your organisation?

Q22. How would you characterise the focus of your organisation?

- ◻ National/domestic
- ◻ Regional
- ◻ Global

[ctd.]

- ◻ Both domestic and international (regional or global)
- ◻ I don't know

Q23. What role do you perform within your organisation?

- ◻ Minister, CEO, or department head
- ◻ Policy adviser
- ◻ Manager
- ◻ Researcher or analyst
- ◻ Engineer or technologist
- ◻ Other

Q24. How would you describe your role?

Q25. What is your job title? (optional)

Q26. How much of your time at work do you spend on technology-related issues?

- ◻ 0% to 5%
- ◻ 5% to 20%
- ◻ 20% to 50%
- ◻ 50% to 70%
- ◻ more than 70%

Q27. What is your gender?

- ◻ Female
- ◻ Male
- ◻ Other
- ◻ I prefer not to say

Q28. How old are you?

Q29. In which country do you spend most of your work time?
(This may be different to the country of expertise identified at the start of the survey.)

This is the final page of questions.

Q30. Can we directly quote your written responses in our research publication?

- □ Yes, I give permission to be quoted directly in the research publication.
- □ Yes, I give permission for my answers to be quoted but not attributed to me personally.
- □ No, I want my answers to be completely anonymised, with no reference to me or my organisation.

Q31. What is your name? (optional)

Q32. Can we contact you for a follow-up interview?
Our research team may wish to follow up with some respondents with a phone conversation of around 45 minutes. Please let us know if you are willing to take time for this.

- □ Yes
- □ No

Q33. At which email/telephone number (including country and area codes) should we contact you?

Q34. Are there other stakeholders that you recommend we speak with?

- □ Yes
- □ No

Q35. Who? Please provide their name and organisation.

Q36. Are you happy to be contacted in relation to other Pathways Commission work?

- □ Yes
- □ No

Q37. Are you happy to be contacted in relation to other Future State work on digital governance?

- □ Yes
- □ No


BLAVATNIK
SCHOOL OF
GOVERNMENT
UNIVERSITY OF
OXFORD


Digital
Pathways
at Oxford