Policy Brief

Analyzing the Inclusive Global Digital Divide: Specific Insights from the CAREC Region

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Background

The digital economy refers to an economy that is based on digital technologies, encompassing the use of digital access, utilization of digital tools and capabilities, and the governance structures that regulate and facilitate digital interactions and transactions (Razzaq et al., 2023). It has become a key engine of global economic growth and recovery, and thus, countries worldwide are actively formulating policies to accelerate the pace of digital development. Nevertheless, the imbalance in the development of international digital economy has also brought new challenges. There is a clear gap in the digital landscapes between developed and developing countries, urban and rural areas, and different groups (ITU, 2022). In terms of access to digital devices, the 4G user population coverage rate in least developed countries is only 53%, far lower than 87.6% in the world and 98.6% in developed countries (China Academy of ICT, 2022).

In terms of development outcome, the digital economy of high-income countries is 28.6 trillion USD, accounting for 75.2% of the world's total (China Academy of ICT, 2022); the top five digital economies (i.e., the US, China, Germany, Japan, and the UK) account for 78.1% of the world's total (China Academy of ICT, 2020). Digital technology and its applications are capital- and technology-intensive, requiring large-scale infrastructure and R&D investment in high-speed broadband, data storage, algorithm application, etc. Developing countries, particularly CAREC region, with restricted resource endowments and technological bases in these aspects, are seeing an even wider gap with developed countries in digital economy development (Razzaq et al., 2022). In addition, the international digital divide reflects and amplifies social, cultural, and economic inequalities, further widens the gap between the rich and the poor, and even leads to the digital monopoly or hegemony of developed countries, thereby endangering the digital sovereignty and security of all countries (UN, 2020).

Effectively measuring the development level of the international digital economy is of great significance for bridging the digital divide in promoting inclusive digital transformation. Measuring international development of digital economy provides a sufficient theoretical basis for countries to formulate targeted policies and measures by comparing countries and positioning the global digital economy development (Wang et al., 2021). *Given the swift advancement of digital technologies, the challenges stemming from digital economy imbalances, and the evident lag in the global governance system, there is an immediate need to undertake comprehensive research into theoretical mechanisms and viable governance strategies. Therefore, measuring global digital divide in various domains is first stepping stone for effective policy intervention and tracking the digital progress of developed and developing countries.*

Data and Key Findings

The study reconstructs the digital economy indicators system from four dimensions: digital access, digital use, digital capacity and digital governance sourced from ITU, Knoema, UNCTAD, WIPO, and publications such as the Global Competitiveness Report, Global Innovation Index, Global Cybersecurity Index, and Doing Business. List of indicators is given in Appendix I (Di et al. 2024). This research uses the entropy weight method to assign weights to various indicators, calculates each level-1 indicator, and then uses the entropy weight method again to calculate the index value of the

digital economy. For brevity, details are not mentioned here; however, they will be presented upon request.

The key findings are as follows:

(1) From a measurement perspective, the global digital economy is rising, with China, the US, and Europe as key players. Developed countries excel in the digital economy, while many developing nations lag behind. The digital economies of the US, China, and selected European countries outpace the global average. Less developed nations experienced faster growth, while advanced economies progressed more slowly. Developed countries outperform most developing ones across digital access, use, capacity, and governance. Developing nations advance notably in access, use, and capacity, whereas developed nations prioritize governance, reflecting a dominance of digital economy regulation.

Among the countries within the CAREC region, China stands out as a leader in digital economic development, while the digital economic development levels of other countries in the region lag behind on a global scale. China's digital economic development level is notably advanced, with the digital economic index value of 0.70 in 2020, ranking second globally in digital economic development. In contrast, the digital economic index for other countries in 2020 fall between 0.06 and 0.15, placing them in the 50th and 100th global positions. When examining the trend of digital economic development, it is evident that digital economic development in CAREC countries is progressing at a fast pace. The increase in digital economic index is positive, indicating substantial growth. Notably, Kyrgyz Republic, Pakistan, and Tajikistan are the top three nations with the increase in digital economic index. This illustrates the significant emphasis on digital economic development in CAREC countries and the rapid progress in this regard.

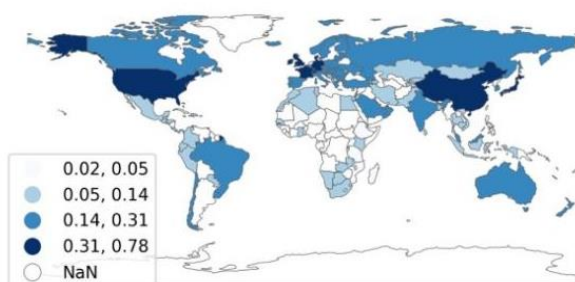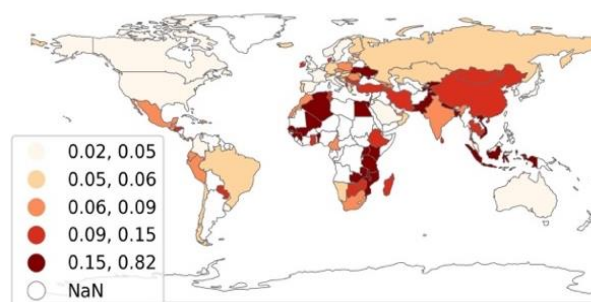**Figure 1: Global digital economy development 2020**

Figure 2: Increase in digital economic index, 2015-2020

Source: Author's own presentation

(2) From the perspective of global divides, the differences in the development of digital economy, digital access, and digital use show a slow narrowing trend. In contrast, the gap between digital capacity and digital governance has widened. The calculation of Dagum's Gini[1] coefficient shows

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[1] Gini coefficient is a widely used index to measure the gap. It was initially used to calculate the inequality of

that the overall Gini coefficient of the development of international digital economy has a downward trend, indicating that the difference between different countries narrows. The Gini coefficient of digital access and digital use is declining, indicating the gap between hardware access and platform use is narrowing. The Gini coefficient of digital capacity and governance is rising, indicating that digital powers have more discourse power in the digital governance system and rule-making. The inter-group gap is the main source of the overall difference between digital economy and the four subsystems of digital access, digital use, digital capacity, and digital governance.

There exists a significant digital divide among CAREC countries. In 2020, the Gini coefficient for the digital economy in CAREC countries reached a high of 0.423, indicating substantial disparities in digital economic development levels among these nations. When examining the four subsystems (Figure 3), the Gini coefficients for digital access and digital usage are relatively lower and display a noticeable downward trend, with Gini coefficients of 0.198 and 0.381 in 2020, respectively. This suggests that differences among CAREC countries in terms of device access, infrastructure, and device usage are gradually narrowing. Nevertheless, considerable divide persists among CAREC countries regarding digital capability and digital governance, with Gini coefficients of 0.663 and 0.468 in 2020, respectively. This indicates a pronounced digital divide in digital capability and governance within the CAREC region, with China notably outperforming other countries in these domains. Moreover, the Gini coefficient for digital capability exhibits a noticeable upward trend, signifying an expanding digital capability divide among CAREC countries.

Figure 3: The Dagum Gini coefficient of digital economy and its subsystems in CAREC region
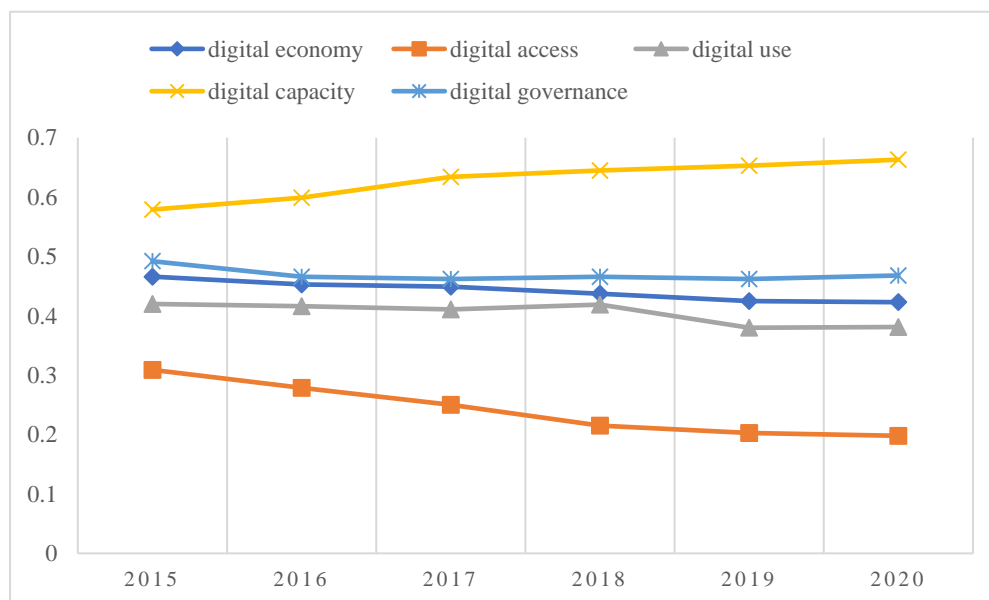
Source: Author's own presentation

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people's income within a country or region. Now it's used to measure differences in various aspects, such as technology gap, medical gap and so on. The value of the Gini coefficient is between 0 and 1, and a larger value indicates greater inequality.

(3) From the perspective of spatial correlation and probability of transfer, there is a significant spatial correlation in the development of international digital economy. There is a path-dependence phenomenon in the development of digital economy. After considering the spatial factors, it is found that the probability of the transfer of digital economy development is not only related to the spatial lag type but also to the initial level of national digital economy. In addition, there is a negative spillover effect when countries of the same level are adjacent. When the development level of the digital economy between adjacent countries is similar, there may be a competitive effect between the two countries, and the positive spillover effect disappears.

Policy recommendations

First, addressing the gaps in the digital economy subsystems requires a performance-based approach.   The overall and subsystem scores of developing countries in CAREC region are significantly lower than those of developed countries. This discrepancy underscores a substantial disparity in terms of digital access, utilization of digital platforms, and individual digital proficiencies. The development of the digital economy is not achieved overnight, but rather a gradual development process. Thus, digitally disadvantaged countries must prioritize the development of digital infrastructures to lay a solid foundation for the flourishing development of the digital economy in the later stage, including but not limited to internet access facilities, cloud computing, and artificial intelligence. They can bridge this gap by enhancing the adoption rates of such digital infrastructure and facilities. Concurrently, endeavors to bolster digital skills and education are imperative, aiming to augment the quantity and quality of skilled professionals. This, in turn, will enhance their competitiveness and adaptability in the impending digital era.

Secondly, establishing a multi-stakeholder digital governance framework is paramount. The discrepancy in digital governance is expanding globally. The existing structure grants a handful of developed nations the ability to monopolize technologies, dictate regulations, and exercise control over major corporations. While data advantages accrue to the developed world, most developing countries contribute data but incur costs – the former accesses data resources for free and even garners profits. Building an international multi-stakeholder governance framework[2] is conducive to fully protecting the rights of developing countries such as data security, data sovereignty, and data revenue. Likewise, establishing a domestic multi-stakeholder governance framework benefit achieving a win-win situation among various stakeholders, reaching governance consensus, standardizing digital governance rules, and enhancing the efficiency of digital governance. Erecting such a framework entails the involvement of not only national governments but also various stakeholders such as international organizations, businesses, and civil societies. This inclusivity guarantees diversity, transparency, and an equilibrium for public interests.

Thirdly, instituting a mechanism for international collaboration in the digital economy is essential to amplify the influence of digital powerhouses. The advancement of the global digital economy

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[2] A multi-stakeholder governance framework for developing a data security network involves collaboration and coordination among various stakeholders, including government agencies, private sector entities, civil society organizations, and academic institutions.

exhibits substantial spatial correlations, with nations harboring well-developed digital economies having spill-over effects on their neighboring counterparts. Consequently, the CAREC community must heed these spatial spillover effects engendered by digital powerhouses like China. Most Central Asian countries are relatively close to China, which provides favorable geographical conditions for constructing a regional cooperation mechanism in Central Asia. To this end, a cooperative framework for digital economy collaboration should be devised, stimulating cooperation in digital technology research and application. Additionally, facilitating the exchange and sharing of digital technologies is pivotal. The role of international collaboration and regional integration should be harnessed to expedite synchronized development of the global digital economy. By doing so, the full potential of spatial spillover effects arising from digital powerhouses can be harnessed, thereby propelling the digital economies of neighboring nations.

Fourth, as China leads the CAREC region in digital development, the Digital Silk Road initiative could significantly boost Central Asian countries' digital penetration and reduce the digital gap. Central Asian nations are keen to advance their digital economies and have formulated national strategies, creating promising opportunities for the Digital Silk Road. Nonetheless, the diverse constraints and circumstances across these countries present challenges to establishing a cohesive digital economic environment. Thus, a comprehensive analysis of Central Asia's digital economy development challenges from various perspectives is essential.

The Digital CAREC strategy provides guidelines for these countries. However, the main hurdle is a conducive investment ecosystem in the region that supports closing gaps in basic infrastructure, leading to further industry development. A previous CAREC Institute report (Razzaq et al. 2022a) highlighted critical aspects of digital investment: new digital activities, digital adoption, digital infrastructure, digital FDI restrictions, and digital promotion tools. Core challenges include digital security and privacy, digital infrastructure, data regulations, intellectual property rights, and others, which, if addressed, could attract more investment to the CAREC region. Beyond that, it notes that most FAANG companies are not operational in the region. Social media, telecom, and other applications restrict the potential of huge investments from FAANG firms. Therefore, a lenient policy would provide space for digital investment, with an integrated data privacy and sharing policy implemented to respect host countries' data privacy requirements. Domestic data centers and exchange points would help in doing so. The untapped potential of digital investment needs to implement an inclusive digital FDI ecosystem.

Fifth, although China has excelled in producing high-level ICT equipment, software design, and computing power enhancement, other CAREC countries are in the initial or second phase of the digital economy, lacking basic infrastructure and human capital. Therefore, these countries must prioritize building their digitalization pillars to create a strong foundation for future digital development. A collaborative approach involving public-private partnerships and international cooperation is essential, along with initiatives to develop comprehensive national strategies, improve digital infrastructure, enhance digital literacy and skills, foster innovation, and promote cross-border collaboration i.e. Digital Silk Road.

Lastly, digitalization is intricately linked with urbanization and population density. The more

urbanized a city is and the higher its population density, the more feasible and beneficial it becomes to implement digitalization initiatives. Urban areas tend to have better digital infrastructure, such as high-speed internet and mobile connectivity, which are essential for digitalization efforts. Additionally, densely populated cities offer a larger market and user base for digital services, increasing the potential return on investment for businesses and governments. From a policy perspective, this relationship underscores the importance of focusing digitalization efforts in urban areas, especially those experiencing rapid urbanization. Governments and policymakers should prioritize improving digital infrastructure in cities and promoting digital literacy among urban residents. By doing so, they can harness the full potential of digitalization to improve service delivery, enhance economic productivity, and promote sustainable urban development.

Appendix I:

International Digital Economy Development Level Indicator System

Level 1	Level 2	Level 3	Positive / Negative
Digital access	Access coverage	Home Internet access ratio	+
		Mobile Internet subscribers / 100 persons	+
		Fixed Internet subscribers / 100 persons	+
	Infrastructure	4G Internet coverage	+
	Access quality	Access pricing	−
Digital application	Personal use	Internet users / 100 persons	+
	Platform	E-participation index	+
		Online public service index	+
	Benefits	ICT service export	+
		Digital trade volume	+
Digital capacity	Education & training	Higher education admission ratio	+
		Staff training	+
	IPR	ICT patents	+
	Research & innovation	Innovation capacity index	+
Digital governance	Cybersecurity	Global cybersecurity index	+
		Secure web servers / one million persons	+
	Domestic governance	Business environment index	+
		Total of ICT-related laws & rules	+
	International discourse power	GDP global share	+

Note: "+" represents a positive indicator, while "-" represents a negative one.

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