asia cloud computing association

Cloud Readiness Index 2020

The ACCA is the apex industry association representing the stakeholders of the cloud computing ecosystem in the Asia-Pacific (APAC) region. Its mission is to accelerate adoption of cloud computing in APAC by creating a trusted and compelling market environment and a safe and consistent regulatory environment for cloud computing products and services.

The association works to ensure that the interests of the cloud computing community are effectively represented in the public policy debate. Drawing on subject-matter expertise from member companies, expert working groups, and special interest groups, it develops best practice recommendations and other thought leadership materials.

To find out more on how to join us, email secretariat@asiacloudcomputing.org, or visit our website at www.asiacloudcomputing.org

The Asia Cloud Computing Association's

Cloud Readiness Index 2020

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I. Executive Summary

Welcome to the sixth edition of the Cloud Readiness Index (CRI), where the events of 2020 have ushered in a world vastly different that the one we are used to. The Covid-19 pandemic has increased the visibility and importance that the internet and cloud computing tools play in all of our lives – not just in business and economics, but also in our private and interpersonal lives.

Cloud computing has constantly worked behind the scenes to provide the technological foundation upon which much of today's economic resilience rests – and which tomorrow's capacity of international trade recovery may be built upon.

In our personal lives, anecdotal evidence will reveal that with movement control orders and social distancing policies in place, the use of internet protocol (IP)-based tools such as messaging, tele-and video-conferencing tools have increased. Online shopping has become the norm, and other remote access technologies have come into play as all aspects of life – from interpersonal to leisure to work – move online.

In our professionals lives, work-from-home (WFH) has become de rigueur, with videoconference meetings and work messaging systems the means of communicating with our colleagues. A host of other solutions now support the entire work ecosystem, from email to evites, from message pings to payments – and supporting these activities are a host of cloud computing technologies.

The Cloud Readiness Index (CRI) was developed by the Asia Cloud Computing Association (ACCA) in 2011, and has since become a definitive reference point to assess the readiness of Asia-Pacific (APAC) markets to adopt cloud computing technologies. This year, the results of the CRI 2020 will hopefully provide an added dimension into the technological resilience of markets to weather the economic impact of the Covid-19 pandemic

The CRI 2020 measures economies' preparedness through ten quantitative parameters, followed by a qualitative review of the regulations and policies each APAC market has put in place since the last iteration of the CRI in 2018.

Three key observations may be made from this year's results:

1. Cloud readiness is advancing in the region, but the pace of progress is stalling. This is not a positive sign, as it indicates some countries may have chosen to plateau their technology and infrastructural investment in a time when it is needed the most to recover from the economic fallout from Covid-19.

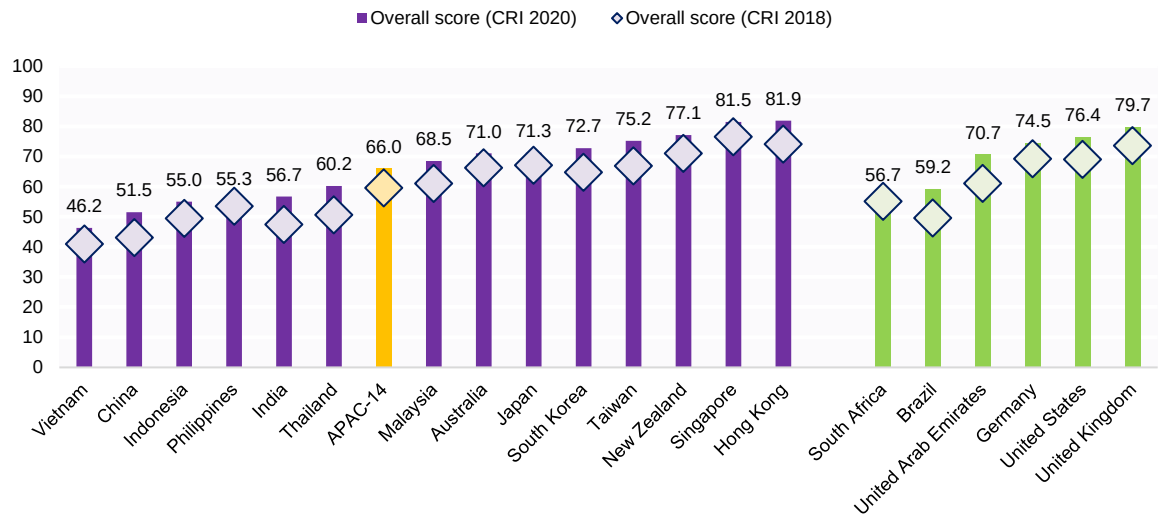
2. The digital divide has narrowed, although core capabilities such as managing natural risks, privacy, cybersecurity remain fragile. There are benefits to regional cooperation and standardisation, and here are where there are opportunities for regional collaboration to increase risk management capabilities.

3. Emerging APAC markets risk losing out on economic recovery from Covid-19 by not leveraging promising 'leapfrog' technologies.

Observation 1: Cloud readiness is advancing in the region, but the pace of progress is stalling

In terms of absolute scores, CRI 2020 shows that cloud readiness has advanced for all 14 APAC and all 6 non-APAC economies covered in this report. Overall CRI 2020 scores range from a low of 46.2 (Vietnam) to a high of 81.9 (Hong Kong), a significant increase compared to CRI 2018's range of 41 (Vietnam) to 76.6 (Singapore).

Figure 1: Overall CRI score comparison, 2018-2020



Source: ACCA calculations

In terms of relative rankings, CRI 2020 shows that cloud readiness is undergoing some moderate shifts. Ten of the 14 APAC economies have moved in the rankings since CRI 2018. Hong Kong, India, South Korea, Taiwan, and Thailand have moved up, while Australia, Indonesia, Japan, the Philippines, and Singapore have moved down.

It is worth noting that despite these changes, the top three economies are the same as for CRI 2018 (Hong Kong, Singapore, and New Zealand), as are the bottom two (China and Vietnam). This suggests that the overall trend for the region is one of stalling readiness, despite movement taking place between and within economies.

Table 1: Overall CRI rank comparison, 2018-2020

	Overall Rank (CRI 2018)	Overall Rank (CRI 2020)	Rank Changes (2018/2020)
Australia	6	7	-1
China	13	13	-
Hong Kong	2	1	+1
India	12	10	+2
Indonesia	11	12	-1
Japan	4	6	-2
Malaysia	8	8	-
New Zealand	3	3	-
Philippines	9	11	-2
Singapore	1	2	-1
South Korea	7	5	+2
Taiwan	5	4	+1
Thailand	10	9	+1
Vietnam	14	14	-

Source: ACCA calculations

This absence of notable shifts reflects a general slowdown of cloud-related activities and initiatives around the region. Since CRI 2018, no new 'Cloud First' policies have been launched or implemented, and no major cloud-related frameworks have been announced or adopted – despite such measures being recognised as a key differentiator for digital economies looking to harness the broader technological advancements that cloud computing enables.

To avoid reaching a technological stand-still, the ACCA recommends that APAC economies who have announced 'Cloud First' policies to focus their efforts on making them a reality. The ACCA also recommends that APAC economies that have not yet planned or designed such policies to consider doing so, as well as developing supporting measures (cloud vendor registration/accreditation schemes, guidelines for baseline security standards, data management policies, etc.).

Observation 2: The digital divide has narrowed, although core capabilities such as managing natural risks, privacy, cybersecurity remain fragile – these are where there are opportunities for regional collaboration

A notable advancement has been the narrowing of the deep digital divide between mature and emerging APAC economies that CRI 2018 highlighted. While the divide is far from gone, it has not noticeably advanced since 2018.

The average scores for mature and emerging markets have changed from 2018 to 2020 – most notably in the Cloud Security and Regulation segments. But the difference between these average scores has not advanced much in the same timeframe, suggesting a relative stabilisation of the divide between mature and emerging markets.

Looking closer at individual parameters, there remain major gaps in APAC markets' fundamental capabilities. On average, basic connectivity, sustainable energy production and consumption, exposure to natural risks, privacy, cybersecurity, and freedom of information remain major challenges across the APAC region – in some cases, even for the region's more mature economies.

Table 2: Difference between average segment scores, 2018-2020

	CRI 2018					CRI 2020				
	Total CLOUD INFRASTRUCTURE	Total CLOUD SECURITY	Total CLOUD REGULATION	Total CLOUD GOVERNANCE	Total ALL	Total CLOUD INFRASTRUCTURE	Total CLOUD SECURITY	Total CLOUD REGULATION	Total CLOUD GOVERNANCE	Total ALL
Average Score *Mature APAC Markets**	17.2	12.6	24.3	15.5	**69.6**	17.3	16.3	26.7	15.6	**75.8**
Average Score *Emerging APAC Markets***	10.2	9.7	18.0	11.5	**49.5**	10.5	13.5	20.3	11.9	**56.2**
Average Difference *Mature/Emerging Scores*	7.0	2.9	6.3	3.9	**20.1**	6.8	2.8	6.4	3.7	**19.6**

*Note: * Mature APAC markets: Australia, Hong Kong, Japan, New Zealand, Singapore, South Korea, and Taiwan*
*** Emerging APAC markets: China, India, Indonesia, Malaysia, the Philippines, Thailand, and Vietnam*
Source: ACCA calculations

These gaps may not directly exacerbate the digital divide, but they do not contribute to its mitigation either. For example, the vulnerability to natural and man-made catastrophes affects economies differently, but impacts the region's economic dynamism as a whole. Some regions experience disasters much more frequently and intensely than others, leading to the disruption of infrastructure that may not have been designed to withstand extreme conditions. Earthquakes, for instance, frequently damage submarine cables and interrupt internet access in densely populated coastal areas and cities.[1]

Likewise, in an increasingly inter-connected global economy, the cybersecurity shortcomings of one economy jeopardise the economic dynamism of another. In the APAC region, the highly fragmented approach to cybersecurity regulation makes the region both a prime target for cyber-criminals and an ideal launchpad for organised cyber-attacks – exposing organisations to risks that could be mitigated by a more harmonised approach.[2] Together, these elements show that these fundamentals may pose a significant roadblock to a stronger Asia Pacific cloud computing ecosystem.

To effectively consolidate their strengths and leverage them into long-term comparative advantages, the ACCA recommends APAC economies accelerate work to develop initiatives that boost regional capabilities. APAC economies could work together to enable both innovation and investment to emerge in a competitive and sustainable manner.

Observation 3: Emerging APAC markets risk losing out on economic recovery from Covid-19 by not leveraging promising 'leapfrog' technologies

Most APAC economies are already looking at the wave of next-generation technologies that will open up a range of global business opportunities. Internet of Things (IoT), artificial intelligence (AI), virtual and augmented realities (VR and AR), Fifth Generation (5G) networks, high-performance and quantum computing, automated and autonomous devices – these are some of the new advancements set to transform communities, organisations, and industries across the region.

For many, these technologies (see following figure) represent a unique opportunity to 'leapfrog' ahead of more mature economies – a promising scenario that is pushing APAC governments to gear up by strengthening infrastructure, adapting regulatory frameworks, and capacitating students and workers. But how much 'leapfrogging' can they actually and sustainably do if cloud readiness is stalled and/or inhibited?

Indeed, a slew of restrictive measures that make it difficult for data to travel freely and securely have taken shape between 2018 and 2019. For example, data localisation measures (data-residency requirements that confine data within a country's borders) have been proposed, considered, or enacted in China, Hong Kong, India, Indonesia, Malaysia, Thailand, and Vietnam – most often within broader privacy, cybersecurity, or national defence policies.

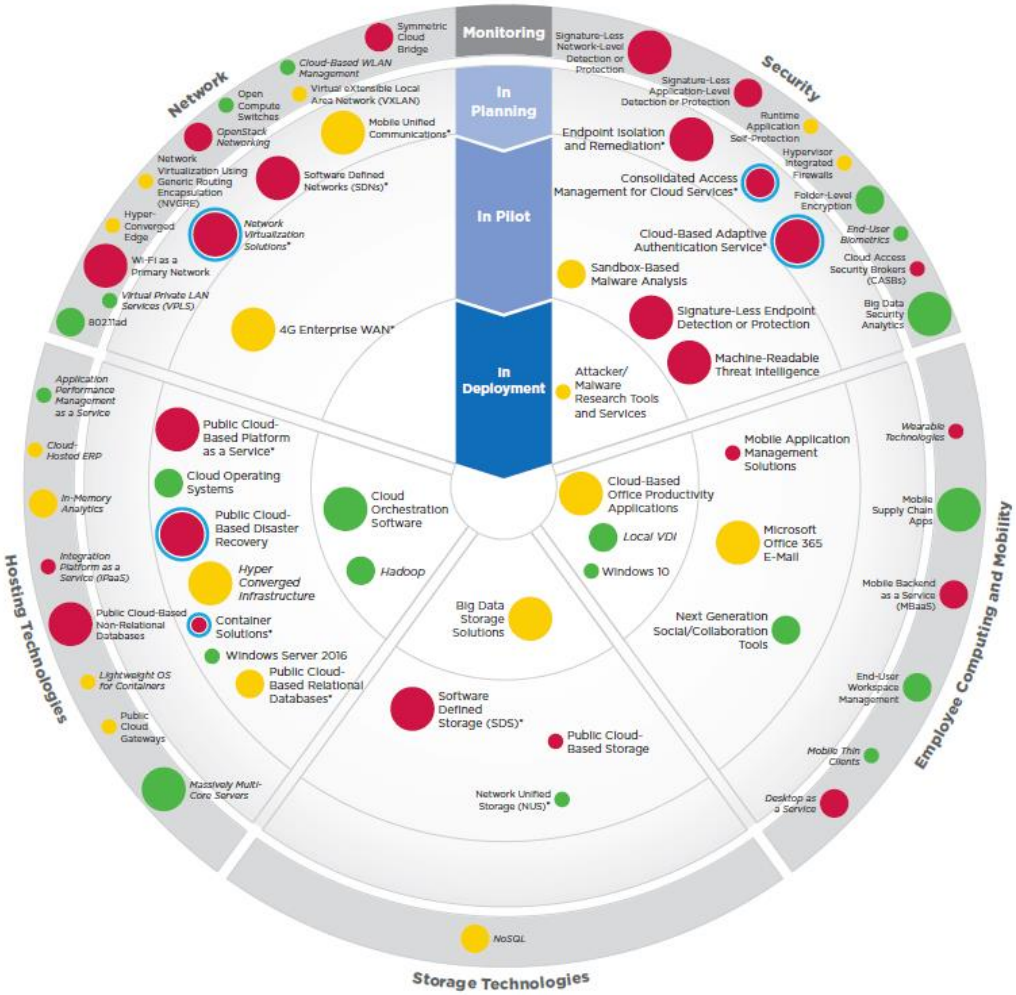
Likewise, there are many policies that make it increasingly expensive, complicated, or unfeasible to transfer data transnationally, effectively forcing digital service providers to keep data within a given border or jurisdiction.[3]

In this context, policies and regulations that enable the free and secure flow of data across borders and jurisdictions – essential to the growth and expansion of digital businesses and economies, and to economic recovery from the Covid-19 pandemic – are not necessarily or systematically framed as such across APAC markets. If APAC economies do not address the data restrictions highlighted, there is a chance that investment alone will not be able to unlock the opportunities that next-generation technologies represent.

To remain relevant and competitive, and effectively pave the way to economic recovery from the Covid-19 pandemic, the ACCA recommends APAC economies use policies and regulations to create conducive environments in which data-driven businesses of all types and sizes can thrive. Make it so that businesses do not have to choose between innovating and growing, disrupting and expanding – but achieve all at once.

We welcome your feedback at secretariat@asiacloudcomputing.org, and look forward to continuing existing partnerships and forging new relationships. Working together, we can better understand the implications that new cloud technologies will have on national, regional, and global growth, particularly as we navigate our way out of the Covid-19 pandemic together. Stay safe, be well.

Figure 2: Emerging cloud-based technology roadmap (2018)



Source: Gartner & CEB, https://ppeaem.cebglobal.com/information-technology/infrastructure/emerging-technology.html

II. Cloud Readiness Index 2020

Table 3: Asia Cloud Computing Association's Cloud Readiness Index 2020 – Overall scores and rankings

Rank, Economy	CRI#01 International Connectivity	CRI#02 Broadband Quality	CRI#03 Power Grid, Green Policy, and Sustainability	CRI#04 Data Centre Risk	CRI#05 Cybersecurity	CRI#06 Privacy	CRI#07 Government Regulatory Environment	CRI#08 Intellectual Property Protection	CRI#09 Business Sophistication	CRI#10 Freedom of Information	**TOTAL CRI 2020 SCORE (/100)**	**Rank Change**
#1 Hong Kong	9.3	9.1	4.8	8.0	8.7	8.3	9.8	8.4	8.4	7.0	**81.9**	**+1**
#2 Singapore	6.5	9.9	6.1	8.8	9.0	9.2	9.8	9.0	8.5	4.9	**81.5**	**-1**
#3 New Zealand	4.2	6.4	6.7	7.8	7.9	8.3	9.7	8.6	8.7	8.9	**77.1**	**-**
#4 Taiwan	6.8	6.6	5.1	7.3	8.7	8.3	9.8	7.1	8.1	7.5	**75.2**	**+1**
#5 South Korea	2.6	8.2	4.3	7.0	8.7	9.4	9.9	6.6	8.4	7.5	**72.7**	**+2**
#6 Japan	1.7	6.6	5.2	7.1	8.8	9.2	9.7	8.4	7.6	7.1	**71.3**	**-2**
#7 Australia	2.9	4.6	3.6	7.4	8.9	9.2	9.8	8.3	8.0	8.3	**71.0**	**-1**
#8 Malaysia	3.0	5.6	4.5	7.2	8.9	8.3	8.9	7.7	8.1	6.3	**68.5**	**-**
#9 Thailand	4.0	6.0	2.5	6.2	8.0	8.3	6.5	5.3	7.8	5.6	**60.2**	**+1**
#10 India	1.7	4.3	2.5	5.5	7.2	7.2	9.5	6.6	6.7	5.4	**56.7**	**+2**
#11 Philippines	1.2	4.0	4.3	4.8	6.4	7.8	9.1	6.3	5.8	5.6	**55.3**	**-2**
#12 Indonesia	2.4	3.9	3.2	5.8	7.8	6.4	5.9	6.6	6.8	6.3	**55.0**	**-1**
#13 China	1.8	6.5	2.3	6.0	8.3	1.9	8.8	6.4	7.4	2.1	**51.5**	**-**
#14 Vietnam	2.9	4.6	2.5	5.6	6.9	2.2	7.1	5.0	6.8	2.5	**46.2**	**-**
Comparison with non-APAC economies												
Brazil	*1.8*	*4.6*	*4.4*	*6.4*	*5.8*	*8.3*	*9.5*	*5.7*	*6.0*	*6.7*	***59.2***	
Germany	*2.6*	*5.8*	*7.1*	*7.8*	*8.5*	*9.2*	*9.3*	*7.9*	*7.9*	*8.5*	***74.5***	
South Africa	*0.5*	*4.0*	*1.9*	*6.3*	*6.5*	*8.3*	*8.4*	*6.3*	*6.6*	*7.8*	***56.7***	
United Arab	*5.2*	*6.3*	*4.8*	*7.3*	*8.1*	*8.3*	*9.4*	*7.6*	*8.1*	*5.6*	***70.7***	
United Kingdom	*5.4*	*5.4*	*8.0*	*7.9*	*9.3*	*9.2*	*9.8*	*8.7*	*8.3*	*7.8*	***79.7***	
United States	*3.6*	*7.3*	*6.0*	*7.0*	*9.3*	*9.3*	*9.8*	*8.4*	*8.3*	*7.4*	***76.4***	

Note: All values rounded to 1 decimal place

III. Index Parameters

The Cloud Readiness Index (CRI) measures the extent to which economies are prepared to adopt and roll out cloud computing technologies. As the region continues to improve its cloud readiness, the CRI measures where economies are in relation to each other (rather than comparing absolute scores).

It is a composite index made up of 10 parameters grouped into four readiness segments: cloud infrastructure, cloud security, cloud regulation, and cloud governance.

Scores are derived from secondary, publicly-sourced data and indexes. Original sources and their URLs have been provided throughout the report. We have also provided a methodology note for each parameter, explaining how aggregated indexes were derived and normalised to obtain comparable values. More detailed methodology notes can be found in the Appendix.

Table 4: CRI 2018 Segments and Parameters

Segment #01 – **CLOUD INFRASTRUCTURE**
Parameter #01 – **International Connectivity** Parameter #02 – **Broadband Quality** Parameter #03 – **Power Grid, Green Policy, and Sustainability**
Segment #02 – **CLOUD SECURITY**
Parameter #04 – **Data Centre Risk** Parameter #05 – **Cybersecurity**
Segment #03 – **CLOUD REGULATION**
Parameter #06 – **Privacy** Parameter #07 – **Government Regulatory Environment** Parameter #08 – **Intellectual Property Protection**
Segment #04 – **CLOUD GOVERNANCE**
Parameter #09 – **Business Sophistication** Parameter #10 – **Freedom of Information**

CRI Segment #01 – Cloud Infrastructure

The Cloud Infrastructure segment comprises three parameters: International Connectivity, Broadband Quality, and Power Grid, Green Policy, and Sustainability. The data for each of the three parameters was normalised to a 10-point scale and then aggregated to provide scores out of 30.

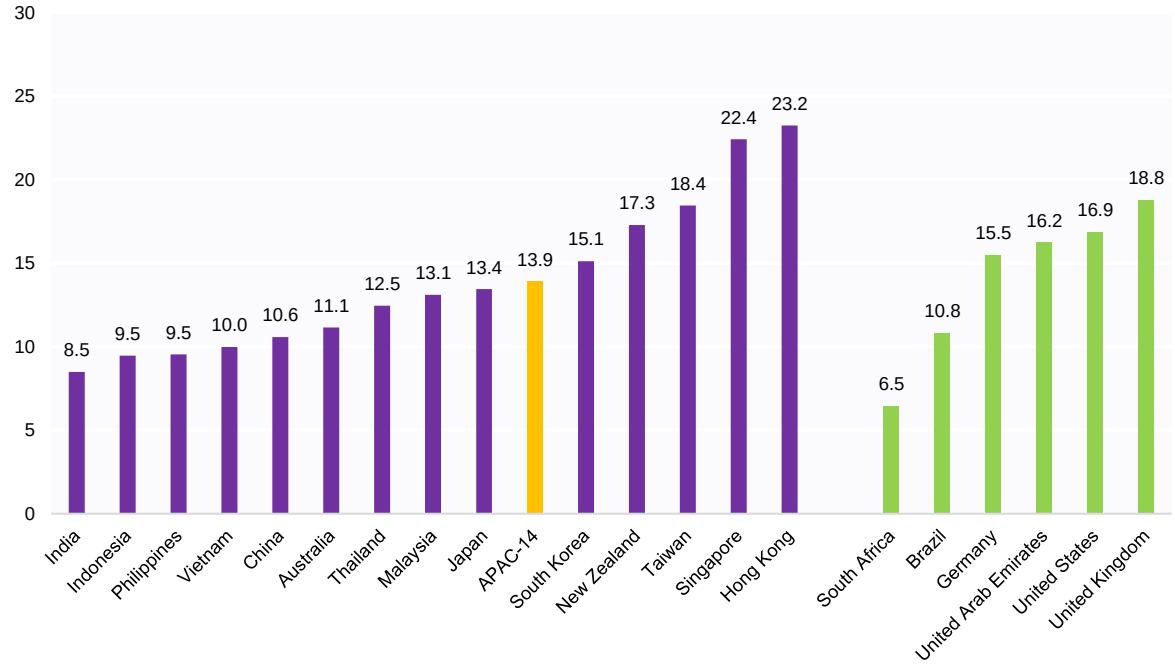
International Connectivity: International bandwidth is one of the prime components of the physical infrastructure needed both to develop competitive cloud services and to enable domestic cloud users to use international cloud services. The parameter is derived from the International Telecommunication Union (ITU)'s *World Telecommunication/ICT Indicators Database* and is expressed in Internet bandwidth (kb/s) per Internet user.

Broadband Quality: Average download speeds show an economies' readiness to provide fast and reliable access to the cloud, ensuring advanced computing demands can effectively be met. The parameter is derived from Speedtest's *Global Index for Fixed Broadband* and is expressed in average download speed *(*Mbps) captured for the month of June 2019.

Power Grid, Green Policy, and Sustainability: Stable, continuous access to power, water, and sustainable energy contributes to economies' ability to provide favourable environments for data centres to grow, a key factor for the rise of cloud computing services. The parameter is derived from the World Energy Council's *Energy Trilemma Index 2019*. It is the normalised sum of three sub-components: Energy Security, Energy Equity, and Environmental Sustainability.

The aggregated cloud infrastructure measure shows that Hong Kong and Singapore stand out as clear leaders, largely above other APAC and non-APAC economies (scores of 23.2 and 22.4, respectively). The United Kingdom is 3rd, while Japan and Australia are the two mature economies under the APAC-14 average of 13.9.

Figure 3: Cloud Infrastructure, aggregated scores out of 30



Sources:
- *International Telecommunication Union (ITU), www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx*
- *Speedtest, www.speedtest.net/global-index*
- *World Energy Council, https://trilemma.worldenergy.org/#!/energy-index*

CRI Parameter #01 – International Connectivity

Table 5: International Connectivity, APAC rankings

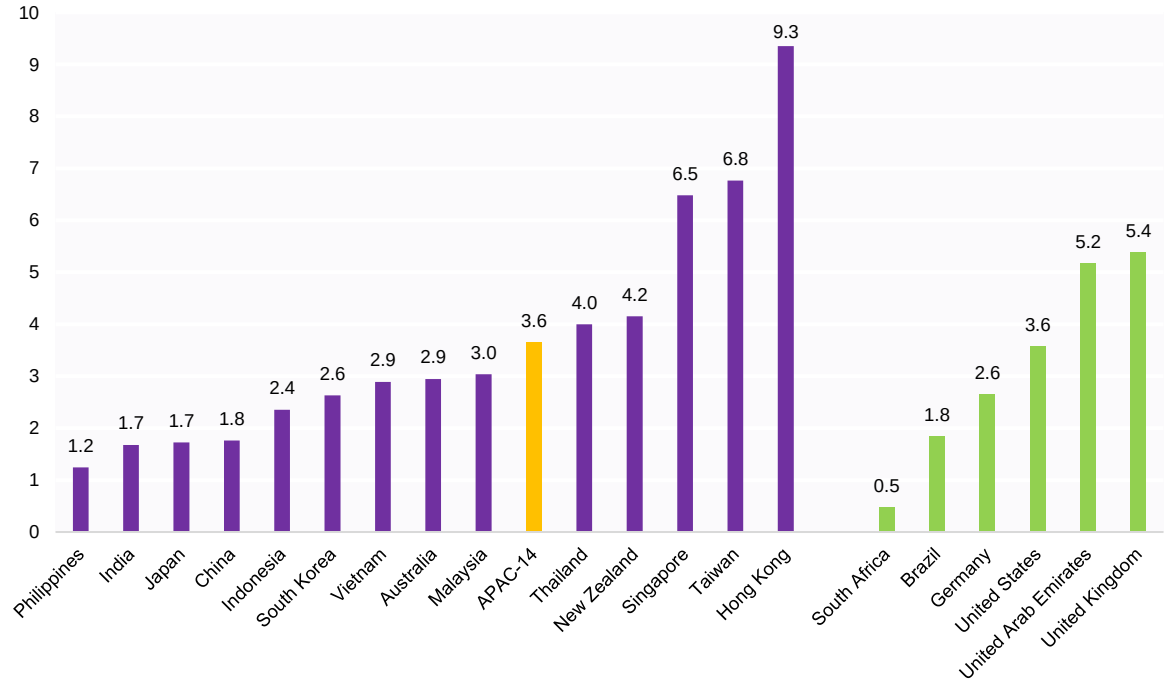
	AU	CN	HK	IN	ID	JP	MY	NZ	PH	SG	KR	TW	TH	VN
Rank 2020	**=7**	**11**	**1**	**=12**	**10**	**=12**	**6**	**4**	**14**	**3**	**9**	**2**	**5**	**=7**
Rank 2018	=6	14	1	13	12	=6	=10	4	=10	2	8	3	9	5
Rank 2016	4	14	1	13	12	6	=9	3	=9	2	=7	5	=7	11
Rank 2014	10	12	2	14	13	=5	4	9	7	1	=5	3	8	11

With a score of 9.3, Hong Kong takes the lead in terms of international connectivity – far ahead of Taiwan (2nd at 6.8) and Singapore (3rd at 6.5). Thailand (4.0) and New Zealand (4.2) are the other two economies scoring over the APAC-14 average of 3.6. At the other end of the spectrum are the Philippines (1.2), India and Japan (both at 1.7), and China (1.8).

In terms of growth, average international connectivity has increased by 53% year-on-year for the 14 APAC economies covered in this report. This is much lower than 2018's 63% and 2016's 62%. Similar to CRI 2018, emerging markets take the lead in terms of growth. At 200%, Thailand has experienced the highest year-on-year bandwidth growth between 2018 and 2020, followed by China (88.4%), Indonesia (73.5%), and Malaysia (69.2%). Meanwhile, Australia, Vietnam, the Philippines, and Japan have undergone negative growth comprised between -20 and -60%.

These growth trends are largely reflected in the rankings. Australia and Vietnam (both 7th), Japan (12th), and the Philippines (14th) have continued their steady tumbles since 2016, while China (11th), Indonesia (10th), Malaysia (6th), Thailand (5th), and Taiwan (2nd) have all progressively made their way up the ranks. It is worth noting that Hong Kong retains its number one spot for the third consecutive year, while Singapore is experiencing a slight fall from grace (from 1st, to 2nd, and to 3rd between 2014 and 2020).

Figure 4: International Connectivity, normalised scores out of 10



Source: International Telecommunication Union (ITU), www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx

CRI Parameter #02 – Broadband Quality

Table 6: Broadband Quality, APAC rankings

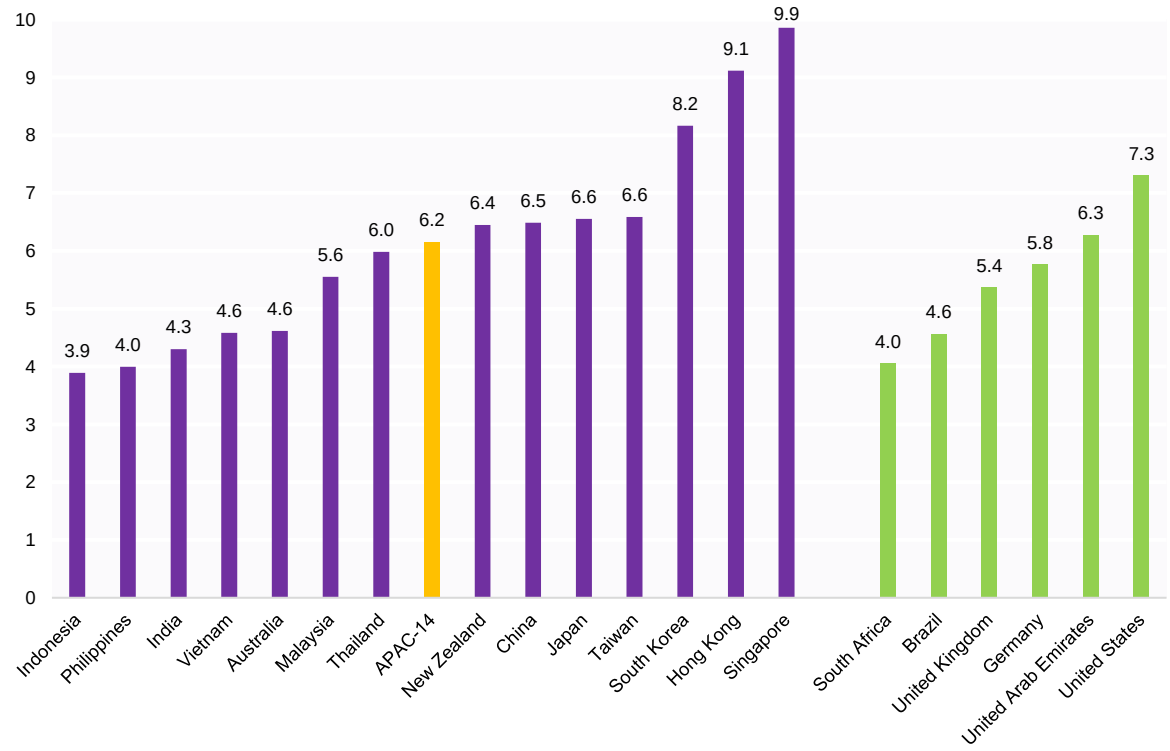
	AU	CN	HK	IN	ID	JP	MY	NZ	PH	SG	KR	TW	TH	VN
Rank 2020	**=10**	**6**	**2**	**12**	**14**	**=4**	**9**	**7**	**13**	**1**	**3**	**=4**	**8**	**=10**
Rank 2018	11	12	2	14	=8	=5	=8	7	13	1	3	=5	4	10
Rank 2016	8	11	2	13	12	4	9	7	14	1	3	5	6	10
Rank 2014	=6	10	2	13	14	3	9	8	12	4	1	5	=6	11

The APAC-14 average fixed broadband download speed was 84.6 Mbps in 2020, a virtually non-existent year-on-year growth compared to 2018's 84.2 Mbps. With 195.9 Mbps and 173.5 Mbps respectively, Singapore (1st) and Hong Kong (2nd) top the charts. Indonesia (16.7 Mbps), the Philippines (19.9 Mbps), and India (29.1 Mbps), meanwhile, remain largely behind the pack (respectively 14th, 13th, and 12th positions).

In terms of year-on-year growth, China leads the way with 106.2%, tailed by Hong Kong (34%) and New Zealand (32%). Japan, Taiwan, Malaysia, and Singapore have experienced moderate year-on-year growth comprised between 2 and 6%, while Thailand, India, Australia, Vietnam, and the Philippines have all experienced negative growth of -25% or more.

In terms of rankings, two movements stand out. China has jumped six positions between CRI 2018 and CRI 2020, advancing from 12th to 6th. Conversely, Indonesia and Thailand have tumbled significantly between 2018 and 2020. Indonesia has lost six positions (from 8th in 2028 to 14th in 2020) and Thailand has lost four positions (from 4th in 2018 to 8th in 2020). All other APAC economies have either not moved at all (Singapore, Hong Kong, South Korea, New Zealand, the Philippines, Vietnam) or gone through very slight variations (Australia, India, Japan, Malaysia, Taiwan) compared to 2018.

Figure 5: Broadband Quality, normalised scores out of 10



Source: Speedtest, www.speedtest.net/global-index

CRI Parameter #03 – Power Grid, Green Policy, and Sustainability

Table 7: Power Grid, Green Policy, and Sustainability, APAC rankings

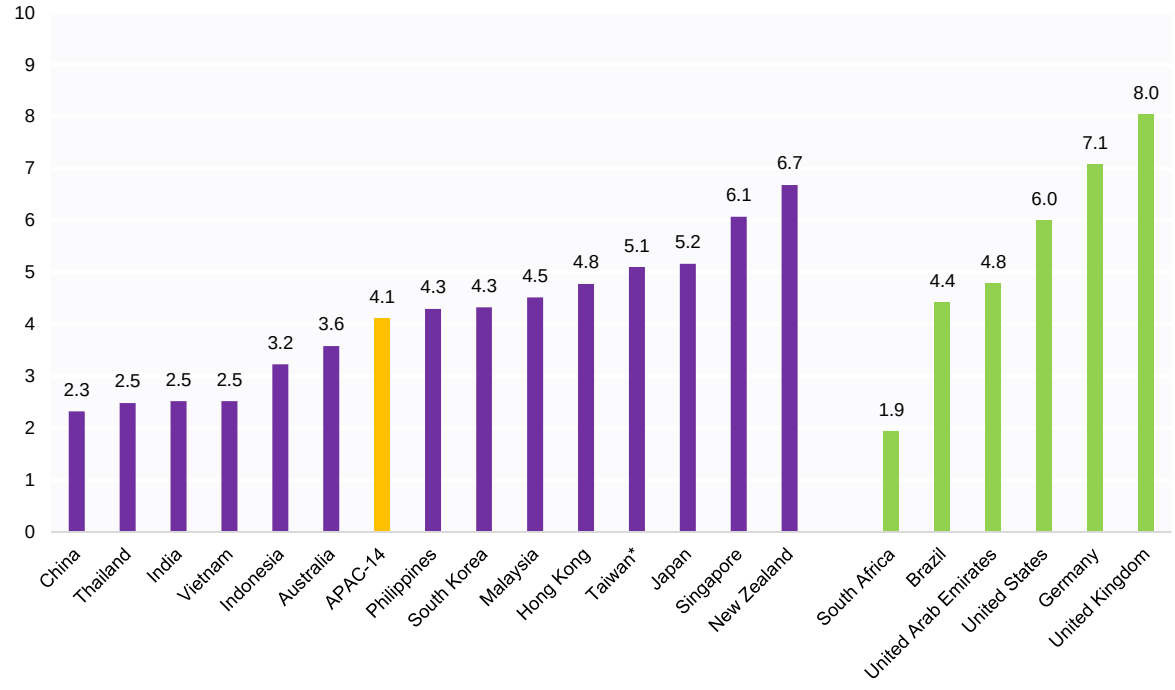
	AU	CN	HK	IN	ID	JP	MY	NZ	PH	SG	KR	TW	TH	VN
Rank 2020	**9**	**14**	**5**	**=11**	**10**	**3**	**6**	**1**	**=7**	**2**	**=7**	**4**	**13**	**=11**
Rank 2018	7	13	6	14	10	3	9	1	4	2	8	5	11	12
Rank 2016	5	13	=2	14	=10	=2	=10	1	=8	6	7	=2	=8	=10
Rank 2014	2	14	9	11	8	3	12	1	10	7	5	4	6	13

Just like CRI 2018, New Zealand (score of 6.7) remains in its top position, which it has consistently held since CRI 2014. Likewise, Indonesia (score of 3.2) has kept its 10th position for the third consecutive time, and Singapore (6.1) and Japan (5.2) respectively remain 2nd and 3rd. All other economies have shifted one to three positions. In this regard, India (score of 2.5) and Malaysia (4.5) stand out with upward shifts of three positions (respectively 14th to 11th and 9th to 6th), while the Philippines (4.3) experienced a downward shift of three positions (from 4th to 7th).

The clear divide between mature and emerging APAC economies observed in CRI 2018 is much less clear-cut in 2020. With a score of 3.6, Australia joins China (2.3), Thailand, India, and Vietnam (all at 2.5), and Indonesia (3.2) under the APAC-14 average of 4.1. Malaysia and the Philippines still stand out as the only emerging economies above the regional average, though Malaysia has advanced and the Philippines has backtracked.

Of note is the fact that this is the only parameter in which non-APAC economies lead the way. With 8.0 and 7.1 respectively, the United Kingdom and Germany score well above APAC's top scorer (New Zealand, 6.7). The United Kingdom scores close to double the regional average of 4.1 and close to four times the score of the lowest ranking economy (China, 2.3). This signals that sustainable growth remains a significant challenge for all APAC economies, even the best performing ones.

Figure 6: Power Grid, Green Policy, and Sustainability, normalised scores out of 10



Note: Missing values for Taiwan are estimated based on the average of five economies in the same World Bank lending group which had values in this dataset (Australia, Japan, New Zealand, Singapore, and South Korea).
Source: World Energy Council, https://trilemma.worldenergy.org/#!/energy-index

CRI Segment #02 – Cloud Security

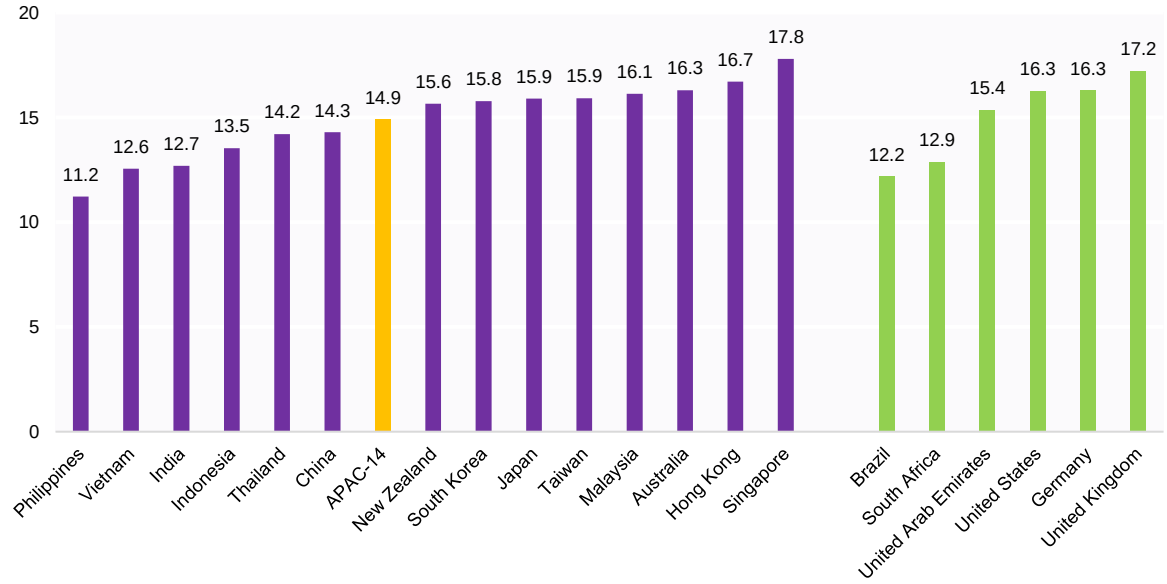
The Cloud Security segment comprises two parameters: Data Centre Risk and Cybersecurity. The data for each of the two parameters was normalised to a 10-point scale and then aggregated to provide scores out of 20.

Data Centre Risk: Data centres are core to cloud development, and building them involves a substantial amount of investment. Whether foreign or domestic, investors assess the extent to which data centre infrastructure is safe within a given location. The data centre risk parameter looks at a number of factors involved in assessing different types of risks, including infrastructure, tax environment, legal and institutional capabilities, labour costs, and exposure to natural disasters. It is important to note that the parameter illustrates potential attractiveness for cloud providers, not actual adoption of cloud technologies. The parameter is derived from TRPC's *Data Centre Security Index (DCSI)*, a composite statistical measure of six major types of risk – Infrastructure Risk, Energy Risk, Natural Risk, Business Risk, Political Risk, and Legal Risk.[4]

Cybersecurity: Cybersecurity is paramount for cloud readiness, as the perception of lack of security remains a key barrier to cloud adoption. The parameter assesses governments' use of legal instruments – technical standards, frameworks and initiatives, ICT education and infrastructure, coordinated ICT and cybersecurity strategies – to address all types of cyber-crime. The parameter is derived from the International Telecommunication Union (ITU)'s *Global Cybersecurity Index 2018*.

The aggregated cloud security measure shows that Singapore and Hong Kong (scores of 17.8 and 16.7, respectively) stand out as clear leaders, largely above the APAC-14 average of 14.9 and far ahead of Vietnam and the Philippines (12.6 and 11.2, respectively). In 4th position, Malaysia is the only emerging economy at the top of the rankings, demonstrating the effectiveness of recent cybersecurity initiatives.[5]

Figure 7: Cloud Security, aggregated scores out of 20



Sources:
- *TRPC, https://trpc.biz/the-trpc-data-center-security-index-2020*
- *International Telecommunication Union (ITU), www.itu.int/dms_pub/itu-d/opb/str/D-STR-GCI.01-2018-PDF-E.pdf*

CRI Parameter #04 – Data Centre Risk

Table 8: Data Centre Risk, APAC rankings

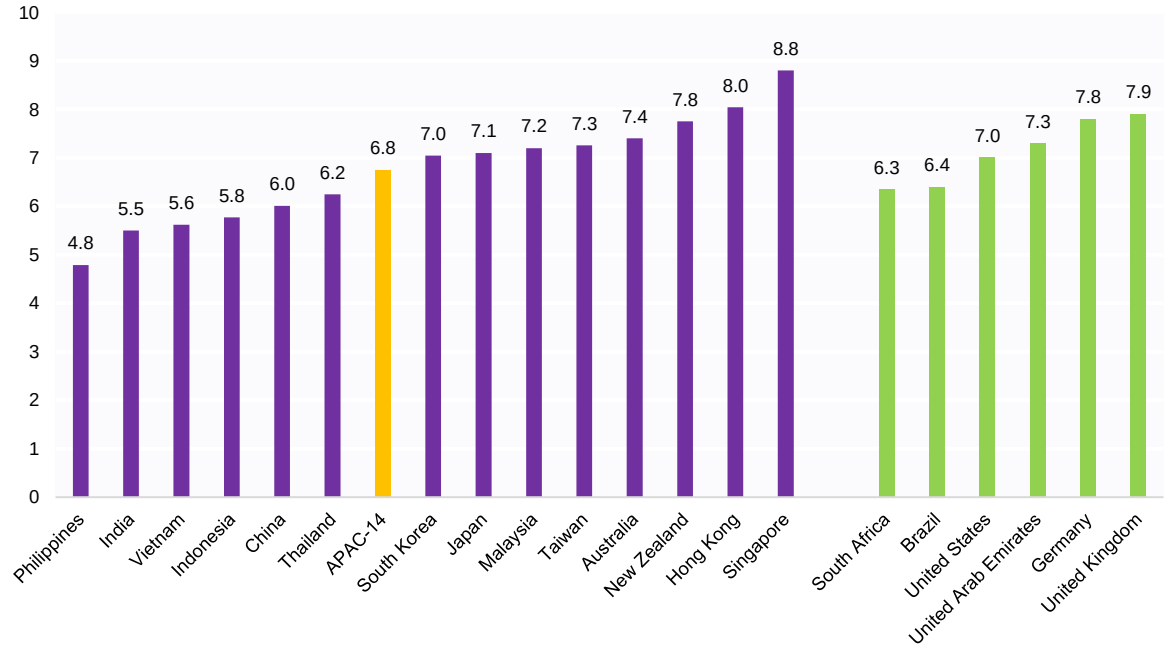
	AU	CN	HK	IN	ID	JP	MY	NZ	PH	SG	KR	TW	TH	VN
Rank 2020	**4**	**10**	**2**	**13**	**11**	**7**	**6**	**3**	**14**	**1**	**8**	**5**	**9**	**12**
Rank 2018	=5	13	1	14	=11	4	8	2	9	3	=5	7	=11	9
Rank 2016	5	13	1	14	11	=7	=7	3	10	2	6	4	9	12
Rank 2014	1	10	=6	14	=11	9	3	4	13	=6	2	8	5	=11

With a score of 8.8, Singapore ranks 1st, jumping ahead of Hong Kong (score of 8.0) and New Zealand (7.8), respectively 1st and 2nd in CRI 2018. At the other end of the spectrum is the Philippines (14th with a score of 4.8), followed by India (5.5), Vietnam (5.6), and Indonesia (5.8). Overall, only Indonesia has kept its 11th position, while all others have either advanced or backtracked in the rankings. China stands out with a three-position jump (from 13th in 2018 to 10th in 2020), while the Philippines has moved in the opposite direction (from 9th in 2018 to 14th in 2020).

Similar to CRI 2018, mature APAC economies score higher than emerging ones, and thus stand out as generally low-risk environments for data centres. This indicates that risk may be less about markets' intrinsic vulnerabilities and more about the resources they can devote to mitigate their effect. Across the board, Natural Risk (exposure to natural hazards) is the highest form of risk for data centres in the APAC region, while Political and Legal Risk (unstable institutions and weak legal systems) are less of a threat to their operations.

Non-APAC economies perform relatively well and thus constitute safe environments for data centres. The United Kingdom tops the charts with a score of 7.9. It is closely followed by Germany (score of 7.8), the United Arab Emirates (7.3), and the United States (7.0) – all well above the APAC-14 average of 6.8.

Figure 8: Data Centre Risk, normalised scores out of 10



Source: TRPC, https://trpc.biz/the-trpc-data-center-security-index-2020

CRI Parameter #05 – Cybersecurity

Table 9: Cybersecurity, APAC rankings

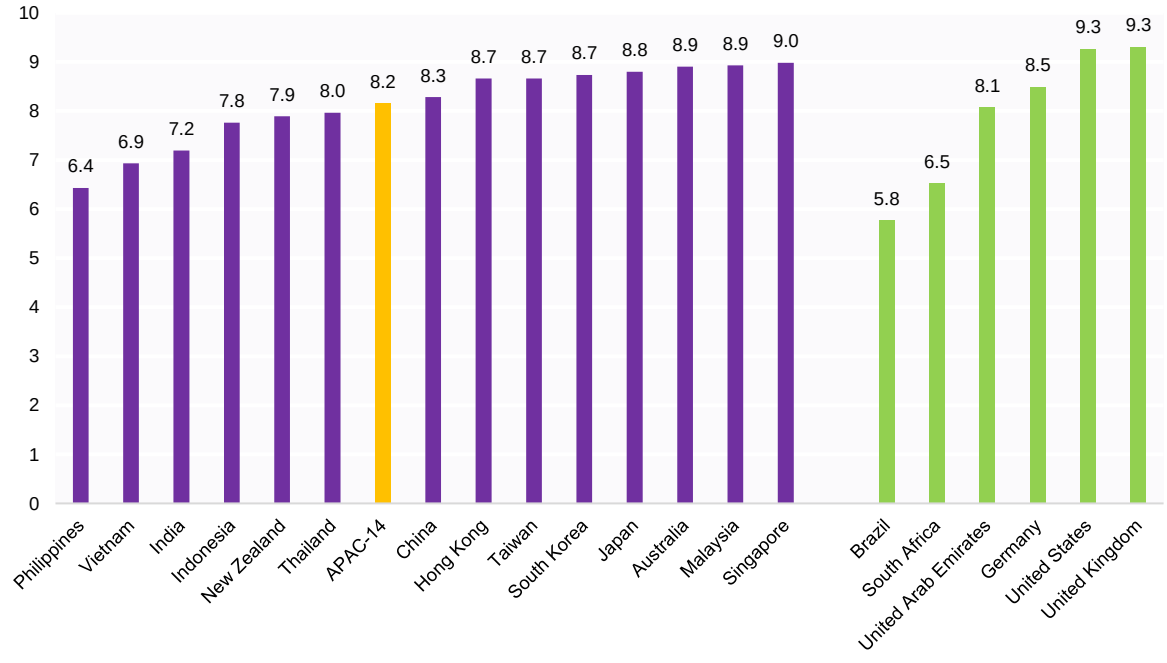
	AU	CN	HK	IN	ID	JP	MY	NZ	PH	SG	KR	TW	TH	VN
Rank 2020	**=2**	**8**	**=5**	**12**	**11**	**4**	**=2**	**10**	**14**	**1**	**=5**	**=5**	**9**	**13**
Rank 2018	3	11	=4	9	13	6	2	8	12	1	7	=4	9	14
Rank 2016	=1	11	9	14	10	=4	=1	3	13	8	=4	7	12	14

The sharp gap obseved between top and bottom performers in CRI 2018 has significantly reduced in CRI 2020, pointing to some major progress made – though relative positions remain largely unchanged. With respective scores of 9.0 and 8.9, Singapore, Malaysia, and Australia remain the top three APAC performers. At 6.4, 6.9, 7.2, 7.8, and 8.0, the Philippines, Vietnam, India, Indonesia, and Thailand remain under the APAC-14 average of 8.2, but the gap that separates them from both the average and the top performers is much less pronounced than in CRI 2018.

In terms of rankings, rises and falls are evenly distributed across emerging and mature economies, pointing to an increasingly homogenous cybersecurity landscape. India stands out with a major tumble from 9th in CRI 2018 to 12th in CRI 2020, but most other downward movements have been limited to one- or two-position changes; Hong Kong and Taiwan (both from 4th to 5th), New Zealand (8th to 10th), and the Philippines (12th to 14th). Likewise, most advances made have been two-position jumps: China (11th to 8th), Indonesia (13th to 11th), Japan (6th to 4th), and South Korea (7th to 5th).

Among non-APAC economies, the United States and the United Kingdom (both at 9.3) score above the APAC-14 average of 8.2, as well as above APAC top scorers. Indeed, both these economies have national laws, policies, and agencies specifically devoted to strengthening cybersecurity capabilities, while cybersecurity remains lagely uneven and fragmented in APAC markets. This increases the region's exposure to sophisticated, rapidly evolving cyber-threats, and creates a number of organisational, operational, and financial burdens for businesses operating in the region.

Figure 9: Cybersecurity, normalised scores out of 10



Note: Missing values for Hong Kong and Taiwan are estimated based on the average of five economies in the same World Bank lending group which had values in this dataset (Australia, Japan, New Zealand, Singapore, and South Korea).
Source: International Telecommunication Union (ITU), www.itu.int/dms_pub/itu-d/opb/str/D-STR-GCI.01-2018-PDF-E.pdf

CRI Segment #03 – Cloud Regulation

The Cloud Regulation segment comprises three parameters: Privacy, Government Regulatory Environment, and Intellectual Property Protection. The data for each of the three parameters was normalised to a 10-point scale and then aggregated to provide scores out of 30.

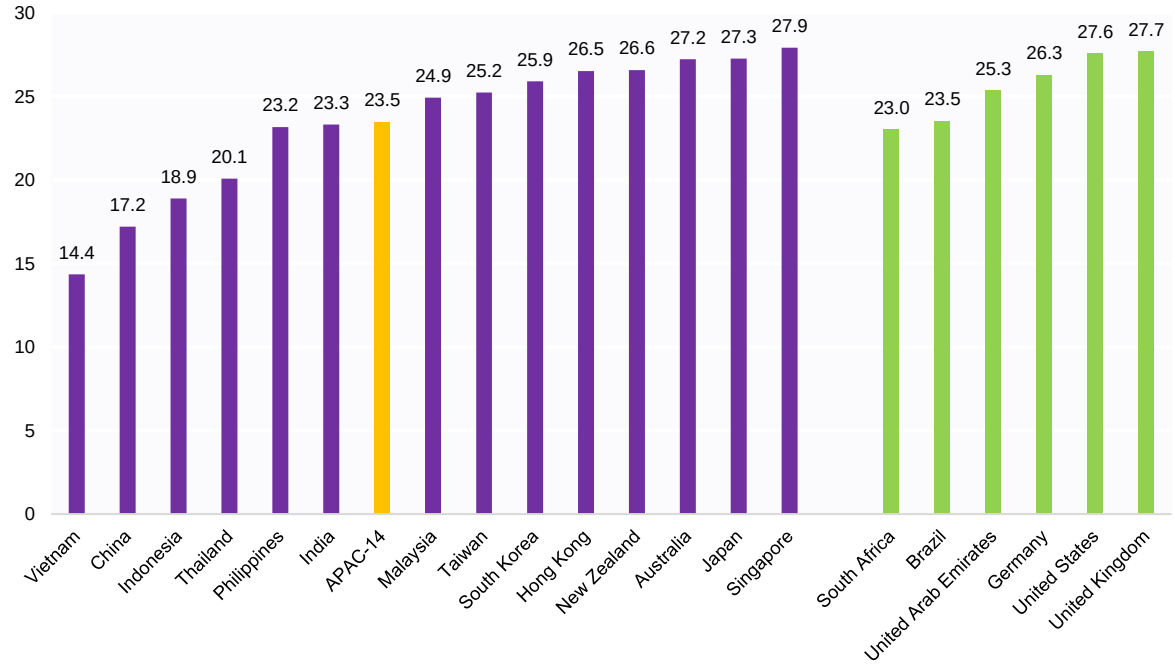
Privacy: Cloud services need secure and reliable data flows across borders, networks, and third-party providers. Users will only adopt cloud if their information is secure and held privately without any unexpected breaches. Regulations and effective oversight and enforcement of data privacy rules are therefore important aspects of cloud readiness. The parameter is derived from TRPC's *Data Protection Index*, which assesses a number of data protection characteristics using the ASEAN Framework on Data Protection as a best practice guideline. Assessment criteria include the existence of a data protection law and a Privacy Enforcement Authority (PEA), as well as the adherence to internationally recognised privacy principles and best practices.[6]

Government Regulatory Environment: Government support and use of technology is key to the success of national cloud uptake. Governments that do well in this parameter have strong regulatory frameworks that promote and enable the use of cloud technologies within the public sector. The parameter is derived from the World Intellectual Property Organisation (WIPO)'s *Global Innovation Index 2019* (Indicators 3.1.3 "Government's online service" and 3.1.4 "Online e-participation").

Intellectual Property Protection: Robust protections and enforcement of intellectual property rights are seen as protecting both consumer and corporation interests and an institutional prerequisite to foster technological innovation. Consumers need to know that their data is subjected to adequate safeguards, and cloud service providers need reassurance that their information is protected against misappropriation and misuse. The parameter is derived from the World Economic Forum (WEF)'s *Global Competitiveness Report 2018*, using index 1.16 (IP Protection).

The aggregated cloud regulation measure shows that Singapore has particularly conducive regulatory frameworks. With a score of 27.9, it is largely above the APAC-14 average of 23.5 and ahead of non-APAC leaders (United Kingdom and United States). Vietnam and China, meanwhile, lag far behind the rest of the region's emerging economies, with 14.4 and 17.2, respectively.

Figure 10: Cloud Regulation, aggregated scores out of 30



Sources:
- *TRPC, https://trpc.biz/the-trpc-data-protection-index-2020*
- *World Intellectual Property Organisation (WIPO), www.globalinnovationindex.org/gii-2019-report*
- *World Economic Forum (WEF), http://reports.weforum.org/global-competitiveness-report-2018*

CRI Parameter #06 – Privacy

Table 10: Privacy, APAC rankings

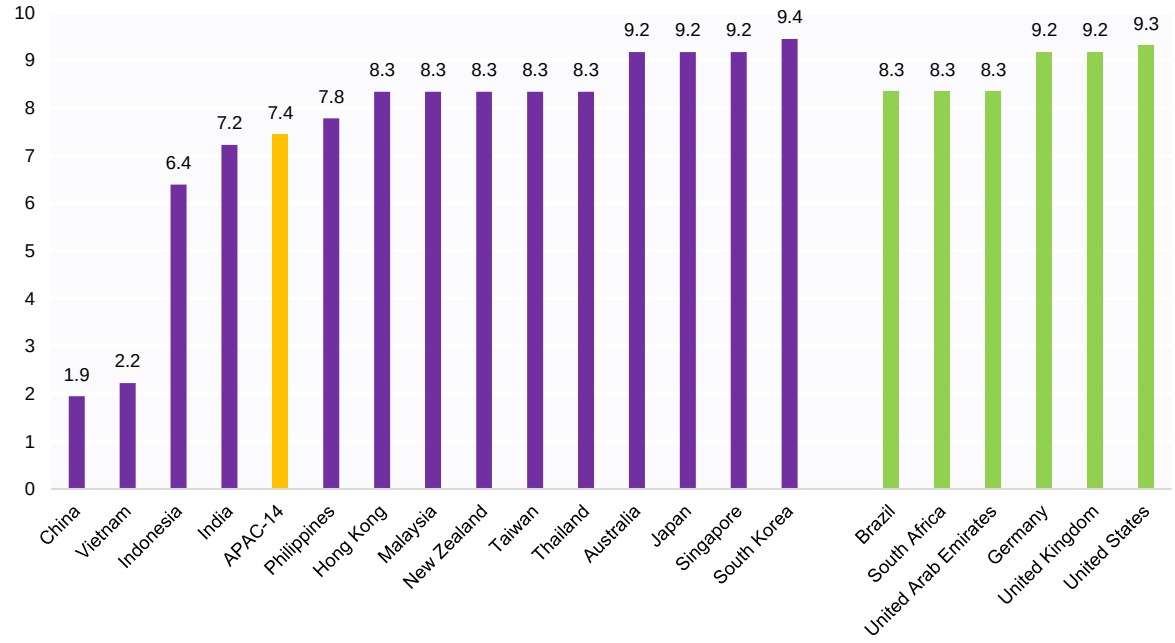
	AU	CN	HK	IN	ID	JP	MY	NZ	PH	SG	KR	TW	TH	VN
Rank 2020	**=2**	**14**	**=5**	**11**	**12**	**=2**	**=5**	**=5**	**10**	**=2**	**1**	**=5**	**=5**	**13**
Rank 2018	=1	13	=1	11	10	=1	8	=5	=5	=1	=5	9	12	14
Rank 2016	=1	11	=1	14	10	=7	=7	=4	9	=4	=4	=1	=12	=12
Rank 2014	=3	7	5	=10	12	2	=8	=3	=8	6	1	=10	13	14

Privacy is an area that is undergoing significant change as the region's governments adapt laws, policies, and regulations to meet the rapidly evolving needs of data-driven devices, products, and services – many of which rely on data moving freely but securely across borders and jurisdictions to operate. In this context, Australia and Singapore (both with scores of 9.2) and Hong Kong (8.3) seem to not be adapting fast enough, as they have not maintained their top positions from CRI 2018; all three have tumbled from their shared 1st position (Australia and Singapore from 1st to 2nd and Hong Kong from 1st to 5th).

South Korea now sits alone at the top (major jump from 5th to 1st with a score of 9.4), reflecting the balanced approach it has been championing to effectively protect citizens' and consumers' data while enabling data-driven business models. It is closely followed by Japan (small fall from 1st in CRI 2018 to 2nd in CRI 2020), which has built a robust and conducive data protection regime. At the other end of the spectrum, China and Vietnam (scores of 1.9 and 2.2, respectively) lag far behind the regional average of 7.4.

In terms of rankings, the Philippines has experienced the biggest tumble (from 5th to 10th). Conversely, the biggest jump upwards belongs to Taiwan and Thailand, who respectively went from 9th to 5th and from 12th to 5th. These noteworthy shifts point to a slight reduction in the divide that was observed in CRI 2018 between mature and emerging economies; all economies below the APAC-14 average remain emerging ones, but Malaysia, Thailand, and the Philippines are clearly breaking from the mould.

Figure 11: Privacy, normalised scores out of 10



Source: TRPC, https://trpc.biz/the-trpc-data-protection-index-2020
Note: This analysis does not include the Jan 2020 drafts and/or updates in personal data protection laws from Indonesia, Malaysia, South Korea, and Vietnam.

CRI Parameter #07 – Government Regulatory Environment

Table 11: Government Regulatory Environment, APAC rankings

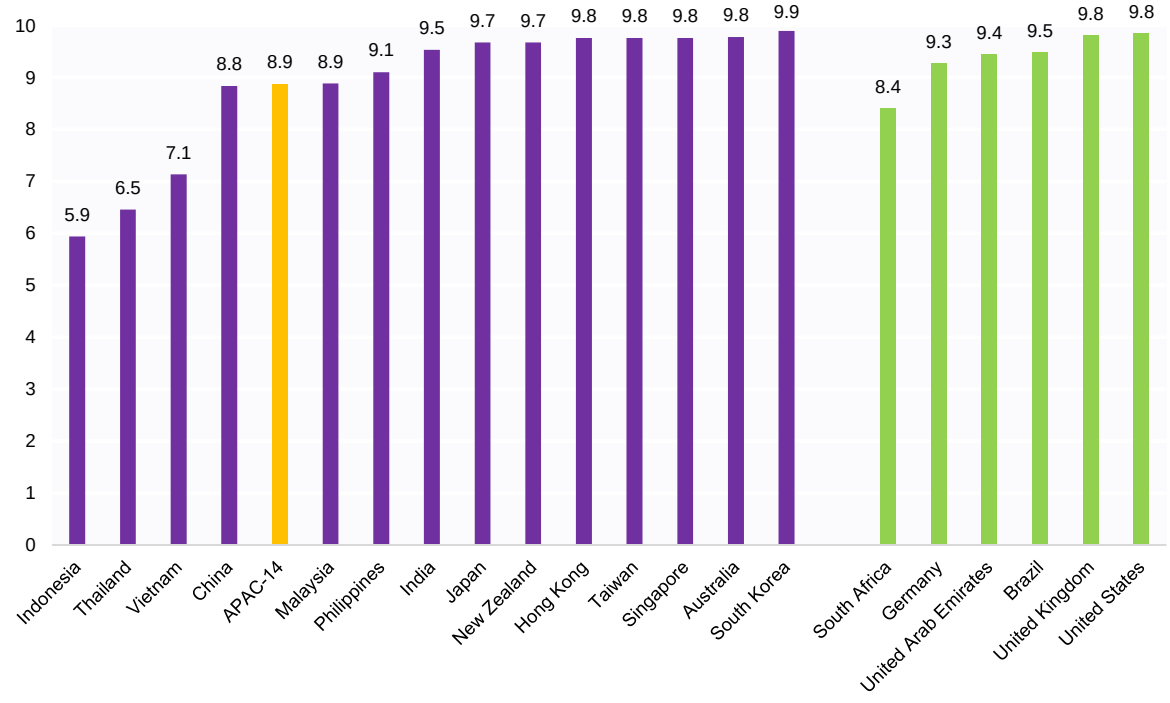
	AU	CN	HK	IN	ID	JP	MY	NZ	PH	SG	KR	TW	TH	VN
Rank 2020	**=2**	**11**	**=2**	**8**	**14**	**=6**	**10**	**=6**	**9**	**=2**	**1**	**=2**	**13**	**12**
Rank 2018	=6	9	8	10	13	=4	3	=4	=11	1	2	=6	14	=11
Rank 2016	=4	9	6	=11	10	3	=4	2	=11	1	7	8	14	13
Rank 2014	3	9	=5	10	11	=7	4	2	=13	1	=5	=7	=13	12

With a score of 9.9, South Korea jumps ahead of Singapore, taking the 1st position it had held since 2014. It is worth noting that the gap between 1st position and the top eight economies is extremely narrow, and much less pronounced between mature and emerging economies than in CRI 2018 – this points to many of the region's economies effectively strengthening and streamlining their institutional and regulatory capabilities in order to make their digital economies more competitive and more sustainable.

For instance, Australia, Singapore, Taiwan, and Hong Kong are all tied for 2nd position (scores of 9.8), while New Zealand and Japan are tied in 3rd position (scores of 9.7). Not too far behind, with a score of 9.5, is India. At the other end of the spectrum are Indonesia (score of 5.9), Thailand (6.5), and Vietnam (7.1) – all highly dynamic digital economies that are burdened by equally highly complex bureaucracies.

In terms of ranking shifts, the biggest jump belongs to Hong Kong (six positions from 8th in 2018 to 2nd in 2020), followed by Taiwan and Australia (four positions for both, from 6th in 2018 to 2nd in 2020). Conversely, the biggest tumble belongs to Malaysia (seven positions from 3rd in 2018 to 10th in 2020), followed by China and New Zealand (two positions for both, from 9th to 11th and from 4th to 6th, respectively).

Figure 12: Government Regulatory Environment, normalised scores out of 10



Note: Missing values for Hong Kong and Taiwan are estimated based on the average of five economies in the same World Bank lending group which had values in this dataset (Australia, Japan, New Zealand, Singapore, and South Korea).
Source: World Intellectual Property Organisation (WIPO), www.globalinnovationindex.org/gii-2019-report

CRI Parameter #08 – Intellectual Property Protection

Table 12: Intellectual Property Protection, APAC rankings

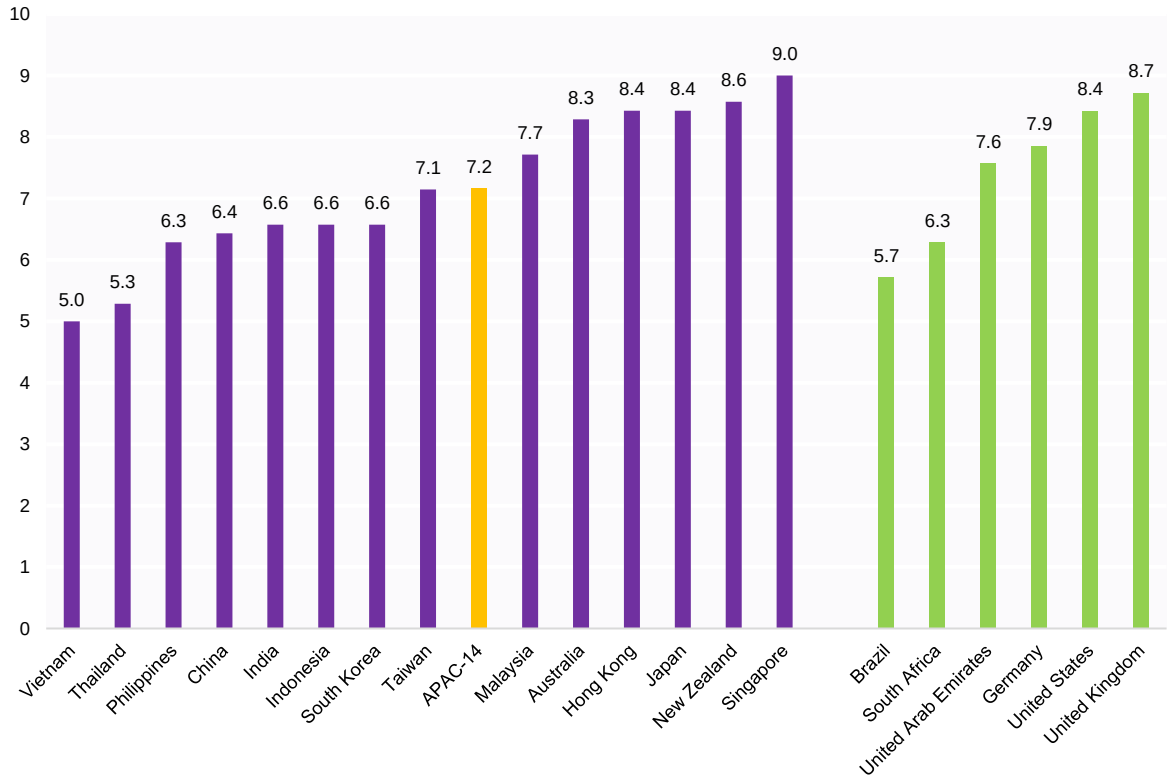
	AU	CN	HK	IN	ID	JP	MY	NZ	PH	SG	KR	TW	TH	VN
Rank 2020	**5**	**11**	**=3**	**=8**	**=8**	**=3**	**6**	**2**	**12**	**1**	**=8**	**7**	**13**	**14**
Rank 2018	=4	9	3	=10	8	=4	6	=1	12	=1	=10	7	14	13
Rank 2016	5	11	4	=9	8	=2	6	=2	12	1	=9	7	14	13
Rank 2014	5	=9	=3	11	=9	=3	7	2	12	1	8	6	13	14

Intellectual property shows no major shifts, pointing to a relatively stable area for the APAC region. With a score of 9.0, Singapore remains in 1st position, though New Zealand has shifted to 2nd position (score of 8.6). Hong Kong (3rd), Malaysia (6th), Taiwan (7th), and the Philippines (12th) keep the same positions as CRI 2018, while the last and before-to-last positions (13th and 14th) keep alternating between Thailand and Vietnam.

The movements that have taken place are relatively minor, limited to one-position jumps or tumbles; Australia from 4th to 5th, Japan from 3rd to 4th, Thailand from 14th to 13th, and Vietnam from 13th to 14th. The most notable changes come from China (a two-position shift from 9th to 11th), and from India and South Korea (both shifting up from 10th to 8th).

In line with the findings of CRI 2018, non-APAC economies all score less than Singapore, APAC's top scorer (scores of 8.7 or less). This may be less a reflection of differences between APAC and non-APAC economies' ability to uphold intellectual property laws, and more a testament to Singapore's uniquely effective governance mechanisms that permeate across all regulatory areas, including the protection of intellectual property.

Figure 13: Intellectual Property Protection, normalised scores out of 10



Source: World Economic Forum (WEF), http://reports.weforum.org/global-competitiveness-report-2018

CRI Segment #04 – Cloud Governance

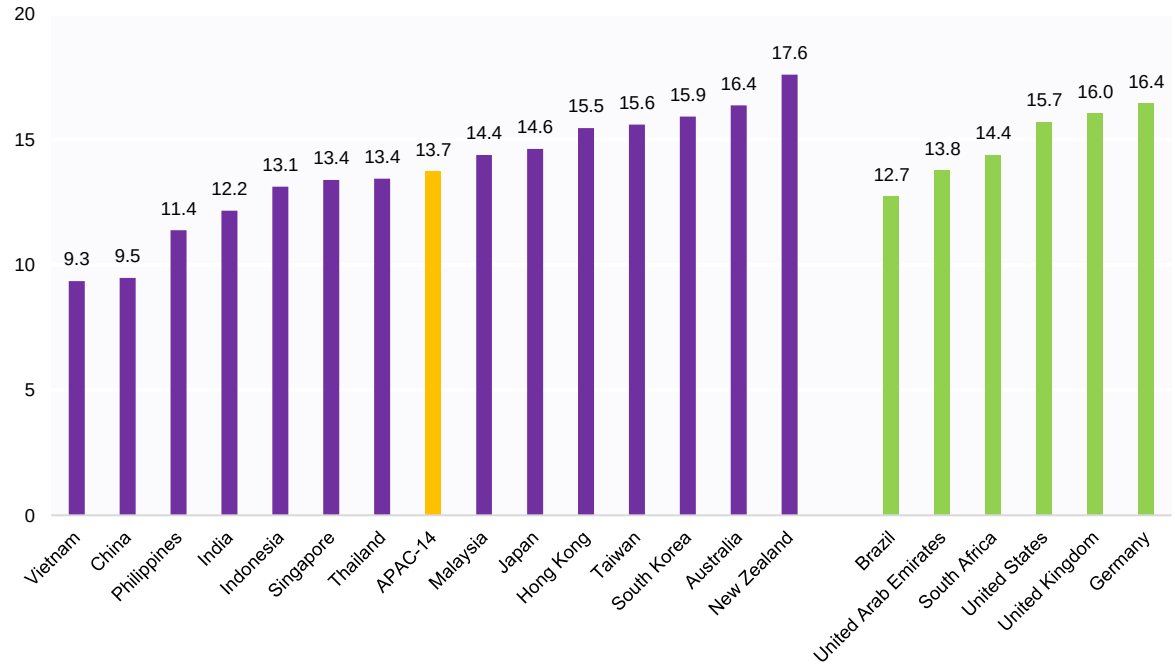
The Cloud Governance segment comprises two parameters: Business Sophistication and Freedom of Information. The data for each of the two parameters was normalised to a 10-point scale and then aggregated to provide scores out of 20.

Business Sophistication: The race for innovation in the digital age requires governments to simplify and streamline the process of setting up businesses. The business sophistication score demonstrates an economy's ability to not only facilitate the creation of a new business entity, but also help existing businesses become flexible, responsive players in the digital economy. The parameter is derived from the World Bank's *Ease of Doing Business Index 2019*, using the overall Doing Business score.

Freedom of Information: The freedom to access all information online has been stymied in recent years, with many economies limiting content access and distribution. Allowing information to flow freely is a key condition of digital communications, just as uninhibited cross-border data flows are essential for cloud technologies to thrive. The parameter is derived from the Reporters Without Borders' *World Press Freedom Index 2019*.

The aggregated cloud governance measure shows that New Zealand and Australia rank highest in terms of overall governance (scores of 17.6 and 16.4, respectively). The region's mature markets are all above the APAC-14 average of 13.7, except for Singapore (below the average with a score of 13.4).

Figure 14: Cloud Governance, aggregated scores out of 20



Sources:
- *World Bank, www.doingbusiness.org/en/data/doing-business-score*
- *Reporters Without Borders, https://rsf.org/en/ranking_table*

CRI Parameter #09 – Business Sophistication

Table 13: Business Sophistication, APAC rankings

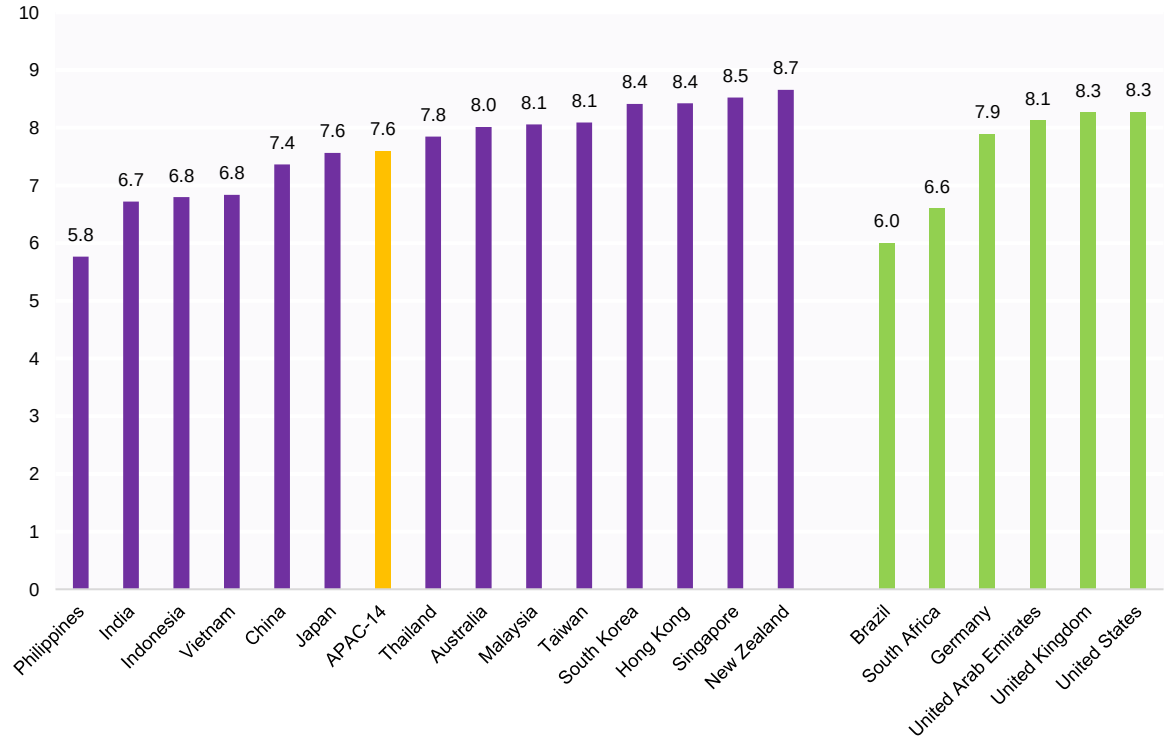
	AU	CN	HK	IN	ID	JP	MY	NZ	PH	SG	KR	TW	TH	VN
Rank 2020	**7**	**10**	**=3**	**13**	**=11**	**9**	**=5**	**1**	**14**	**2**	**=3**	**=5**	**8**	**=11**
Rank 2018	=5	12	4	13	11	9	7	1	14	2	3	=5	8	10
Rank 2016	8	=10	3	13	=10	1	2	=6	=10	4	=6	5	9	14
Rank 2014	8	12	2	=9	=9	1	5	7	13	4	6	3	=9	14

Like Intellectual Property Protection (Parameter #08), business sophistication is an area that has not undergone any extreme variations from CRI 2018 to CRI 2020. With a score of 8.7, New Zealand remains 1st, as do Singapore (2nd with a score of 8.5) and South Korea (3rd with a score of 8.4). Taiwan remains 5th for the third consecutive time, as does India (13th). Thailand, Japan, Indonesia, and the Philippines all remain in the same positions they occupied in CRI 2018 (respectively 8th, 9th, 11th, and 14th).

Unlike the changes operated from CRI 2016 to CRI 2018, the shifts that have taken place between CRI 2018 and CRI 2020 are neither major nor profound. Australia and Malaysia have moved by two positions, exchanging ranks (from 5th to 7th and vice-versa). Hong Kong has move up by one position (from 4th to 3rd), while Vietnam has moved down by one position (from 10th to 11th). The most notable jump comes from China, which has shifted two positions between 2018 and 2020 (from 12th to 10th).

The clear divide that could be observed in CRI 2018 between mature and emerging APAC economies is much less pronounced. The divide is still present, but Thailand and Japan are clear outliers toeing both sides of the APAC-14 average. At the same time, the gap between top and bottom performers has only slightly increased between CRI 2018 and CRI 2020; in CRI 2018, there was a 2.8-point gap between New Zealand and the Philippines (respectively 1st and 14th, with scores of 8.7 and 5.9). In CRI 2020, the gap between New Zealand and the Philippines (respectively 1st and 14th, with scores of 8.7 and 5.8) is at 2.9. This points to a very limited exacerbation of the differences between top- and bottom-performers.

Figure 15: Business Sophistication, normalised scores out of 10



Source: World Bank, www.doingbusiness.org/en/data/doing-business-score

CRI Parameter #10 – Freedom of Information

Table 14: Freedom of Information, APAC rankings

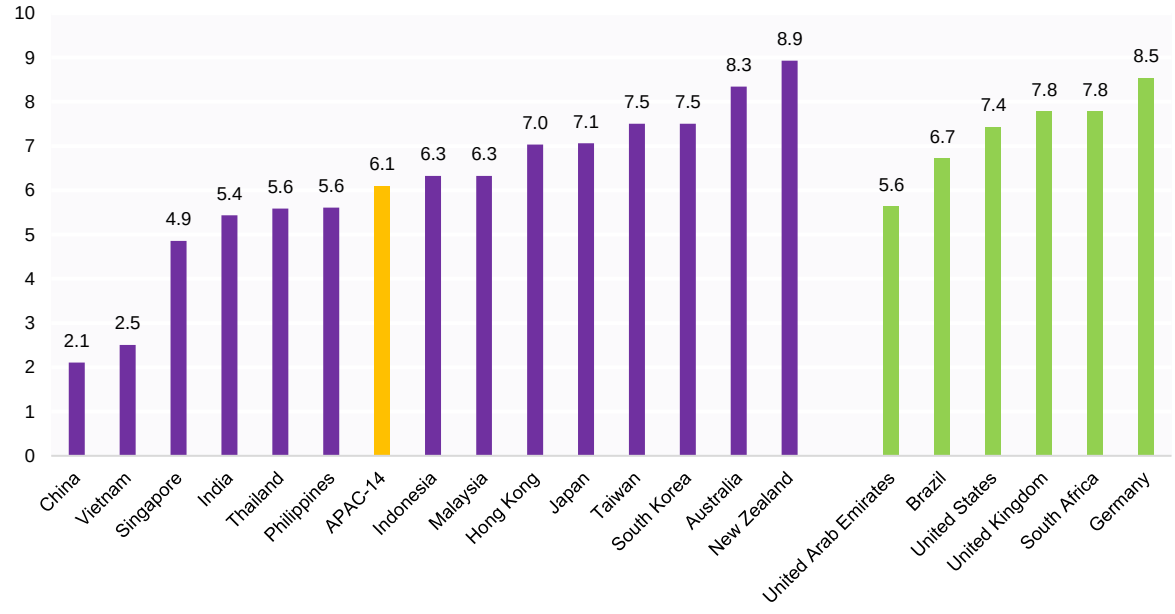
	AU	CN	HK	IN	ID	JP	MY	NZ	PH	SG	KR	TW	TH	VN
Rank 2020	**2**	**14**	**6**	**11**	**=7**	**5**	**=7**	**1**	**=9**	**12**	**=3**	**=3**	**=9**	**13**
Rank 2018	2	14	=5	9	7	5	11	1	8	12	4	3	10	13
Rank 2016	1	14	=4	=9	=9	2	=9	=4	3	8	7	=4	12	13
Rank 2014	=2	13	=2	12	10	1	9	4	5	=6	=6	=6	11	14

Freedom of Information is another parameter that has not budged immensely between CRI 2018 and CRI 2020. The top three positions, for instance, remain unchanged; New Zealand is 1st with a score of 8.9, followed by Australia (2nd with 8.3) and South Korea and Taiwan (both 3rd with 7.5). Likewise, the last three positions remain identical to 2018: Singapore (4.9), Vietnam (2.5), and China (2.1) respectively come in at 12th, 13th, and 14th.

In terms of notable movements, Malaysia has risen four positions (from 11th in CRI 2018 to 7th in CRI 2020) and India has backtracked two positions (from 9th in 2018 to 11th in 2020). All other economies have either moved by a single position or have remained static. In terms of trends over time, it is interesting to note that Japan's and Singapore's downward trajectories since 2014 have somewhat tapered (from 1st, to 2nd, to 5th, and now to 5th again for Japan, and from 6th, to 8th, to 12th, and now to 12th again for Singapore) while Hong Kong's shows no sign of abating (from 2nd, to 4th, to 5th, and now to 6th).

Freedom of information seems largely tied to economic maturity, with some notable exceptions. Emerging markets such as China and Vietnam lag far behind the APAC-14 average of 6.1, while mature economies such as Australia and New Zealand are well above it. Three economies stand out in this regard: Singapore, which ranks 12th despite being one of the region's most mature economies, and Malaysia and Indonesia, two emerging economies that have surpassed the average score for the region. Interestingly, all non-APAC economies except the United Arab Emirates rank higher than the APAC-14 average.

Figure 16: Freedom of Information, normalised scores out of 10



Source: Reporters Without Borders, https://rsf.org/en/ranking_table

IV. Market Highlights

Australia #7 (-1)

Falls from CRI 2018's 6th ranking

Table 15: Australia – CRI 2020 Scores and Rankings

	CRI #01 Int'l Connectivity	CRI #02 Broadb. Quality	CRI #03 Power and Sust.	CRI #04 Data Cent. Risk	CRI #05 Cybersecurity	CRI #06 Privacy	CRI #07 Govt Reg. Env.	CRI #08 IP Protection	CRI #09 Biz Sophistication	CRI #10 Freedom of Info.	TOTAL Cloud Infrastructure	TOTAL Cloud Security	TOTAL Cloud Regulation	TOTAL Cloud Governance	TOTAL All
Score	2.9	4.6	3.6	7.4	8.9	9.2	9.8	8.3	8.0	8.3	11.1	16.3	27.2	16.4	**71.0**
Ranking	7	10	9	4	2	2	2	5	7	2	9	3	3	2	**7**

Australia has been on a gradual downward spiral since CRI 2016; it went from 4th position in 2016, to 6th in 2018, and it now finds itself in 7th position. This downward trend can be explained by its stagnating cloud infrastructure, which weighs its overall cloud readiness down just as other APAC economies are making great strides in this area. The aggregated Cloud Infrastructure segment is indeed its weakest, while Cloud Governance is its strongest.

Despite its tumble in the rankings, Australia remains a strong regional contender. It is among the few APAC economies to have adopted a comprehensive 'Cloud First' policy, and it has recently strengthened it based on comprehensive cybersecurity principles.[7] It also remains a low-risk location to build data centres, with little exposure to natural hazards and strong institutions that value the protection of data and of intellectual property.

Overall, if Australia continues struggling to take its digital readiness to the next level, it risks losing its competitive edge and becoming a 'stall out' economy – one that has attained digital maturity in key areas but whose capacity for innovation has slowed down.[8]

Recent Digital Economy Regulation/Legislation and ICT Developments

- In May 2020, the Digital Transformation Agency released a tender for a new Cloud Marketplace.[9]
- In September 2019, the Department of Home Affairs launched a public consultation on the new Cyber Security Strategy to be delivered in 2020.[10]
- In June 2019, the New Payments Platform (NPP) released a QR Code Standard to make QR code functionalities interoperable across banks, merchants, and payment service providers.[11]
- In April 2019, Australia passed the Sharing of Abhorrent Violent Material Bill, a "world first" law to put a stop to the sharing of violent videos on social media.[12]
- In November 2018, the DTA launched Vision 2025 to enable the delivery of all government services through comprehensive, integrated digital platforms.[13]
- In February 2018, the Digital Transformation Agency (DTA) launched the Secure Cloud Strategy, a new iteration of the 2014 Cloud Computing ('Cloud First') Policy.[14]
- In May 2018, the 2018-2019 budget announced a four-year, AUD29.9-million investment to support the development of AI in Australia.[15]

Recommendations

- Australia must sustain the momentum it has built over the years and accelerate both the pace and scale of development of its digital connectivity and infrastructure.
- Australia must help institutional processes and political interests converge towards a shared vision for a digitally capable government and society.
- Australia must implement this vision at all levels of federal, state, and commonwealth government, a daunting but necessary task considering the many administrative layers of Australian government.

China #13 (-)

Retains CRI 2018's 13th ranking

Table 16: China – CRI 2020 Scores and Rankings

	CRI #01 Int'l Connectivity	CRI #02 Broadb. Quality	CRI #03 Power and Sust.	CRI #04 Data Cent. Risk	CRI #05 Cybersecurity	CRI #06 Privacy	CRI #07 Govt Reg. Env.	CRI #08 IP Protection	CRI #09 Biz Sophistication	CRI #10 Freedom of Info.	TOTAL Cloud Infrastructure	TOTAL Cloud Security	TOTAL Cloud Regulation	TOTAL Cloud Governance	TOTAL All
Score	1.8	6.5	2.3	6.0	8.3	1.9	8.8	6.4	7.4	2.1	10.6	14.3	17.2	9.5	**51.5**
Ranking	11	6	14	10	8	14	11	11	10	14	10	9	13	13	**13**

In 13th position, China retains its 2016 and 2018 rankings despite making progress in several parameters, most notably in connectivity, broadband quality, and data centre risk. This overall stagnation can be explained by the fact that despite the size and dynamism of its digital economy – China's digital economy has indeed seen the emergence of new digital industries and the digitalisation of traditional sectors – important structural inadequacies remain in key enabling areas such as Cloud Governance and Regulation.

This does not necessarily mean that China is doing nothing in these areas. In fact, the Chinese government pays close attention to cloud computing, not least to enhance pubic services efficiency and capability, and save administrative costs. In this sense, it devotes considerable resources to the development and improvement of plans, programmes, projects, and frameworks aimed at strengthening the digital economy.

Part of the issue is the fact that the degree of digitalisation varies across provinces and sectors – reflecting the diverse levels and stages of economic development across Chinese society and territory. Another factor is the fact that a number of recent regulations, such as the Cybersecurity Law, impose restrictions on routine flows of data and information – the lifeblood of digital products and services. As the ongoing trade conflict with the United States demonstrates, this broad, prescriptive coupling of economic measures with national and strategic interests may become a major obstacle to the emergence of an outwardly sustainable digital economy.

Recent Digital Economy Regulation/Legislation and ICT Developments

- In Mar 2020, China's financial regulators jointly released the Work Plan for the Overall Regulation of Financial Infrastructure 统筹监管金融基础设施工作方案.[16]
- In June 2019, the Ministry of Industry and Information Technology (MIIT) granted four 5G licenses: China Telecom, China Mobile, China Unicom, and China Broadcasting Network.[17]
- In May 2019, China released the Beijing AI Principles, a code of ethics for AI that aims to guide AI scientists and engineers as they develop and implement AI-based systems.[18]
- In March 2019, the China Banking Regulatory Commission (CBRC) released draft Guidelines for Data Governance of Banking Financial Institutions for public consultation.[19]
- In March 2019, Alibaba and the Chinese Academy of Sciences (CAS) launched the nation's first cloud-based quantum computer, the second-fastest of its kind after IBM's.[20]
- In February 2019, China launched the first AI Pilot Zone in Beijing, an experimental zone providing an open platform for joint AI models and applications to be developed.[21]
- In January 2019, a coalition of regulatory authorities announced they would step up the enforcement of personal data protection to tackle data-harvesting practices.[22]

Recommendations

- China must strengthen its connectivity fundamentals across its territory, allowing more people to both contribute to and benefit from the opportunities created by digital business models.
- China must dissociate data protection laws and guidelines from national and strategic interests, creating a truly conducive environment for cross-national digital businesses.
- China must make data protection regulations an enabling and facilitating factor for digital businesses, rather than a restrictive or prescriptive burden.

Hong Kong #1 (+1)

Climbs from CRI 2018's 2nd ranking

Table 17: Hong Kong – CRI 2020 Scores and Rankings

	CRI #01 Int'l Connectivity	CRI #02 Broadb. Quality	CRI #03 Power and Sust.	CRI #04 Data Cent. Risk	CRI #05 Cybersecurity	CRI #06 Privacy	CRI #07 Govt Reg. Env.	CRI #08 IP Protection	CRI #09 Biz Sophistication	CRI #10 Freedom of Info.	TOTAL Cloud Infrastructure	TOTAL Cloud Security	TOTAL Cloud Regulation	TOTAL Cloud Governance	TOTAL All
Score	9.3	9.1	4.8	8.0	8.7	8.3	9.8	8.4	8.4	7.0	23.2	16.7	26.5	15.5	**81.9**
Ranking	1	2	5	2	5	5	2	3	3	6	1	2	5	5	**1**

Hong Kong climbs to 1st position, reclaiming the rank it held in CRI 2016. A strong regional performer in fundamental readiness areas (Cloud Regulation and Infrastructure), it needs to strengthen other areas that are just as essential to wider and faster cloud adoption (Cloud Governance and Security). According to CRI 2020, sustainable energy, freedom of information, and data centre security are the three areas that warrant increased resources and attention – especially considering the openness of most other sectors within Hong Kong's digital ecosystem.

A most notable development is the sharp drop in the privacy parameter: Hong Kong has gone from 1st in 2018 to 5th in 2020. This may reflect the wave of major data leaks that have affected millions of Hong Kong citizens in the past two years.[23] Indeed, sensitive and personal information have been compromised on a number of digital platforms, severely undermining the public's confidence in organisations' data protection capabilities.[24] The most prominent of these breaches, the Cathay Pacific hack which in late 2018 saw the information of 9.4 million users being leaked,[25] was the last push the Hong Kong government needed to consider revising its privacy framework.[26] Unfortunately, this priority was indefinitely pushed back as political tensions escalated for the better part of 2019.[27]

To keep pace with other countries – most notably Singapore, with whom it is constantly vying for top spot – Hong Kong must strengthen the key areas that make it vulnerable to the increasingly sophisticated tools used to compromise data. Privacy, cybersecurity, and freedom of information all need urgent attention if they are to take Hong Kong's digital economy to the next level. But the current political climate makes it difficult to tell when such issues will effectively return to the forefront of the national agenda.[28]

Recent Digital Economy Regulation/Legislation and ICT Developments

- In November 2019, the Office of the Communications Authority (OFCA) completed all three rounds of 5G spectrum auctions for the 3.3, 3.5, and 4.9 GHz bands.[29]
- In October 2019, the Securities and Futures Commission (SFC) released guidelines to mitigate cybersecurity risks when engaging external electronic data storage providers.[30]
- In April 2019, the OGCIO presented the security measures to safeguard the transfer of data regarding the forthcoming e-ID System (a.k.a. iAM Smart).[31]
- In January 2019, the Hong Kong government announced that 650 new open data sets will be released over the year, focusing on mobility and urban planning.[32]
- In December 2018, the Office of the Government Chief Information Officer (OGCIO) announced the expansion of the government's Open Data Policy.[33]
- In July 2018, the Hong Kong Monetary Authority (HKMA) introduced an Open API Framework to accelerate the adoption of APIs by the banking sector.[34]

Recommendations

- Hong Kong must mitigate the long-term negative effects that political instability is already having on both its digital and traditional economies.
- Hong Kong must widely engage the public and continue to carry out initiatives that allow them to both benefit from and contribute to the digital economy.
- Hong Kong must continue to open public-sector datasets, while ensuring they meet usability requirements and adhere to international practices.

India #10 (+2)

Climbs from CRI 2018's 12th ranking

Table 18: India – CRI 2020 Scores and Rankings

	CRI #01 Int'l Connectivity	CRI #02 Broadb. Quality	CRI #03 Power and Sust.	CRI #04 Data Cent. Risk	CRI #05 Cybersecurity	CRI #06 Privacy	CRI #07 Govt Reg. Env.	CRI #08 IP Protection	CRI #09 Biz Sophistication	CRI #10 Freedom of Info.	TOTAL Cloud Infrastructure	TOTAL Cloud Security	TOTAL Cloud Regulation	TOTAL Cloud Governance	TOTAL All
Score	1.7	4.3	2.5	5.5	7.2	7.2	9.5	6.6	6.7	5.4	8.5	12.7	23.3	12.2	**56.7**
Ranking	12	12	11	13	12	10	8	8	13	11	14	12	8	11	**10**

Unlike previous editions of the CRI, CRI 2020 sees India moving up two positions to 10th. This demonstrates that the many measures launched over the years are starting to have a tangible impact – though weaknesses remain. India has made small but noticeable improvements across all parameters. The biggest improvements have taken place in sustainable energy, regulatory environment, and protection of intellectual property. Cybersecurity and freedom of information, meanwhile, have deteriorated since 2018.

Infrastructure remains India's 'Achilles' Heel' despite the multiple synergistic initiatives launched by the government under the banner of the Digital India Programme. The sheer size of the territory makes it difficult for digital initiatives such as digital literacy programmes to reach everyone in the same manner. There is also an environmental factor, as India's propensity for and vulnerability to natural disasters makes it hard to build and maintain cloud-enabling infrastructure. Coupled with the wide range of diverging – and sometimes conflicting – needs and interests, even the smallest of political, institutional, or bureaucratic roadblocks can slow the digital momentum.

Despite the progress made since CRI 2018, the lack of quality digital infrastructure and the difficulty for businesses to navigate the country's complex governance mechanisms remain major issues for India. Together, they make it difficult for even the most polished security and governance frameworks to drive cloud adoption. As demonstrated by the jump to 10th position, this is slowly but steadily improving, but the sheer scale of the task poses a serious challenge for years to come.

Recent Digital Economy Regulation/Legislation and ICT Developments

- In April 2020, the Ministry of Electronics and Information Technology (MeitY) began reaching out to local stakeholder groups to seek ideas on the revamp of the IT Act.[35]
- In October 2019, MeitY issued guidelines to guide government departments in their cloud services procurement processes.[36]
- In October 2019, the draft Personal Data Protection Bill (2018) was expected to be submitted to Parliament before the end of 2019.[37]
- In February 2019, the 2019-2020 Budget included plans to set up a National Centre on Artificial Intelligence, as well as steps to turn a million Indian villages into "digital villages".[38]
- In September 2018, the Department of Telecommunications (DoT) published the National Digital Communications Policy 2018 to improve digital connectivity and security.[39]
- In June 2018, the government launched the National Strategy for AI, a plan to accelerate the adoption of AI and promote ethics, privacy, and security in AI.[40]
- In February 2018, the Telecom Regulatory Authority of India (TRAI) published recommendations to incentivise the setting-up of International Data Centres (IDCs).[41]

Recommendations

- India must take stock of the measures that have had long-term, on-the-ground success and recreate the approach across key government plans and strategies.
- India must continue to streamline and simplify its administrative and bureaucratic processes to ensure its business environment is both conducive and attractive to digital companies.
- India must strive to become a regional/global data centre hub by leveraging the comparative advantages it possesses.

Indonesia #12 (-1)

Falls from CRI 2018's 11th ranking

Table 19: Indonesia – CRI 2020 Scores and Rankings

	CRI #01 Int'l Connectivity	CRI #02 Broadb. Quality	CRI #03 Power and Sust.	CRI #04 Data Cent. Risk	CRI #05 Cybersecurity	CRI #06 Privacy	CRI #07 Govt Reg. Env.	CRI #08 IP Protection	CRI #09 Biz Sophistication	CRI #10 Freedom of Info.	TOTAL Cloud Infrastructure	TOTAL Cloud Security	TOTAL Cloud Regulation	TOTAL Cloud Governance	TOTAL All
Score	2.4	3.9	3.2	5.8	7.8	6.4	5.9	6.6	6.8	6.3	9.5	13.5	18.9	13.1	**55.0**
Ranking	10	14	10	11	11	12	14	8	11	7	13	11	12	10	**12**

Indonesia lost one position in the CRI 2020 rankings despite being a highly promising and dynamic digital economy. This demonstrates that small, incremental improvements in some readiness parameters can be cancelled out – and even weighed down – by sharp declines in others. In Indonesia's case, moderate improvements in connectivity and cybersecurity were outweighed by a pronounced tumble in broadband quality and an absence of movement in most other parameters – resulting in a tumble to 12th position.

Apart from Cloud Infrastructure, Governance is Indonesia's other major weakness. This may be a reflection of the fact that Indonesia is taking regulatory oversight of the digital economy seriously – multiplying the laws, agencies, and resources devoted to optimising specific branches of the digital economy, such as e-commerce, competition, privacy, etc. However, digital businesses note that Indonesia's regulatory environment is difficult to navigate, with government agencies developing overlapping – sometimes even conflicting – policies and regulations. This hinders the government's ability to build a clear and consistent regulatory environment, thereby limiting businesses' ability to focus on developing and adopting new technologies.

Indonesia is currently in the process of developing overarching and comprehensive cybersecurity and data protection laws. It is hoped that when passed, these laws will consolidate and streamline the fragmented regulatory landscape that many perceive as counter-intuitive or even counter-productive. Indonesia's scores and rankings may change in the near future as a direct result of these new laws, but at the moment it seems the parameters will continue their current trajectory.

Recent Digital Economy Regulation/Legislation and ICT Developments

- In May 2020, the Ministry of Trade released E-Commerce Regulations under Ministerial Regulation No. 50/2020, which itself falls under Government Regulation No. 80/2019.[42]
- Indonesia's new draft Personal Data Protection Law has been drafted as of Mar 2020,[43] and is scheduled to be discussed with the House of Representatives in June 2020.[44]
- In May 2019, Bank Indonesia (BI) launched five Payment System (IPS) 2025 Visions to guide and drive the development of a secure and inclusive digital financial ecosystem.[45]
- In August 2019, Bank Indonesia launched the Quick Response Code Indonesian Standard (QRIS), a national standard for QR-based electronic payments.[46]
- In September 2019, the National Cyber and Crypto Agency (BSSN) released draft regulation on the Protection of National Critical Information Infrastructure (IIKN).[47]
- In September 2019, President Joko Widodo requested industry feedback on the draft Cybersecurity Law, originally drafted in 2017 and amended since then.[48]
- In October 2019, the Government of Indonesia issued GR 71/2019 on the Implementation of Electronic Systems and Transactions, replacing GR 82/2012 of the same name.[49]

Recommendations

- Indonesia must continue to prioritise initiatives that improve its fundamentals to drive cloud adoption: infrastructure, connectivity, and security.
- Indonesia must ensure its forthcoming laws effectively create a conducive environment for data-driven organisations and do not constrain the movement of data.
- Indonesia must continue to drive cross-government coordination to ensure laws and regulations are comprehensive, coherent, and conducive.

Japan #6 (-2)

Falls from CRI 2018's 4th ranking

Table 20: Japan – CRI 2020 Scores and Rankings

	CRI #01 Int'l Connectivity	CRI #02 Broadb. Quality	CRI #03 Power and Sust.	CRI #04 Data Cent. Risk	CRI #05 Cybersecurity	CRI #06 Privacy	CRI #07 Govt Reg. Env.	CRI #08 IP Protection	CRI #09 Biz Sophistication	CRI #10 Freedom of Info.	TOTAL Cloud Infrastructure	TOTAL Cloud Security	TOTAL Cloud Regulation	TOTAL Cloud Governance	TOTAL All
Score	1.7	6.6	5.2	7.1	8.8	9.2	9.7	8.4	7.6	7.1	13.4	15.9	27.3	14.6	**71.3**
Ranking	12	4	3	7	4	2	6	3	9	5	6	5	2	6	**6**

Japan has lost two positions since CRI 2018, backtracking to 6th (the same position it occupied in CRI 2014). This loss of momentum is explained by the lack of movement in four parameters, a moderate advance in three parameters, and a sharp decline in three other parameters. Overall, Japan is strongest in the Cloud Regulation segment and weakest in Cloud Infrastructure and Cloud Governance. Privacy, however, is its strong point, reflecting the legislative reforms it undertook in 2016-2017 and has since reinforced.

A decidedly mature economy, the challenge for Japan is less whether it is capable of building solid digital foundations, and more how it will ensure that the system it has built can keep up with technological advancements. CRI 2020 shows that despite its past successes – or perhaps because of them – Japan is not as adaptable as it could be. The downward trajectory it has experienced since CRI 2016 may indeed reveal a struggle to remain as competitive and as innovative as nimbler digital economies 'leapfrogging' their way up the rankings.

To effectively reverse this trend, Japan will need to improve the way it plans and prioritises its digitisation strategies. First, the government must proactively and comprehensively make sense of the digital transformations impacting the world. This will then enable a confident and consistent approach to changing and updating regulations, making them drivers of – not barriers to – investment and innovation.

Recent Digital Economy Regulation/Legislation and ICT Developments

- In Apr 2020, the Ministry of Information and Communications (MIC) opened consultations on its "Beyond 5G" strategy.[50]
- In Mar 2020, Japan's Cabinet approved the Bill to Amend the Act on the Protection of Personal Information (APPI), paving the way for the scheduled 3-year review of the APPI.[51]
- In June 2019, Prime Minister Shinzo Abe proposed the creation of Data Free Flow with Trust (DFFT), a framework for cross-border data sharing to further develop the global economy.[52]
- In January 2019, the EU-Japan Mutual Adequacy Agreement came into force, allowing the transfer of personal data between Japan and the European Union.[53]
- In July 2018, the Digital Transformation Office was created to make all corporate administrative procedures accessible online with a unique ID.[54]
- In April 2018, the Social Security and Tax Number System – or "My Number" – was extended for use in financial institutions for opening accounts and making international fund transfers.[55]
- In January 2018, the Digital Government Action Plan was launched to provide fully digitised one-stop government services that can be accessed by the public and corporations.[56]

Recommendations

- Japan must continue to push its drive for innovation, especially in the way start-ups and entrepreneurs make cloud services part of their business models.
- Japan must leverage consumer demand for next-generation technologies (IoT, AI, VR/AR) to drive business and government adoption of cloud products and services.
- Japan must intensify public-private partnerships to allow government bodies and agencies to benefit from the nimbleness of the start-up ecosystem.

Malaysia #8 (-)

Retains CRI 2018's 8th ranking

Table 21: Malaysia – CRI 2020 Scores and Rankings

	CRI #01 Int'l Connectivity	CRI #02 Broadb. Quality	CRI #03 Power and Sust.	CRI #04 Data Cent. Risk	CRI #05 Cybersecurity	CRI #06 Privacy	CRI #07 Govt Reg. Env.	CRI #08 IP Protection	CRI #09 Biz Sophistication	CRI #10 Freedom of Info.	TOTAL Cloud Infrastructure	TOTAL Cloud Security	TOTAL Cloud Regulation	TOTAL Cloud Governance	TOTAL All
Score	3.0	5.6	4.5	7.2	8.9	8.3	8.9	7.7	8.1	6.3	13.1	16.1	24.9	14.4	**68.5**
Ranking	6	9	6	6	2	5	10	6	5	7	7	4	8	7	**8**

Malaysia is the only APAC economy covered in this report to have retained the same position (8th) four consecutive times since 2014. Over the years, it has made notable advancements in key readiness areas, but these have been accompanied by equally sharp declines in other areas, as well as several instances of stagnation. This is the case for CRI 2020, which shows that sharp improvements made in some parameters (connectivity, energy sustainability, data centre risk, business sophistication, freedom of information) were met by equally pronounced tumbles in other parameters (privacy, regulatory environment, intellectual property protection).

This is despite Malaysia's proactive efforts to drive cloud adoption as well as broader digital transformation. Malaysia's private sector has been receptive to cloud adoption, and the government's announcement to introduce a 'Cloud First' strategy is telling of an increasingly pro-cloud stance within the public sector.[57] At the same time, Malaysia has launched a number of projects aimed at bringing both sectors closer together for holistic innovation: a data exchange hub for ministries to share information and better understand citizens,[58] the MyIdentity digital identity platform, and several smart city projects aimed at better meeting citizens' needs in business, education, health, and welfare.[59]

The question then, is not so much what Malaysia should be doing to become a digitally enabled nation – it is already doing a lot – but how it should consolidate and strengthen its existing initiatives to concretise its vision. To achieve its true potential and extend digital transformation beyond the economy, Malaysia will need leadership from the top as well as supporting initiatives on the ground.

Recent Digital Economy Regulation/Legislation and ICT Developments

- In February 2020, the Department of Personal Data Protection (JPDP), an agency under the Ministry of Communications and Multimedia (KKMM), released proposed amendments to the country's Personal Data Protection Act for comments.[60]
- In October 2019, the government announced the National Fiberisation and Connectivity Plan (NFCP), providing nationwide high-speed digital connectivity over the next five years.[61]
- In October 2019, the government announced the creation of a multi-stakeholder National Digital Inclusion Council (NDIC) to create digital economy income opportunities.[62]
- In October 2019, the government presented Budget 2020, with one of four main objectives being to grow Malaysia's digital economy in a shared and inclusive manner.[63]
- In March 2019, the Netpreneur Training Programme was launched to enable Malaysian SMEs to embrace digital innovation and benefit from globalisation.[64]
- In October 2018, the government announced its Fourth Industrial Revolution Policy Framework to accelerate the adoption of AI and IoT in the manufacturing sector.[65]
- In April 2018, the Digital Transformation Acceleration Programme (DTAP) was launched to provide companies with a structured approach to the adoption of digital technologies.[66]

Recommendations

- Malaysia must finalise and launch its 'Cloud First' policy to ensure the cloud-friendly momentum it has cultivated yields long-lasting results.
- Malaysia must review its freedom of information and privacy laws, seen to be going against the dynamism that cloud computing can bring about.
- Malaysia must simplify and streamline the wide range of government-driven plans and programmes devoted to enhancing the digital economy.

New Zealand #3 (-)

Retains CRI 2018's 3rd ranking

Table 22: New Zealand – CRI 2020 Scores and Rankings

	CRI #01 Int'l Connectivity	CRI #02 Broadb. Quality	CRI #03 Power and Sust.	CRI #04 Data Cent. Risk	CRI #05 Cybersecurity	CRI #06 Privacy	CRI #07 Govt Reg. Env.	CRI #08 IP Protection	CRI #09 Biz Sophistication	CRI #10 Freedom of Info.	TOTAL Cloud Infrastructure	TOTAL Cloud Security	TOTAL Cloud Regulation	TOTAL Cloud Governance	TOTAL All
Score	4.2	6.4	6.7	7.8	7.9	8.3	9.7	8.6	8.7	8.9	17.3	15.6	26.6	17.6	**77.1**
Ranking	4	7	1	3	10	5	6	2	1	1	4	8	4	1	**3**

New Zealand has not moved from the 3rd position it has held since CRI 2016. A strong regional contender, its position may be less about any specific inadequacies on its part and more about the relative prowess of Singapore and Hong Kong, who alternate for the top position. CRI 2020 shows that New Zealand ranks first in the Cloud Governance segment as well as in the sustainable energy parameter. Conversely, cybersecurity and broadband quality are its two least-performing areas.

The fact that New Zealand has not budged in the rankings despite having a progressive and conducive 'Cloud First' policy may be a reflection of its specific approach to driving digital innovation. A mature digital economy, some of New Zealand's industries are open to digital innovation while others are comparatively harder to convert. While other economies have taken a more structured or centralised approach to driving digital transformation – creating new agencies or empowering existing agencies to drive change – New Zealand has opted for a networked, collaborative model that allows a coordinated sharing of knowledge and resources across levels of government. This approach has yielded a number of results, but it is not without its flaws and limitations.

Indeed, New Zealand's digital initiatives tend to be couched in vague collections of principles and concepts. There is a distinct lack of concrete deliverables and timetables, a feature that can be frustrating if one wants to gauge progress. This also means there is no system-wide prioritisation, no cross-agency funding models or cost benefit frameworks, and no ability to view investment early in the investment cycle – a largely iterative approach that does not necessarily stack up when competing with meticulous planners such as Singapore.

Recent Digital Economy Regulation/Legislation and ICT Developments

- In Mar 2020, the Privacy Commissioner announced a new Privacy Principle 12: International Disclosure of Personal Information, where companies need to demonstrate due diligence and safeguard checks in the case of cross border data transfers.[67]
- In October 2019, the Department of Statistics launched a consultation on a Draft Algorithm Charter for government agencies using data and algorithms in their decision-making.[68]
- In February 2019, New Zealand and Australia announced the forthcoming adoption of the Pan European Public Procurement Online (PEPPOL) interoperability framework.[69]
- In December 2018, the Digital Identity Transition Programme was launched to improve privacy and security protections for the identity data of citizens.[70]
- In November 2018, a government algorithm transparency report was published to track and evaluate the effectiveness of algorithms used to deliver a range of government services.[71]
- In October 2019, the marketplace added two more channels – professional and managed services – to cover, among others, cloud transition services and cloud brokerage services.[72]
- In September 2018, a Digital Procurement marketplace was launched to make it easier for smaller suppliers and sellers to bid for government contracts and projects.[73]

Recommendations

- New Zealand must develop impact assessment measures to ensure its ambitious regulatory initiatives actually yield the desired results.
- New Zealand must improve cybersecurity by strengthening collaboration between industry, non-profit, academic, and government organisations.
- New Zealand must continue iterating the new school curriculum and qualifications framework that will prepare students for the challenges of the future of work.

Philippines #11 (-2)

Falls from CRI 2018's 9th ranking

Table 23: Philippines – CRI 2020 Scores and Rankings

	CRI #01 Int'l Connectivity	CRI #02 Broadb. Quality	CRI #03 Power and Sust.	CRI #04 Data Cent. Risk	CRI #05 Cybersecurity	CRI #06 Privacy	CRI #07 Govt Reg. Env.	CRI #08 IP Protection	CRI #09 Biz Sophistication	CRI #10 Freedom of Info.	TOTAL Cloud Infrastructure	TOTAL Cloud Security	TOTAL Cloud Regulation	TOTAL Cloud Governance	TOTAL All
Score	1.2	4.0	4.3	4.8	6.4	7.8	9.1	6.3	5.8	5.6	9.5	11.2	23.2	11.4	**55.3**
Ranking	14	13	7	14	14	8	9	12	14	9	12	14	10	12	**11**

The Philippines has tumbled two positions from 9th in 2018 to 11th in 2020. No single factor can explain this movement, but the sharp decline of scores across several parameters certainly plays a large part (international connectivity, sustainable energy, data centre risk, cybersecurity, privacy, and freedom of information). Overall, Cloud Regulation was its strongest segment, while Cloud Security was its weakest.

This is despite the government indicating its strong support for the use of cloud by the release of its 'Cloud First' policy. Launched in January 2017, the policy instructs all government agencies to consider cloud computing as the preferred ICT deployment strategy so as to tap the benefits of the cloud including reduced IT management costs and increased service delivery efficiency.[74] But little progress has been made since, with the policy currently still in the implementation stage.[75] However, progress has been made in the form of a procurement e-store, expected to be launched by the Department of Budget and Management (DBM) in 2020 to help agencies assess and compare cloud services and providers.[76]

A newly appointed secretary of the Department of Information and Communications Technology (DICT) has instilled a renewed optimism for improved broadband connectivity across the Philippines, progressively working to reduce the bureaucracy involved in deploying cell towers, as well as enlisting a host of new common tower partners to more efficiently build, operate, and share infrastructure.[77] Where connectivity has been the major bottleneck of the Philippines' digital economy, improvements will enable organisations to better adopt and leverage cloud computing solutions. Of course, the DICT will have to do this while simultaneously work on other enabling parts of the digital ecosystem.

Recent Digital Economy Regulation/Legislation and ICT Developments

- In May 2020, a Digital Tax bill was proposed.[78]
- In July 2019, the Philippines Innovation Act was enacted to help micro, small, and medium-sized enterprises (MSMEs) remain innovative and competitive in the digital age.[79]
- In June 2019, the E-Government Masterplan (EGMP) 2022 was launched to build an interoperable government ICT network and system.[80]
- In February 2019, the Philippine Digital Transformation Strategy (PDTS) was launched to transform, integrate, and streamline all digital public services.[81]
- In November 2018, the PhilSys Registry Office (PRO) was created to oversee the implementation of the PhilSys Number (PSN) digital identity scheme.[82]
- In August 2018, the Philippine Identification System Act was enacted to consolidate and centralise all personal information of citizens and residents and enable authentication.[83]
- In July 2018, the government announced the National ICT Ecosystem Framework (NIEF) 2022, a roadmap for the management and development of data in national initiatives.[84]

Recommendations

- The Philippines must craft clear and practical guidelines to guide agencies in adopting cloud computing, including best practices in cloud procurement.
- The Philippines must continue its efforts to improve connectivity nationwide and continue to work with industry to holistically enhance its digital ecosystem.
- The Philippines must review and update its cybersecurity and privacy frameworks in support of the digital economy and begin looking at greener options for energy consumption.

Singapore #2 (-1)

Falls from CRI 2018's 1st ranking

Table 24: Singapore – CRI 2020 Scores and Rankings

	CRI #01 Int'l Connectivity	CRI #02 Broadb. Quality	CRI #03 Power and Sust.	CRI #04 Data Cent. Risk	CRI #05 Cybersecurity	CRI #06 Privacy	CRI #07 Govt Reg. Env.	CRI #08 IP Protection	CRI #09 Biz Sophistication	CRI #10 Freedom of Info.	TOTAL Cloud Infrastructure	TOTAL Cloud Security	TOTAL Cloud Regulation	TOTAL Cloud Governance	TOTAL All
Score	6.5	9.9	6.1	8.8	9.0	9.2	9.8	9.0	8.5	4.9	22.4	17.8	27.9	13.4	**81.5**
Ranking	3	1	2	1	1	2	2	1	2	12	2	1	1	9	**2**

Singapore's stellar track record across segments and parameters allows it to retain a top-3 position, but it loses the leadership ranking it held in CRI 2018. Singapore has remained at the top of most parameters, except international connectivity and freedom of information, where it falls below 2nd position. Just like in past CRI iterations, freedom of information stands out as a thorn on Singapore's side. Broadband quality and government regulatory environment remain Singapore's strongest parameters. Overall, Cloud Regulation is its strongest segment, while Cloud Governance is its weakest.

Singapore does indeed have one of the region's most progressive and conducive approaches to cloud and digital technologies. Its institutional stability and continuity have allowed it to experiment and collaborate at a pace and scale that not many other APAC economies can follow. From data protection laws[85] to nationwide cybersecurity strategies,[86] Singapore's institutions have built strong regulatory foundations to maximise the impact of digital technologies on the economy.[87]

But if the Cloud Governance segment is any indication, Singapore's majorly top-down approach to policy-making may soon hinder the next stage of its digital competitiveness. The government's highly centralised approach to digitisation has been fruitful up until now, but may very well reach its limits once it goes against nimble, bottom-up economies that see digital technologies as unique 'leapfrogging' opportunities. From internal coordination among government agencies to external consultation with the population, Singapore must strengthen the way citizens and consumers are not only engaged, but also actively involved in the nation's digital trajectory.

Recent Digital Economy Regulation/Legislation and ICT Developments

- In May 2020, the Personal Data Privacy Commission (PDPC) held a public consultation for amendments to the Personal Data Protection Act (PDPA).[88]
- In October 2019, Singapore adopted the Protection from Online Falsehoods and Manipulation Act (POFMA) to curb the impact of harmful "fake news" on social platforms.[89]
- In January 2019, Singapore launched the Model AI Governance Framework to help organisations make a responsible and ethical use of AI.[90]
- In November 2018, Singapore launched AI Singapore, a five-year national programme exclusively devoted to driving AI investment and promotion.[91]
- In June 2018, the Digital Government Blueprint (DGB) was launched as a component of Singapore's Smart Nation initiative, focusing on digital transformation of the government.[92]
- In March 2018, the Cybersecurity Act was published to provide, among other cybersecurity efforts, a framework for the regulation of Critical Information Infrastructure (CII).[93]
- In February 2018, the National Digital Identity (NDI) initiative was announced to update and upgrade the capabilities of the SingPass, and is scheduled to be fully operational in 2020.[94]

Recommendations

- Singapore must continue to explore innovative initiatives that allow it to stay ahead of its 'leapfrogging' neighbours in the region.
- Singapore's proposal to build offshore floating data centres, for example, may offset its prohibitive property prices and allow it to become a regional data centre hub.[95]
- Likewise, Singapore's proposal to launch data "embassies", where the data from other countries is hosted in Singapore but governed by countries' own laws, may consolidate its digital leadership in the region.[96]

South Korea #5 (+2)

Climbs from CRI 2018's 7th ranking

Table 25: South Korea – CRI 2020 Scores and Rankings

	CRI #01 Int'l Connectivity	CRI #02 Broadb. Quality	CRI #03 Power and Sust.	CRI #04 Data Cent. Risk	CRI #05 Cybersecurity	CRI #06 Privacy	CRI #07 Govt Reg. Env.	CRI #08 IP Protection	CRI #09 Biz Sophistication	CRI #10 Freedom of Info.	TOTAL Cloud Infrastructure	TOTAL Cloud Security	TOTAL Cloud Regulation	TOTAL Cloud Governance	TOTAL All
Score	2.6	8.2	4.3	7.0	8.7	9.4	9.9	6.6	8.4	7.5	15.1	15.8	25.9	15.9	**72.7**
Ranking	9	3	7	8	5	1	1	8	3	3	5	7	5	3	**5**

South Korea is one of two APAC economies to have moved up by two positions between CRI 2018 and CRI 2020. Its most notable improvements were in privacy, cybersecurity, and intellectual property, while its most pronounced tumble was in data centre risk. Its highest score is in regulatory environment, and its lowest score is in international connectivity. Overall, the Cloud Governance segment is its strongest, and Cloud Security is its weakest.

South Korea's upward trajectory may reflect the fact that it has long recognised the value of promoting and adopting cloud computing. The South Korean National Assembly passed the world's first Cloud Computing Act in March 2015, encouraging public institutions to prioritise the use of cloud to become more cost-effective, stay competitive, and improve operational efficiencies. However, the stringent requirements of the Korea Internet & Security Agency (KISA) certification – including physical network separation, data localisation, and local algorithm use have slowed the availability of cloud services.[97] To date, only five local CSPs have received the cloud security certification required to provide cloud services to the public sector, illustrating the challenging regulatory environment facing international CSPs.[98]

Thus, the challenge for South Korea today is less the shaping or implementation of a comprehensive cloud strategy, but rather its ability to overcome long-standing institutional obstacles. There is, for instance, the challenge of government agencies working in silos, which can lead to policies being launched with overlapping or contradictory objectives, or with uncoordinated approaches.

Recent Digital Economy Regulation/Legislation and ICT Developments

- In May 2020, the National Assembly passed a revision to the Information and Communication Network Act.[99]
- Amendments to the South Korean Personal Information Protection Act 2011 (PIPA) were promulgated on 4 Feb and will come into force in six months in Aug 2020.[100]
- In October 2019, the Digital Government Innovation Promotion Plan was announced to support and accelerate the national priority of AI- and cloud-driven digital transformation.[101]
- In June 2019, the Ministry of Trade, Industry and Energy (MOTIE) announced several AI-based industrial initiatives, including the construction of 2,000 AI-based factories by 2030.[102]
- In April 2019, the MSIT launched its 5G+ Strategy, targeting the completion of a nationwide 5G network and ecosystem of 5G-based industries and services by 2022.[103]
- In November 2018, the Ministry of Science and ICT (MSIT) consulted 12 CSPs and associated organisations to find ways to improve cloud adoption and competitiveness.[104]
- In May 2018, as part of the national I-Korea 4.0 plan, a new AI R&D Strategy was announced, bolstered by an investment of KRW2.2 trillion (USD1.81 billion).[105]
- In July 2018, the Korean government announced a pan-government investment of KRW42 billion (USD34.6 million) to accelerate AI-powered medical devices and systems.[106]

Recommendations

- South Korea must develop and implement a national AI strategy to not only align its various AI-focused initiatives, but also ensure they are truly effective.
- South Korea must continue to invest in and develop AI talent in order to sustain its government's envisioned trajectory in the Fourth Industrial Revolution.
- South Korea must not neglect the security fundamentals of its cloud services and data centres as it seeks to expand the use of cloud in the country.

Taiwan #4 (+1)

Climbs from CRI 2018's 5th ranking

Table 26: Taiwan – CRI 2020 Scores and Rankings

	CRI #01 Int'l Connectivity	CRI #02 Broadb. Quality	CRI #03 Power and Sust.	CRI #04 Data Cent. Risk	CRI #05 Cybersecurity	CRI #06 Privacy	CRI #07 Govt Reg. Env.	CRI #08 IP Protection	CRI #09 Biz Sophistication	CRI #10 Freedom of Info.	TOTAL Cloud Infrastructure	TOTAL Cloud Security	TOTAL Cloud Regulation	TOTAL Cloud Governance	TOTAL All
Score	6.8	6.6	5.1	7.3	8.7	8.3	9.8	7.1	8.1	7.5	18.4	15.9	25.2	15.6	**75.2**
Ranking	2	4	4	5	5	5	2	7	5	3	3	6	7	4	**4**

Since CRI 2018, Taiwan has moved up one position, from 5th to 4th. This is because it has performed relatively well in the Cloud Infrastructure and Cloud Governance segments, while at the same time progressing steadily in lowering data centre risk and safeguarding cybersecurity. The most noticeable improvement was made in two areas of the Cloud Regulation segment: privacy and government regulatory environment.

In late 2018, Taiwan became the seventh member of the Asia-Pacific Economic Cooperation Cross Border Privacy Rules (APEC CBPR) system. This entails that its regulatory framework has been recognised as meeting internationally accepted standards, and that the government has actively facilitated the international transfer of cross-border data and promoted the use of cloud technologies through the provision of an enabling regulatory environment.[107]

With government and research institutes' concerted efforts to attract international technology investment, Taiwan is well-placed to move up in the ranks in the next iteration of the CRI. To further improve its performance in Cloud Regulation, the government should strengthen intellectual property protection, especially in the area of digital patents and online piracy, as it lags behind Japan, Singapore, and South Korea in this area.[108]

Recent Digital Economy Regulation/Legislation and ICT Developments

- In November 2019, the National Information and Communication Security Taskforce (NICST) co-hosted a multinational cybersecurity exercise with the United States.[109]
- In October 2019, Taiwan unveiled a set of eight AI ethical guidelines to minimise the negative impact of transformative technology on society.[110]
- In July 2019, the Financial Supervisory Commission issued virtual banking licenses to three consortiums to promote the development of innovative financial services.[111]
- In April 2019, the Ministry of Economic Affairs (MOEA) partnered with AWS to launch a joint innovation centre for MSMEs and start-ups.[112]
- In December 2018, Taiwan was admitted to the APEC CBPR system joining the United States, Mexico, Canada, Japan, South Korea, and Singapore.[113]
- In December 2018, the state-owned National Center for High-performance Computing (NCHPC) announced the launch of an AI-based supercomputer in 2019.[114]

Recommendations

- Taiwan must strengthen IP protection for digital patents, tackle Internet piracy, and address shortcomings in the technology licensing regime to avoid restrictive or unfair competition.
- Taiwan must continue to boost international collaborations, promote public-private partnerships on technology R&D, and cultivate talent.
- Taiwan must formulate a long-term open data policy to ensure its datasets effectively meet users' needs, encourage citizen participation, and drive public innovation.

Thailand #9 (+1)

Climbs from CRI 2018's 10th ranking

Table 27: Thailand – CRI 2020 Scores and Rankings

	CRI #01 Int'l Connectivity	CRI #02 Broadb. Quality	CRI #03 Power and Sust.	CRI #04 Data Cent. Risk	CRI #05 Cybersecurity	CRI #06 Privacy	CRI #07 Govt Reg. Env.	CRI #08 IP Protection	CRI #09 Biz Sophistication	CRI #10 Freedom of Info.	TOTAL Cloud Infrastructure	TOTAL Cloud Security	TOTAL Cloud Regulation	TOTAL Cloud Governance	TOTAL All
Score	4.0	6.0	2.5	6.2	8.0	8.3	6.5	5.3	7.8	5.6	12.5	14.2	20.1	13.4	**60.2**
Ranking	5	8	13	9	9	5	13	13	8	9	8	10	11	8	**9**

Thailand is one of two APAC economies to have moved up by one position between CRI 2018 and CRI 2020. Its biggest improvement was in the international connectivity, data centre risk, and privacy parameters, while its biggest tumble was in the broadband quality and sustainable energy parameters. Overall, Cloud Infrastructure and Cloud Governance were its strongest segments, while Cloud Regulation was its weakest.

A robust and dynamic digital economy, Thailand is on the verge of 'leapfrogging' ahead of more mature economies, but is not quite there yet. A major challenge is its ability to develop laws and enforce regulations in a way that balances the protection of its national interests with the transparency, openness, and flexibility that digital business models need to thrive. Indeed, several recent controversial measures have concerned the business community, as it worries that provisions of the Cybersecurity Bill were designed to search and seize data and equipment in cases that are deemed issues of national emergency.[115]

Another factor that is holding back the growth and expansion of Thailand's domestic digital ecosystem is the fact that the growth of the digital economy may not be a straightforward or balanced process. For instance, small and local companies are smothered by tech giants who tend to hoard capital and manpower.[116] At the same time, digital advances seem to be a highly urbanised phenomenon; e-commerce, for instance, is severely hindered despite its dynamism. Logistical and infrastructural limitations make it difficult to securely and rapidly ship a package to rural and remote communities despite more people in these areas being able to make online payments and purchases.[117]

Recent Digital Economy Regulation/Legislation and ICT Developments

- In May 2020, Thailand announced it would give businesses another year to comply with the new personal data protection law, given the impact of the Covid-19 on business operations.[118] Thailand's Personal Data Protection Act (PDPA) became effective in Jun 2019, and originally gave organisations up to end 2020 to be fully compliant with key provisions of the law.[119]
- In November 2019, the DES Ministry announced the launch of the Anti-Fake News Centre, an AI-driven verification system trained to track and mitigate suspicious online news.[120]
- In November 2019, the Digital Economy and Society (DES) Ministry announced it had drafted Thailand's first artificial intelligence (AI) ethics guidelines.[121]
- In September 2019**,** the NBTC provided details on a 5G regulatory sandbox aimed at preparing the ground for wider 5G adoption in Thailand.[122]
- In April 2019, the Electronic Transaction Act and the Electronic Transaction Development Agency Act were enacted to regulate electronic transactions initiatives.[123]
- In October 2018, the 20-year National Strategy 2018-2036 came into effect to turn Thailand into a developed, digitally enabled nation.[124]

Recommendations

- Thailand must ensure its digital business environment is built to strengthen the local tech start-up ecosystem and not just to find the next tech unicorn.
- Thailand must ensure its laws and regulations effectively favour and support investment and innovation, avoiding any potential misuses in the name of national security.
- Thailand must holistically cultivate innovation across all sectors, investing in MSMEs and focusing on up- and re-skilling initiatives that prepare the workforce of the future.

Vietnam #14 (-)

Retains CRI 2018's 14th ranking

Table 28: Vietnam – CRI 2020 Scores and Rankings

	CRI #01 Int'l Connectivity	CRI #02 Broadb. Quality	CRI #03 Power and Sust.	CRI #04 Data Cent. Risk	CRI #05 Cybersecurity	CRI #06 Privacy	CRI #07 Govt Reg. Env.	CRI #08 IP Protection	CRI #09 Biz Sophistication	CRI #10 Freedom of Info.	TOTAL Cloud Infrastructure	TOTAL Cloud Security	TOTAL Cloud Regulation	TOTAL Cloud Governance	TOTAL All
Score	2.9	4.6	2.5	5.6	6.9	2.2	7.1	5.0	6.8	2.5	10.0	12.6	14.4	9.3	**46.2**
Ranking	7	10	11	12	13	13	12	14	11	13	11	13	14	14	**14**

Coming in at 14th for the third consecutive iteration of the CRI, Vietnam is one of four APAC economies – along with China, Indonesia, and New Zealand – that have not shifted positions since CRI 2016. Vietnam has backtracked in the rankings for the international connectivity, data centre risk, regulatory environment, intellectual property protection, and business sophistication parameters. Meanwhile, it has climbed in the sustainable energy and cybersecurity parameters.

This is despite the Vietnamese government's commitment to developing its digital capacities in a participative and transparent manner. The Ministry of Information and Communications (MIC) and the State Bank of Vietnam (SBV), for example, have been very active in this regard, putting out draft policies and soliciting public comments from various stakeholders. A key challenge for Vietnam is the regulatory sprawl cutting across multiple disciplines and ministry silos, making it difficult to effectively coordinate the various plans and resources devoted to digital transformation in Vietnam.

Many digitisation efforts, such as Smart City plans being implemented by local governments in collaboration with the private sector, exist on a city-wide level. This can be conducive approach, to the extent that it engages new stakeholders as active participants. But in many cases, a lack of communication and collaboration between government levels leads to a counter-productive duplication of resources. Vietnam is attempting to mitigate this by releasing policies with clear implementation objectives, assigning specific tasks to specific bodies and ministries.

Recent Digital Economy Regulation/Legislation and ICT Developments

- In Apr 2020, Vietnam released a draft of the ICT Development Masterplan 2025-2030.[125]
- In January 2020, Vietnam released a draft of the Personal Data Protection Decree.[126]
- In November 2019, Vietnam's central bank released draft regulations around non-cash payments, proposing a regulatory framework for electronic payments/transfers.[127]
- Amongst other "Make In Vietnam" measures – which have accelerated in the wake of Covid-19 crisis – in Aug 2019, Gapo and Lotus – two local social media networks – were launched in line with the government's push for more homegrown digital content platforms,[128] and in May 2020, the MIC released a Vietnamese-programmed online meeting platform, Zavi.[129]
- In April 2019, the Draft Architecture Framework for e-Government of Vietnam (version 2.0) was released to enhance the quality of digital citizen services.[130]
- In January 2019, Vietnam's Cybersecurity Law (a.k.a. Decree 72) came into effect, comprising controversial elements that have drawn criticism.[131] Further amendments, additions, and adjustments were proposed on Apr 2020.[132]
- In December 2018, the Ministry of Science and Technology (MST) announced an investment of USD1.5 million on AI research, infrastructure, and labour-force capacitation.[133]
- In August 2018, the Sustainable Smart City Development Plan 2018-2025 was approved to develop Hanoi, Da Nang, Ho Chi Minh City, and Can Tho as model smart cities.[134]

Recommendations

- Vietnam must establish its cybersecurity agency as a coordinating body between government agencies, making it a driver of public- and private-sector cloud adoption.
- Vietnam must seize the 'leapfrogging' opportunities that 5G, IoT, and AI represent; this entails developing national policies for these technologies, with a focus on workforce capacitation.
- Vietnam must invest in stronger safeguards and/or alternative plans for subsea connectivity, as its current track record of cable damage hinders nationwide digitisation efforts.

Appendix: Methodology and Data Sources

Research was done on the Cloud Readiness Index 2020 during 2019. The 10 parameters are sourced from publicly-available sources, which have been referenced. Below are some added details on data aggregation and normalisation.

a) Normalisation

The indicators used have different units and scales. Any indicator that does not use a 10-point scale is normalised to make the indicator values comparable, as well as to construct aggregate scores for each economy. For example, indicators such as the Global Cybersecurity Index already use a percentage (100-point) scale, so these did not need to be normalised, and were simply adjusted to fit a 10-point scale. Indicators not based on a 100-point scale were systematically normalised. The Intellectual Property Protection measure, for instance, was normalised from a 7-point to a 10-point scale.

b) Minimum-Maximum Method

Some numerical indicators require more complex normalisation. Internet speed indicators, for instance, are measured in absolute values with no minimum or maximum value limitations. Where applicable, absolute values were transformed into natural logarithmic values. Minimum and maximum values were then set to transform the logarithmic values into scores comprised between 0 and 10. The following formula was used wherever necessary:

$$Normalised\ value = \left(\frac{actual\ value - minimum\ value}{maximum\ value - minimum\ value}\right) \times 10$$

c) Treatment of Missing Values

Where indicated, some figures were missing values for certain economies. In order to avoid incomplete databases that may skew the results, it was decided to recreate the missing values using a clustering technique to group APAC economies according to the World Bank's income classification groups.[135]

The World Bank's income classification groups APAC economies as follows:

- High-income economies (GDP per capita of USD12,746 or more): Australia, Japan, New Zealand, Singapore, and South Korea.
- Upper-middle-income economies (GDP per capita of USD4,126 to USD12,745): China, Malaysia, and Thailand.
- Lower-middle-income economies (GDP per capita of USD1,046 to USD4,125): Indonesia and India.

The average of the data for each income group was calculated to estimate the missing values. For example, to estimate the missing value for Hong Kong, an average of the normalised data for Australia, Japan, New Zealand, Singapore, and South Korea (high-income economies) was used.

d) CRI Parameter #04 – Data Centre Risk

The TRPC Data Centre Security Index (DCSI) is a composite statistical measure of the different risks that can impact data centres' activities. Comprising 32 indicators, the DCSI provides a snapshot of data centres' exposure to elements that can threaten their integrity, disrupt their activities, and jeopardise their reputation when they operate in a given location. The indicators are grouped under six major types of risk – Infrastructure Risk, Energy Risk, Natural Risk, Business Risk, Political Risk, and Legal Risk – providing a holistic assessment of an economy's risk profile.

The table below indicates the sources and methodologies that allowed TRPC to calculate the DCSI.

Table 29: TRPC Data Centre Risk – Data Sources, Definitions, and Methodologies

Indicator	Definition / Description	Source
Quality of Roads	Measures the quality (extensiveness and condition) of road infrastructure.	World Economic Forum, Global Competitiveness Report – EOSQ057 indicator
Efficiency of Train Services	Measures the efficiency (i.e., frequency, punctuality, speed, price) of train transport services.	World Economic Forum, Global Competitiveness Report – EOSQ485 indicator
Airport Connectivity	Measures the degree of integration of a country within the global air transport network.	World Economic Forum, Global Competitiveness Report – IATACONNECTIDX indicator
Efficiency of Seaport Services	Measures the efficiency (i.e., frequency, punctuality, speed, price) of seaport services (ferries, boats).	World Economic Forum, Global Competitiveness Report – EOSQ487 indicator
Secure Internet Servers	Measures the number of distinct, publicly trusted TLS/SSL certificates found in the Netcraft Secure Server Survey.	World Bank, Indicator Database – IT.NET.SECR.P6 indicator
Electrification Rate	Measures the share of the population with access to electricity.	World Economic Forum, Global Competitiveness Report – ELECRATE indicator
Quality of Electricity Supply	Measures the reliability of the electricity supply (lack of interruptions and lack of voltage fluctuations).	World Bank, TCdata360 database – indicator 548
Renewables in Electricity Production	Measures the ratio between the electricity production from renewable energies (hydro, wind, geothermal, and solar) and the total electricity production.	Enerdata, Global Energy Statistical Yearbook 2019
Reliability of Water Supply	Measures the reliability of the water supply (lack of interruptions and flow fluctuations).	World Economic Forum, Global Competitiveness Report – EOSQ488 indicator
Physical Exposure to Earthquakes	Measures the absolute and relative exposure to MMI VI and VIII category earthquakes.	INFORM, Global Risk Index 2018
Physical Exposure to Floods	Measures the absolute and relative exposure to floods.	INFORM, Global Risk Index 2018
Physical Exposure to Tsunamis	Measures the absolute and relative exposure to tsunamis.	INFORM, Global Risk Index 2018
Physical Exposure to Tropical Cyclones	Measures the absolute and relative exposure to tropical cyclones and storm surges.	INFORM, Global Risk Index 2018
Population Affected by Natural Disasters	Measures the share of the total population affected by natural disasters in the last 3 years.	INFORM, Global Risk Index 2018
Tax Attractiveness	Measures the attractiveness of a country's tax environment.	LMUTax, Tax Attractiveness Index – Overall score
Ease of Paying Taxes	Measures the taxes and mandatory contributions that a medium-sized company must pay in a given year, as well as measures of the administrative burden of paying taxes and complying with procedures.	World Bank, Ease of Doing Business Index 2019
Ease of Enforcing Contracts	Measures the time and cost for resolving a commercial dispute through a local first-instance court, and the degree to which good practices are adopted to promote quality and efficiency in the court system.	World Bank, Ease of Doing Business Index 2019
Soundness of Banks	Measures the soundness of banks (banks are generally healthy with sound balance sheets).	World Economic Forum, Global Competitiveness Report – EOSQ087 indicator
Ease of Starting a Business	Measures all procedures officially required for an entrepreneur to start and operate an industrial or commercial business.	World Bank, Ease of Doing Business Index 2019
Ease of Getting Credit	Measures the legal rights of borrowers and lenders with respect to secured transactions through one set of indicators and the reporting of credit information through another.	World Bank, Ease of Doing Business Index 2019
Terrorism Incidence	Measures the number of terrorism-related casualties (injuries and fatalities) and the number of terrorist attacks.	World Economic Forum, Global Competitiveness Report – TERRORISMINCIDENCEIDXGCI4 indicator
Absence of Corruption	Measures the absence of corruption in government (three forms of corruption: bribery, improper influence by public or private interests, and misappropriation of public funds or other resources).	World Justice Project (WJP), Rule of Law Index 2019
Order & Security	Measures how well a society ensures the security of persons and property.	World Justice Project (WJP), Rule of Law Index 2019
Social Safety and Security	Measures the level of harmony or discord within a nation (low crime rates, minimal terrorist activity, low violent demonstrations, harmonious relations with neighbouring countries, and a stable political scene).	Institute for Economics and Peace (IEP), Global Peace Index 2019
Militarisation	Measures the link between a country's level of military build-up and access to weapons and its level of peacefulness, both domestically and internationally.	Institute for Economics and Peace (IEP), Global Peace Index 2019
Property Rights	Measures the extent to which property rights, including financial assets, are protected.	World Economic Forum, Global Competitiveness Report – EOSQ051 indicator
Judicial Independence	Measures the independence of the judicial system from influences of the government, individuals, or companies.	World Economic Forum, Global Competitiveness Report – EOSQ144 indicator
Efficiency of Legal Framework in Settling Disputes	Measures the efficiency of the legal and judicial systems for companies in settling disputes.	World Economic Forum, Global Competitiveness Report – EOSQ040 indicator
Intellectual Property Protection	Measures the extent to which intellectual property is protected.	World Economic Forum, Global Competitiveness Report – EOSQ052 indicator
Quality of Land Administration	Measures five dimensions of land administration: reliability of infrastructure, transparency of information, geographic coverage, land dispute resolution, and equal access to property rights.	World Economic Forum, Global Competitiveness Report – DBREGPROPADMINQUAL indicator
Strength of Auditing and Reporting Standards	Measures the strength of financial auditing and reporting standards.	World Economic Forum, Global Competitiveness Report – EOSQ097 indicator
Conflict of Interest Regulation	Measures the protection of shareholders against directors' misuse of corporate assets for personal gain.	World Economic Forum, Global Competitiveness Report – CONFINTREG indicator

Source: TRPC, https://trpc.biz/the-trpc-data-center-security-index-2020

e) CRI Parameter #06 – Privacy

TRPC's Data Protection Index 2020 uses the ASEAN Framework on Data Protection 2016[cxxxvi] to assess the level of data protection across various economies. This is the first index to use the ASEAN Framework on Data Protection as a best practice guideline, where the assessment of a positive data protection policy posture by a country would be one which promotes the free flow of data across borders.

The TRPC Data Protection Index comprises a total of 12 questions. It starts with questions establishing the existence of a data protection law and a Privacy Enforcement Authority (PEA), and follows with questions that organise around the seven principles in the ASEAN Framework on Data Protection. These principles have been operationalised into questions and scored accordingly. The assessment questions then conclude with two final questions on whether the economy is a participant in the EU GDPR or the APEC CBPR, or a similar regional framework.

The table below provides detailed information on the questions, assessment criteria, and scoring mechanisms.

Table 30: TRPC Data Protection Index – Assessment Criteria and Scoring Mechanisms

Questions (Scored 0-6)	ASEAN Principle
Q1 Does the economy have a personal data protection law? Yes – 6 No, but in draft form – 4 No, but some principles are established in policies and guidelines or other laws (e.g. Constitution, Cybersecurity law, etc.) – 2 No – 0	
Q2 Does the economy have a Privacy Enforcement Authority (PEA)? Yes, a national PEA – 6 No, but has sectoral regulator which enforces privacy (amongst other regulatory requirements) within the industrial sector – 2 No – 0	
Q3 Does the personal data protection law require that organisations obtain consent from individuals, and notify them of the purposes of collection, use, and disclosure of their personal information by the organisation? Yes, in the PDP law and universal – 6 Yes, in the PDP law, in some cases – 4 No, there is no PDP law, but this principle is protected or evident in other laws/sectoral regulations – 2 No, there is no PDP law, and there are no protections around this principle – 0	1. Consent, Notification and Purpose *(a) An organisation should not collect, use or disclose personal data about an individual unless:* *(i) the individual has been notified of and given consent to the purpose(s) of the collection, use or disclosure of his/her personal data; or* *(ii) the collection, use or disclosure without notification or consent is authorised or required under domestic laws and regulations.* *(b) An organisation may collect, use or disclose personal data about an individual only for purposes that a reasonable person would consider appropriate in the circumstances.*
Q4 Does the personal data protection law have clear instructions on exemption circumstances by which consent from individuals for the collection, use, and disclosure of their personal information, is NOT required? E.g. where collection of personal information is authorised or required under domestic laws and regulations? Yes, in the PDP law and universal – 6 Yes, in the PDP law, in some cases – 4 No, there is no PDP law, but this principle is protected or evident in other laws/sectoral regulations – 2 No, there is no PDP law, and there are no protections around this principle – 0	
Q5 Does the personal data protection law require organisations to ensure that personal data be accurate and complete for the extent necessary for the purpose(s) for which the personal data is to be used or disclosed? Yes, in the PDP law and universal – 6 Yes, in the PDP law, in some cases – 4 No, there is no PDP law, but this principle is protected or evident in other laws/sectoral regulations – 2 No, there is no PDP law, and there are no protections around this principle – 0	2. Accuracy of Personal Data *The personal data should be accurate and complete to the extent necessary for the purpose(s) for which the personal data is to be used or disclosed.*
Q6 Does the personal data protection law require that personal data be appropriately protected against loss and unauthorised access, collection, use, disclosure, copying, modification, destruction or similar risks? Yes, in the PDP law and universal – 6 Yes, in the PDP law, in some cases – 4 No, there is no PDP law, but this principle is protected or evident in other laws/sectoral regulations – 2 No, there is no PDP law, and there are no protections around this principle – 0	3. Security Safeguards *The personal data should be appropriately protected against loss and unauthorised access, collection, use, disclosure, copying, modification, destruction or similar risks.*

Q7 Does the personal data protection law require organisations to, upon request from individuals, provide the individual access to his/her personal data which is in the possession or under the control of the organisation within a reasonable period of time, and correct an error or omission in his personal data, unless domestic laws and regulations require or authorise the organisation not to provide access or correct the personal data in the particular circumstances? Yes, in the PDP law and universal – 6 Yes, in the PDP law, in some cases – 4 No, there is no PDP law, but this principle is protected or evident in other laws/sectoral regulations – 2 No, there is no PDP law, and there are no protections around this principle – 0	4. Access and Correction *Upon request by an individual, an organisation should: (i) provide the individual access to his/her personal data which is in the possession or under the control of the organisation within a reasonable period of time; and (ii) correct an error or omission in his personal data, unless domestic laws and regulations require or authorise the organisation not to provide access or correct the personal data in the particular circumstances.*
Q8 Does the law require that, before transferring personal data to another country or territory, the organisation should obtain the consent of the individual for the overseas transfer? Yes, in the PDP law and universal – 6 Yes, in the PDP law, in some cases – 4 No, there is no PDP law, but this principle is protected or evident in other laws/sectoral regulations – 2 No, there is no PDP law, and there are no protections around this principle – 0	5. Transfers to Another Country or Territory *Before transferring personal data to another country or territory, the organisation should either obtain the consent of the individual for the overseas transfer or take reasonable steps to ensure that the receiving organisation will protect the personal data consistently with these Principles.*
Q9 Does the personal data protection law require that an organisation cease to retain documents containing personal data, or remove the means by which the personal data can be associated with particular individuals as soon as it is reasonable to assume that the retention is no longer necessary for legal or business purposes, or after a certain period of time (e.g. 5 years)? Yes, in the PDP law and universal – 6 Yes, in the PDP law, in some cases – 4 No, there is no PDP law, but this principle is protected or evident in other laws/sectoral regulations – 2 No, there is no PDP law, and there are no protections around this principle – 0	6. Retention *An organisation should cease to retain documents containing personal data, or remove the means by which the personal data can be associated with particular individuals as soon as it is reasonable to assume that the retention is no longer necessary for legal or business purposes.*
Q10 Does the personal data protection law require an organisation to, on request, provide clear and easily accessible information, such as how to contact the organisation, about its data protection policies and practices with respect to personal data in its possession or under its control? Yes, in the PDP law and universal – 6 Yes, in the PDP law, in some cases – 4 No, there is no PDP law, but this principle is protected or evident in other laws/sectoral regulations – 2 No, there is no PDP law, and there are no protections around this principle – 0	7. Accountability *An organisation should be accountable for complying with measures which give effect to the Principles. (i) An organisation should, on request, provide clear and easily accessible information about its data protection policies and practices with respect to personal data in its possession or under its control. An organisation should also make available information on how to contact the organisation about its data protection policies and practices.*
Q11 Is the economy a participant of the EU's GDPR regime, or meets GDPR adequacy requirements? Yes – 6 No, but has adequacy agreement – 4 No, but is in talks for adequacy decision – 2 No – 0	
Q12 Is the economy a participant of the APEC CBPR or similar regional system (promoting an accountability rather than an adequacy system? Yes – 6 No, but has applied – 2 No – 0	

Source: TRPC, https://trpc.biz/the-trpc-data-protection-index-2020

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The ACCA is a leading industry association comprising the stakeholders of the cloud computing ecosystem in Asia. The ACCA works to ensure that the interests of the cloud computing community are effectively represented in the public policy debate.

Our primary mission is to accelerate the growth of the cloud market in Asia, where we promote the growth and development of cloud computing in Asia Pacific through dialogue, training, and public education.

Through regular meetings, we also provide a platform for members to discuss implementation and growth strategies, share ideas, and establish policies and best practices relating to the cloud computing ecosystem.

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