

Research:



Modeling an Inclusive Digital Future

Country Digital Readiness: Research to Determine a Country's Digital Readiness and Key Interventions

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Introduction

We live in a world where technological advancement is a constant. The recent pace of technological advancement is unprecedented. In fact, it is predicted that by 2020, 1 million new devices will come online every hour.¹ The impact of the Internet of Things (IoT) and digitization is ubiquitous—it is being felt almost everywhere. The European Commission cites that in the near future 90% of jobs—in careers such as engineering, accountancy, nursing, medicine, art, architecture, and many more—will require some level of digital skills.² Technology can transform businesses and lives and drive global innovation. Digitization will enable countries to maintain global competitiveness, increase GDP, foster innovation, and create new jobs. Due to the pace and constant advancements in technology, how do countries compete? How do individuals and countries continue to thrive in this ever-changing digital world? How can educators best prepare the future workforce to take advantage of the rapid pace of technological change?

“Given the pace of technological change, we believe it’s important to understand and anticipate what this means for youth and society more broadly, so that everyone has an opportunity to participate in our increasingly digital economy and interconnected world.

By coming up with a common language and holistic model to measure a region’s digital readiness, we hope to better understand how we, and others, can support learners, workers, and entrepreneurs, but also help shape entirely new ideas and industries to fuel the digital economy and create the jobs of the future.”

— Tae Yoo, SVP, Cisco Corporate Affairs/Corporate Social Responsibility

We believe Cisco has a role to play. Cisco hopes to partner to drive an inclusive digital economy. To do so, we believe in conducting research to gain a better understanding of what it means to be digitally ready, along with what activities or investments could help countries move up in their digital journey. These insights enable us to make strategic investments that help countries meet industry demand for a digitally skilled workforce, while also helping shape entirely new ideas and industries to fuel the digital economy and create the jobs of the future. We use these insights to ensure the relevance of our key investments, such as our Cisco Networking Academy program. Every year, the Cisco Networking Academy teaches over one

¹ [Gartner, 2015](#)

² European Commission, 2016

million students worldwide. The Cisco Networking Academy provides individuals with foundational digital and entrepreneurial skills that improve their career prospects and help fill global demand for technology professionals. In addition, our Critical Human Needs portfolio focuses on reducing food insecurity and increasing access to affordable housing, clean drinking water, and sanitation. We invest in non-profit and non-governmental organizations that are using technology-based interventions to improve the speed, efficiency, and effectiveness of humanitarian relief, and provide support for disasters. Some of our partners in this space include Mercy Corps, NetHope, Water For People, Akvo, Feeding America, and World Food Programme.

Methodology

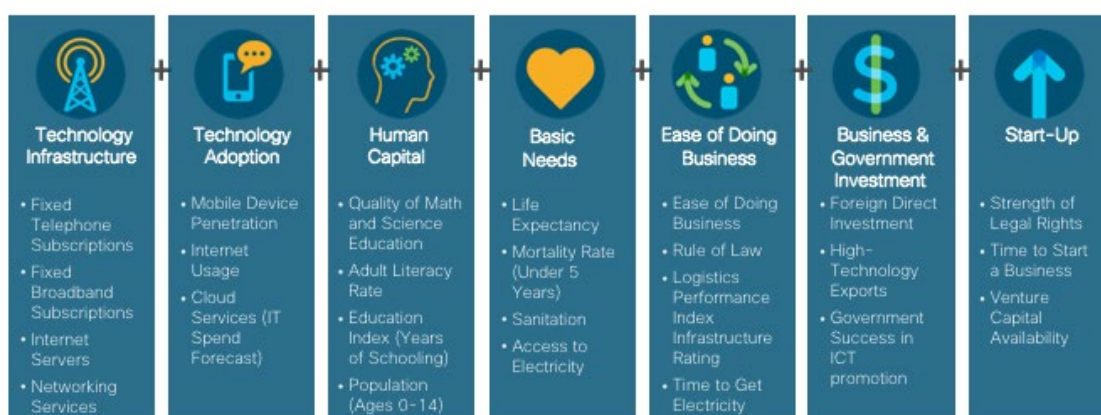
To build our understanding of the components and interventions needed for digital readiness, we developed a framework and model with Gartner Inc., to define digital readiness, measure countries' digital readiness, and discover key interventions that can help countries move up in their digital readiness journey. This model also can apply to regional and state levels using corresponding metrics. Although technology is critical and foundational for digital readiness, we chose a holistic model for measuring a country's digital readiness (see Figure 1). Many indices of network or technology readiness have focused on technology measures. However, there are many other factors that can indicate a country's level of digital readiness, including the availability of skilled labor to help deploy and maintain technology. Without enough skilled workers, countries are not able to take advantage of what new technologies can bring. For this study, digital readiness was defined using a holistic model based on seven components, including technology aspects such as technology infrastructure and technology adoption, but also measures of ease of doing business, human capital development, business and government investment, basic human needs, and the start-up environment.

In order to have comparable scores for each country, using standardized data points that were available for every country was essential. Using the seven components, each country was scored based on standardized data-points from reputable data sources, such as the World Bank, the World Economic Forum, Gartner, and the United Nations (see Appendix A for details) and summed to create a total digital readiness score.

Figure 1. Country Digital Readiness Components.

Calculating a Country's Score

How It Adds Up – Criteria for the Components



= **A Country's Digital Readiness Score**
 (Ranged from 5.9 – 20.1 on a scale of 0 to 25)

To understand the available infrastructure that enables digital activities, factors such as fixed telephone subscriptions, Internet servers, fixed broadband subscriptions, networking services, and IT spend forecasts were applied. Infrastructure is the foundation for digital connections and activities. Without the right level of infrastructure, countries are not able to advance in their digital journey. For technology adoption, the general demand for digital products and services was assessed by including factors such as mobile device penetration, actual Internet usage, and IT spend forecasts for services including cloud services. The amount of technology demand, utilization, and adoption reflects a country's current level of digital readiness.

The best infrastructure provides little value if a population cannot take advantage of it. Consider a community living in poverty where a major portion of the population is struggling to make ends meet. This overwhelming focus on survival makes it challenging for people to take advantage of the benefits of digitization. To measure the ability of people to thrive, we assessed factors like life expectancy, the mortality rate of children under five years of age, sanitation conditions, and access to electricity. To thrive in a digital economy, people must have their basic human needs met—access to clean water, food, and shelter.

Along with basic human needs, a skilled workforce is critical for a country's success in the digital world. Without enough skilled talent, a country's ability to grow in digital readiness is slowed, and the ability to take advantage of digital connections stagnates. In fact, of all the challenges facing decision makers, one consistently stands out: skills gaps. Sixty-eight percent of global IT decision makers say their teams face a shortage of the necessary skills to be successful. That percentage is 71% in the U.S. and Canada. Of those decision-makers who report not currently experiencing skills gap challenges, almost all believe they will face that critical challenge over the next two years..³

In addition, 77% of CEOs globally say that availability of key skills is a threat to their organizations' growth prospects..⁴ Many factors that demonstrate an appropriately skilled labor force that is available to support digital innovation were included in the digital readiness score. Among these factors are: total labor force, youth population, adult literacy rate, education index (i.e., years of schooling), and the prospective population of the future workforce (ages 0 to 14). In order for countries to embrace the opportunities this digital transformation can bring, they need people with the right technology skills.

For countries and individuals to thrive, it is also important that businesses thrive. One key characteristic of the digital revolution is that it is fueled by a different innovation, based on digital technologies and new business models..⁵ Ease of doing business in a country is one factor to understand the possible success and growth potential of new businesses and new jobs. To measure ease of doing business, indicators were included such as: local rule of law, the Logistics Performance Index (LPI) infrastructure rating, and even the time it takes to obtain electricity.

Building out infrastructure and providing digital services requires investment. Businesses and government have a key role to play. To measure business and government investments, we considered different sources of private and public investment in innovation and technology, including foreign direct investment, high-technology exports, and government success in information and communications technology (ICT) promotion.

In today's global market, a particularly important source of innovation comes from start-ups. Through start-ups, individuals or small groups are able to develop and prove out innovative ideas. Start-ups typically have the agility to adjust more quickly to rapidly changing market conditions. In addition, it has been found that most net new jobs come from small to medium businesses⁶. Many small businesses are adopting new technologies at both greater speed and lower cost, which yields a competitive advantage. These companies are also attracting top

³ [Global Knowledge, 2017](#)

⁴ [PricewaterhouseCoopers, 2017](#)

⁵ [WEF, 2016](#)

⁶ [Kaufman, 2015](#)

talent due to their entrepreneurial mindset and new definition of work.⁷ Because of this, start-ups are a crucial source of job creation and innovation. To assess a country's start-up environment, we included factors such as: the time it takes to start a business, the strength of legal rights, and the availability of venture capital.

Statistically, not all components equally reflected a country's total digital readiness. For instance, it was found that—in addition to the technology components of technology infrastructure and technology adoption—basic human needs, human capital, and the ease of doing business were strong indicators of digital readiness. Moving the needle on these scores can have a larger impact on a country's level of digital readiness than others. The start-up environment and business and government investments were found to be important components of digital readiness, but were less strongly correlated to the overall digital readiness score (see Appendix C for details). Improvements in technology infrastructure, technology adoption, basic human needs, ease of doing business, and human capital development can have substantial impact on a country's digital readiness score.

Each country was scored based on standardized data points reflecting the seven components from reputable sources. Measures that reflected each component were standardized and summed to develop a total digital readiness score. Scores could range from 0 to 25. A total of 118 countries were assessed and countries with populations less than three million and those with international sanctions were not included in the evaluation. Overall digital readiness scores range between 5.9 and 20.1. No country obtained a perfect score.

Key Findings

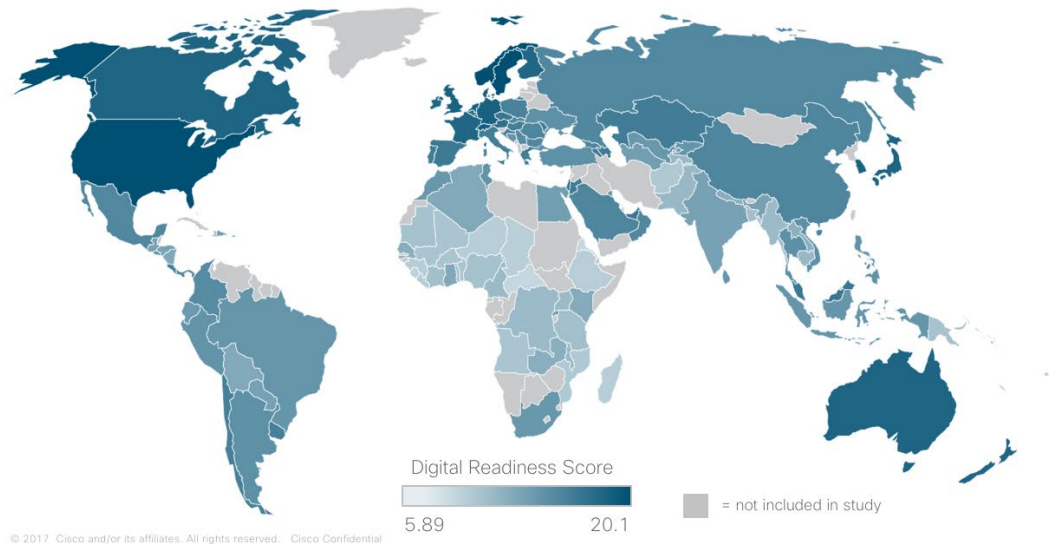
Digital readiness scores broadly mirror developed and emerging economies. The global average for digital readiness is 11.96. Countries with the highest digital readiness scores include the United States, countries in Western and Northern Europe, such as the United Kingdom, France, Germany, Switzerland, and the Netherlands, and those in Asia, such as Australia, Japan, and Singapore. Countries with the lowest digital readiness scores are primarily in Africa, such as Liberia, Nigeria, and Chad, and some in Asia, such as Cambodia. Countries in the middle stage of digital readiness were primarily in Latin America, such as Uruguay, Brazil, Chile, Mexico and Argentina, and Eastern Europe, such as Poland and Hungary. Some Asia countries also scored in the middle range of digital readiness, including Thailand and the Philippines. For each country's digital readiness score see Appendix B.

⁷ [Simon, 2018](#)

Figure 2. Global Digital Readiness Scores.

Full Spectrum of Digital Readiness

Scores Broadly Mirror Developed and Emerging Economies



Past studies have found a relationship between ICT or network readiness and a country's GDP. For instance, the Inter-America Development Bank (IDB) found that a 10% increase in broadband penetration in Latin America was associated with a 3.19% increase in GDP and a 2.61% increase in productivity.⁸ Also, the impact of ICT use on economic growth across 159 countries between 2000 and 2009 was assessed globally and results indicated that there is a positive relationship between the growth rate of real GDP per capita and ICT (as measured by the number of Internet users, fixed broadband Internet subscribers, and the number of mobile subscriptions per 100 people).⁹ In this study, it was found that a country's level of digital readiness was correlated with a country's GDP per capita, demonstrating the economic value of digital readiness.

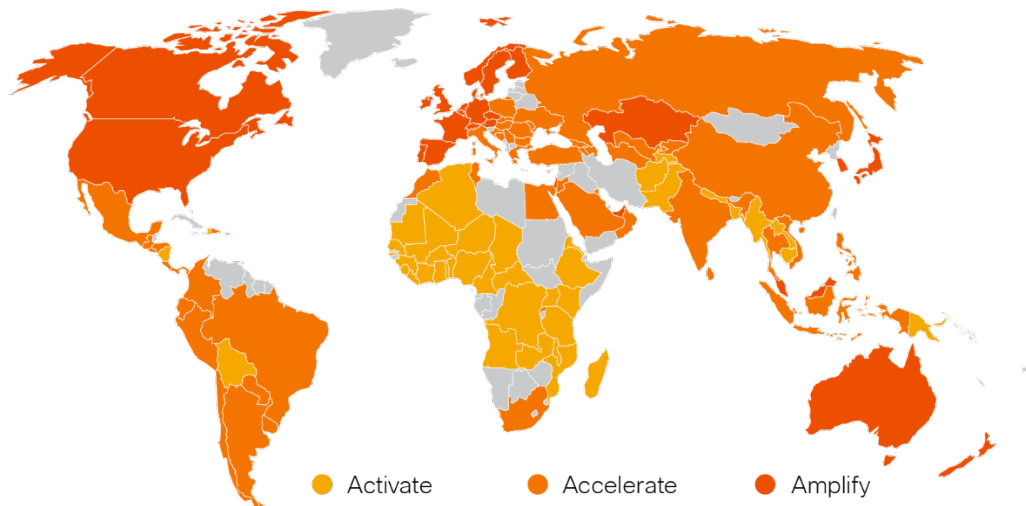
Using a data-driven approach, three stages of digital readiness emerged in our study: **Activate** (the lowest stage of digital readiness), **Accelerate** (countries in the middle stage) and **Amplify** (those in the highest stage of digital readiness). Countries in the Activate stage are just starting out in their digital journey and include many countries from Africa and some from the Middle East and Asia. Some are on the cusp of moving up to the middle stage of digital readiness, such as Algeria and Nicaragua. Countries in the Accelerate stage of digital readiness scored in the middle range with some component scores having room for improvement. Countries in this middle stage include many from Latin America, Eastern Europe, and some in Asia. Some are on the cusp of moving up to the highest stage of digital readiness. Examples include Hungary, Poland, Uruguay, and China. Countries at the highest stage of digital readiness include the United States, many countries in Western Europe, and some in Asia, such as Singapore, Japan, and Australia. Subsequent research studies have shown that in the United States and Australia not all states and territories are at the highest stage of digital readiness.

In this study, it was found that a country's level of digital readiness was correlated with a country's GDP per capita, demonstrating the economic value of digital readiness.

⁸ [Inter-American Development Bank \(IDB\), 2012](#)

⁹ [Farhadi, Ismail, and Fooladi, 2012](#)

Figure 3. Stages of Digital Readiness.



Digital readiness scores for those countries in the highest stage of digital readiness (Amplify) averaged 16.83. Those in the middle stage of digital readiness (Accelerate) averaged 12.49, and those in the lowest stage of digital readiness (Activate) averaged 8.10.

This study revealed that different targeted activities, investments, and interventions are needed depending on a country's stage of digital readiness. It was found that countries beginning their digital journey (*the Activate stage*) would primarily benefit from interventions focused on improvements in basic human needs and human capital development, especially growing foundational IT knowledge. Countries in the middle stage (*the Accelerate stage*) would most benefit from human capital development, basic human needs improvements, and advancements in the ease of doing business in that country. Accelerate countries can maximize the positive impact of digitization on economic growth by proactively increasing the ease with which businesses can operate, and by focusing on human capital investments and improvements in basic human needs. Countries in the highest stage (*the Amplify stage*) of digital readiness would most benefit from human capital development, especially a focus on specialized, emerging technology skills. It was found that many countries could benefit from improvements in technology infrastructure and adoption. Only eleven countries scored in the higher range (above a 2.0) for technology infrastructure. One country, the United States, stood out in terms of the technology adoption scores, with many countries scoring in the mid to lower range. A key finding of this study is that human capital development is critical across every stage of digital readiness. Whereas digitization can accelerate and differentiate a country's ability to progress, lack of adequate digital skills can limit its potential to digitize and grow economically.

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Figure 4. Investments Required by Digital Readiness Stage.



Conclusion

As this research has shown, technology alone is not the answer—developing skills, ensuring basic human needs, creating a business-friendly and start-up environment, and business and government investments will aid countries in their digital future.

We are working toward empowering global problem solvers who embody both the technology and human skills needed to be successful. We believe that global problem solvers—individuals who innovate as technologists, think as entrepreneurs, and act as social change agents—will be key to fueling an inclusive digital economy. Using this research, we can better design our programs and investments to develop and support global problem solvers who apply digital solutions to address social problems and foster economic development, which can help achieve our goal to positively impact 1 billion people by 2025.

Though we do not fully know what the future holds, if we empower people to become global problem solvers and prepare them with the right skills, we can help them participate in the global economy and create economic opportunity for all.

Appendix A

Digital Readiness Measures, Definitions, and Sources

Digital Readiness Components:	Definition	Indicator	Source
Technology Adoption	Demand for digital products / services	Mobile Device Penetration	World Bank (2015)
		Internet Usage	World Bank (2015)
		Cloud Services (Spend, IT Forecast Data)	Gartner (2016)
Start-up Environment	Environment which fosters innovation within a community	Strength of Legal Rights	World Bank (2016)
		Time to Start a Business	World Bank (2016)
		Venture Capital Availability	NRI/WEF (2013)
Human Capital	Skilled labor force available to support digital innovation (build and maintain)	Quality of Math & Science Education	NRI/WEF (2013)
		Adult Literacy Rate	World Bank (2016)
		Education Index (Years of School)	UN Development Program (2013)
		Population (0-14)	World Bank (2015)
Technology Infrastructure	The infrastructure available to enable digital activities and connected consumers (IoT, Cloud)	Fixed Telephone Subscriptions	World Bank (2015)
		Fixed Broadband Subscriptions	World Bank (2015)
		Secure Internet Servers	World Bank (2015)
		Networking Services (Spend, IT Forecast Data)	Gartner (2016)
Business & Government Investment	Private and public investment in innovation and technology	Foreign Direct Investment	World Bank (2015)
		High-Technology Exports	World Bank (2015)
		Government Success in ICT Promotion	NRI/WEF (2013)
Ease of Doing Business	Basic infrastructure / policies needed to support business continuity	Ease of Doing Business	World Bank (2016)
		Rule of Law	World Justice Project (2016)
		Logistics Performance Index (LPI) – Infrastructure Rating	World Bank (2016)
		Time to Get Electricity	World Bank (2016)
Basic Needs	Basic human needs for a population to thrive	Life Expectancy	World Bank (2014)
		Mortality Rate (Under Age 5)	World Bank (2015)
		Improved Sanitation Facilities	World Bank (2015)
		Access to electricity	World Bank (2012)

Appendix B

Country Digital Readiness Scores and Stages

Country	Score	Category	Country	Score	Category
Afghanistan	7.32	Activate	Lao PDR	9.48	Activate
Algeria	10.18	Activate	Liberia	6.72	Activate
Angola	7.65	Activate	Madagascar	6.72	Activate
Argentina	12.53	Accelerate	Malawi	8.37	Activate
Armenia	12.67	Accelerate	Malaysia	15.19	Amplify
Australia	17.34	Amplify	Mali	7.62	Activate
Austria	16.43	Amplify	Mauritania	7.88	Activate
Azerbaijan	12.77	Accelerate	Mexico	13.11	Accelerate
Bangladesh	8.01	Activate	Moldova	12.62	Accelerate
Belgium	16.31	Amplify	Morocco	11.50	Accelerate
Benin	7.61	Activate	Mozambique	7.19	Activate
Bolivia	9.88	Activate	Myanmar	8.41	Activate
Bosnia and Herzegovina	12.18	Accelerate	Nepal	9.61	Activate
Brazil	11.80	Accelerate	Netherlands	17.89	Amplify
Bulgaria	13.23	Accelerate	New Zealand	16.90	Amplify
Burkina Faso	7.20	Activate	Nicaragua	10.03	Activate
Cambodia	8.60	Activate	Niger	6.82	Activate
Cameroon	8.57	Activate	Nigeria	7.91	Activate
Canada	17.11	Amplify	Norway	17.38	Amplify
Central African Republic	5.89	Activate	Oman	13.10	Accelerate
Chad	6.85	Activate	Pakistan	8.58	Activate
Chile	13.92	Accelerate	Panama	13.41	Accelerate
China	13.64	Accelerate	Papua New Guinea	7.80	Activate
Colombia	12.88	Accelerate	Paraguay	10.74	Accelerate
Congo, Dem. Rep.	8.43	Activate	Peru	11.97	Accelerate
Costa Rica	13.89	Accelerate	Philippines	12.15	Accelerate
Cote d'Ivoire	8.30	Activate	Poland	13.89	Accelerate
Croatia	14.09	Accelerate	Portugal	14.54	Amplify
Czech Republic	15.14	Amplify	Puerto Rico	12.95	Accelerate
Denmark	17.27	Amplify	Romania	13.34	Accelerate
Dominican Republic	10.93	Accelerate	Russian Federation	13.13	Accelerate
Ecuador	11.33	Accelerate	Rwanda	10.96	Accelerate
Egypt, Arab Rep.	10.83	Accelerate	Saudi Arabia	13.35	Accelerate
El Salvador	11.57	Accelerate	Senegal	9.55	Activate
Eritrea	6.62	Activate	Serbia	12.94	Accelerate
Ethiopia	7.01	Activate	Sierra Leone	6.40	Activate
Finland	17.01	Amplify	Singapore	18.30	Amplify
France	16.98	Amplify	Slovak Republic	14.29	Accelerate

Georgia	13.39	Accelerate		South Africa	11.50	Accelerate
Germany	17.68	Amplify		Spain	14.91	Amplify
Ghana	9.97	Activate		Sri Lanka	11.56	Accelerate
Greece	14.06	Accelerate		Sweden	17.58	Amplify
Guatemala	10.80	Accelerate		Switzerland	18.42	Amplify
Guinea	6.91	Activate		Tajikistan	8.61	Activate
Haiti	7.49	Activate		Tanzania	8.26	Activate
Honduras	10.58	Accelerate		Thailand	12.53	Accelerate
Hungary	14.29	Accelerate		Togo	7.89	Activate
India	10.54	Accelerate		Tunisia	12.05	Accelerate
Indonesia	11.73	Accelerate		Turkey	12.58	Accelerate
Ireland	17.00	Amplify		Turkmenistan	11.02	Accelerate
Israel	15.73	Amplify		Uganda	8.43	Activate
Italy	14.11	Accelerate		Ukraine	12.36	Accelerate
Japan	17.33	Amplify		United Arab Emirates	15.22	Amplify
Jordan	12.75	Accelerate		United Kingdom	17.84	Amplify
Kazakhstan	14.50	Amplify		United States	20.10	Amplify
Kenya	9.82	Activate		Uruguay	14.07	Accelerate
Korea, Rep.	17.50	Amplify		Uzbekistan	11.39	Accelerate
Kuwait	12.08	Accelerate		Vietnam	12.56	Accelerate
Kyrgyz Republic	11.61	Accelerate		Zambia	9.61	Activate

Appendix C

Relationship (Correlations) of Digital Readiness Components to the Total Digital Readiness Score

Digital Readiness Components:	Basic Needs	Bus & Govt. Investment	Ease of Doing Business	Human Capital	Start-up Environment	Technology Infrastructure	Technology Adoption	Total Digital Readiness Score
Basic Needs	1.000							
Bus & Government Investment	0.404	1.000						
Ease of Doing Business	0.686	0.605	1.000					
Human Capital	0.678	0.518	0.659	1.000				
Start-up Environment	0.250	0.470	0.424	0.430	1.000			
Tech Infrastructure	0.677	0.577	0.843	0.634	0.424	1.000		
Technology Adoption	0.843	0.553	0.771	0.725	0.400	0.767	1.000	
Total Digital Readiness Score	0.867	0.666	0.901	0.799	0.526	0.894	0.914	1.000