2017

DIGITAL NATION:
POLICY LEVERS FOR INVESTMENT AND GROWTH

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Important Notice on Contents – Estimations and Reporting

This report has been prepared by AlphaBeta for the Asia Internet Coalition (AIC). The AIC is an industry association comprised of leading digital companies. The AIC seeks to promote the understanding and resolution of Internet policy issues in the Asia Pacific.

All information in this report is derived or estimated by AlphaBeta analysis using both proprietary and publicly available information. The AIC has not supplied any additional data, nor does it endorse any estimates made in the report. Where information has been obtained from third party sources and proprietary research, this is clearly referenced in the footnotes.

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THE STATE OF DIGITAL NATIONS IN THE ASIA PACIFIC REGION

LEVERS, PROGRESS AND OPPORTUNITIES[1]

THE LEVERS

>80% of digital startups, multinational enterprises (MNEs) and investors highlighted

1. DIGITAL TALENT
2. TECH INVESTMENT ENVIRONMENT
3. TAXATION

are the most important levers for a Digital Nation.

~60% of digital MNEs felt that

TAXES DISCRIMINATING THE DIGITAL SECTOR WOULD DISCOURAGE

them to establish activitities in an APAC country.

1 in 2 startups put

"INVESTMENT IN THE DIGITAL ECOSYSTEM"

among the top 3 most important MNE contributions to Digital Nations (out of 10 contribution channels identified).

THE PROGRESS

145 DIGITAL IPOs
between 2015 and 2016 in 11 APAC countries.

4.9 MILLION APP-JOBS
(app developers, designers) in 11 APAC countries in 2016.

COMBINED MARKET VALUE OF US$238 BILLION
of the top 3 digital firms in each of the APAC countries.

THE OPPORTUNITIES

If other APAC countries had the same number of tech-related IPOs per capita of Australia, there would be

ALMOST 2,000 ADDITIONAL IPOs PER YEAR
across the 11 APAC countries.

If all countries across the Asia Pacific had the same app job intensity as in Singapore, an

ADDITIONAL 8.8 MILLION JOBS WOULD BE CREATED
in the region.

1. Countries examined include: Australia, Indonesia, India, Japan, Malaysia, New Zealand, Singapore, South Korea, Thailand, Taiwan, and Viet Nam.
Source: AlphaBeta analysis

EXECUTIVE SUMMARY

Countries across the Asia-Pacific region are benefiting from the rapid digitization of the business world, which boosts their productivity and growth. But some countries are benefiting more than others, as their economies become more digital. These countries are making the transition from being a passive recipient of digitization to actively reaping its benefits: they are becoming Digital Nations.

This report is centred around the key assumption that countries need a thriving digital economy to be globally competitive and fully exploit their economic potential. It has three main objectives: first, outline the most critical policy levers to boost growth and investment in the digital economy; second, measure how well countries across the Asia Pacific currently perform when extracting benefits from the digital economy; third, give concrete recommendations to policymakers.

WHAT DOES IT TAKE TO BECOME A DIGITAL NATION?

For the purpose of this research, AlphaBeta defines a Digital Nation as a country that plays an active rather than passive role in steering its digital economy. All countries benefit from the consumption of digital products and services, but a Digital Nation goes further: it uses policy levers to create a strong base of digital products, firms, and talent (Exhibit E1).

We interviewed and surveyed hundreds of leading digital multinationals (MNEs), investors, and startups across 11 Asia-Pacific countries to discover how governments can best attract investment in the digital economy. Our research revealed a range of policy levers that countries can pull to evolve into a Digital Nation (Exhibit E2). The top three levers are:

DIGITAL TALENT

Training digitally savvy local workers and attracting foreign digital talent.

TECH INVESTMENT CLIMATE

Being a welcoming place for digital firms whose contributions to funding, the digital ecosystem, technological transfer and global market access are important for domestic startups.

TAX APPROACH

Laws that target the digital sector or aggressive treatment by tax authorities are more of a concern to investors than the tax rate itself.

While the performance of the 11 Asia-Pacific countries varies across the seven levers (Exhibit E2), their fate is not set in stone. Encouragingly, every country can use these three policy levers to accelerate its progress in becoming a Digital Nation, allowing it to overcome traditional constraints such as the size of the domestic market. In other words, countries can shape their digital future.

EXHIBIT E1:

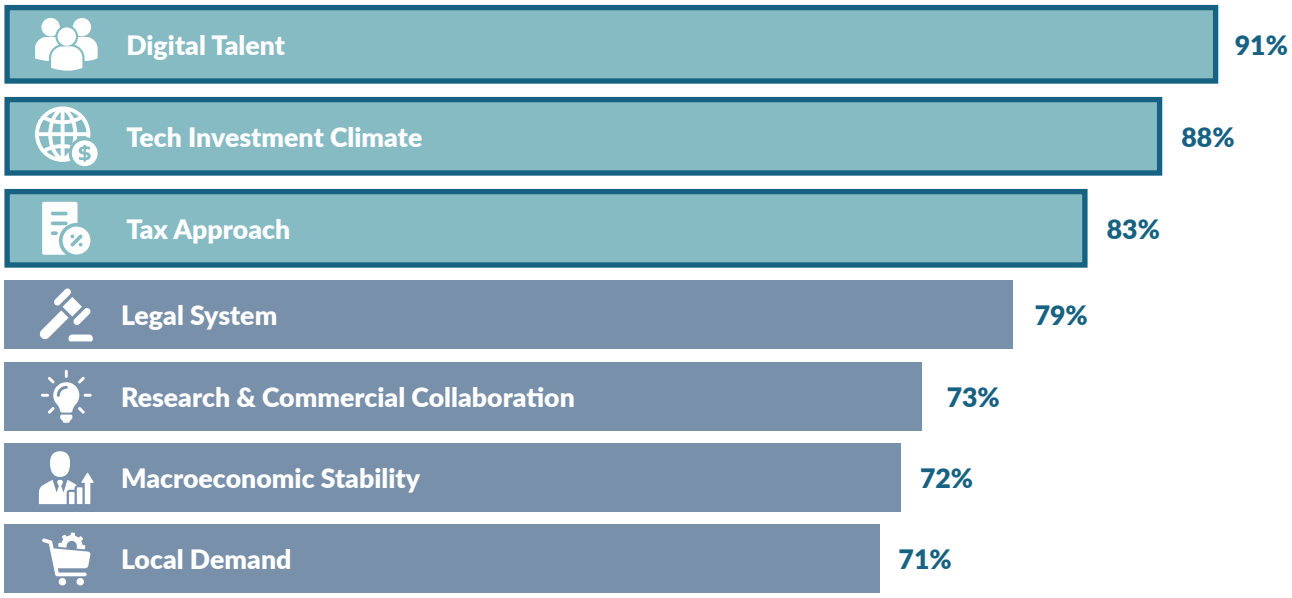
WHAT IS A DIGITAL NATION?

WHILST *PASSIVE RECIPIENTS* OF THE DIGITAL ECONOMY ONLY FOCUS ON LEVERS SUCH AS...	*DIGITAL NATIONS* GO FURTHER TO FOCUS ON ADDITIONAL LEVERS SUCH AS...
• Promoting general **digital literacy** among population	• Developing **ad-hoc programs** for **workforce re/up-skilling** to account for innovation shifts (e.g., automation, e-commerce, etc.)
• **Passively waiting** for foreign direct investment	• **Attracting, retaining, and embedding** digital multinationals
• **Improving universal access** to broadband	• **Supporting innovative startups** through government grants and incentives
• **Adjusting regulations** only when the need arises and not considering their impact of regulatory change on on investment	• **Experimenting approaches** (e.g., regulatory sandboxes) for firms to explore new products

EXHIBIT E2:

THE SEVEN POLICY LEVERS

PERCENTAGE OF RESPONDENTS AGREEING THAT THE POLICY LEVER IS IMPORTANT TO BECOMING A DIGITAL NATION[1]



1.Based on a survey of 300 digital startups, investors, and MNEs, in 11 APAC countries
SOURCE: AlphaBeta Digital Nation Survey

HOW ARE ASIA-PACIFIC COUNTRIES PROGRESSING IN BECOMING DIGITAL NATIONS?

A range of objective indicators was used to measure how far a country has advanced as a Digital Nation, giving insights into the availability of financial capital in a country, its power to produce innovative digital products, its talent base (human capital), and the vibrancy of its local digital community. Based on these findings, Singapore ranks first overall, thanks to its particularly strong performance in providing access to financial capital, attracting and retaining talent, and developing a strong local digital community. Australia ranks second, and South Korea third (Exhibit E3).

Among the other key findings:

1. THE RACE FOR DIGITAL LEADERSHIP IS STILL OPEN: NO SINGLE COUNTRY OUTPERFORMS ACROSS ALL AREAS.

While Singapore ranks first overall, its performance varies widely across the different indicators. Other countries achieve surprisingly high results in some areas, but remain average in others. For example, Malaysia leads in terms of venture capital availability, Australia outperforms traditional financial powerhouses (such as Singapore) in providing financing for digital companies; and New Zealand scores the highest on AlphaBeta's index of top paid apps (see Appendix B for details). The varying scorecard results suggest that countries still have time to carve out a leadership role in Asia Pacific's digital economy. There is significant scope for countries ranking poorly across some metrics to improve their performance by copying policies from a more advanced country.

2. BILLIONS OF DOLLARS AND MILLIONS OF JOBS ARE AT STAKE.

If countries incorporated the best practices from across the Asia-Pacific region, the benefits would be sizeable. For example, if every Asia-Pacific country was to achieve the employment intensity of app-developer jobs[1] in Singapore, around 8.8 million additional jobs in app development alone could be created across the 11 countries. Moreover, focusing on the "Financial Capital" dimension, if every country had the same ratio of "IPO per capita" as Australia, there would be almost 2,000 additional company listings in the 11 countries per year.

1. This index measures the relative share of successful apps originating from a given country in 18 of the world's largest app.

EXHIBIT E3:

MEASURES OF SUCCESS: THE RACE FOR DIGITAL LEADERSHIP IN ASIA PACIFIC IS STILL OPEN

ALPHABETA DIGITAL NATION SCORECARD

RANK	OVERALL RANKING	FINANCIAL CAPITAL	DIGITAL PRODUCTS	HUMAN CAPITAL	DIGITAL COMMUNITY
1	Singapore	Australia	South Korea	Singapore	Japan
2	Australia	Singapore	Japan	Malaysia	Singapore
3	South Korea	Japan	Taiwan	New Zealand	Australia
4	Japan	Taiwan	Australia	India	India
5	New Zealand	Malaysia	New Zealand	Taiwan	South Korea
6	Taiwan	New Zealand	Singapore	Australia	New Zealand
7	Malaysia	India	Malaysia	South Korea	Taiwan
8	India	Indonesia	Viet Nam	Indonesia	Indonesia
9	Indonesia	Thailand	India	Japan	Malaysia
10	Thailand	South Korea	Indonesia	Thailand	Thailand
11	Viet Nam	Viet Nam	Thailand	Viet Nam	Viet Nam

The Digital Nation Scorecard includes the following dimensions and indicators:

- *Financial capital: Venture capital availability (WEF Survey) and number of IPOs of tech-related companies in the national stock exchanges in 2015 and 2016*
- *Digital products: Value and volume share of the world's most successful applications; number of patent grants for digital communication and computer technology*
- *Human capital: App Intensity, i.e. share of core app jobs as a % of total jobs in the economy; country capacity to attract and retain talent (WEF Survey)*
- *Digital community: Number of local digital startups, aggregate market capitalization of top 3 domestic companies in the digital/tech space; and AlphaBeta index of digital MNE contribution*

Where necessary, indicators have been standardised per 1 million inhabitants. Rankings are calculated by averaging % gap from top performers in each indicator. For details, please consult the methodological appendix in the paper.

SOURCE: Literature review, AlphaBeta analysis

WHAT ARE THE KEY INSIGHTS AND LESSONS FOR POLICYMAKERS?

SHIFT FROM THINKING ABOUT OCCUPATIONS TO SKILLS.

New skills will be needed to support the shift to a Digital Nation. A recent AlphaBeta report revealed that digital literacy and critical thinking are currently some of the most highly sought-after skills in the corporate world[2]. Not all jobs require employees to develop entirely new skills, as the skill sets of many jobs are interchangeable. In fact, AlphaBeta's past work has found that when an average person trains or works in one occupation, they typically acquire skills to perform 13 different jobs.[3]

EMBED MULTINATIONALS AS ANCHORS.

Countries can leverage the strong contribution of multinational enterprises to the digital economy to become a Digital Nation faster. Recent overtures by the governments of Indonesia and Malaysia to include Jack Ma, Alibaba's founder and CEO, as a member of their national digital economy committees go in the right direction of giving large technology companies a shared stake in the national digital strategies.[4] Recognizing the importance of digital MNEs to develop a Digital Nation, Denmark is planning to appoint a "Digital Ambassador" to Silicon Valley to strengthen links and establish partnerships with these players[5].

RETHINK TAX: APPROACH IS MORE IMPORTANT THAN RATE.

To a large degree, venture capitalists, entrepreneurs, and MNE executives are less concerned about the overall rate of taxation, than the way taxes are administered. What they care about is that fiscal authorities behave in a non-discriminatory, non-aggressive and predictable way. This suggests that it is important not to "ring fence" the digital economy by creating sector-specific tax rules.

2. The New Basics: Big data reveals the skills young people need for the New Work Order, AlphaBeta and the Foundation for Young Australians (FYA), 2016.
3. The New Work Mindset: 7 new job clusters to help young people navigate the new work order, AlphaBeta and the Foundation for Young Australians (FYA), 2016.
4. "Matrade: TN50 to prepare nation's economic structure after if high-income status achieved by 2020", The Malay Mail Online, January 2017. Retrieved at http://www.themalaymailonline.com/malaysia/article/matrade-tn50-to-prepare-nations-economic-structure-after-if-high-income-sta#sthash.ZICkO1ED.dpuf
5. "Denmark to Appoint a 'Silicon Valley Ambassador' As If Tech Was Its Own Country", Fortune, January 2017. Retrieved at http://fortune.com/2017/02/06/denmark-ambassador-apple-google/

It is useful to keep in mind that government policies for the digital economy require action across several different areas, ranging from new ICT rules to university curricula and immigration laws. Our research shows that as many as 72 different government departments are involved in some countries to improve a digital economy. A frequent concern raised in interviews with MNEs and startups is the lack of a coherent approach to support the digital economy. Strong leadership from the highest state offices is often needed to streamline action and outcomes. A case in point is the Singaporean government approach, which brought together key government agencies involved in the country's digital transformation strategy under the Prime Minister's Office (PMO) to improve coordination and oversight.

STRUCTURE OF THIS REPORT

How can governments across the Asia Pacific best capitalize on a global surge in digital products and services? This report provides valuable answers and recommendations on key actions countries can take to shape their digital future. It is based on extensive data research and an analysis of hundreds of interviews with and input from investors and company leaders who shape our modern, digital economies. The report starts with an overview, in Chapter 1, on policies considered most effective for countries wishing to advance and become truly Digital Nations; it then analyzes in detail the most important ones: talent, tech investment climate, and tax approach. Chapter 2 takes stock: how successful have countries across the Asia Pacific been so far in extracting benefits from the digital economy? The report concludes with a summary of the main implications and takeaways for policymakers in Chapter 3.

POLICY LEVERS:
THE THREE T's

As the world moves online, the metrics of economic success are changing. A growing share of our trade now flows through e-commerce marketplaces; online crowdfunding platforms have popped up linking entrepreneurs and investors in a flash; and the prolific use of smartphones has made software app creation and development a powerful new industry. Governments cannot ignore these changes. In fact, this chapter argues that countries wishing to become a truly "Digital Nation" need to do more than just set the basic cornerstones of the digital economy, such as providing universal internet access or teaching school children computer skills.

Governments can use an array of policy actions ("policy levers") to maximise economic gains in the digital era. A large-scale survey of around 300 investors and company executives with roles in Asia Pacific's digital economies suggests that three policy levers are particularly important: attracting talent, creating a welcoming climate for technology investors, and having a fair and predictable corporate tax system in place. In discussing these "Three T's" in detail, this chapter also gathers best-practice examples from the region and sheds a light on some of the most burning issues governments need to address.

WHAT IS A DIGITAL NATION?

We define a "Digital Nation" as a country that is an active driver of its digital economy, extracting significant benefits for individuals, small and medium-sized enterprises, and large corporations, as opposed to a country that remains a rather passive user of digital goods and services. A Digital Nation does more than just set the basic cornerstones of the digital economy, such as providing universal internet access or teaching school children computer skills. Rather, a Digital Nation plays an active role in supporting the growth of local digital startups and larger digital firms. It recognizes the strong economic value of attracting and engaging with foreign investors and multinational enterprises to improve its digital ecosystem, and to drive the development of a new class of entrepreneurs and digitally ready citizens (Exhibit 1).

In this context, basic enablers such as internet penetration remain a must-have for any country in today's digital era: they can be seen as a foundation. However, to remain truly competitive and generate strong growth and prosperity, a country needs to go a step further. It needs to move from being a passive recipient to an active diver of the digital economy itself.

EXHIBIT 1:
WHAT IS A DIGITAL NATION?

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• Promoting general **digital literacy** among population	• Developing **ad-hoc programs** for **workforce re/up-skilling** to account for innovation shifts (e.g., automation, e-commerce, etc.)
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SEVEN POLICY LEVERS

So what drives the digital performance of an aspiring Digital Nation? To find out which concrete actions policymakers can take, AlphaBeta has interviewed and surveyed representatives from MNEs, local entrepreneurs and financial investors active in the digital economy of the Asia-Pacific region. The analysis has identified seven key levers that governments can pull to accelerate their journey towards becoming a Digital Nation:

DIGITAL TALENT

Create an abundant pool of workers with relevant and up-to-date digital skills.

TECH INVESTMENT CLIMATE

Create a welcoming environment for foreign direct investment and ensure all investors are being treated equally, regardless of their nationality or industry.

TAX APPROACH

Ensure the corporate tax regime is broad-based, consistent and transparent and that tax enforcements are conducted in a consistent and fair manner.

LEGAL SYSTEM

Ensure laws and regulations are clearly written, consistently applied and rapidly executed.

RESEARCH & COMMERCIAL COLLABORATION

Foster strong ties between companies and researchers to maximize the number of high-quality research collaborations between industry and academia.

MACROECONOMIC STABILITY

Limit political risk and economic volatility.

LOCAL DEMAND

Cultivate a strong base of tech-savvy consumers with high purchasing power and strong preference for technologically advanced goods; also stimulate demand for digital products and services from government agencies (including through public procurement).

Although many Asia-Pacific countries have successfully kickstarted the growth of their digital economies, AlphaBeta's research shows that there is still scope for improvement. When these seven levers are mapped across 11 Asia-Pacific countries, it is clear that many countries are leveraging their domestic markets as a springboard for the digital economy. However, respondents in most countries felt that policies improving the digital talent pool, legal system, and research and commercial collaborations are largely under-applied as levers to develop a Digital Nation. As an interviewee, familiar with the digital sector in ASEAN commented: "How can a city be a regional hub if they do not let me get the talent I need from the region?" (Exhibit 2).

EXHIBIT 2:

KEY WEAKNESSES AND STRENGTHS BY COUNTRY

POLICY LEVER WHERE COUNTRY PERFORMS WEAKEST/STRONGEST[1]

COUNTRY	WEAKEST PERFORMANCE	STRONGEST PERFORMANCE
AUSTRALIA	Research & Commercial Collaboration	Macroeconomic Stability
INDIA	Research & Commercial Collaboration	Digital Talent
INDONESIA	Digital Talent	Local Demand
JAPAN	Tech Investment Climate	Macroeconomic Stability
MALAYSIA	Research & Commercial Collaboration	Tax Approach
NEW ZEALAND	Digital Talent	Macroeconomic Stability
SINGAPORE	Digital Talent	Tax Approach
SOUTH KOREA	Research & Commercial Collaboration	Local Demand
TAIWAN	Research & Commercial Collaboration	Digital Talent
THAILAND	Macroeconomic Stability	Local Demand
VIET NAM	Legal System	Local Demand

1. Based on a survey of roughly 300 digital startups, investors, and MNEs, in 11 APAC countries
SOURCE: AlphaBeta Digital Nation Survey

THE THREE T's: TALENT, TECH INVESTMENT CLIMATE, TAX APPROACH

It is important for policymakers to understand which levers will likely matter most. Results from AlphaBeta's extensive survey among company leaders, venture capitalists and other investors shed light on what key participants in the digital economy consider priority actions for countries aspiring to become a Digital Nation, and how countries are scoring in each of them. Additionally, several publicly available indicators, such as the World Economic Forum Digital Readiness Index, were used to test the validity of the qualitative findings—and proved to be broadly in line with the aggregate survey results (for further details on country's performance see Appendix A; for the methodology see Appendix B).

Despite some significant variations across countries and respondent groups, three policy levers stand out as particularly crucial: digital talent, tech investment climate, and tax (see Exhibit 3).

TALENT:

Investors, multinational enterprises and local startups in the digital economy in all 11 Asia-Pacific countries consider access to talent a top priority, with 91% of respondents saying they "agree" or "strongly agree" on the importance of using this policy lever to become a Digital Nation. Approval rates were particularly high in Singapore (100%) and Malaysia (100%).

TECH INVESTMENT CLIMATE:

Foreign investors and MNEs are seen as crucial for the growth of a digital ecosystem and often act as "anchors" for local startups. 88% of respondents confirmed it is important for an aspiring Digital Nation to cultivate a welcoming investment climate. Survey results from local startups suggest MNEs are particularly beneficial because they: (1) provide financing; (2) invest in digital hubs/ ecosystems; (3) facilitate technological transfer and global market access.

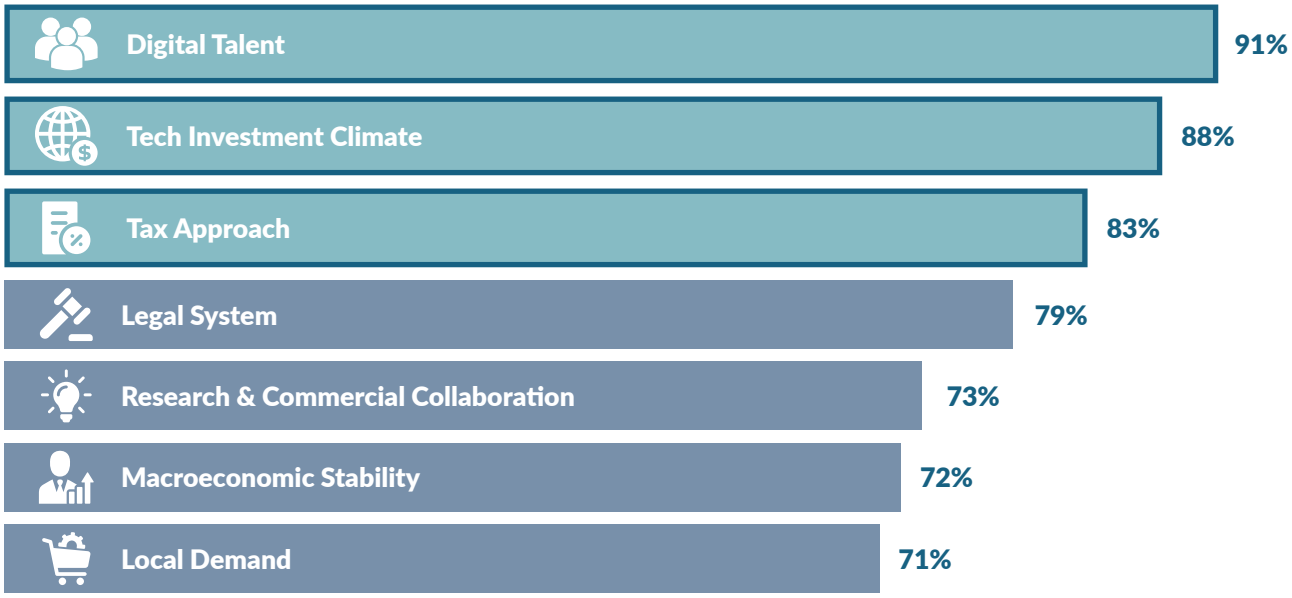
TAX APPROACH:

How a country taxes companies that contribute to the digital economy can influence the level of investment and incentives for domestic and international players. 83% of respondents agree that tax is an important lever for a Digital Nation. However, the survey results also show that investors and MNEs are more concerned about being fairly treated and that the digital sector is not singled out for differential treatment (i.e., "digital discrimination") than they are about a specific tax rate. This means that a government aspiring to become a Digital Nation should take care to work with its tax authority to ensure its corporate tax system is predictable and non-discriminatory against the digital sector.

EXHIBIT E2:

THE SEVEN POLICY LEVERS

PERCENTAGE OF RESPONDENTS AGREEING THAT THE POLICY LEVER IS IMPORTANT TO BECOMING A DIGITAL NATION[1]



1.Based on a survey of 300 digital startups, investors, and MNEs, in 11 APAC countries
SOURCE: AlphaBeta Digital Nation Survey

Encouragingly, these top policy levers are all areas which countries can influence—more so than, say, the size of the domestic market. This suggests that countries can shape their digital future. The following sections take a detailed look at these "Three T's": talent, tech investment climate, and tax approach. They also provide examples of international best practices.

DIGITAL TALENT IN ASIA PACIFIC: CLOSING THE SKILLS GAP

Nine out of ten participants in the surveyed Asia-Pacific economies—people ranging from company executives to venture capitalists—agree that a country needs a constant and steady stream of digital talent to successfully become a Digital Nation. However, most agree that there is still room for improvement in their particular countries, as seen in Exhibit 4.

In fact, none of those surveyed in Indonesia felt that the country has done well so far in developing a solid base of digital talents. The opposite holds true for India, where almost three-quarters (74%) of startups, MNEs and investors felt that this country offers access to a good pool of digital workers. It is also worthwhile to note that only one-third of respondents believe that Japan's digital talent policy is effective, potentially reflecting the difficulty of recruiting and retaining foreign talent in this country.

Perceptions around future performance are more uniform. At least 45% of respondents in each Asia-Pacific country believe that their national pool of talent is growing. South Korea fares especially well: despite particularly high language barriers to learn English in this country, more than 70% of respondents note that that the stream of digital talent is improving.

The overall encouraging regional result suggests that Asia-Pacific governments have begun to recognize the importance of this lever and introduce a range of policies to widen their digital talent pool in the short- and medium-term. For example:

1. Some Asia-Pacific governments are working towards closing the digital skills gap by adjusting their immigration laws and by encouraging citizens living abroad to return home. India is working to lure back its diaspora with expertise in the science and technology sector by committing to reducing red tape for returning citizens and promote a welcoming investment climate.[6] Japan and South Korea have created preferential talent-based immigration systems that target migrants with relevant digital skills and experience.[7]

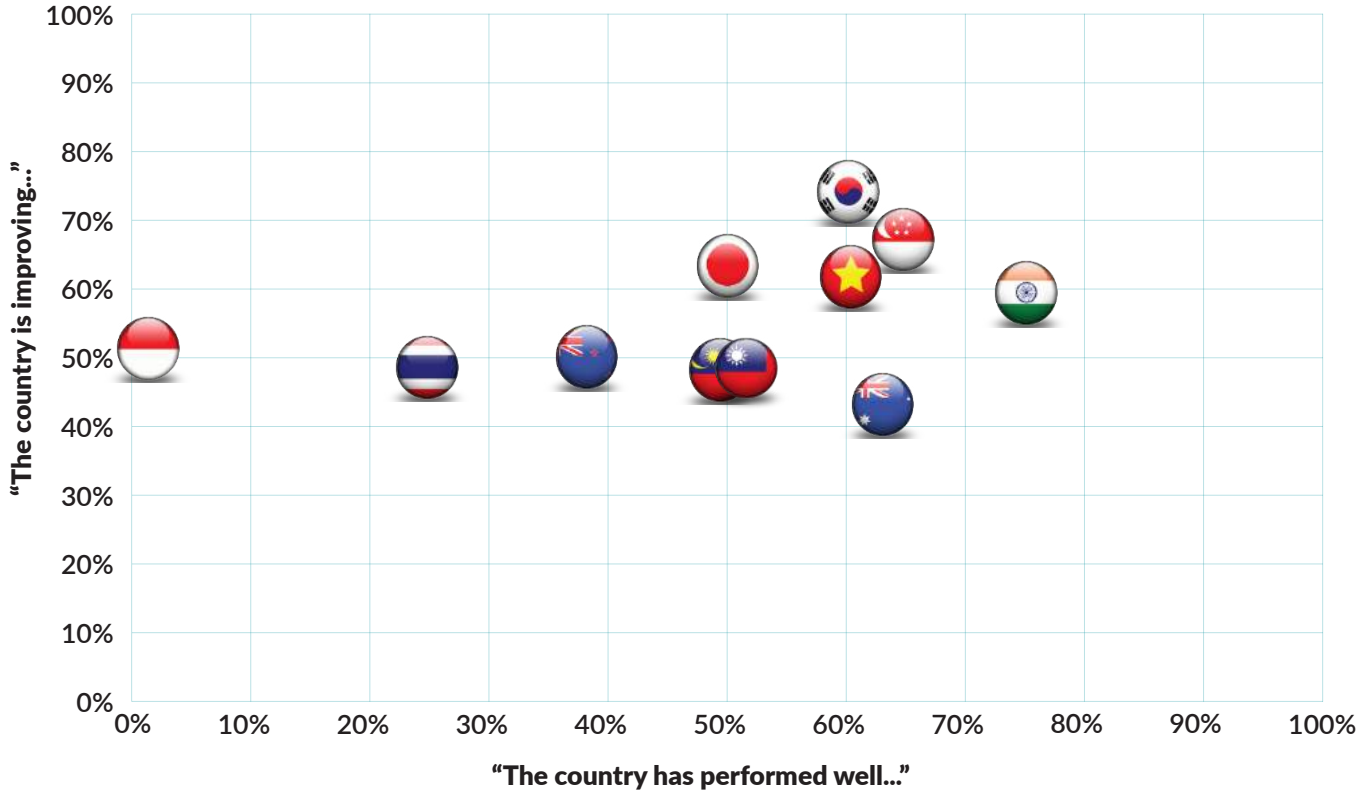
2. Some countries have started aligning their education system with the needs of the digital economy, for example, by adding subjects that enhance students' digital skills to the school curriculum. In 2015, Malaysia launched its #mydigitalmaker program with the objective to integrate computational thinking and computing into the school curricula.[8]

6. "PM Narendra Modi to Indian Diaspora: 'India is waiting for you'", The Times of India, September 2015. Retrieved at: http://timesofindia.indiatimes.com/india/PM-Narendra-Modi-to-Indian-Diaspora-India-is-waiting-for-you/articleshow/49133237.cms
7. "South Korea to launch talent-based immigration system", CPID, February 2017. Retrieved at http://www.cipd.asia/people-management-magazine/hr-news-opinion/south-korea-immigration-system and "Japan set to fast-track permanent residency for skilled foreign professionals", Japan Times, January 2017. Retrieved at: http://www.japantimes.co.jp/news/2017/01/18/national/crime-legal/japan-set-fast-track-permanent-residency-skilled-foreigners/#.WMpZm2995EY
8. "Creating a nation of digital makers key to Malaysia's future success", MDEC, August 2016. Retrieved at: http://www.mdec.my/news/mydigitalmaker

EXHIBIT 4:

PERCEPTIONS ON THE SUCCESS OF ASIA PACIFIC COUNTRIES IN LEVERAGING DIGITAL TALENT ARE MIXED – ESPECIALLY ON CURRENT PERFORMANCE

DIGITAL NATION PERCEPTION SURVEY



SOURCE: AlphaBeta Digital Nation Survey

WELCOMING TECH INVESTORS: HOW MULTINATIONAL ENTERPRISES CONTRIBUTE

A welcoming climate for tech investment is seen as the second most important lever available for governments aspiring to become truly Digital Nation, with 88% of survey respondents agreeing on its importance. Several factors can affect the investment climate in a country, including rules protecting minority investors, shareholder governance, and FDI restrictions.

When asked about why is it so crucial to attract leading digital MNEs, one local entrepreneur replied that "trying to recreate Silicon Valley from scratch is impossible – a better approach is to try to lure the firms and people from those areas to become involved in the local digital economy." An analysis of annual reports, press releases, newspaper and academic articles provided valuable insights into how 20 of the world's largest MNEs[9] have contributed to the digital economies in the Asia-Pacific region over the past five years. As seen in Exhibit 5, they typically influence local economies through ten channels, clustered in the following four dimensions:

- **FINANCIAL CAPITAL**
  MNEs can strengthen the financial capital base in a digital economy by investing broadly into the local digital ecosystem; by providing venture and growth capital for local startups; and by generally signaling their commitment to a country, thereby stimulating additional investments by other MNEs.

- **HUMAN CAPITAL**
  MNEs can improve a local education system, thus promoting the growth of talent to support the digital economy, through collaborations with local schools, enterprises, and community organizations for ad-hoc courses (for example, on app development and entrepreneurial skills), as well as broader digital literacy programs. They can also act as a platform for local talent to gain experience of working at leading MNEs, providing them the knowledge to potentially establish their own companies.

- **DIGITAL PRODUCTS**
  MNEs can increase the amount of digital goods and services in an economy through research and development (R&D), which usually spurs innovation and creates new products for local (and potentially overseas) markets. MNEs also often invest in world-class technology, which furthers local innovation and enterprise growth.[10]

- **DIGITAL COMMUNITY**
  MNEs can enter into partnerships with local firms to support their growth; they can strengthen local supply chains by outsourcing some operations to local companies; and they can interact with local stakeholders to spread awareness on the benefits of the digital economy and key improvement opportunities.

9. The global digital MNEs considered are AirBnB, Alibaba, Amazon, Apple, eBay, Cisco, Expedia, Facebook, Google, IBM, Line, LinkedIn, Microsoft, Oracle, Rakuten, Samsung, SAP, Twitter, Uber and Yahoo!
10. The concept of technology transfer has significantly evolved over time: while in the past it meant physically bringing machinery and technical know-how to a host nation; MNEs are now able to transfer technology more efficiently and extensively via online channels.

EXHIBIT 5:

MNEs CONTRIBUTE TO THE LOCAL DIGITAL ECONOMY THROUGH 10 CHANNELS

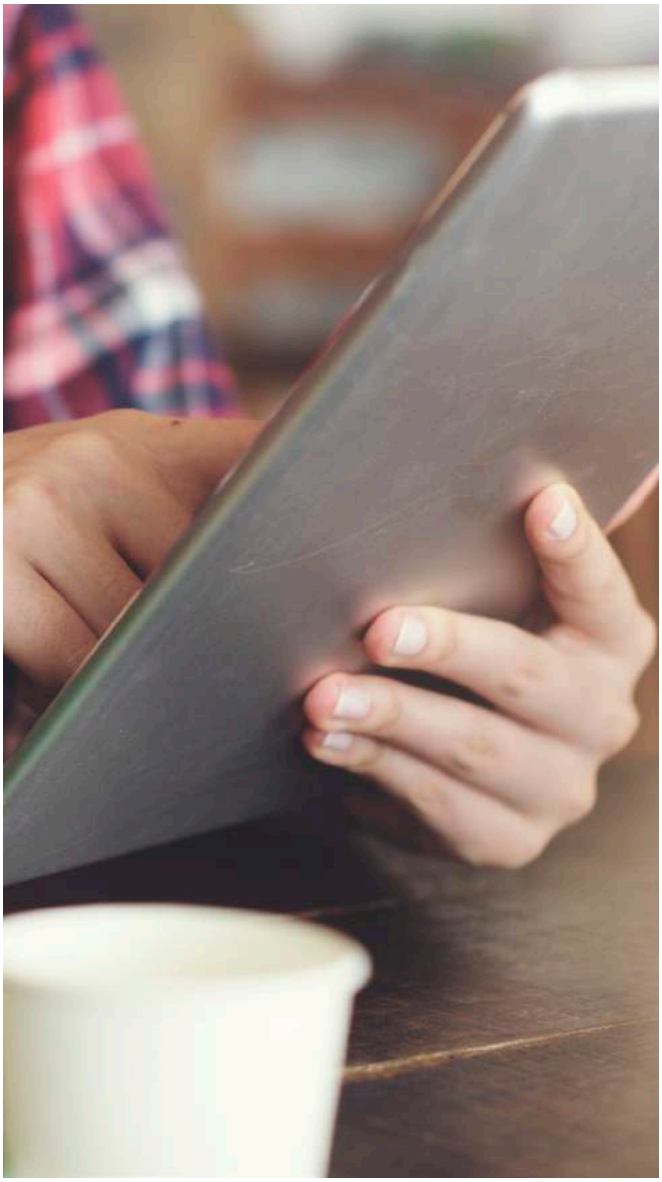
DIMENSION	CHANNEL	DESCRIPTION
FINANCIAL CAPITAL	**Investment in digital ecosystem**	Provide capital investments to develop and support digital hub ecosystems as well as infrastructure
	Support for start-up financing	Provide capital for local start-ups through corporate venturing from seed to series C funding
	Signaling	Signal commitment to a country to increase prominence of a country and stimulate investment by other MNEs
DIGITAL PRODUCTS	**Product development for local/ international market**	Conduct R&D which spurs innovation and creates new products for local markets and potentially overseas
	Technological transfer and global market access	Bring world-class technology and global markets access (e.g., via app stores) to enable local innovation and enterprise growth at close to zero cost
HUMAN CAPITAL	**Support for education system**	Foster the development of education ecosystems which promote the development of talent to support the digital economy
	Entrepreneurship training	Act as a platform for local talent to gain experience of working at leading MNE, providing them the knowledge to found their own companies
DIGITAL COMMUNITY	**Local enterprise development**	Enter into partnerships with local firms, tech hubs and incubators, to support their growth
	Awareness and stakeholder education	Interact with local stakeholders, especially political ones, to spread awareness on the benefits of digital, strengthening the (fact) base for (public) investment
	Supply chain development	Outsource parts of the value chain to local companies, enabling them to acquire scale and size to profitably expand abroad and other areas of the value chain

SOURCE: AlphaBeta Digital Nation Survey

Which channel allows MNEs to make the biggest contribution to the local digital economy? The survey shows that stakeholders have different perceptions:

INVESTORS AND MNEs

Investors and MNEs typically perceive "soft" contributions as the most effective channel, including strategies such as "signaling" (committing large amount of resources in a country and encouraging other investors to do so), "entrepreneurship training", and "product development for local and international markets".



STARTUPS

Startups, on the other hand, place more emphasis on direct monetary contributions, including "startup financing" (with 49% of respondents rating this channel as one of the three most important) and "investment in digital ecosystems" (48%). Startups also consider the knowledge transfer between MNEs and startups (39%) as highly important. (Exhibit 6)

A look at various countries in the Asia Pacific unveils some promising examples for such MNE contributions:

- **INVESTMENT IN DIGITAL ECOSYSTEMS.** In India, Google is partnering with RailTel to introduce free high-speed WiFi for commuters at 400 Indian train station. The initiative aims to connect 20 million people.[11]

- **SUPPORT FOR STARTUP FINANCING.** Alibaba's Taiwan Entrepreneurs Fund has provided approximately US$310 million for local startups starting and growing their businesses through Alibaba's online platforms, and break into the Greater China market.[12]

- **SUPPORT FOR THE EDUCATION SYSTEM.** Google's first startup campus in Asia, Campus Seoul, nurtures South Korean entrepreneurs by providing creative spaces, workshops, mentorship, and resources. Campus Seoul has over 10,000 registered members and close to 6,600 people have participated in its programs. In 2015 alone, Campus Seoul raised ₩10.9 billion (US$9.6 million) for startups.[13]

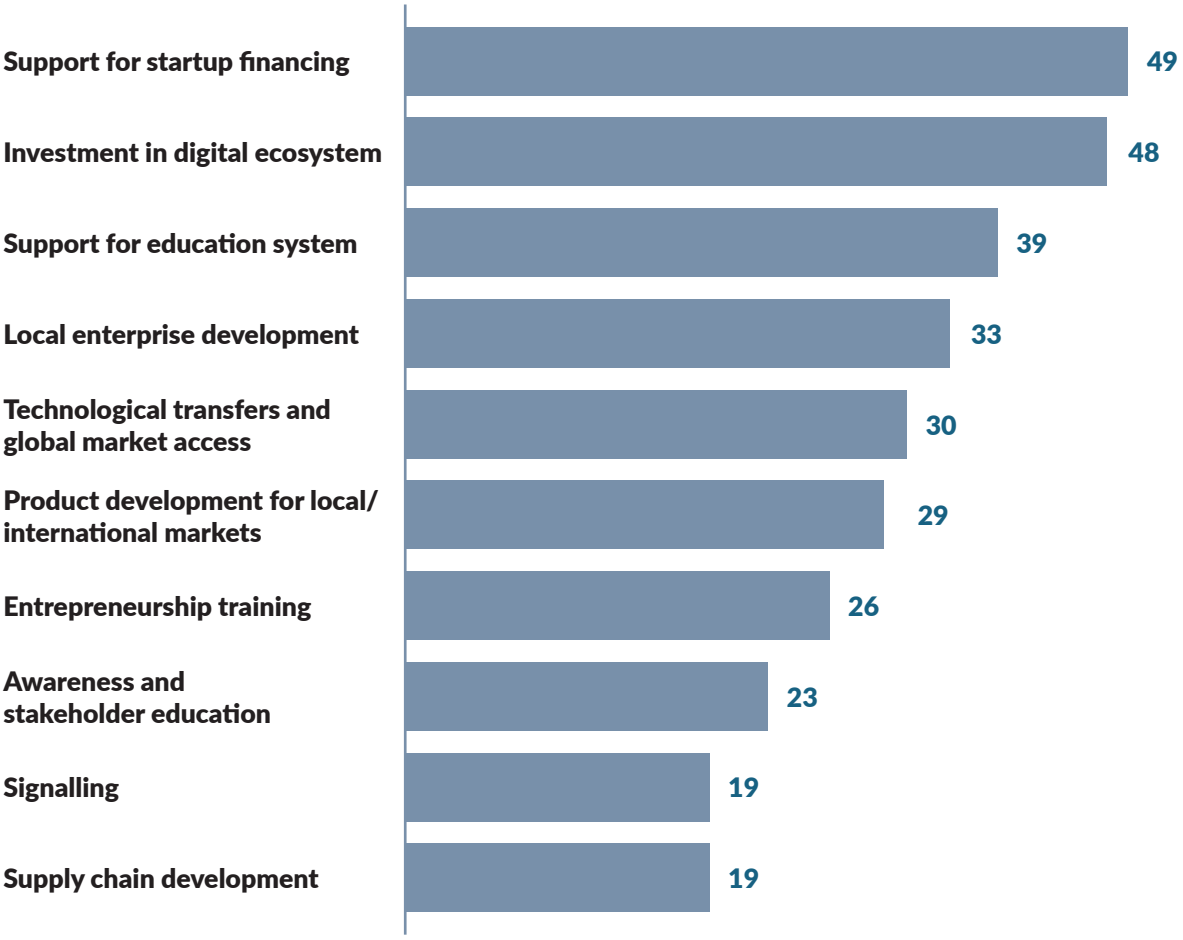
11. "Google, RailTel join hands for one of the world's largest Wi-Fi projects", The Economics Times, September 2015. Retrieved at http://economictimes.indiatimes.com/tech/internet/google-railtel-join-hands-for-one-of-the-worlds-largest-wi-fi-projects/articleshow/49139472.cms
12. "Alibaba to Invest $316 Million in Taiwan Startup Fund", The Wall Street Journal, March 2015. Retrieved at http://blogs.wsj.com/digits/2015/03/02/alibaba-to-invest-316-million-in-taiwan-startup-fund/
13. Reported by onoffmix.com - http://onoffmix.com/event/46474

EXHIBIT 6:

STARTUPS CONSIDER FINANCING, INVESTMENT IN DIGITAL ECOSYSTEM, SUPPORT FOR EDUCATION AS THE MOST IMPORTANT MNE CONTRIBUTIONS

CONTRIBUTIONS OF MNEs ON DIGITAL NATION DEVELOPMENT

% of startups perceiving this channel among the top 3 MNE contribution[1]



1. Senior figures in leading digital startups (164) were asked to rank the importance of each factor against the other 9 factors
SOURCE: AlphaBeta Digital Nation Survey

TAXING THE DIGITAL ECONOMY: WHAT MATTERS IS HOW, NOT HOW MUCH

Tax approach is identified as the third most important lever that governments have on hand to develop a Digital Nation, with over 83% of respondents agreeing on its importance. However, the interaction between MNEs and governments on tax issues is often framed as adversarial. Media articles tend to over-simplify this issue as a debate that predominantly evolves around the amount of tax foreign companies have to pay. However, the survey results reveal two surprising insights:

1. THE TAX RATE IS NOT THE MOST IMPORTANT CRITERION FOR THE PERCEIVED QUALITY OF TAX SYSTEMS: UNCERTAINTY AND DISCRIMINATION MATTER MORE (EXHIBIT 7).

Responses from both startups and MNEs indicate that inconsistent behavior by tax authorities (for example in tax audits) is the most important issue. Investors appear more concerned that unpredictability could negatively impact their investment choices. As one investor commented, "I am okay with higher tax rates as long as they are written in stone." Fiscal unpredictability affects the hurdle rate at which investors set for tech-related investments, potentially lowering the expected profit and investment size. These findings have important implications for fiscal reforms: to a large degree, how you tax companies matters more than how much you tax them.

2. EVEN ESTABLISHED DIGITAL NATIONS HAVE SUBSTANTIAL ROOM FOR IMPROVEMENT.

While the unpredictability of a tax system is perceived by investors and companies as the most important issue, many respondents are also concerned that tax codes across the Asia Pacific are overly complex—even for those operating in leading Digital Nations, like Japan (Exhibit 8). Many startups signal that it takes too long to comply with tax requirements and that information on where to obtain relevant information is not readily accessible. These results are in line with other research on the topic. For example, over 40% of respondents in Deloitte's latest "Asia Pacific Tax Complexity Survey" consider the tax compliance and fiscal requirements in Japan and Australia to be "complicated".[14]

14. "Shifting sands: risk and reform in uncertain times. 2017 Asia Pacific Tax Complexity Survey", Deloitte.
65% of their survey respondents in the same region also confirm that consistency, complexity and predictability in tax regimes have strong (or at least some) influence in companies' decision to operate in a given country.

EXHIBIT 7:

HIGH CORPORATE TAX RATE IS NOT THE MOST PRESSING ISSUE FOR FIRMS CONSIDERING TO ESTABLISH A PRESENCE/INCREASE ACTIVITIES IN A COUNTRY

TAX-SPECIFIC ISSUES[1]

% of respondents who agree with the statement

"The following tax issue is an obstacle to establish/increase activities in a country"

1. Senior figures in leading digital startups (164), Multi-National Enterprises and investment firms (136) were asked "how important are the following tax issues for your company to establish/ increase activities in a country – in general?" Respondents could answer: "NA", "not an issue", "not a significant issue", "slightly significant issue", "significant issue", and "very significant issue"

SOURCE: AlphaBeta Digital Nation Survey

EXHIBIT 8:

FISCAL SYSTEMS IN MANY COUNTRIES APPEAR POORLY DESIGNED – AND LIKELY TO DEVELOP SPECIAL TAXES THAT WOULD DISCRIMINATE THE DIGITAL SECTOR

Very significant issue | (Slightly) significant issue | Not significant/Not an issue

FACTORS[1]	AUS	SGP	IND	KOR	IDN	TWN	JPN	THA	MYS	NZL	VNM
Inconsistent or unpredictable treatment by tax authority	(Slightly) significant issue	Not significant/Not an issue	Very significant issue	(Slightly) significant issue	Very significant issue	(Slightly) significant issue	Not significant/Not an issue	Very significant issue	(Slightly) significant issue	Not significant/Not an issue	Very significant issue
Special taxes that discriminate the digital sector	(Slightly) significant issue	Not significant/Not an issue	Very significant issue	(Slightly) significant issue	Very significant issue	(Slightly) significant issue	Very significant issue	(Slightly) significant issue	(Slightly) significant issue	(Slightly) significant issue	Very significant issue
Over-complexity in the tax laws	(Slightly) significant issue	Not significant/Not an issue	(Slightly) significant issue	(Slightly) significant issue	Very significant issue	(Slightly) significant issue	Not significant/Not an issue	(Slightly) significant issue	(Slightly) significant issue	Not significant/Not an issue	(Slightly) significant issue
High corporate tax rates	(Slightly) significant issue	Not significant/Not an issue	Very significant issue	(Slightly) significant issue	(Slightly) significant issue	(Slightly) significant issue	Very significant issue	(Slightly) significant issue	(Slightly) significant issue	(Slightly) significant issue	Very significant issue
Aggressive treatment by the tax authority	(Slightly) significant issue	Not significant/Not an issue	Very significant issue	(Slightly) significant issue	Very significant issue	(Slightly) significant issue	Not significant/Not an issue	Very significant issue	(Slightly) significant issue	(Slightly) significant issue	Very significant issue

1. Senior figures in leading digital startups (164), Multi-National Enterprises and investment firms (136) were asked, based on the 5 factors above, "how significant are these tax issues likely to develop?" Respondents could answer: "NA", "not an issue", "not a significant issue", "slightly significant issue", "significant issue", and "very significant issue".

SOURCE: AlphaBeta Digital Nation Survey, AlphaBeta analysis

MEASURES OF SUCCESS: HOW ARE COUNTRIES FARING?

Knowing which policy levers a country has at hand to become a Digital Nation is a first step to improving the status quo, which still varies widely across the region. How good is each country in the Asia Pacific at extracting benefits from the digital economy? This chapter provides an overview on the pace of success.

A country's performance was tracked using a scorecard comprising various indicators, ranging from perceived availability of venture capital to the number of multinational enterprises in a local economy. The results of the analysis yield some notable findings: while Singapore ranks best overall, other countries excel in individual areas. Australia has the strongest IPO market for companies in the digital sector, Malaysia stands out as a hotspot for venture capital, and New Zealand is a thriving app development hub.

Governments should take notice, as the prize of learning from best practice in other countries is substantial. For example, there could be an extra 8.8 million jobs in the region if the software app job market in every Asia-Pacific country was as vibrant as in Singapore.

FOUR DIMENSIONS OF SUCCESS: THE DIGITAL NATION SCORECARD

To gauge the digital performance of countries across the region, a scorecard was created covering four core areas that define the success of a Digital Nation (Exhibit 9). Typically, a Digital Nation provides ample financial capital for firms at all stages of growth. Its companies are considered innovation leaders, with a track record of developing commercially viable digital products and services, including new mobile phone apps. A Digital Nation has no shortage of high-quality workers (human capital) with relevant skills to contribute to the digital economy. It is also home to a thriving community of foreign and local firms that are actively promoting growth in the digital space.

More specific indicators were used to measure a country's performance in each of these four core areas. For example, a large number of IPOs may be a signal that financial capital for growth-orientated startups is readily available. Similarly, the number of listed patents for digital products indicates that a country has innovative power (see Appendix B for further details on the methodology).[15]

The results of this scorecard approach, reveal a number of interesting insights (Exhibit 10).

- **Singapore ranks first overall,** thanks to a particularly strong performance on access to financial capital, attracting and retaining talent, and a strong local digital community. Australia ranks second, with a leading position in financial capital; and South Korea ranks third, thanks to a particularly high number of mobile apps produced.

- **The race for digital leadership is still open: no single country outperforms across all areas.** While Singapore ranks first overall, its performance varies widely across the different indicators: it ranks first in human capital, second in financial capital and digital community, and only sixth in digital products, due to a relatively low performance in developing mobile applications and registering digital patents. Other countries achieve surprisingly high results in some areas, but remain average in others. For example, Malaysia leads in terms of venture capital availability, Australia outperforms traditional financial powerhouses (such as Singapore) in providing financing for digital companies; and New Zealand scores the highest on AlphaBeta's index of top paid apps (see Appendix B for details).[16] The varying scorecard results suggest that countries still have time to carve out a leadership role in Asia Pacific's digital economy. There is significant scope for countries ranking poorly across some metrics to improve their performance by copying policies from a more advanced country.

- **Billions of dollars and millions of jobs are at stake.** If countries incorporated the best practices from across the Asia-Pacific region, the benefits would be sizeable. For example, if every Asia-Pacific country was to achieve the employment intensity of app-developer jobs in Singapore (where app developers represent 1.6% of the total workforce) around 8.8 million additional jobs in app development alone could be created across the 11 countries. Moreover, focusing on the "Financial Capital" dimension, if every country had the same ratio of "IPO per capita" as Australia (where there have been 46 IPOs in the last two years), there would be almost 2,000 additional company listings in the 11 countries per year.

The following sections provide more detail on the country-specific performance in each of the four core areas that define a Digital Nation.

15. These 11 indicators were selected in accordance with input from our survey of investors, local startups, and MNE executives, as well as information provided in the academic literature. All indicators were adjusted to account for the size of the country. Rankings were calculated by averaging the percentage gap from the top performers in each indicator, also known as "distance to frontier". See Appendix B for a detailed description of the methodology and sources.
16. This index measures the relative share of successful apps originating from a given country in 18 of the world's largest app markets.

EXHIBIT 9:

WHAT ARE THE COMPONENTS OF A DIGITAL NATION?

FINANCIAL CAPITAL	DIGITAL PRODUCTS	HUMAN CAPITAL	DIGITAL COMMUNITY
			
Access to financing throughout the stages of firm growth	Range of innovations in the digital space, including app and IP development	High quality pipeline of local talent and access to top foreign talent	Active group of local and foreign firms in the digital space

EXHIBIT 10:

MEASURES OF SUCCESS: THE RACE FOR DIGITAL LEADERSHIP IN ASIA PACIFIC IS STILL OPEN

ALPHABETA DIGITAL NATION SCORECARD					
RANK	OVERALL RANKING	FINANCIAL CAPITAL	DIGITAL PRODUCTS	HUMAN CAPITAL	DIGITAL COMMUNITY
1	Singapore	Australia	South Korea	Singapore	Japan
2	Australia	Singapore	Japan	Malaysia	Singapore
3	South Korea	Japan	Taiwan	New Zealand	Australia
4	Japan	Taiwan	Australia	India	India
5	New Zealand	Malaysia	New Zealand	Taiwan	South Korea
6	Taiwan	New Zealand	Singapore	Australia	New Zealand
7	Malaysia	India	Malaysia	South Korea	Taiwan
8	India	Indonesia	Viet Nam	Indonesia	Indonesia
9	Indonesia	Thailand	India	Japan	Malaysia
10	Thailand	South Korea	Indonesia	Thailand	Thailand
11	Viet Nam	Viet Nam	Thailand	Viet Nam	Viet Nam

The Digital Nation Scorecard includes the following dimensions and indicators:

- *Financial capital: Venture capital availability (WEF Survey) and number of IPOs of tech-related companies in the national stock exchanges in 2015 and 2016*
- *Digital products: Value and volume share of the world's most successful applications; number of patent grants for digital communication and computer technology*
- *Human capital: App Intensity, i.e. share of core app jobs as a % of total jobs in the economy; country capacity to attract and retain talent (WEF Survey)*
- *Digital community: Number of local digital startups, aggregate market capitalization of top 3 domestic companies in the digital/tech space; and AlphaBeta index of digital MNE contribution*

Where necessary, indicators have been standardised per 1 million inhabitants. Rankings are calculated by averaging % gap from top performers in each indicator. For details, please consult the methodological appendix in the paper.

SOURCE: Literature review, AlphaBeta analysis

FINANCIAL CAPITAL

Companies in the digital sector require various types of capital, depending on their stage of business development. At an early stage, seed funding enables startups to build a product prototype to test whether their business idea is commercially and technologically feasible. Once they have passed that hurdle, successful ventures will then look for growth funding to scale their business. At a later stage, company founders might seize the opportunity to "cash out", typically by selling their venture to another company or by listing it on the stock market. For the purpose of this report, two indicators were used to capture how well a country manages to drive the dynamics of this business life cycle:

PERCEPTION OF VENTURE CAPITAL AVAILABILITY.

The World Economic Forum (WEF) Competitiveness Index was used to measure the perceived ease for companies to access financial capital for seeding and expanding a business.[17]

NUMBER OF INITIAL PUBLIC OFFERINGS (IPOs) OF DIGITAL FIRMS.

This indicator, standardized for population size, was used as a proxy for the ability of digital firms to raise capital via a stock market listing.

17. Whilst we are aware of the limitation of a perception index versus a purely quantitative one, there is a lack of a robust quantitative measure of funding availability for local startups – mainly because the available sources (e.g., Crunchbase) have different levels of coverage across Asia Pacific. A perception index of this kind has therefore three main merits: i) it covers all the stages of venture capital financing; ii) it comes directly from local entrepreneurs; and iii) it is easily comparable across countries and does not require standardizations that would potentially introduce further distortions.

Australia, Singapore, and Japan are overall leaders in this dimension, as seen in Exhibit 11. Perhaps surprisingly, Malaysia ranks first in terms of venture capital (VC) availability. The country recently invited "500 startups", an American Venture Capital fund, to collaborate with the Malaysian Global Innovation & Creativity Centre (MaGIC) on a domestic startup and entrepreneurship program. The program provides funding and advisory services to support the growth and internationalization of domestic startups.[18] In 2016, the government also increased its budget allocation to support small and medium-sized enterprises and startups by MY$6 billion (around US$1.44 billion).[19]

Australia leads in terms of the number of IPOs of digital firms (relative to population size), with almost two IPOs per one million inhabitants in the last two years. These include GetSwift, a logistics optimization software company previously based in New York; and OpenDNA, an artificial intelligence software company with offices in Singapore, South Africa, and the USA.[20] Their decision to get listed in Australia – rather than in other markets where they also operate – is a testament to the strong reputation of the Australian stock exchange and ability to raise a substantial amount of capital for digital enterprises.

At the other end, South Korea ranks surprisingly low in both sub-indicators. An executive of a large digital MNE based in Seoul commented that South Korea has been relying for a long time on state-backed financial resources, and it is, therefore, struggling to transition to privately-owned and driven funds. The country has recently launched several initiatives to increase the availability of capital—including through non-traditional funding channels like the Korea Startup Market, which is described in Box 1.

18. "500 Startups And Malaysia's MaGIC to Run Post-Funding Startup Growth Program In Southeast Asia", Tech Crunch, Jul 2015. Retrieved at https://techcrunch.com/2015/07/12/500-startups-distro-dojo-southeast-asia/

19. These funds include the Malaysian Venture Capital Management Bhd and Malaysian Technology Development Corporation. "Malaysia Budget 2016 revision sees VC funding going up by $1.44b, to spur consumer spending by $1.92b", Deal Street Asia, January 2016. Retrieved at http://www.dealstreetasia.com/stories/28878-28878/

20. "About Hot Copper", Hot Copper, 2016. Retrieved at http://investors.hotcopper.com.au/about/

EXHIBIT 11:

AUSTRALIA IS THE CLEAR LEADER ON DIGITAL IPOs (PER CAPITA), WHILE MALAYSIA LEADS ON VENTURE CAPITAL AVAILABILITY

DIGITAL NATION SCORECARD - FINANCIAL CAPITAL

RANK	OVERALL– FINANCIAL CAPITAL	INDICATORS	
		Venture Capital Availability[1] *(Max=7)*	Digital IPOs, 2015-2016[2] *(# per 1 million inhabitants)*
1	Australia	3.2	1.918
2	Singapore	4.6	0.181
3	Japan	3.6	0.550
4	Taiwan	4.2	0.298
5	Malaysia	4.8	0
6	New Zealand	4.1	0
7	India	4.0	0.004
8	Indonesia	3.8	0
9	Thailand	3.3	0.029
10	South Korea	2.6	0.257
11	Viet Nam	3.0	0.011

1. Indices for venture capital availability reflect latest score by WEF World Global Competitiveness Report (2016/2017)

2. Digital IPOs refer to companies successfully listed on each country's stock exchange between 2015 and 2016 and that produce goods and services in the digital sector

SOURCE: WEF, Bloomberg, Literature review, AlphaBeta analysis

BOX 1.
KOREA STARTUP MARKET (KSM)

In South Korea, startups generally find it challenging to secure financial funding from banks and even venture capital. This hurdle is illustrated by the country's low "venture capital availability" score on the World Economic Forum's Global Competitiveness Index. A main reason for the dearth in available startup funding is the conservative lending practice of Korean banks when confronted with companies that have a limited financial and commercial track record.

A new securities exchange for startups could change the situation. In November 2016, the Korea Exchange (KRX) launched the Korea Startup Market (KSM), to provide additional financial support to the county's 30,000 startups. KSM is a marketplace where investors can buy and sell equity shares of early stage startups in the public market.[21] It is also the first stock exchange in the country to commercially adopt blockchain technology to record trades. Startups listed on the KSM are required to raise money through crowdfunding or holding recommendations from state entities, such as the Korea Development Bank.[22] KSM also provides advisory services, training, and consulting to support startups listed on its marketplace.

To date, over 42 startups have been listed on the KSM and cover a variety of activities in the technology sector - including digital media, health, e-commerce, online games, and fintech.[23] Although it is still in its infancy, the Korea Exchange has high hopes that the KSM could act as an entry point for startups to later participate in more mature stock markets.

21. "Korea Exchange Launches Korea Startup Market using Blockchain Technology ", CrowdFund Insider, November 2016, retrieved at http://www.crowdfundinsider.com/2016/11/92779-korea-exchange-launches-korea-startup-market-using-blockchain-technology/
22. "Korea Exchange opens stock market for startups" Arirang News, Nov 2016. Retrieved at http://www.arirang.co.kr/News/News_View.asp?nseq=197646&sys_lang=Kor
23. "Korea Exchange opens stock market for startups" Arirang News, Nov 2016. Retrieved at http://www.arirang.co.kr/News/News_View.asp?nseq=197646&sys_lang=Kor

DIGITAL PRODUCTS

Digital goods and services are omnipresent in our lives: the challenge for researchers and policymakers is to understand and improve both the quantity and the quality of digital products created in each country. The average Indonesian spends 6.8 hours per day looking at the screen of a PC, smartphone, or tablet; Vietnamese citizens are not far behind, with around 6.6 hours of screen time per day.[24] Each time they consult their devices, they are consuming, buying, or at least using a digital good or service.

The following indicators can capture how well a country fares at developing and commercializing digital goods (Exhibit 12):

TOP FREE APPS DOWNLOAD INDEX.

This index measures the popularity of free mobile apps produced in each of the 11 Asia-Pacific countries across 18 key global markets.[25] Focusing on the apps in the top 100 list of each market, the index sums the number of downloads and standardizes the numbers for the size of the population in each (producing) country.

TOP PAID APPS DOWNLOAD INDEX.

This index measures the relative popularity of paid mobile apps produced in the 11 Asia-Pacific country across 18 key markets.

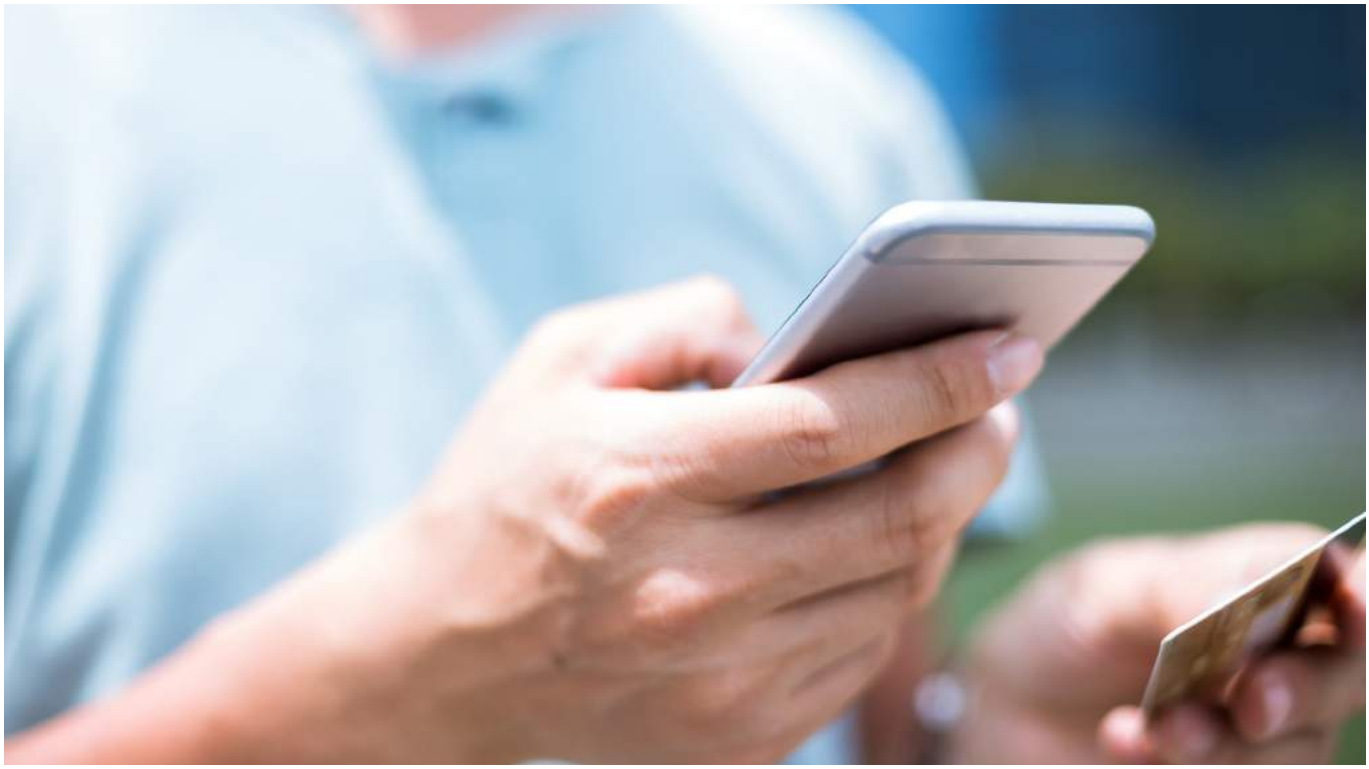
DIGITAL PATENT GRANTS.[26]

This indicator, taken from the World Intellectual Property Organization (WIPO), is used as proxy for the innovative capacity of a country, measuring its Intellectual Property (IP) endowments in the digital sector.

24. "Internet Trends code conference", presentation by M. Meaney, May 2014. Retrieved at https://qz.com/214307/mary-meeker-2014-internet-trends-report-all-the-slides/ (slide 96)
25. Note: These markets include the 11 Asia Pacific countries, as well as the seven largest markets of the other regions of the world.
26. Total number of patent grants filed for digital communication and computer technology. Standardized per 1 million inhabitants.

The performance scorecard of a country's success in being a digital product leader, summarized in Exhibit 12, yields two interesting insights:

- **IP endowments are the foundation of a Digital Nation.** In the sub-category of "digital communications", Japan accounted for 20% of all the global patents filed for this sub-category in 2015. There are several potential reasons for this result: i) a strong push to develop an ecosystem that champions innovation—the government has recently set an ambitious target to generate ¥30 trillion (around US$26.4 billion) of value-added goods and services by supporting growth in the Internet of Things, Big Data, Artificial Intelligence, and Robotics[27]; ii) a robust consumer market for creative, novel technology—for example, Japan is home to the word's first laundry folding robot, automated hotel, and even an automated farm; and iii) a strong business culture and regulatory system that has a positive attitude towards intellectual property protection.[28]
- **Digital products overcome geographical remoteness.** While a small domestic market is often seen as a significant constraint for the growth of local firms, developing digital products can help countries transcend geographical constraints. To illustrate, New Zealand, which is the most remotely located country in the list, is the top performer for top paid apps downloaded. "Bloons Tower Defence", developed by "Kiwi Ninja" has led the proliferation of "made in New Zealand" apps, and features strongly in the top 100 apps in five foreign app markets (United States, Germany, Nigeria, Australia, and South Korea).



27. *"Drive Innovation and Trade Retrieved", The Government of Japan, 2017. Retrieved at: http://www.japan.go.jp/abenomics/innovation/*
28. *"Asia takes lead in rush to monetise innovation", Financial Times, June 2016. Retrieved at https://www.ft.com/content/69b37312-0e21-11e6-b41f-0beb7e589515*

EXHIBIT 12:

JAPAN AND SOUTH KOREA ARE CLEAR LEADERS IN DEVELOPING DIGITAL PRODUCTS GLOBALLY

DIGITAL NATION SCORECARD - DIGITAL PRODUCTS

RANK	OVERALL– DIGITAL PRODUCTS	INDICATORS		
		Top free apps download index[1]	Top paid apps download index[1]	Digital patent grants[2] *(# per 1m inhabitants)*
1	South Korea	1.05	0.70	213.56
2	Japan	0.49	0.55	137.00
3	Taiwan	0.25	0.28	198.5
4	Australia	0.39	0.83	77.4
5	New Zealand	0.18	1.26	26.76
6	Singapore	0.20	0.01	83.87
7	Malaysia	0.06	0.00	8.37
8	Viet Nam	0.06	0.03	0.98
9	India	0.07	0.01	1.05
10	Indonesia	0.05	0.03	0.49
11	Thailand	0.05	0.01	1.32

1. Index was calculated using the relative share of Android apps from an APAC country in the "top 100 apps" from the 11 APAC countries and seven other large markets globally. The share is adjusted for the relative size of the country's online store (proxied using smartphone users), and weighted by the population of the producing country.

2. Patent grants only include those that were filed for digital communication and computer technology; data for Indonesia, Singapore, Thailand, and Viet Nam for digital and computer technology patents was unavailable and proxied using the average share of technology related grants to total patent grants in the other seven countries – where data was available.

SOURCE: App Annie, WIPO, literature review, AlphaBeta analysis

HUMAN CAPITAL

The pioneers of a Digital Nation are the people creating its digital goods and services, i.e., the local and foreign talent the country manages to attract, retain, develop, and employ. This dimension, dubbed "human capital", is proxied using three indicators (Exhibit 13):

TALENT ATTRACTION.

Taken from the WEF Networked Readiness Index, this survey-based indicator measures a country's capacity to attract top people.[29]

TALENT RETENTION.

This survey-based indicator measures the perceived country capacity to retain top people.[30]

"APP JOB INTENSITY".

AlphaBeta adopted a big data approach to calculate the total number of app-related jobs as a share of the total workforce proxying for the importance and the pervasiveness of the "app economy" (more details are provided in Box 2).[31]

29. Data was taken from the World Economic Forum Competitiveness Report 2016, a survey which asked respondents to score a country (1= very unsuccessful; 7 = very successful) based on the following question: "How successful is [country] at attracting the best and brightest minds from around the world?"
30. Data was taken from the World Economic Forum Competitiveness Report 2016, a survey which asked respondents to score a country (1= very unsuccessful; 7 = very successful) based on the following question: "How successful is [country] at retaining the best and brightest minds from around the world?"
31. This approach adapted the work of M. Mandell, "The App Economy in Europe: Leading Countries and Cities", Progressive Policy Institute Memo, June 2016. See box 2 for further details.

EXHIBIT 13:

SINGAPORE LEADS OVERALL IN THE HUMAN CAPITAL DIMENSION OF A DIGITAL NATION

DIGITAL NATION SCORECARD - HUMAN CAPITAL

RANK	OVERALL– HUMAN CAPITAL	INDICATORS		
		Talent attraction *(Max=7)*[1]	Talent retention *(Max=7)*[1]	App job intensity *(% of labor force)*[2]
1	Singapore	6.0	5.5	1.63%
2	Malaysia	5.1	5.3	1.17%
3	New Zealand	4.9	4.4	0.95%
4	India	4.4	4.3	0.79%
5	Taiwan	3.5	4.1	0.94%
6	Australia	4.7	4.5	0.39%
7	South Korea	3.7	4.4	0.45%
8	Indonesia	4.2	4.2	0.11%
9	Japan	3.2	4.1	0.30%
10	Thailand	3.8	3.9	0.19%
11	Viet Nam	3.3	3.2	0.16%

1. Indices for ability to attract and retain talent reflect latest score by WEF World Global Competitiveness Report (2016/2017)
2. App intensity refers to the share of core app jobs as a % of total jobs in the economy. A big data approach – scrapping data from online job platforms - was used to approximate the size of the app economy through the relative share of the ICT job postings to the actual number of ICT jobs
SOURCE: WEF, Indeed.com, literature review, AlphaBeta analysis

BOX 2.
SIZING APP-RELATED JOBS AND "APP JOB INTENSITY" IN ASIA PACIFIC

Innovation is an important driver of job creation in today's economy. The rapid market penetration of smartphones and personalized applications have created a new digital sector, known as the "app economy". Although there are various definitions for this latest branch of the Information & Communications Technology (ICT) sector, we define the "app economy" as the products (and jobs) directly created by, or linked to, mobile phone applications.

To calculate the impact of the "app economy" on the workforce, we built upon the work of Michael Mandel at the Progressive Policy Institute. The actual size of the "app economy" was proxied through three key figures, obtained via a combination of web-crawlers, job portals, and information from various government statistics bureaus:

1. **Core-app job postings.** The "app economy" requires a significant amount of technical expertise to develop, maintain, and support the mobile applications ecosystem. Using a webcrawler to collect data from Indeed.com – an online job portal - we identified job postings containing at least one of the following key words: iOS; Android; Blackberry; Windows Phone; Windows Mobile; App; Developer. Results generated were manually verified to ensure that these positions referred to app-related, core-technical jobs such as app developers, user-interface designers, security engineers, and testers.

2. **ICT sector job postings.** ICT sector jobs posting are a much larger classification than job posting for the "app economy". The sector includes individuals who work in ancillary and supporting jobs in the "app economy", such as Network administrator, database administrator, and telecommunications engineer. To collect data on the job vacancies related to the ICT sector in each country, we constructed another set of keywords to identify ICT job postings in that country and ran a similar crawler through Indeed.com's local websites. Results generated were physically verified to ensure that the postings reflected ICT-related jobs based on the country specific definitions of the ICT sector.

3. **Total employment in ICT sector.** This figure was acquired from government statistics departments – where available. Otherwise, the OECD definition and figures were used.

Using the data acquired in each country, AlphaBeta calculated the ratio of ICT job postings over total jobs in the ICT sector, and then applied this ratio to the core-app job postings in order to derive an estimate for the total size of app employment in each country.

"App job intensity" was finally measured by dividing the estimated number of core-app jobs in relation to the total labor force. This is a conservative measure of the "app economy" as it only considers core/technical jobs in the "app economy" and excludes other non-technical employees – even if they are working for companies in the "app economy", in roles such as sales, human resource, marketing, cleaning services. It also excludes a variety of jobs created either directly through the "gig" economy (temporary opportunities through mobile applications such as Uber Drivers) or indirectly through increased consumer spending (for example, delivery drivers for e-commerce retailers).[32]

32. This approach adapted the work of M. Mandell, "The App Economy in Europe: Leading Countries and Cities", Progressive Policy Institute Memo, June 2016.

Although there is no conclusive evidence to confirm that the best people are attracted and retained by the "app economy", it is interesting to note how these indicators go hand-in-hand. Singapore, Malaysia, and New Zealand, the leading countries in this dimension, are not only very good at attracting and retaining talent, they also employ a significant amount of people in their "app economies". The human capital policies of their governments in these countries share two common traits. They include:

- **Strong platforms to support innovation and R&D.** For instance, the Singaporean government attracts the world's leading scientists through generous funding for R&D and innovative technologies through its SG$19 billion (around US$14 billion) "Research, Innovation and Enterprise 2020 Plan". Similarly, New Zealand's "Entrepreneurial Universities" initiative financially supports world-leading entrepreneurial researchers to base their research laboratories in its universities.[33]
- **Supportive policies for professionals to enter and return from overseas.** For example, Malaysia has reformed regulations to make recruitment of foreign ICT workers easier via special immigration laws.[34] Likewise, Singapore's "Returning Singaporean Scientist" scheme, which aims to attract Singapore scientists based abroad to work in Singapore, has successfully attracted Singaporeans in the field of computer science, advanced electronics and biotechnology to return home.[35]

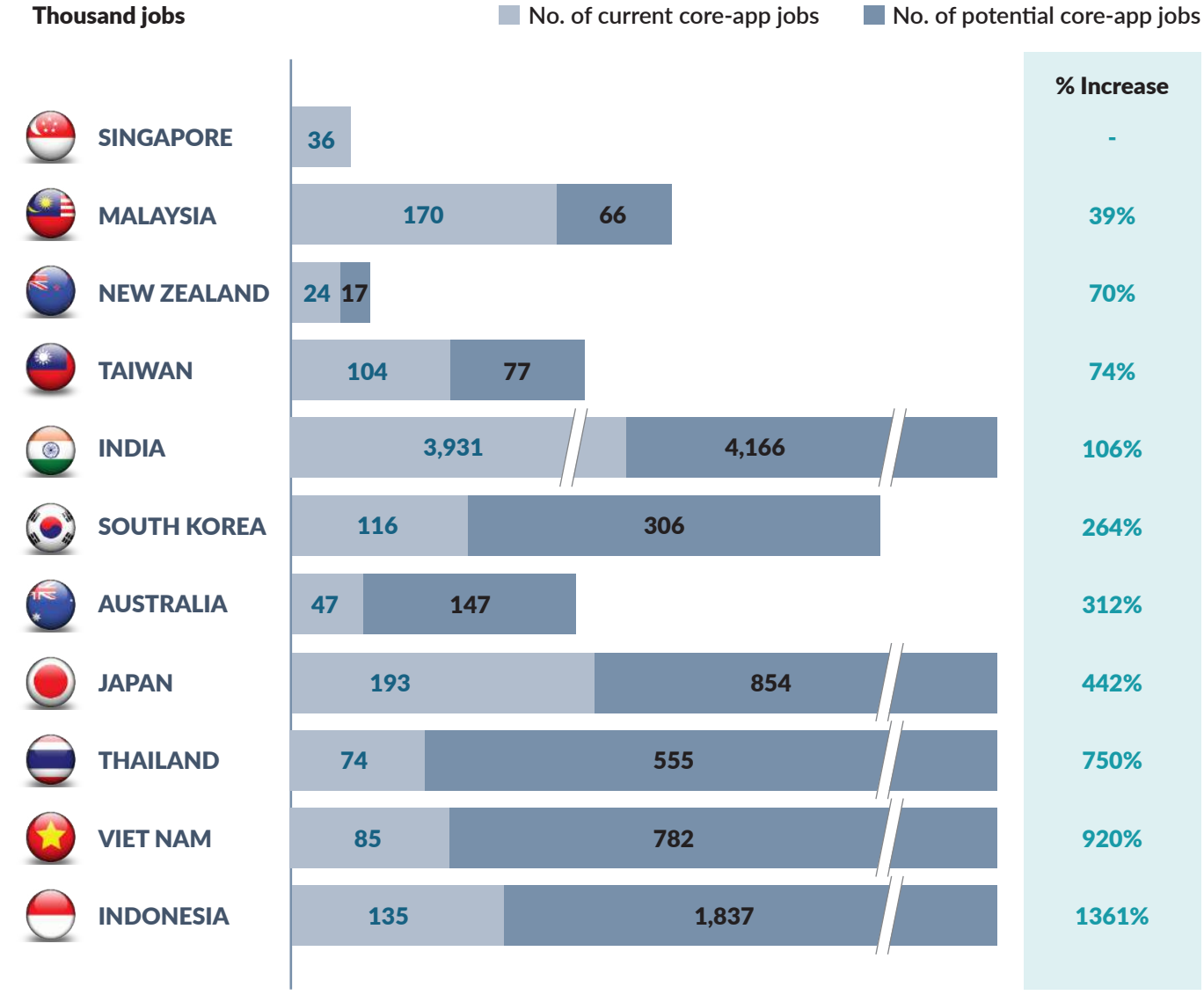
Finally, Exhibit 14 shows the current size and the potential of the "app economy" to transform the workforce: if all the Asia-Pacific countries would have the same "app job intensity' as Singapore, an additional 8.8 million core-app jobs could be created on top of the current 4.9 million in the 11 Asia-Pacific countries.[36]

33. "Govt announces new $35 million fund to attract world-class researchers", New Zealand Herald, July 2016. Retrieved at http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11678054
34. "The Global Startup Ecosystem Ranking", Compass, 2015.
35. "Three top Singaporean scientists coming home", Straits Times, Jan 2016. Retrieved at http://www.straitstimes.com/singapore/three-top-singaporean-scientists-coming-home
36. This estimate is a theoretical exercise to give an idea of the potential impact of the app economy on the workforce. The next step of research would be to consider general equilibrium effects such as wage increases and shifts of workers between sectors to accommodate labour demand.

EXHIBIT 14:

RAISING "APP JOB INTENSITY" TO SINGAPORE'S LEVEL COULD CREATE AN ADDITIONAL 8.8 MILLION JOBS ACROSS 11 APAC COUNTRIES

APP JOB INTENSITY AND POTENTIAL JOB CREATION[1]



1. This analysis only includes app jobs in the core App-Economy i.e., it excludes jobs in sales, human resource, finance – even if the workers may be employed by digital companies
SOURCE: Literature review, AlphaBeta analysis

DIGITAL COMMUNITY

Digital Nations wouldn't exist without a community of local and international digital firms. These firms attract the financial capital and employ the talent to create new digital products. Digital communities around the world are built on three key pillars, which informed the choice of indicators:

NUMBER OF LOCAL STARTUPS.

Number of local startups standardized per population size.[37]

SIZE OF NATIONAL CHAMPIONS.

This indicator was constructed by summing the market value of the three largest domestic digital companies (at the end of 2016), to measure the country's capacity to grow its mature enterprises.

MNEs CONTRIBUTION INDEX.

AlphaBeta's MNE contribution index measures the country-specific contribution of the top 20 digital MNEs along 10 specific channels (described in the previous chapter). [38]

There are few surprises in this category (Exhibit 15):

- Japan leads the group (due to the high value of its digital companies and active digital MNE presence in the country), followed by Singapore and Australia.
- The size of the top three digital public companies also seem to be very significantly correlated with GDP size, as well as with the economic footprint of large conglomerates, such as Chaebol in South Korea and Keiretsu in Japan.
- While there is significant variation in the rankings for both the number of startups and national champions, contributions of digital MNEs are closely linked to the overall performance of a country's digital community (for example, the top five countries in this dimension score significantly higher in the MNE contribution index than the bottom six).

37. Given how hard it is to classify and quantify the exact number of digital startups, we employed a combination of different country sources (e.g., "Tech in Asia" and "Angel list"). Our results are deliberately conservative and are largely consistent with other reports, including Google and Temasek's in-depth study of the digital economy in ASEAN. In "e-Conomy SEA: Unlocking the $200 billion digital opportunity in Southeast Asia," Google and Temasek, 2016.

38. AlphaBeta used a combination of research (e.g., press releases, annual reports, newspaper and academic articles) and expert interviews to develop the MNE Contribution Index. The Index measures the contribution of digital MNEs across 10 impact channels – with a focus on providing financial capital, supporting the development of digital community; increasing human capital capabilities and developing digital products in the country. The 10 channels are listed in Chapter 1.

EXHIBIT 15:

JAPAN IS THE OVERALL LEADER IN THE DIGITAL COMMUNITY DIMENSION OF A DIGITAL NATION

DIGITAL NATION SCORECARD - DIGITAL COMMUNITY				
RANK	OVERALL– DIGITAL COMMUNITY	INDICATORS		
		Startups *(# per 1m inhabitants)*	Market value of the top 3 digital companies in 2016 *(USD million)*[1]	Digital MNE Contribution Index *(Max=7)*
1	Japan	6	142,300	4.6
2	Singapore	406	69.4	4.5
3	Australia	206	8,880	4.2
4	India	18	51,700	4.9
5	South Korea	8	32,210	4.3
6	New Zealand	84	2,206.8	3.5
7	Taiwan	19	803.2	3.7
8	Indonesia	8	60	3.9
9	Malaysia	26	18.7	3.5
10	Thailand	18	32	3.5
11	Viet Nam	17	1.5	3.3

1. Based on publicly available data for the top 3 digital companies. Indonesia, Thailand and Viet Nam have only one entry.
SOURCE: Tech in Asia, Angel list, literature review, AlphaBeta analysis

KEY IMPLICATIONS AND TAKEAWAYS

Based on the findings in the previous two chapters, this chapter extracts the main implications policymakers face when trying to accelerate the growth of their digital economies and become a Digital Nation. It offers a synthesis of the quantitative scorecard analysis and the qualitative insights from interviews with hundreds of stakeholders in Asia Pacific's digital economies.

TALENT - SHIFT FROM THINKING ABOUT OCCUPATIONS TO SKILLS.

A 2015 survey of internet investors also highlighted education as the most impactful government intervention to increase investments in the Asia Pacific.[39] New skills will be needed to support the shift to a Digital Nation. Drawing on online job advertisement data, a recent AlphaBeta report revealed that certain enterprise skills (ones that are transferrable across occupations), such as digital literacy and critical thinking, are strongly in demand at present.[40] Workers do not always have to acquire a set of entirely new skills when they change jobs because their skills are often "portable" to other jobs. AlphaBeta's past research has found that an average person training or working in one job automatically acquires skills for 13 other jobs.[41] This means most people are skilled for more jobs than they, or their potential employers, realize. Even more interestingly from a policy context: AlphaBeta's past research found that targeted training programs can significantly increase the scope of available occupations to an individual. Someone who has already trained or worked in one job, would typically only need one additional skill to match the requirements listed in ads for 44 different other jobs.

There are opportunities for government to work more closely with the digital sector to support this skills transition. For example, Airtel launched a campaign in India ("Each One Teach One") to encourage its network of 1.4 million retailers and 20,000 field executives to spread digital and financial literacy in their communities[42].

TECH INVESTMENT CLIMATE - EMBED MULTINATIONALS AS ANCHORS.

MNEs play a key role in shaping Digital Nations through at least 10 channels linked to their human and financial capital, digital products and community. Most of their contributions are almost impossible to be replicated by governments or by "national champions"; the journey towards a Digital Nation becomes much harder and slower without involving MNEs as active partners.

Governments should try to pro-actively establish a mutually-beneficial relationship with MNEs. Indonesia and Malaysia have already moved to encourage a greater participation of MNEs as anchors and catalysts of digital development. They recently started talks to make Alibaba founder and CEO Jack Ma a member of their national digital economy committees, signaling their readiness to give large tech players a shared stake in the national digital strategies.[43] In Europe, Denmark recognizes the importance of digital MNEs for the digital and economic development of the country and is planning to appoint a "Digital Ambassador" among the ranks of senior governments, who will be tasked to liaise, strengthen links and establish partnerships with large multinational companies.[44]

Our research also found that MNEs can become a catalyst for the digital economy even without a large physical presence in a country. In fact, less than 20 percent of MNE contributions require a significant physical presence (Exhibit 16). MNEs may choose to open data centers or innovation hubs, but they can already add value to a country's digital economy when their presence is less publicly visible, for example when providing technology to local firms or training local workers.

Strong ties between these global players and local firms are crucial to strengthen a country's digital ecosystem. For example, Google has committed to training 100,000

39. "The impact of Internet Regulation on Local and Foreign Investment", The Fifth Era, December 2015
40. The New Basics: Big data reveals the skills young people need for the New Work Order, AlphaBeta and the Foundation for Young Australians (FYA), 2016.
41. The new work mindset, 7 new job clusters to help young people navigate the new work order, AlphaBeta and the Foundation for Young Australians (FYA), 2016.
42. "Sustainability report", Airtel, 2015. Retreived at: http://www.airtel.in/sustainability-file/common/files/Airtel%20CSR%202016_web.pdf
43. "Matrade: TN50 to prepare nation's economic structure after if high-income status achieved by 2020", The Malay Mail Online, January 2017. Retrieved at http://www.themalaymailonline.com/malaysia/article/matrade-tn50-to-prepare-nations-economic-structure-after-if-high-income-sta#sthash.ZICkO1ED.dpuf
44. "Denmark to Appoint a 'Silicon Valley Ambassador' As If Tech Was Its Own Country", Fortune, January 2017. Retrieved at http://fortune.com/2017/02/06/denmark-ambassador-apple-google/

app developers in Indonesia by 2020 in a bid to expand the local digital talent pool. The company offers various Android development courses for computer science students in partnership with local universities. Google has begun to translate its non-profit Udacity courses into Bahasa. It also launched mentorship programs for software developers called "Google Developers Study Jams" in five major Indonesian cities.[45]

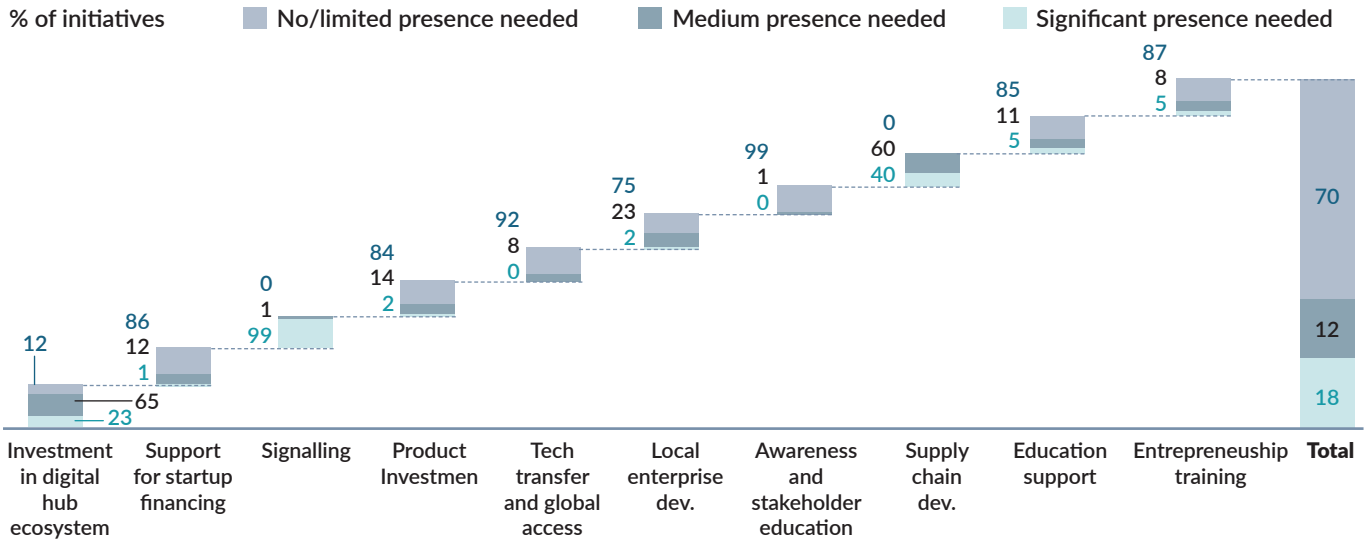
RETHINK TAX - APPROACH IS MORE IMPORTANT THAN RATE.

Most of the investors, entrepreneurs, and MNE executives surveyed are less concerned about overall tax rates than they are about the discriminatory, aggressive and unpredictable behavior of fiscal authorities. This indicates that many may accept a higher tax rate more easily if they perceived the rate as "fair and predictable". The result also highlights the danger of "ringfencing" the digital economy with sector-specific taxes or by making digital investors feel "discriminated". To succeed in the investment world, where expectations count as much as facts, countries are well-advised to create an investor-friendly image. Dozens of investment-enhancing laws might miss their purpose if they are poorly communicated to the public. New Zealand recently demonstrated it is acutely aware of investor needs when it rejected a proposed diverted profit tax (DPT) on the basis that it would have a negative impact on tax predictability and fairness of tax regime.[46]

EXHIBIT 16:

LESS THAN 20% OF MNE CONTRIBUTIONS REQUIRE A SIGNIFICANT PHYSICAL PRESENCE IN THE BENEFICIARY COUNTRY

MNE CONTRIBUTION BY CHANNEL AND INTENSITY OF PHYSICAL PRESENCE[1]



1. MNE presence based on the AlphaBeta MNE Contribution Index (See Appendix for details). Using the same initiatives recorded in the database, AlphaBeta analyzed the physical presence required for these initiatives to be successful. "Significant presence" refers to initiatives which require a permanent physical ("brick & mortar") presence in a country (e.g., establishing data centers, country offices, etc.); "Medium presence" refers to initiatives which only require a significant but temporary physical presence in the country, or, a partial physical presence due to partnerships with local stakeholders (e.g., product development with local banks, research cooperation with local R&D centers,); "No/limited presence" refers to activities that MNEs can support remotely or through limited and temporary physical presence in the country (e.g., roadshows, app developer courses, etc.).
SOURCE: AlphaBeta MNE Contribution Index, AlphaBeta analysis

45. Commitment made by Google to President Joko Widodo on February 18, 2016. "Widodo promises digital economy boom for Indonesia", Nikkei Asian Review, March 2016. Retrieved at http://asia.nikkei.com/Politics-Economy/Economy/Widodo-promises-digital-economy-boom-for-Indonesia?page=2
46. "Measures to strengthen transfer pricing rules and prevent permanent establishment avoidance", New Zealand Office of the Minister of Finance and Office of the Minister of Revenue, 2016. Retrieved at: http://taxpolicy.ird.govt.nz/sites/default/files/2016-other-cabinet-paper-transfer-pricing.pdf

Implementing the recommendations made in this report requires strong government coordination. National Digital Strategies do not fit neatly into just one economic sector, nor under one ministerial remit. They are influenced by ICT laws, education policies, and immigration flows, which fall under the responsibility of various government agencies and decision-makers. Alphabeta analysis found that the digital economy impacts 38 government departments in the New Zealand, 65 in Australia, and up to 72 in Singapore. A frequent concern raised in interviews with MNEs and startups is that government departments often lack a coherent approach to manage the digital economy. To quote one interviewee – "The Prime Minister and certain senior ministers are incredibly supportive, but at the same time we face incredible roadblocks in some of the other relevant ministries. It is almost like working with different governments on occasions". Exhibit 17 shows the presence of the two most common coordination mechanisms in Asia-Pacific countries:

1. SINGLE EXECUTING/COORDINATING AGENCY.

This approach puts one specific agency in charge of developing the digital economy. For instance, South Korea's Ministry of Science, ICT and Future Planning is the central agency driving implementation of the country's digital strategy. This Ministry has a wide portfolio of responsibilities, ranging from developing centers of innovation around the country to providing policy support for startups and even identifying new growth areas for the economy.

2. COORDINATING COMMITTEE.

This approach requires coordination across different government bodies, for example through regular cross-ministerial working group sessions. Taiwan's National Development Council lets various ministries define their own digital economy strategy. The Council limits its role to providing minimal guidance and monitoring that each ministry is consistent with national goals. Singapore, in turn, has established a coordination committee and executing ministry to oversee different agencies' efforts to strengthen the digital economy. For example, while the Singaporean Ministry of Communication and Information is in charge of implementing the government's plan "Infocomm Media 2025", it works closely with other agencies, such as "GovTech" and "Info-communications Media Development Authority".

Regardless of the approach used, governments need to make sure that digital sector does not become "siloed", degrading its relevance and leaving it as a strategic priority for only a handful of ministries. Strong leadership from the highest offices in the state may be needed to ensure the digital economy remains a national key policy area. In Singapore, for example, the government has appointed the Prime Minister's Office (PMO) as the central coordinating body overseeing the country's national digital strategy.[47]

47. "Update on the CFE: 'Leveraging the digital economy", Committee on the future economy, 2016. Retrieved at https://www.gov.sg/microsites/future-economy/press-room/news/content/leverage-the-digital-economy

EXHIBIT 17:

ASIA-PACIFIC COUNTRIES USE DIFFERENT COORDINATION METHODS TO MANAGE THEIR DIGITAL ECONOMIC STRATEGIES

COORDINATION MECHANISMS TO ADDRESS NATIONAL PLANS FOR THE DIGITAL ECONOMY[1]

✓ Present ✓ Partially present

DIMENSIONS/COUNTRY	AUS	NZL	KOR	TWN	JPN	IND	IDN	SGP	MYS	THA	VNM
Single executing/ coordinating agency (e.g., Ministry or department driving implementation)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Coordination committee with various government departments (with private sector involvement)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

1. Most countries have several national strategies to support the digital economy. Analysis based the most prominent national strategy linked to promoting a digital economy (e.g., promoting technology firms, R&D, innovation, e-commerce, etc.).

SOURCE: Literature review, National Government agency websites, AlphaBeta analysis

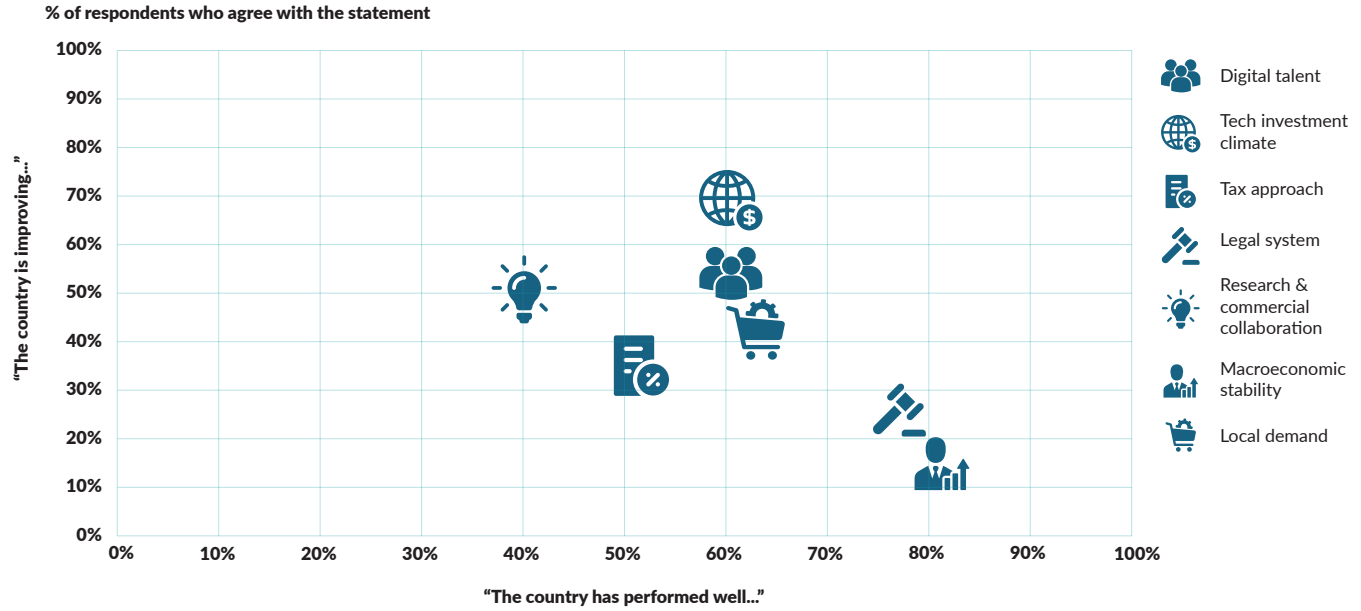
APPENDIX A
COUNTRY-SPECIFIC PAGES

DIGITAL NATION SURVEY – POLICY LEVERS.

The graph plots the percentage of survey respondents agreeing with the statement that the country is performing well on each lever. The x-axis refers to the current performance; the y-axis refers to the future performance.

AUSTRALIA'S TECH INVESTMENT CLIMATE IS PERCEIVED AS STRONG SO FAR,BUT TAX APPROACH AND MACRO STABILITY ARE NOT EXPECTED TO IMPROVE

DIGITAL NATION PERCEPTION SURVEY



SOURCE: AlphaBeta Digital Nation Survey

DIGITAL NATION SCORECARD - MEASURES OF SUCCESS.

Each indicator is plotted as distance (in % points) from the best-in-class performance.

AUSTRALIA RANKS 2ND ON THE OVERALL SCORECARD: 1ST IN FINANCIAL CAPITAL AND 3RD IN DIGITAL COMMUNITY

Other countries

DIMENSION	SUB-DIMENSION	PERFORMANCE AS % OF BEST IN CLASS	RANK
FINANCIAL CAPITAL (1ST)	**Venture capital availability** (WEF GCI 2016/17)	20% 40% 60% 80%	9
	Digital IPOs (2015-16) (Per million inhabitants)		1
DIGITAL PRODUCTS (4TH)	**Top free apps download index** (weighted by population size)		3
	Top paid apps download index (Weighted by population size)		2
	Digital patent grants (standardized by population)		5
HUMAN CAPITAL (6TH)	**Talent attraction** (WEF GCI 2016/17)		4
	Talent retention (WEF GCI 2016/17)		3
	App job market (% of labor force)		7
DIGITAL COMMUNITY (3RD)	**Number of tech startups** (Per million inhabitants)		2
	Market value of the top 3 tech firms listed locally		4
	Digital MNE Contribution index		5

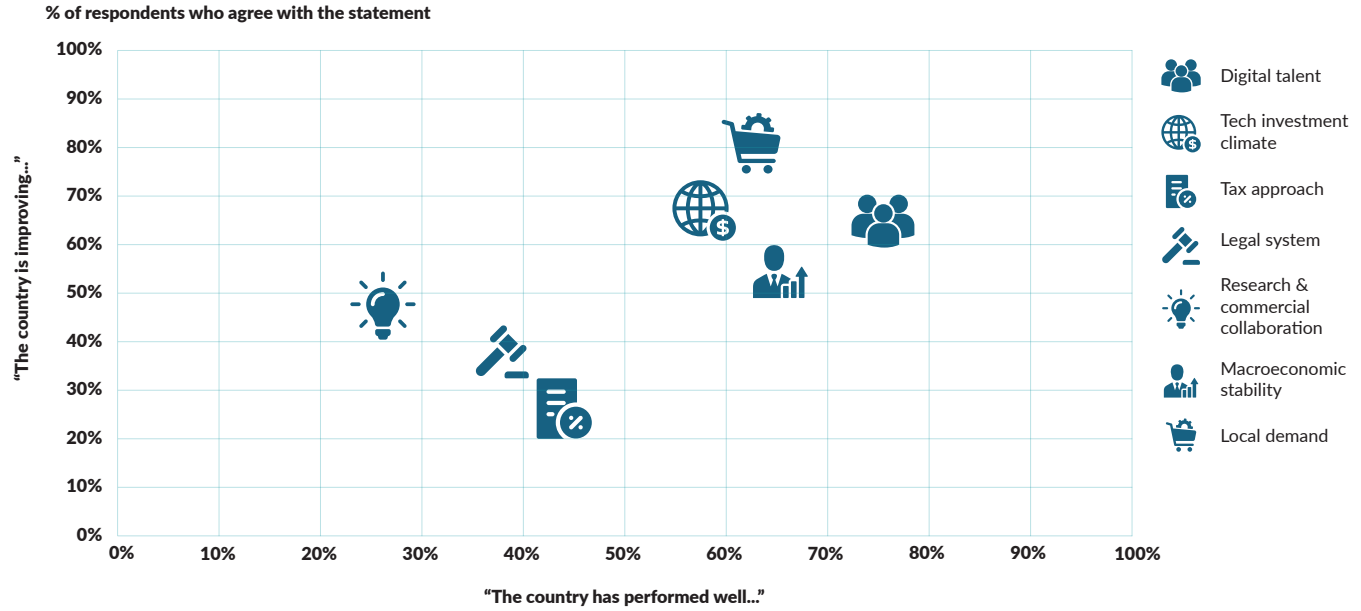
INDIA

DIGITAL NATION SURVEY – POLICY LEVERS.

The graph plots the percentage of survey respondents agreeing with the statement that the country is performing well on each lever. The x-axis refers to the current performance; the y-axis refers to the future performance.

INDIA'S LOCAL DEMAND AND DIGITAL TALENT ARE PERCEIVED AS STRONG,BUT THERE ARE CONCERNS ABOUT THE TRAJECTORY OF ITS TAX APPROACH

DIGITAL NATION PERCEPTION SURVEY



SOURCE: AlphaBeta Digital Nation Survey

DIGITAL NATION SCORECARD - MEASURES OF SUCCESS.

Each indicator is plotted as distance (in % points) from the best-in-class performance.

INDIA RANKS 8TH ON THE OVERALL SCORECARD: 4TH IN HUMAN CAPITAL AND DIGITAL COMMUNITY

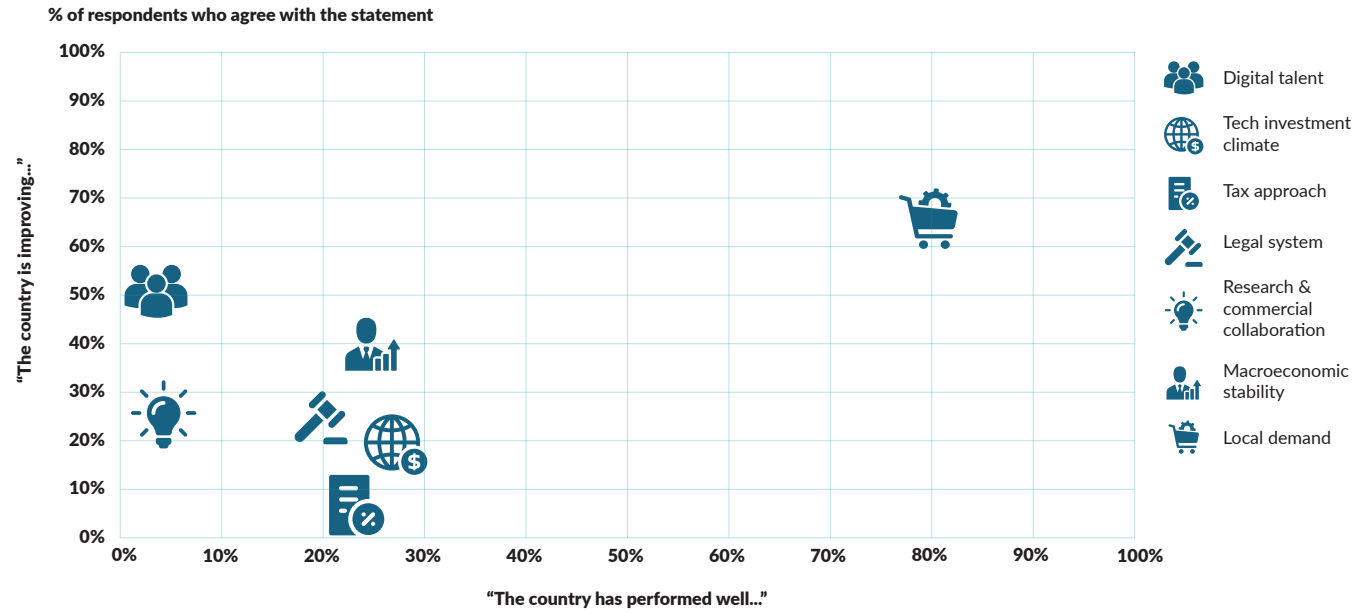
○ Other countries

DIMENSION	SUB-DIMENSION	PERFORMANCE AS % OF BEST IN CLASS	RANK
FINANCIAL CAPITAL (7TH)	**Venture capital availability** (WEF GCI 2016/17)	20% 40% 60% 80%	5
	Digital IPOs (2015-16) (Per million inhabitants)		8
DIGITAL PRODUCTS (9TH)	**Top free apps download index** (weighted by population size)		7
	Top paid apps download index (Weighted by population size)		9
	Digital patent grants (standardized by population)		9
HUMAN CAPITAL (4TH)	**Talent attraction** (WEF GCI 2016/17)		5
	Talent retention (WEF GCI 2016/17)		6
	App job market (% of labor force)		5
DIGITAL COMMUNITY (4TH)	**Number of tech startups** (Per million inhabitants)		7
	Market value of the top 3 tech firms listed locally		2
	Digital MNE Contribution index		1

DIGITAL NATION SURVEY – POLICY LEVERS.

The graph plots the percentage of survey respondents agreeing with the statement that the country is performing well on each lever. The x-axis refers to the current performance; the y-axis refers to the future performance.

ASIDE FROM LOCAL DEMAND, MOST SURVEY RESPONDENTS FEEL THAT INDONESIA IS NOT FULLY EXPLOITING THE POLICY LEVERS AT ITS DISPOSAL



SOURCE: AlphaBeta Digital Nation Survey

DIGITAL NATION SCORECARD - MEASURES OF SUCCESS.

Each indicator is plotted as distance (in % points) from the best-in-class performance.

INDONESIA RANKS 9TH ON THE OVERALL SCORECARD: 8TH IN HUMAN CAPITAL, FINANCIAL CAPITAL & DIGITAL COMMUNITY

Other countries

DIMENSION	SUB-DIMENSION	PERFORMANCE AS % OF BEST IN CLASS	RANK
FINANCIAL CAPITAL (8TH)	**Venture capital availability** (WEF GCI 2016/17)	20% 40% 60% 80%	6
	Digital IPOs (2015-16) (Per million inhabitants)		9
DIGITAL PRODUCTS (10TH)	**Top free apps download index** (weighted by population size)		11
	Top paid apps download index (Weighted by population size)		7
	Digital patent grants (standardized by population)		11
HUMAN CAPITAL (8TH)	**Talent attraction** (WEF GCI 2016/17)		6
	Talent retention (WEF GCI 2016/17)		7
	App job market (% of labor force)		11
DIGITAL COMMUNITY (8TH)	**Number of tech startups** (Per million inhabitants)		10
	Market value of the top 3 tech firms listed locally		8
	Digital MNE Contribution index		6

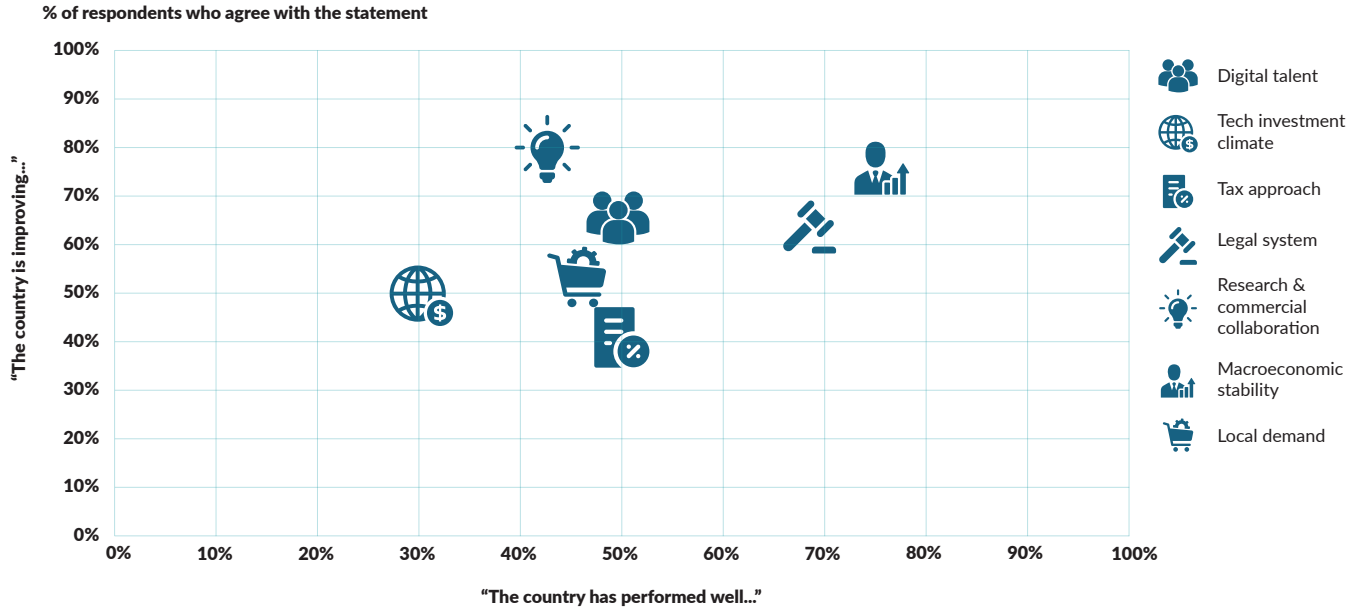
JAPAN

DIGITAL NATION SURVEY – POLICY LEVERS.

The graph plots the percentage of survey respondents agreeing with the statement that the country is performing well on each lever. The x-axis refers to the current performance; the y-axis refers to the future performance.

JAPAN'S MACRO STABILITY AND LEGAL SYSTEM ARE PERCEIVED AS STRONG, BUT THERE ARE SOME CONCERNS ABOUT TAX APPROACH

DIGITAL NATION PERCEPTION SURVEY



SOURCE: AlphaBeta Digital Nation Survey

DIGITAL NATION SCORECARD - MEASURES OF SUCCESS.

Each indicator is plotted as distance (in % points) from the best-in-class performance.

JAPAN RANKS 3RD ON THE OVERALL SCORECARD: 1ST IN DIGITAL COMMUNITY AND 2ND IN DIGITAL PRODUCTS

Other countries

DIMENSION	SUB-DIMENSION	PERFORMANCE AS % OF BEST IN CLASS	RANK
FINANCIAL CAPITAL (3RD)	**Venture capital availability** (WEF GCI 2016/17)	20% 40% 60% 80%	7
	Digital IPOs (2015-16) (Per million inhabitants)		2
DIGITAL PRODUCTS (2ND)	**Top free apps download index** (weighted by population size)		2
	Top paid apps download index (Weighted by population size)		4
	Digital patent grants (standardized by population)		3
HUMAN CAPITAL (9TH)	**Talent attraction** (WEF GCI 2016/17)		11
	Talent retention (WEF GCI 2016/17)		8
	App job market (% of labor force)		8
DIGITAL COMMUNITY (1ST)	**Number of tech startups** (Per million inhabitants)		11
	Market value of the top 3 tech firms listed locally		1
	Digital MNE Contribution index		2

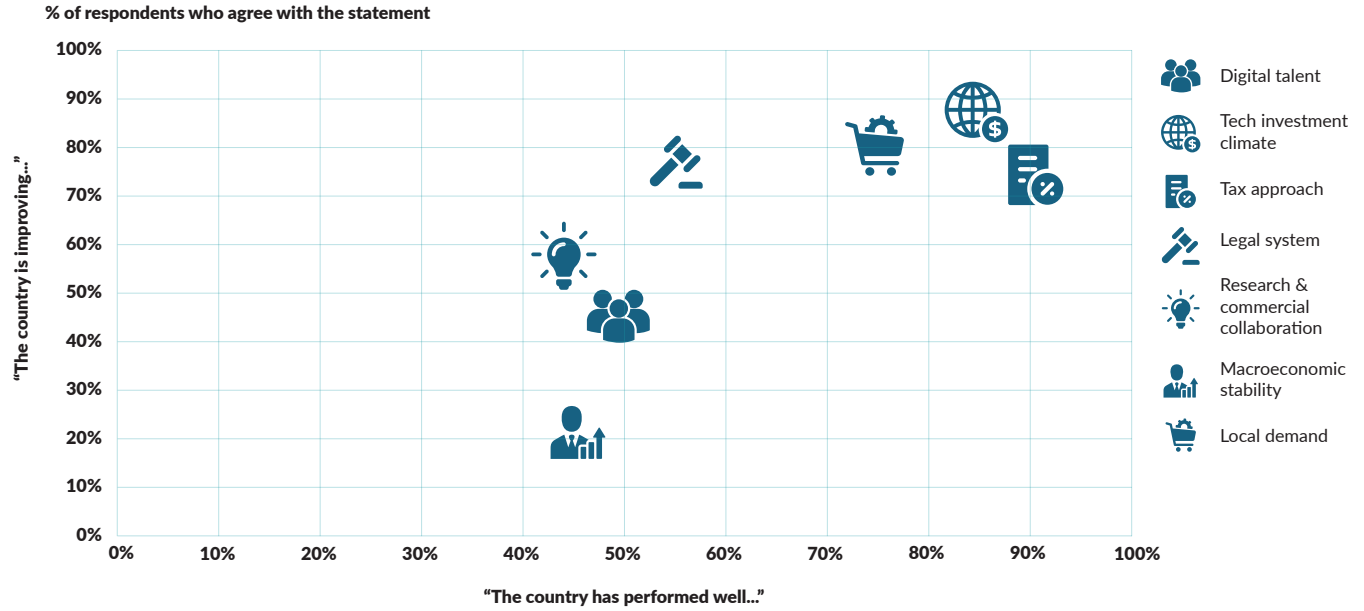
MALAYSIA

DIGITAL NATION SURVEY – POLICY LEVERS.

The graph plots the percentage of survey respondents agreeing with the statement that the country is performing well on each lever. The x-axis refers to the current performance; the y-axis refers to the future performance.

MALAYSIA'S TECH INVESTMENT CLIMATE, TAX APPROACH AND LOCAL DEMAND ARE PERCEIVED AS STRONG AND IMPROVING

DIGITAL NATION PERCEPTION SURVEY



SOURCE: AlphaBeta Digital Nation Survey

DIGITAL NATION SCORECARD - MEASURES OF SUCCESS.

Each indicator is plotted as distance (in % points) from the best-in-class performance.

MALAYSIA RANKS 6TH ON THE OVERALL SCORECARD: 2ND IN HUMAN CAPITAL AND 5TH IN FINANCIAL CAPITAL

○ Other countries

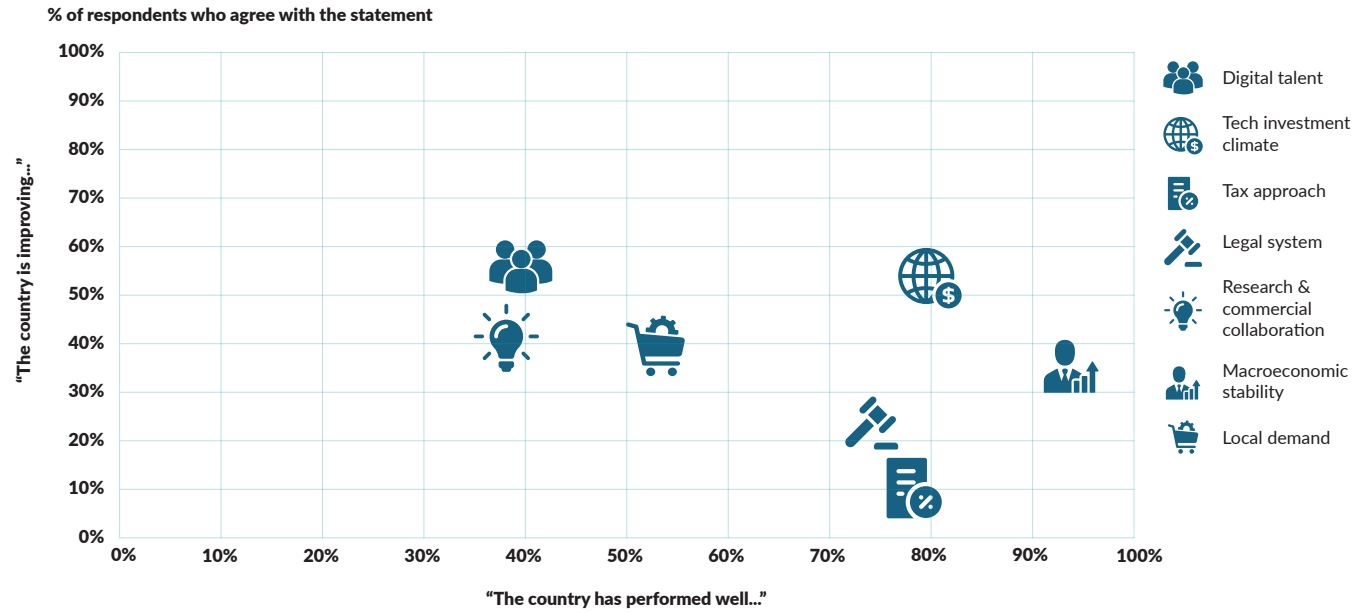
DIMENSION	SUB-DIMENSION	PERFORMANCE AS % OF BEST IN CLASS	RANK
FINANCIAL CAPITAL (5TH)	**Venture capital availability** (WEF GCI 2016/17)	20% 40% 60% 80%	1
	Digital IPOs (2015-16) (Per million inhabitants)		9
DIGITAL PRODUCTS (7TH)	**Top free apps download index** (weighted by population size)		8
	Top paid apps download index (Weighted by population size)		11
	Digital patent grants (standardized by population)		7
HUMAN CAPITAL (2ND)	**Talent attraction** (WEF GCI 2016/17)		2
	Talent retention (WEF GCI 2016/17)		2
	App job market (% of labor force)		2
DIGITAL COMMUNITY (9TH)	**Number of tech startups** (Per million inhabitants)		4
	Market value of the top 3 tech firms listed locally		10
	Digital MNE Contribution index		8

NEW ZEALAND

DIGITAL NATION SURVEY – POLICY LEVERS.

The graph plots the percentage of survey respondents agreeing with the statement that the country is performing well on each lever. The x-axis refers to the current performance; the y-axis refers to the future performance.

THE PERCEPTION OF NEW ZEALAND IS POSITIVE, BUT THE STORY IS MIXED:CLEARLY ADVANCING IN SOME AREAS, WHILE NOT IMPROVING IN OTHERS



SOURCE: AlphaBeta Digital Nation Survey

DIGITAL NATION SCORECARD - MEASURES OF SUCCESS.

Each indicator is plotted as distance (in % points) from the best-in-class performance.

NEW ZEALAND RANKS 5TH ON THE OVERALL SCORECARD: 3RD IN HUMAN CAPITAL AND 5TH IN DIGITAL PRODUCTS

Other countries

DIMENSION	SUB-DIMENSION	PERFORMANCE AS % OF BEST IN CLASS	RANK
FINANCIAL CAPITAL (6TH)	**Venture capital availability** (WEF GCI 2016/17)	20% 40% 60% 80%	4
	Digital IPOs (2015-16) (Per million inhabitants)		9
DIGITAL PRODUCTS (5TH)	**Top free apps download index** (weighted by population size)		6
	Top paid apps download index (Weighted by population size)		1
	Digital patent grants (standardized by population)		6
HUMAN CAPITAL (3RD)	**Talent attraction** (WEF GCI 2016/17)		3
	Talent retention (WEF GCI 2016/17)		5
	App job market (% of labor force)		3
DIGITAL COMMUNITY (6TH)	**Number of tech startups** (Per million inhabitants)		3
	Market value of the top 3 tech firms listed locally		5
	Digital MNE Contribution index		10

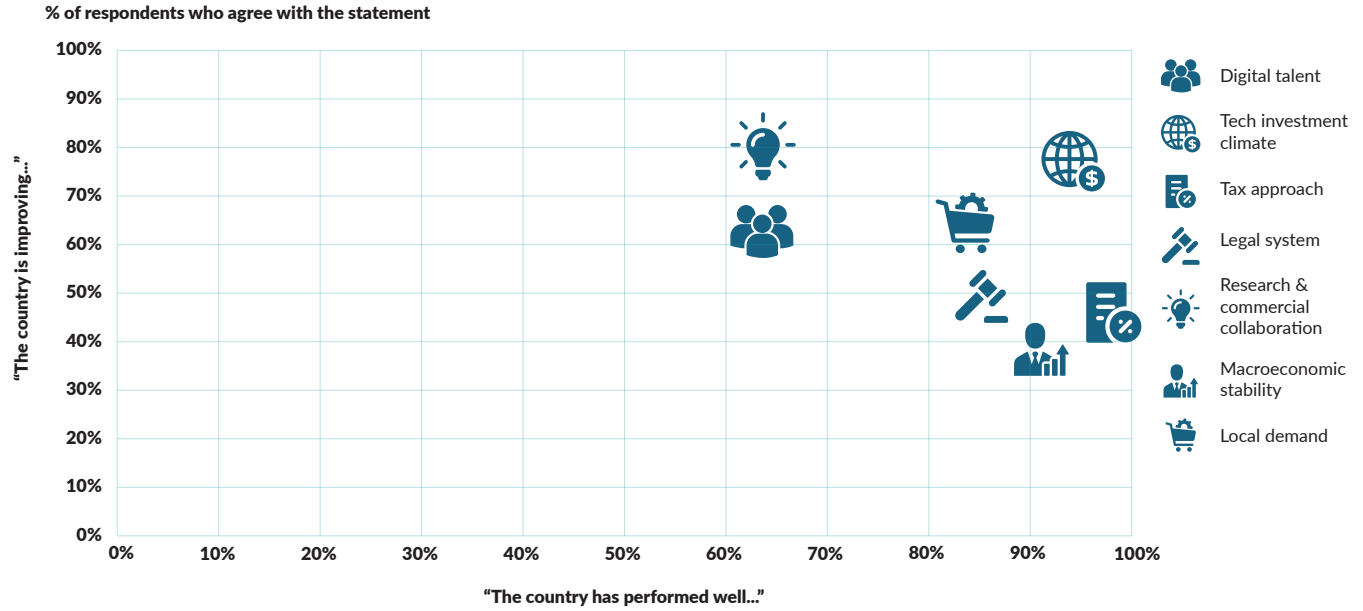
SINGAPORE

DIGITAL NATION SURVEY – POLICY LEVERS.

The graph plots the percentage of survey respondents agreeing with the statement that the country is performing well on each lever. The x-axis refers to the current performance; the y-axis refers to the future performance.

PERCEPTIONS AROUND SINGAPORE'S POLICY LEVERS ARE LARGELY POSITIVE,PARTICULARLY IN TERMS OF TECH INVESTMENT CLIMATE

DIGITAL NATION PERCEPTION SURVEY



SOURCE: AlphaBeta Digital Nation Survey

DIGITAL NATION SCORECARD - MEASURES OF SUCCESS.

Each indicator is plotted as distance (in % points) from the best-in-class performance.

SINGAPORE RANKS 1ST ON THE OVERALL SCORECARD: 1ST IN HUMAN CAPITAL AND 2ND IN FINANCIAL CAPITAL

Other countries

DIMENSION	SUB-DIMENSION	PERFORMANCE AS % OF BEST IN CLASS	RANK
FINANCIAL CAPITAL (2ND)	**Venture capital availability** (WEF GCI 2016/17)	20% 40% 60% 80%	2
	Digital IPOs (2015-16) (Per million inhabitants)		5
DIGITAL PRODUCTS (6TH)	**Top free apps download index** (weighted by population size)		6
	Top paid apps download index (Weighted by population size)		10
	Digital patent grants (standardized by population)		4
HUMAN CAPITAL (1ST)	**Talent attraction** (WEF GCI 2016/17)		1
	Talent retention (WEF GCI 2016/17)		1
	App job market (% of labor force)		1
DIGITAL COMMUNITY (2ND)	**Number of tech startups** (Per million inhabitants)		1
	Market value of the top 3 tech firms listed locally		7
	Digital MNE Contribution index		3

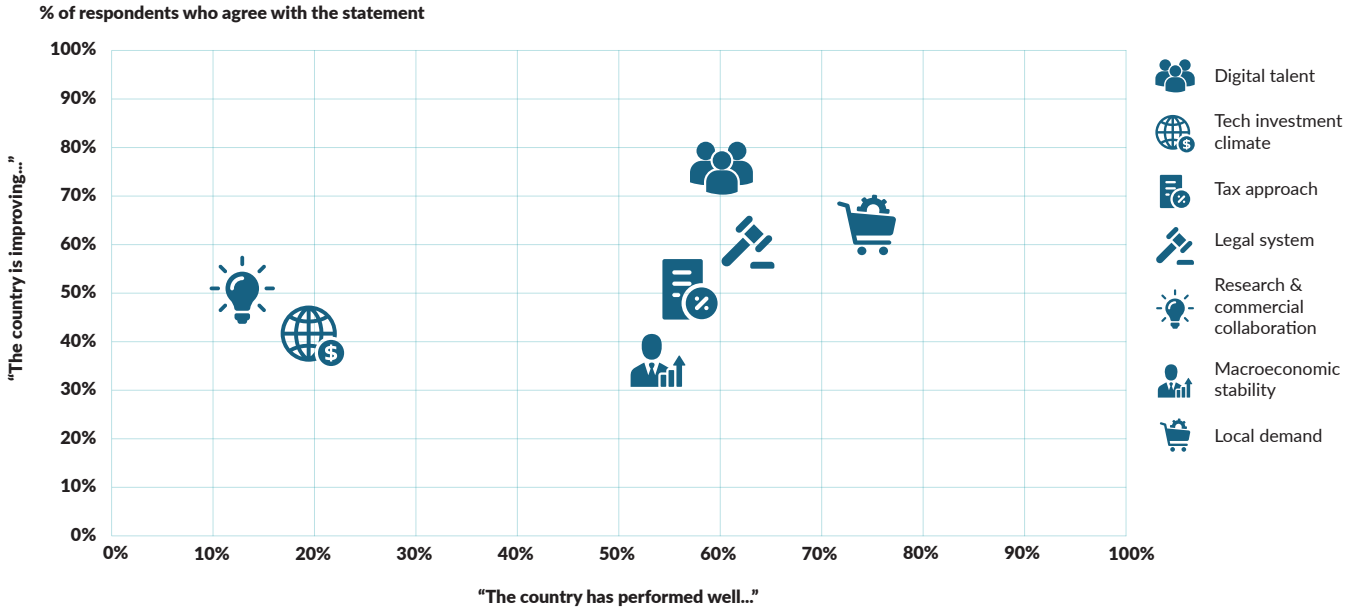
SOUTH KOREA

DIGITAL NATION SURVEY – POLICY LEVERS.

The graph plots the percentage of survey respondents agreeing with the statement that the country is performing well on each lever. The x-axis refers to the current performance; the y-axis refers to the future performance.

DIGITAL TALENT AND LOCAL DEMAND ARE PERCEIVED AS KEY STRENGTHS IN SOUTH KOREA, BUT CONCERNS EXIST OVER TECH INVESTMENT CLIMATE

DIGITAL NATION PERCEPTION SURVEY



SOURCE: AlphaBeta Digital Nation Survey

DIGITAL NATION SCORECARD - MEASURES OF SUCCESS.

Each indicator is plotted as distance (in % points) from the best-in-class performance.

SOUTH KOREA RANKS 4TH ON THE OVERALL SCORECARD: 1ST IN DIGITAL PRODUCTS AND 10TH IN FINANCIAL CAPITAL

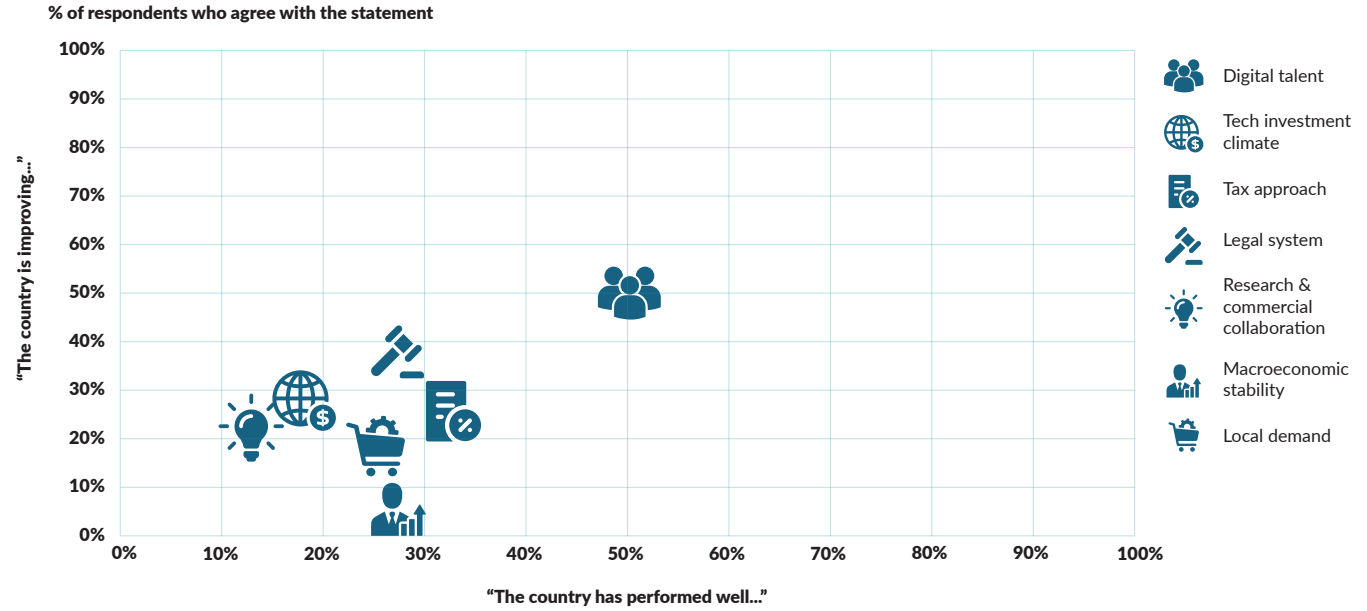
Other countries

DIMENSION	SUB-DIMENSION	PERFORMANCE AS % OF BEST IN CLASS	RANK
FINANCIAL CAPITAL (10TH)	**Venture capital availability** (WEF GCI 2016/17)	20% 40% 60% 80%	11
	Digital IPOs (2015-16) (Per million inhabitants)		4
DIGITAL PRODUCTS (1ST)	**Top free apps download index** (weighted by population size)		1
	Top paid apps download index (Weighted by population size)		3
	Digital patent grants (standardized by population)		1
HUMAN CAPITAL (7TH)	**Talent attraction** (WEF GCI 2016/17)		8
	Talent retention (WEF GCI 2016/17)		4
	App job market (% of labor force)		6
DIGITAL COMMUNITY (5TH)	**Number of tech startups** (Per million inhabitants)		9
	Market value of the top 3 tech firms listed locally		3
	Digital MNE Contribution index		4

DIGITAL NATION SURVEY – POLICY LEVERS.

The graph plots the percentage of survey respondents agreeing with the statement that the country is performing well on each lever. The x-axis refers to the current performance; the y-axis refers to the future performance.

APART FROM DIGITAL TALENT, FEW RESPONDENTS BELIEVE THAT TAIWAN HAS STRONGLY PERFORMED ON THE POLICY LEVERS TO GROW DIGITAL INVESTMENT



SOURCE: AlphaBeta Digital Nation Survey

DIGITAL NATION SCORECARD - MEASURES OF SUCCESS.

Each indicator is plotted as distance (in % points) from the best-in-class performance.

TAIWAN RANKS 7TH ON THE OVERALL SCORECARD: 3RD IN DIGITAL PRODUCTS AND 4TH IN FINANCIAL CAPITAL

Other countries

DIMENSION	SUB-DIMENSION	PERFORMANCE AS % OF BEST IN CLASS	RANK
FINANCIAL CAPITAL (4TH)	**Venture capital availability** (WEF GCI 2016/17)	20% 40% 60% 80%	3
	Digital IPOs (2015-16) (Per million inhabitants)		3
DIGITAL PRODUCTS (3RD)	**Top free apps download index** (weighted by population size)		4
	Top paid apps download index (Weighted by population size)		5
	Digital patent grants (standardized by population)		2
HUMAN CAPITAL (5TH)	**Talent attraction** (WEF GCI 2016/17)		9
	Talent retention (WEF GCI 2016/17)		9
	App job market (% of labor force)		4
DIGITAL COMMUNITY (7TH)	**Number of tech startups** (Per million inhabitants)		5
	Market value of the top 3 tech firms listed locally		6
	Digital MNE Contribution index		7

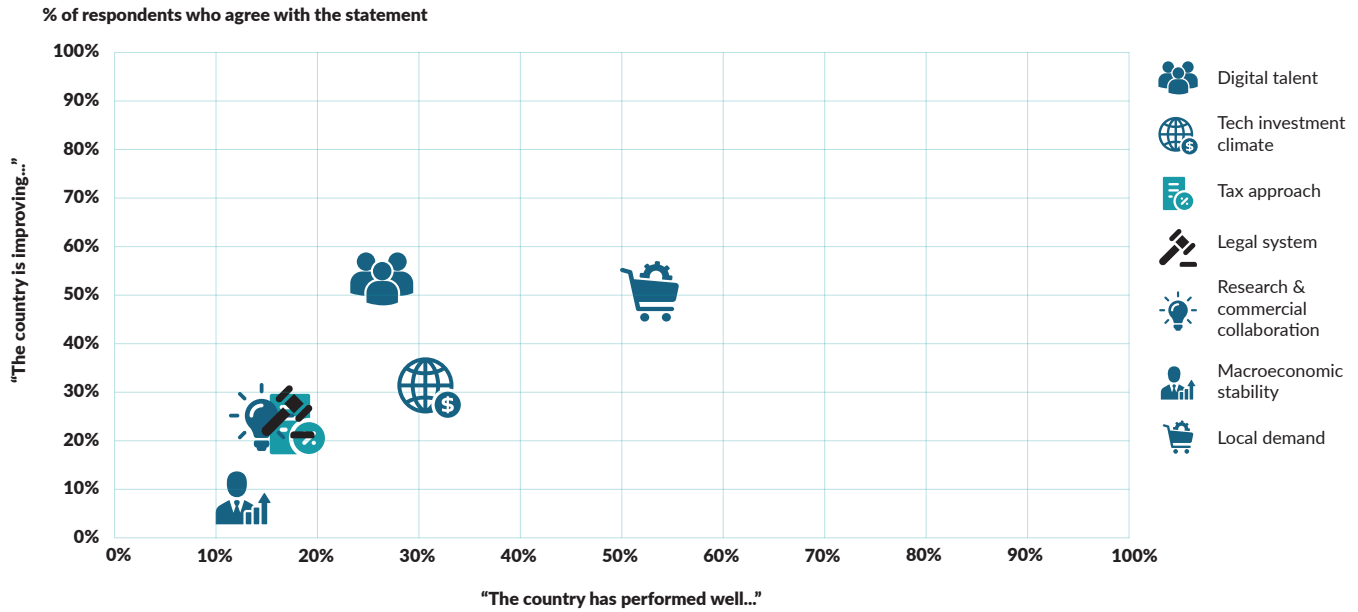
THAILAND

DIGITAL NATION SURVEY – POLICY LEVERS.

The graph plots the percentage of survey respondents agreeing with the statement that the country is performing well on each lever. The x-axis refers to the current performance; the y-axis refers to the future performance.

ASIDE FROM LOCAL DEMAND, MOST SURVEY RESPONDENTS FEEL THAT THAILAND IS NOT FULLY EXPLOITING THE POLICY LEVERS AT ITS DISPOSAL

DIGITAL NATION PERCEPTION SURVEY



SOURCE: AlphaBeta Digital Nation Survey

DIGITAL NATION SCORECARD - MEASURES OF SUCCESS.

Each indicator is plotted as distance (in % points) from the best-in-class performance.

THAILAND RANKS 10TH ON THE OVERALL SCORECARD: 9TH IN FINANCIAL CAPITAL AND 11TH IN DIGITAL PRODUCTS

Other countries

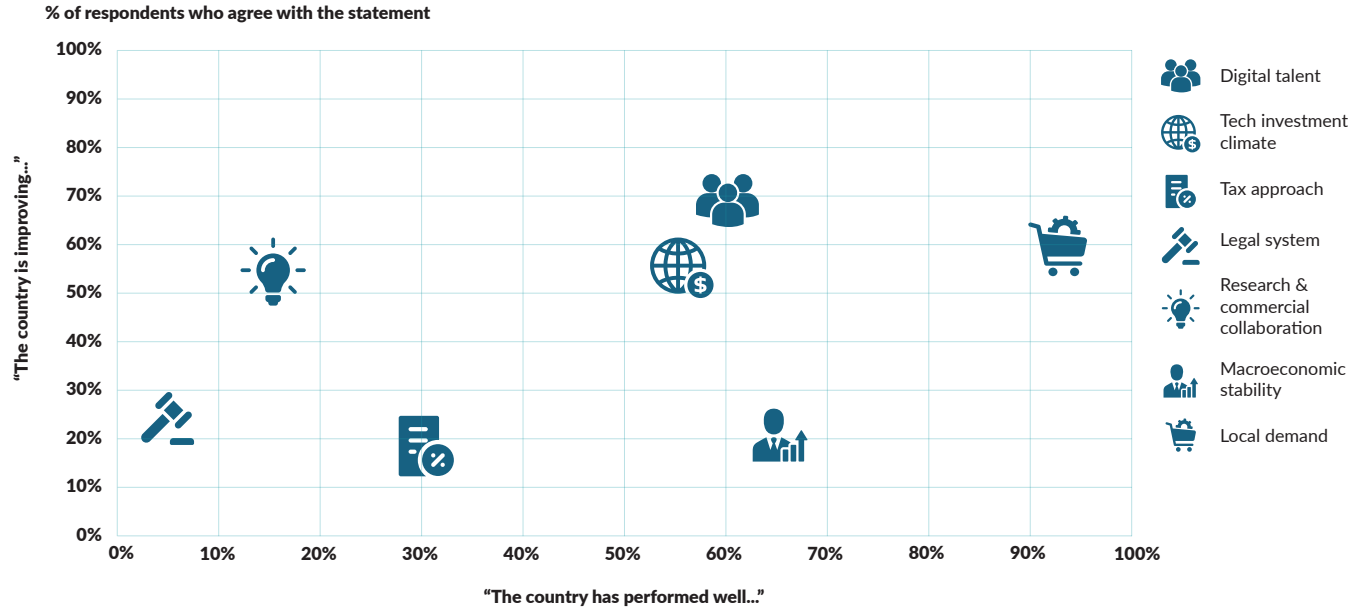
DIMENSION	SUB-DIMENSION	PERFORMANCE AS % OF BEST IN CLASS	RANK
FINANCIAL CAPITAL (9TH)	**Venture capital availability** (WEF GCI 2016/17)	20% 40% 60% 80%	8
	Digital IPOs (2015-16) (Per million inhabitants)		6
DIGITAL PRODUCTS (11TH)	**Top free apps download index** (weighted by population size)		10
	Top paid apps download index (Weighted by population size)		8
	Digital patent grants (standardized by population)		8
HUMAN CAPITAL (10TH)	**Talent attraction** (WEF GCI 2016/17)		7
	Talent retention (WEF GCI 2016/17)		10
	App job market (% of labor force)		9
DIGITAL COMMUNITY (10TH)	**Number of tech startups** (Per million inhabitants)		6
	Market value of the top 3 tech firms listed locally		9
	Digital MNE Contribution index		9

DIGITAL NATION SURVEY – POLICY LEVERS.

The graph plots the percentage of survey respondents agreeing with the statement that the country is performing well on each lever. The x-axis refers to the current performance; the y-axis refers to the future performance.

PERCEPTIONS ABOUT VIET NAM VARY SIGNIFICANTLY: LOCAL DEMAND AND DIGITAL TALENT ARE KEY STRENGTHS, TAX APPROACH RAISES CONCERNS

DIGITAL NATION PERCEPTION SURVEY



SOURCE: AlphaBeta Digital Nation Survey

DIGITAL NATION SCORECARD - MEASURES OF SUCCESS.

Each indicator is plotted as distance (in % points) from the best-in-class performance.

VIET NAM RANKS 11TH ON THE OVERALL SCORECARD: 8TH IN DIGITAL PRODUCTS AND 11TH IN THE OTHER DIMENSIONS

Other countries

DIMENSION	SUB-DIMENSION	PERFORMANCE AS % OF BEST IN CLASS	RANK
FINANCIAL CAPITAL (11TH)	**Venture capital availability** (WEF GCI 2016/17)	20% 40% 60% 80%	10
	Digital IPOs (2015-16) (Per million inhabitants)		7
DIGITAL PRODUCTS (8TH)	**Top free apps download index** (weighted by population size)		9
	Top paid apps download index (Weighted by population size)		6
	Digital patent grants (standardized by population)		10
HUMAN CAPITAL (11TH)	**Talent attraction** (WEF GCI 2016/17)		10
	Talent retention (WEF GCI 2016/17)		11
	App job market (% of labor force)		10
DIGITAL COMMUNITY (11TH)	**Number of tech startups** (Per million inhabitants)		8
	Market value of the top 3 tech firms listed locally		11
	Digital MNE Contribution index		11

APPENDIX B
METHODOLOGY

SURVEY OF POLICY LEVERS

AlphaBeta carried out interviews and surveys across 11 Asia-Pacific countries to develop an understanding of various stakeholders' perceptions on key issues linked to the development of Digital Nations. Surveys involved different groups of stakeholders in the digital ecosystem: senior figures in leading digital startups (164); digital multinational enterprises and investment companies (131).

Whilst the names of interviewees and survey participants are confidential, we would like to gratefully acknowledge the contribution of several local associations that not only directly provided valuable insights and suggestions, but also supported this research by facilitating connections with members of their network. Among those, the following ones agreed to be mentioned: StartupAUS, Australia, the Software Startup Association, India; 500 Startups, Japan; MDEC, Malaysia; MAAYE, Malaysia; Innovation Partnership, New Zealand; Blk 71, Singapore; AppWorks, Taiwan; HUBBA, Thailand; Metaliq Media, Thailand; 500 Startups, Viet Nam; Coder School, Viet Nam; and Ka Koncept, Viet Nam.

The survey consisted of approximately 12, (mostly) multiple choice questions which addressed three themes relevant to our study:

1. POLICY LEVERS

This section contained three questions focused on understanding the importance of seven levers in relation to the development of a Digital Nation:

- Digital talent - Easy access and availability of workforce trained in digital and technology related skills
- Tech investment climate - Welcoming environment for investments in the digital sector (for example, by limiting restrictions on foreign investments)
- Tax approach - Tax system which is consistent, predictable and does not discriminate the digital companies
- Local demand - Attractive market
- Research & commercial collaboration - Strong innovation and collaboration ecosystem (for example, between companies and universities)
- Legal system - Strong regulatory framework (such as strong intellectual property (IP) protection)
- Macroeconomic stability - Stable political and macroeconomic environment (including a stable currency)

In the first question, respondents were asked to rate the importance of these seven factors in relation to their companies' decision to enter/invest/expand presence in a country - in general. The second question evaluated how an individual country has performed in relation to these seven factors. In the third question, respondents were asked about their perception on how the country has developed/is going to develop in relation to the same seven factors in the next years.

In all three questions, respondents were given seven statements which positively describe the importance of these seven levers. Each statement corresponds to one factor. (e.g., "When a digital MNE decides to investment/expand in a country, the country must have a welcoming environment for investments in the digital sector"). In the first two questions, respondents were given 5 multiple-choice options to respond to these statement: "strongly disagree", "disagree", "neither agree or disagree", "agree", and "strongly agree". In the third question, respondents were given 5 options to choose from: "significantly worsen(ed)", "worsen(ed)", "stay(ed) the same", "improve(d)", and "significantly improve(d)". Respondents also had the option to select "N.A." for all questions and the opportunity to identify other factors which they thought were important in the "others" box provided in each question.

1. EXPERIENCE WITH THE LOCAL TAX SYSTEM

Preliminary expert interviews and research indicated that tax was a critical issue in relation to the development of "Digital Nations". As such, two separate questions on tax were also included in the survey. These questions focused on 5 key issues:

- Inconsistent or unpredictable treatment by tax authority
- High corporate tax rates
- Special taxes that target the digital sector only
- Aggressive treatment by the tax authority
- Over-complexity in the tax codes for the digital sector

In the first question, respondents were asked to evaluate the perceived impact of the tax system on digital MNEs, startups, and investors' appetite to enter/expand their presence and investments in markets – in general. In the second question, respondents were asked to indicate how the tax system in the country (in which they have experience) fares in relation to these five factors.

In both questions, respondents were given five statements which positively describe the importance of these five factors. Each statement corresponds to one factor. (e.g., "When a digital MNE decides to investment/expand in a country, the country must low corporate tax rates"). In the first question, respondents were given five multiple-choice options to respond to these statement: "strongly disagree", "disagree", "neither agree or disagree", "agree", and "strongly agree". In the second question respondents were given five options to choose from: "significantly worsen(ed)", "worsen(ed)", "stay(ed) the same", "improve(d)", and "significantly improve(d)". Respondents also had the option to select "NA" in both questions and the opportunity to identify other factors which they thought were important in the "others" box provided in each question.

2. ROLE OF DIGITAL MULTINATIONAL ENTERPRISES (MNEs)

Respondents were asked two questions to evaluate the role of digital MNEs to support the growth the digital sector – particularly the contribution of digital MNEs across 10 different channels (Exhibit below). The first question asked respondents to rank the perceived importance of the 10 channels for a country's development - in general. In the second question, respondents were asked to evaluate the role of digital MNEs in the country which they had experience working in – based on the same 10 channels.

In both questions, respondents were given 10 statements which positively describe the contribution of digital MNEs. Each statement corresponds to one channel. (e.g., "MNEs have brought world class technology which has enabled global market access, local innovation, and enterprise growth"). Respondents were given five multiple choice options to respond to these statement: "strongly disagree", "disagree", "neither agree or disagree", "agree", and "strongly agree". Respondents also had the option to select "NA" in both questions and the opportunity to identify other factors which they thought were important in the "others" box provided in each question.

MEASURE OF SUCCESS

INDICATOR	DESCRIPTION	SOURCE
FINANCIAL CAPITAL		
Perception of venture capital availability	Perceived ease for companies to access equity funding for seeding, starting and expanding a business. Respondents were asked to score a country (1= extremely difficult; 7 = extremely in easy) based on the following question: "In your country, how easy is it for startup entrepreneurs with innovative but risky projects to obtain equity funding?"	WEF Global Competitiveness Index 2016-2017
Number of Initial Public Offerings (IPOs) of digital firms	Number of digital firms, i.e., firms that produce goods or services that are related to the digital sector, which successfully raised public capital through listing on the country's securities exchange – in 2015 and 2016. Indicator was standardized to 1 million inhabitants. NOTE: Digital firms which listed on a securities exchange overseas were not included (for example, Singapore-based Garena was not included since it listed in the United States)	AlphaBeta desk research
HUMAN CAPITAL		
Talent attraction	Perceived ability of a country to attract top talent to reside within the country. Respondents were asked to score a country (1= very unsuccessful; 7 = very successful) based on the following question: "How successful is [country] at attracting the best and brightest minds from around the world?"	WEF Global Competitiveness Index 2016-2017
Talent retention	Perceived ability of a country to keep top talent. Respondents were asked to score a country (1= very unsuccessful; 7 = very successful) based on the following question: "How successful is [country] at retaining the best and brightest minds from around the world?"	WEF Global Competitiveness Index 2016-2017
App job intensity	Total number of mobile application-related jobs as a share of the country's total workforce. Only includes core app-related jobs (app developers, user-interface designers, security engineers, testers and others). (See Box 2 for detailed methodology)	Jobs vacancy data from Indeed.com ICT sector employment from various statistics bureaus[48]

48. Data for Indonesia in 2016 was unavailable and approximated using historical data. See Appendix B for detailed methodology.

INDICATOR	DESCRIPTION	SOURCE
DIGITAL PRODUCTS		
Top free and paid apps download index	Index which measures the popularity of free and paid mobile apps produced in each of the 11 Asia Pacific countries across 18 key markets (i.e. 11 Asia Pacific countries plus the largest ones for each other region); focusing on the apps making it into the top 100 list of each market, the index sums the number of downloads in each of the 11 markets and standardizes the figure for the size of population in the producing country. 1. AlphaBeta recorded the provenance of apps produced by 11 Digital Nations and which lists in the top 100 most downloaded apps in 18 of the world's largest (and relevant) app stores (11 Asia Pacific countries, USA, Nigeria, Russia, Germany, Brazil, Turkey and South Africa). 2. This was then expressed as a percentage share of the top 100 apps and multiplied by the size of the smartphone market in each country to account for the disparity between app market sizes and the number of downloads required to be in the top 100 apps (e.g., getting listed among the top 100 apps for New Zealand - which has a smartphone population of 3.6 million – requires fewer downloads than getting listed the top 100 apps for India - which has a smartphone market of 292 million phones). 3. The sum of downloads – for each Digital Nation, in all 18 markets - was standardized to account for the relative size of the population in the producing country.	App Annie; AlphaBeta analysis
Digital patent grants	Number of original patents registered in a given country - in 2015. Only patent grants filed under the category of "digital communication" or "computer technology" have been included. Data on digital and computer technology patents was unavailable for Indonesia, Singapore, Thailand, and Viet Nam. Number of digital and computer technology patents was proxied using the average share of digital and computer technology patents to the overall grants – in the other 6 countries where data was available. No data for Taiwan. Indicator was standardized to 1 million inhabitants.	World Intellectual Property Office (WIPO)

INDICATOR	DESCRIPTION	SOURCE
DIGITAL COMMUNITY		
Number of tech startups	Number of local startups in a country conducting business activities in the digital and tech sector - i.e., startups that produce goods or services that are related to the digital and tech sector. Data was collected from various reputable databanks. Indicator was standardized to 1 million inhabitants.	Tech in Asia; Angel list; AlphaBeta analysis; Temasek and Google report
Size of national champions	Market value of the three largest domestic digital companies (as of end 2016).	AlphaBeta analysis
MNE Contribution Index	Index which measures the contribution of digital MNEs across 10 impact channels: 1. Investment in digital ecosystem 2. Support for startup financing 3. Signaling 4. Product development for local /international market 5. Technological transfers 6. Local enterprise development 7. Awareness and stakeholder education 8. Supply chain development 9. Support for education system 10. Entrepreneurship training AlphaBeta conducted a literature review (comprising of press releases, newspaper and academic articles, annual reports) on 20 of the largest digital MNEs (AirBnB, Alibaba, Amazon, Apple, eBay, Cisco, Expedia, Facebook, Google, IBM, Line, LinkedIn, Microsoft, Oracle, Rakuten, Samsung, SAP, Twitter, Uber and Yahoo!) to understand the contribution of each company – through a given channel, in a given country. A digital MNE was considered to be active in a channel (in a given country) if at least 2 independent sources mentioned the contribution of the MNE via this channel – over the past five years.	AlphaBeta analysis via press search, literature review and corporate websites

Prepared by AlphaBeta

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strategy x economics