

# Strategic leading of digital transformation in Brunei to propel digital economy

Abdul Qawie Abidin  
 School of Computing  
 Asia Pacific University of Technology  
 and Innovation (APU)  
 Kuala Lumpur, Malaysia  
 TP058389@mail.apu.edu.my

Chandra Reka Ramachandiran  
 School of Computing  
 Asia Pacific University of Technology  
 and Innovation (APU)  
 Kuala Lumpur, Malaysia  
 chandra.reka@apu.edu.my

Shounak Ghosh  
 School of Computing,  
 Asia Pacific University of Technology  
 and Innovation (APU)  
 Kuala Lumpur, Malaysia  
 shounakg@apu.edu.my

**Abstract**—Digital Economy is the integration of digital technology into all aspects of social and economic activities, essentially changing the way citizens, consumers, and businesses communicate and perform work. The rapid advancement of technological innovation will continuously cause digital disruption by which, with proper digital competences and strategic leadership, can be leveraged as an essential element to create opportunities and problem solving, otherwise, it would further widen the digital divide. This study review will be based on the previous academic study in the latest five years; the concept of the digital economy; drivers and enablers of the digital economy, importance of digital economy policies; and role of leadership in digital transformation. The main aim of this paper is to provide some general review in regard to strategically lead the digital transformation of the digital economy in Brunei by propelling the policies.

**Keywords**—digital economy, digital disruption, digital divide, strategic leadership, and digital transformation.

## I. INTRODUCTION

In this technological era, it is apparent that new digital technologies are being developed and adopt at an accelerated rate by which it has now become an imperative asset for business and social innovation [1]. The rapid advancement of digital innovation will constantly trigger digital disruption by which, with proper digital capabilities and resources, can be leveraged as a fundamental factor to create new problem solution and explore new possibilities in improving all aspects of life, otherwise, create vast uncertainty and unease all while competition becomes progressively tough [2][3]. Government and public sector particularly situated in the core confluence of these events as they require to make very important decisions and action to balance the opportunities for their citizen created by digital disruption, alongside the threats created by the very enablers of these opportunities [4]. This is a key challenge for leaders in government and the public sector that aim to become digitally more advanced to prevent a country or an economic ecosystem from falling behind and that as many citizens as possible benefit from the digital transformation [2].

This new paradigm is transforming economies into digital which results in a concept called the digital economy. This represents the concept in relation to the socio-economic and organizational-technical in reliance on the pervasive use of digital information and communication technologies (ICTs) in all aspects of the economy including internal and external activities of organizations through the exchange of knowledge using new technological channels and a society that can partake in and handle this exchange for enhanced wealth creation, productivity, and quality of life. [5]. According to a

Huawei global connectivity index report, mentioned in [6], strengthening ICTs infrastructure has accelerated the digital economy globally this includes new consumer mobile technologies, new digital models, the internet of things; new automation and robotics technologies; and increasing use of data over the spread of data analytics, big data, and machine learning [6][7].

The importance of the digital economy has gained widespread recognition in the twenty-first century as many countries are initiating digital development as a core strategy and unique approach in their national strategic plan to attain and explore all of the opportunities that can be offered through digital technology in the aspect of social and economic while mitigating unplanned issues [6]. As the world's economy is now digitally driven, the government of Brunei has also recently unveiled a masterplan that outlines strategies for Brunei to achieve a digital economy to become a Smart Nation with a digital and future-ready society, vibrant and sustainable economy as well as a conducive digital ecosystem [7]. Nevertheless, a digital transformation would not be successful by only relying on financial resources and digital strategy, it required a whole of nation approach with government leadership to strategically lead the execution of the digital economy masterplan [6][8]. However, the majority of recent academic literature has fixated on providing strategy on the specific perception of digital transformation, but the complete approach to strategically lead digital transformation is very limited [9]. While there is an increase of need for nations to set up digital transformation initiative to advance their digital capabilities and resources [6].

## II. THE CONCEPT OF DIGITAL ECONOMY

The definition and concept of the “digital economy” have been evolving over the years since the commonly cited origin term and it has been acknowledged three foundations associated with the conceptualization of the digital economy [10][11]. Much past literature has defined digital technologies as the core of the digital economy with only a few include the manufacturing of these technologies and related foundational services [10]. This mainly concerns the socio-economic transformation refer as “digital sector” as it covers the core activity of digitalization through a combination of production and service businesses that acquire, assimilate, exchange, and present data and information digitally including hardware manufacture, information, and technical services, software and IT consultant, and telecommunication [5][10][11]. The digital sector essentially comprises the consumption and application of ICT via economic activities categorized in the International Standard Industrial Classification including the

production of ICT consumer goods, software design, network infrastructure, ICT services, retail, and content [10][11].

Digitalization involved the integration of digital technologies through the application of digitization on organizational, social, and economic activities by converting analog data into digital form to create value from the digital network dynamics and information flows. This concludes the broad scope of digital economy refer as “digitalized economy” which covers e-business, e-commerce, automated decision systems in business, and the internet of things in manufacturing and agriculture including Industry 4.0 and precision agriculture [10][13]. The digitalization of the economy has become a crucial source of enabling innovation, economic growth, and societal change as it radically shaping the very nature of products, the process of value creation, and the competitive environment [5][6].

The definition scope of the digital economy was narrowed based on extensive applications of digital technologies to expand the limits of economic activity whereby it creates a platform economy that exists solely with the substantial use of ICT [10][12]. This platform economy can easily be identified as digital services provided by platform-based establishments that did not exist prior to digital technology such as Netflix, Facebook, Instagram, Google, and more [10]. However, there is also a lack of clarity on how to categorize businesses of the collaborative economy and gig economy with trading tangible goods such as Uber, e-Bay, or Amazon. Nonetheless, these businesses were considered to be on the fence of the digital economy as they are established with the application of digital technologies and offer digital business models on digital platforms [10][13].

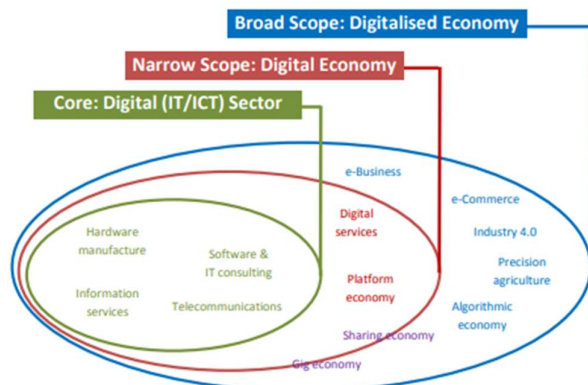


Fig. 1. The scope of Digital Economy concept [3]

In this regard, as illustrated in Fig 1., the digital economy would represent all economic activities that derived from the extensive applications of digital technologies with a business model based on digital goods and services in addition to the manufacture of those digital technologies as described in the core digital sector and without claiming that all digitized activity is part of the digital economy in the broad scope. Due to limited coverage on the digital economy, its boundary is still not clear yet flexible enough to include digital and digital business model innovation [5][10].

### III. DRIVERS AND ENABLERS OF DIGITAL ECONOMY

#### A) Drivers

The exponential advancements of digital and mobile technology have played a predominant role in the industrial and information revolutions that have successfully brought extensive economic and social benefits for countries, business organizations, and citizens [6][14]. The digital transformation across businesses and society essentially being driven with the wide adoption of digital technology, in homes, industries, and society, in accordance to fundamentally integrate the way people perform tasks, communicate, and purchase goods or services [8]. It also changes and improved the way business organizations operate, business strategy as well as business models [6]. GSMA study displays that 4.7% of GDP across the globe in 2019 was solely generated from the mobile ecosystem which is a contribution that amounted to \$4.1 trillion of economic value-added. The mobile system has also directly and indirectly employed a total of 30 million people [14]. However, as technological innovation progress, many jobs are also at high risk of being permanently replaced with a total amount of 36 million jobs in the United State have high exposure to automation. Profession available within office administration, transportation, and manufacturing are especially at great risk of being replaced with technology-driven by automation and artificial intelligence [4]. Although most technology incorporated is meant as an intensive application to augment employee performance, this can still create social unrest and discouraged among employees as they are not well-equipped with the necessary skills to sustain the work disruption due to technological innovation [8].

The benefits derived from the digital economy have been deeply disproportionate across many nations and this has brought substantial disruption commonly with negative consequences [6][8]. Whereby, business companies are threatened in the competitive environment due to digital disruption if they failed to keep up with the adoption of technological advances such as big data analytics to gain customer insights for better recommendations and mobile ecosystems to better engage with customers [13]. Consumers would not be able to gain the same benefits derived from digital transformation due to the digital divide created if some failed to acquire the necessary technology such as ubiquitous connectivity of high-speed broadband and mobile devices to fully utilize or access these products and services [5][6][15].

In the aspects of finance, digital and mobile technologies have greatly enhanced consumer experience with digital integration of online payment transactions and banking management, yet there is still access deficiency in the majority of the population with the growth of mobile internet access has not been equally distributed [14-15]. Nevertheless, the pace of digital and mobile advancement continues to accelerate and reshaping the industries, societies, and economies that would create more severe disruption and widen the digital divide [10]. Across these last several years there is an increasing amount of literature that brings awareness towards the impact of rapid technological advancement on both economy and society. Also, more government leaders and officials are starting to incorporate policies that would ensure effective readiness to enable the digital economy as their national strategic plan [5][7][15].

### B) Enablers

Strategic enablers are very crucial to support strategic priorities so that important foundations for the digital economy can be established successfully and this may vary across different countries. In Singapore's Digital Economy Framework for Action, four critical enablers have become the focus for Singapore's government; nurture the youth with technological talent; empower research and innovation; policy, regulations and standard; and physical and digital infrastructure [11]. Similarly, in Brunei's Digital Economy Masterplan 2025, the focused strategic enablers are relatively identical with the previously mentioned in addition to digital data policy and governance framework as well as emphasizing on cybersecurity [7]. Meanwhile, the GSM Association and Boston Consulting Group compiled five common key enablers of the digital economy from various insights from proficient organizations and experiences from different countries such as the United States, South Korea, India, and Sweden [16].

The first key enabler is to achieve digital inclusion with the development of effective digital and physical infrastructure that offers inexpensive cost and without unreasonable restrictions or conditions. Although the network coverage has reached 90% globally, however, about 750 million people still live outside of these network coverage areas and about 3.3 billion people live within network coverage do not use the mobile internet [14]. On the positive note, mobile operators have been effective on the expansion of 4G and LTE networks which becomes a predominant network reaching 75% coverage globally, whereas 95% of Brunei's population is already covered with the 4G network in 2019 [16]. The type of network also important as it dictates the quality of service available and the capabilities of the devices consumers and businesses can use [6][15]. In essence, the first enabler emphasizes on offering citizens and businesses the ability to seamlessly connect and interact by bridging both "coverage gap" and "usage gap" and upgrading the broadband cellular network.

The second critical enabler of the digital economy underscores the importance of enhancing cyber-security to secure digital infrastructure, protect data and networks from increasing cyber-attacks [15][16]. As digital services are one of the core drivers of the digital economy, it is expected in the growth of digital usage. However, the complexity of the digital system is affecting users with a lack of trust, safety, and security about using the digital services, particularly from banks and credit card firms where there is significant concern about data misuse and financial fraud [14]. Thirdly, it is found from several studies that the digital ecosystem that creates content and applications on the basis of local relevance, such as local language and services, is important for generating digital literacy, attracting local consumers, and serving local necessity [16]. Digital services that inclusively incorporate local relevant content and services can be an important step forward in addressing and resolving local concerns, and gradually advancing competition into the international digital services market [7][16].

In a digitalized society, individuals (citizens, consumers, and employees) are required to obtain specific capabilities and skills to become digitally-ready so they can leverage new digital technologies and improve their performance and productivity [17]. The World Bank has highlighted the three

prerequisite skills for individuals to operate in the future economy; higher-order cognitive skills, strong technical skills, and interpersonal skills [15]. Essentially, education programs are prominent as part of the fourth digital economy enabler where it would nurture individuals at a young age with digital literacy skills and training so they can benefit their everyday lives activities with the use of the internet and digital technology [16]. This approach would not be able to provide immediate digitally-ready talent but rather as a long-term program that will build the next generation with a firm base of digital competencies required in the future of the digital environment, society, and economy [13]. Nonetheless, many governments, such as in Singapore and Brunei, also emphasize offering courses and programs to enhance their existing workforce with the necessary digital capabilities and skills so they can adapt to the changing environment of their workplace due to digital disruption [7][15][16].

Finally, as mentioned in the drivers of the digital economy section above, it is apparent that digital economies only grow with the digitalization of companies with the adoption of digital and mobile technology. This would enable companies to enhance or radically change their business operation, strategy, and models to create access to new customers and markets [17]. Countries failed to digitalize their businesses would certainly bring down their economies as local businesses slowly become irrelevant in comparison to more agile competitors from abroad [16]. The governments are advised to support the digital transition of local business companies by facilitating digital adoption, removing any hindrance, and providing incentives, to expand the digital economy and prevent job stagnation [5].

## IV. DIGITAL ECONOMY POLICIES

As the drivers and enablers of the digital economy have been acknowledged, it is proven that the emerging new technologies are changing the socio-economic landscape with both positive and negative impacts. As technology is not deterministic, governments must take action by prioritizing policymaking to situate their countries in a better position to achieve the benefits of digital technologies and mitigate potential risk while leading economic shift [6]. Governments are required to work in close collaboration with local businesses, employees, and citizens to take full advantage of the opportunities that digitalization can make [6]. Policymakers and regulators essentially need to make a strategic decision in closing the gaps of inequalities and power imbalance created as the digital economy continually progresses. This is a significant challenge that involves a great amount of complexity in adjusting the existing policies, laws, and regulations, and adopting new ones such as cybersecurity policies, laws, and regulations [6][16]. They should also explore new pathways for local value creation and capture, and further structural transformation through digitalization.

In the majority of countries, the digital economy and its long-term effects remain uncharted domain, and regulations and policies have become obsolete with the rapid innovation and technology convergence in economies and societies [6]. This creates a great risk of hindering the innovation and adoption of technology and market advances as the market factors that were essential to regulators when determining significant market power are becoming ineffective and irrelevant [17]. The digital transformation in the world economy urges governments the need for unconventional

economic thinking and policy analysis to address the challenges of digital disruption on regulatory and policy frameworks. A common initial problem encounter when trying to enable the digital economy, across many countries such as Brunei and Malaysia, is to provide fixed broadband with the accessibility and affordability at the national level [7][17]. Whereas, the most noteworthy challenge would be in regard of cybersecurity, privacy and data protection as it has greatly hindered the progression of businesses and citizen to move into the digital world due to lack of confidence in digital security in addition to the fact that countries like Vietnam and Thailand still do not have cybersecurity law [17]. Governments have addressed these issues, but the vast majority in the Asia region, such as Brunei, Vietnam, and Thailand, is still at its infancy stage in the cybersecurity sectors and has limited acknowledgment of data sovereignty issues [7][16][17].

Regardless, an increasing amount of countries are starting to unveil their unique key policy and regulatory framework as guidance to steer digital economy initiatives through enhanced efficiency and promote widespread digital benefits and good governance [6]. The common theme of these policies can be categorized into three domains; digital economy infrastructure policy, ecosystem policy, and digital inclusion policy [6][17]. Although most issues can be handled by means of national policies and strategies, the constitution of the digital economy on the global scale will need more dialogue through the international collaboration for consensus-building and policy-making [6][10]. Due to the novelty of the digital economy concept, there are many more questions than definitive answers about how to deal with the digital economy as there is still lack of relevant statistics, academia literature, empirical evidence, and the fast rate of technological change, findings and policy responses will always need to be reviewed.

## V. THE ROLE OF LEADERSHIP IN DIGITAL TRANSFORMATION

As technological innovation is changing almost every aspect of social and economic activities, as well as organizational structure and culture, strong leadership plays a critical role in not just finding ways to enhance work performance but most importantly to establish and drive these changes [4]. The perception of digital transformation failure has changed from the previous literature that believed the main barrier was lack of technological literacy and the prevalence of legacy systems, whereas most recent literature reports that the main problem is often in the lack of leadership to effectively guide the transition [18]. The success or failure of digital transformation is barely influenced by the technology itself but rather tends to be unsuccessful when it is not managed coordinately and low participation from leaders [8]. Although it is required to acknowledge the possibilities and challenges of adopting technological innovation, it is still hard enough to effectively execute digitalization as it is more essential for leaders to focus on establishing and sharing clear digital strategy and vision for transformation [4][8].

Nonetheless, digital literacy is still essential for the leaders to able to actively engage in activities and provide support, as well as leading by example. Leaders should also practice the concept of continuous improvement where leaders actively listen and reflect any input suggested by employees, consumers, or citizens. This can influence individuals to have a normative commitment towards the change as they feel accountable in their contribution in the decision making and perceive a leader's commitment align with the clear objective of the digital transformation [19]. Successful leadership has demonstrated four main capabilities such as; developing clear vision and strategy for transformation; actively engaging employees with clear communication; focusing on digital governance; and integrating organizational processes with digital technologies [8].

TABLE I. LITERATURE REVIEW MATRIX

Reference	Scope	Outcome	Limitation	Future Research
M. I. Barrett, E. Davidson, J. C. Prabhu, and S. L. Vargo, "Service Innovation in the Digital Age: Key Contributions and Future Directions," <i>MIS Quarterly</i> , 39(1), pp. 135–154, 2015	Compile the latest literature from the Marketing and Information Systems perspectives to advance the developments on service innovation in a digital age.	Four new perspectives are highlighted that further develop the service innovation concept	-	Further research on the frameworks on service innovation individually or in combinations
I. M. Sebastian, J. W. Ross, C. Beath, M. Mocker, K. G. Moloney, and N. O. Fonstad, "How Big Old Companies Navigate Digital Transformation," <i>MIS Quarterly</i> , 41(1), pp. 239–253, 2017	Discuss how three key elements position big old companies for success in the digital era.	The big old company is to choose either two customer engagement or digitized solutions strategy that both would result in different priorities in the shape of the digital services platform and operational backbone.	Only one strategy can fully optimize the tech-enabled assets at a time, whereas the company able to cope with one strategy at a time as well.	-
D. Suarez, and E. Abdallah, "Public Sector Readiness in the Age of Disruption," 2019	Explain and discuss the seven crucial elements to achieve public sector readiness in the age of disruption.	Many government and public sector are already practicing these crucial elements. Also addressed the importance of leadership in leading the disruption agenda.	Many governments are not practicing all of the seven crucial elements rather a few only.	-
United Nation, "Digital Economy 2019," New York 10017, United States of America, pp. 1-22, 2019.	To promote global collaboration on digital economy practices and progress.	Developed countries tend to be more well-prepared to react to digital disruption	Countries that have limited resources and capacities will struggle to make respond to disruption due to not only	-

			the aspects that lack connectivity, technology, finance, or logistics but also weak regulatory and institutional capacities.	
Digital Economy Council, "Digital Economy Masterplan 2025," Brunei Darussalam, 2020.	To identify and provide a roadmap that charts and guides the implementation of digital transformation initiatives for Brunei to propel Digital Economy.	Digital Economy Council is established to lead the determined strategic enablers and success can be measure through some key criteria.	Brunei dropped in the global cybersecurity index and global innovation index.	To provide more digital economy initiatives and close collaboration with stakeholders.
W. Afandi, "The Role of Strategic Leadership in Digital Transformation Process", vol. 33, Issue 2, pp. 19-22, November 2017.	Investigate the opportunities and challenges of digital transformation and their roles to lead by interviewing 15 organizational leaders in Saudi Arabia.	Successful leaders are identified to have the ability to create digital change strategy, have a clear vision in which areas need to be transformed and able to explain objectives, clear communication with high participation, and good at coordinating transformational initiatives through all organizational levels.	Limited study on relating leadership and digital transformation.	-
T. Hess, A. Benlian, C. Matt, and F. Wiesböck, "Options for Formulating a Digital Transformation Strategy," MIS Quarterly Executive, 15(2), pp. 123-139, 2016.	Explain the experience of how three German media companies successfully initiate digital transformation through 11 strategic questions.	The systematic approach to creating a digital transformation strategy can also be used for other industries to address the barriers more systematically.	-	To use this approach to other completely different industries with different settings and national.
B. Parthasarathy, and, O. Matilal, "Development Implications of Digital Economies," 2019	Discusses three potential policy responses that need to be commenced simultaneously	Encourage entrepreneurial initiatives, establish platforms and encourage digitization, and improve the quality and content.	Increasing concerns about the changing conditions of employment due to gig work	To discuss the worries raised by gig work
I. Domazet, and M. Lazić, "Information and communication technologies as a driver of the digital economy," Serbia, pp. 11-19, 2017.	Highlight the importance, application, and benefits of ICT in Serbia economy and recommendations for improvement of e-business.	The recommendation includes; establishment of a digital center, local businesses index, a collaboration between local companies, creating strategies to support small IT sector, and more.	Lack of information and communication technology usage in business companies.	-
A. Pagoropoulos, D. C. Pigosso, and T. C. McAloone, "The emergent role of digital technologies in the Circular Economy: A review," Procedia CIRP, 64, pp. 19-24, 2017.	Evaluation of the application of digital technologies to support the transition to the Circular Economy.	Seven technologies are identified with two in each of the three architectural layers. <i>Data collection</i> ; RFID & IoT. <i>Data integration</i> ; Relational database management system and product lifecycle management. <i>Data analysis</i> ; machine learning and big data analytics.	Limited study on the relationship between digital technologies and Circular Economy	Study on the technological perspective as the interplay between data collection, data integration, and data analysis.
E. S. Chia, "Singapore's Smart Nation Program – Enablers and Challenges," National University of Singapore, June 2016.	Discussion on Singapore's initiatives to drive their Smart Nation Program	Some of the key enablers Singapore's are identified; the whole of nation approach, digital infrastructure, smart nation platform, accessibility and availability of data, data privacy and security, and cyber law.	difficulties in obtaining data heterogeneity such as effective data collection, data analysis, data latency, data security, and data integration.	-
GSMA, "The State of Mobile Internet Connectivity 2019," pp. 1-60, 2019.	The annual analysis of global mobile internet connectivity	3.5 billion people globally are connected to mobile internet which enhances digital inclusion specifically in low and middle economies.	Coverage gap and usage gap are creating inequalities which need to be addressed and accelerate the spread of mobile network connectivity	-
GSMA, "Embracing the Digital Revolution," pp. 1-46, 2017.	Describing the enablers and policies to achieve an	Governments essentially need to accelerate technology adoption to	Policymakers face great pressure in demand for creating policy responses	Constantly reassessed and readjust policy responses

	inclusive digital economy and society	capture social and economic benefits, while minimizing the negative impacts due to technological change.	to control disruption on the economy.	as technology continue to develop.
P. Lovelock, "Framing Policies for the Digital Economy," pp. 1-50, 2018.	Defining policy frameworks for the digital economy in the Asia-Pacific	Having the measurement for digital economy key success, leadership and coordination competencies, strategic choices on platforms and policy approached, and tools for effective digital governance.	Most countries in the Asia-pacific still lack proper digital competencies.	-
J. Hyvönen, "Strategic leading of digital transformation in large established companies – a multiple case-study," January 2018.	Examines digital transformations of three large Nordic companies	Digital transformation was driven by external and internal pressure and leader can lead it through establishing and driving digital transformation. Digital transformation also changes the company's business module and process.	Managerial point of view on the digital economy drivers and a comprehensive study on the leader's actions in digital transformation.	

VI. CONCLUSION AND FUTURE RESEARCH

As technology advance, the conceptual boundaries and definition of the digital economy are expected to change as well. Based on the current literature, there are three foundations of the digital economy which include the core, narrow scope, and broad scope of the digital economy. It essentially includes all activities derived from the extensive applications of digital technologies, in relation to the socio-economic growth, with a business model based on digital goods and services in addition to the manufacture of those digital technologies. Although technological advancements have brought many great benefits through transforming all aspects of life, it also creates a substantial negative impact of digital disruption with digital divide or digital exclusion where these benefits are shared not equally. There are five generic yet critical enablers that have been identified to help facilitate the growth of the digital economy; digital and physical infrastructure; digital safety and security; local inclusion of relevant content and services; tech talent development; and digitalizing companies. As the drivers and enablers of the digital economy have been acknowledged, it is imperative for governments to take action by prioritizing policymaking to situate their countries in a better position to achieve the benefits of digital technologies and mitigate potential risk while leading the economic shift. This will require strong leadership to strategically lead the transformation not just by identifying ways to enhance work performance but most importantly to establish and drive the transition.

A majority of existing academic literature has fixated on providing strategy on certain aspects of digital transformation, but the complete approach to strategically lead digital transformation is very limited. Still, more and more governments are setting up digital transformation initiatives to advance their digital capabilities and resources. This has created a research gap by studying the holistic approach to the aspect of the strategic lead of digital transformation to propel digital economy policy. Specifically focusing on the scope of Brunei to drive forward their initiatives on the digital economy align with their national objective of achieving the status of Smart Nation.

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