SMERU RESEARCH REPORT

ANALYSIS OF DIGITAL SKILLS DEVELOPMENT IN THE PUBLIC SECTOR IN INDONESIA

The SMERU Research Institute, GIZ, and Blavatnik School of Government, University of Oxford

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List of Abbreviations

AAKI	*Asosiasi Analis Kebijakan Indonesia*	Policy Analyst Association
ASEAN		Association of Southeast Asian Nations
ASN	*Aparatur Sipil Negara*	State Civil Apparatus
Bappenas	*Badan Perencanaan Pembangunan Nasional*	National Development Planning Agency
BNSP	*Badan Nasional Sertifikasi Profesi*	National Professional Certification Agency
BKN	*Badan Kepegawaian Nasional*	National Civil Service Agency
BLUD	*Badan Layanan Umum Daerah*	Regional Public Service Agency
BPK	*Badan Pengawas Keuangan*	Audit Board
BPKP	*Badan Pengawas Keuangan dan Pembangunan*	Financial and Development Supervisory Board
BPS	*Badan Pusat Statistik*	Statistics Indonesia
BRIN	*Badan Riset dan Inovasi Nasional*	National Research and Innovation Agency
BSSN	*Badan Siber dan Sandi Negara*	State Cyber and Signal Agency
CASN	*Calon ASN*	Candidate of State Civil Aparatus
CTO		Central Transformation Office
Corpu		Corporate University
DTO		Digital Transformation Office
GoI		Government of Indonesia
GTA		Government Transformation Academy
GACUA		Global Association of Corporate Universities & Academies
ICT		Information and Communication Technology
Prakom	*Pranata Komputer*	ICT Functional Position
Manggala (Informatika)		ICT Security Functional Position
JSC		Jakarta Smart City
JDS	*Jabar Digital Service*	West Java Digital Service

KADIN	*Kamar Dagang Indonesia*	Indonesian Chamber of Commerce
LAN	*Lembaga Administrasi Negara*	State Administration Agency
MCI	*Kementerian Komunikasi dan Informatika*	Ministry of Communication and Informatics
MoF	*Kementerian Keuangan*	Ministry of Finance
MoH	*Kementerian Kesehatan*	Ministry of Health
MoHA	*Kementerian Dalam Negeri*	Ministry of Home Affairs
MoLHR	*Kementerian Hukum dan Hak Asasi Manusia*	Ministry of Law and Human Rights
MoM	*Kementerian Ketenagakerjaan*	Ministry of Manpower
MoSA-BR	*Kementerian Pendayagunaan Aparatur Negara dan Reformasi Birokrasi*	Ministry of State Apparatus Optimization and Bureaucratic Reform
PMO		Project Management Office
PNS	*Pegawai Negeri Sipil*	Civil Servant
PPPK	*Pegawai Pemerintah dengan Perjanjian Kerja*	Contractual-term Government Employee
Pusdiklat	*Pusat Pendidikan dan Pelatihan*	Training Center
SPBE	*Sistem Pemerintahan Berbasis Elektronik*	Electronic-based Government System
STAN	*Sekolah Tinggi Administrasi Negara*	College for State Administration
THR	*Tunjangan Hari Raya*	Religious Festivity Allowance
WBK	*Wilayah Bebas Korupsi*	Corruption-Free Area
WBBM	*Wilayah Birokrasi Bersih dan Melayani*	Clean and Attending Bureaucracy Area

Executive Summary

The COVID-19 pandemic has proved that digital transformation is a must for the public sector. In fact, the initiative to go digital in Indonesia was started when Presidential Instruction No. 3/2003 on National Policy and Strategy on e-Government was issued and later re-intensified in 2018 when Presidential Regulation No. 95/2018 on e-Government was issued. However, it takes digital skills in public sector to implement e-Government. In reality, only limited numbers of government employees have digital skills as explicitly written in Presidential Regulation No. 95/2018. This is in line with the condition in labor market in the country. The study of Amazon Web Service and AlphaBeta (2021) say that 19% of workers have basic digital skills, and 6% have middle level skills. This findings are in line with the recent study of SMERU, Oxford, and UNESCAP (2022) highlighting that fewer than 1% of Indonesian workers have advanced digital skills. At the same time, the public sector in many countries cannot compete with the private sector in the war for talent.

In order to study e-Government, one needs to understand the context and evolution of Indonesia's public sector. Therefore, in this report, the regulatory framework has been mapped to comprehend the State Civil Apparatus (ASN) as well as the broader context of bureaucratic reform of the Indonesian public sector. Data on the previous and current ASN are also discussed.

ASN consists of two groups, namely (i) civil Servants (PNS) with permanent employment contract and (ii) contractual-term government employees (PPPK) with a 1-to-5-year contract. To date, Indonesia's public sector employs 4.3 million ASN with 3.9 million (92%) of them being PNS and 352.000 (8%) being PPPK. Currently, ASN is still dominated by PNS. However, the government will increase the number of PPPK in the following years. In 2022, government recruit 1.1 million ASN and 95% of them are PPPK. In terms of structure, ASN consists of three broad positions, namely high leadership position, administrative position, and functional position. The high leadership and administrative positions are commonly referred to as structural positions. They predominantly perform managerial functions. On the other hand, functional positions are focused more on specific technical jobs with certain required skills and competencies. There are currently at least 27 clusters of functional positions comprising 288 roles within the government of Indonesia (GoI). Aside from ASN, there are several types of government employees, such as (i) honorary staff, (ii) individual consultant, (iii) vendors, and others. However, honorary staff and individual consultant will not be used by November 2023. They will be replaced by PPPK.

This study adopts four aspects of e-Government under Presidential Regulation No. 95/2018 as its research framework, namely (i) governance, (ii) service delivery, (iii) infrastructure, and (iv) human capital. *First*, the main objective of governance is to ensure that e-Government is implemented in an integrated and effective manner across government agencies. *Second*, effective and efficient service delivery could boost productivity of ASN, reduce services cost, and improve bureaucratic or administrative function within and across levels of government. *Third*, e-Government infrastructure, including all hardware, software, and facilities, becomes the main support for the

government institutions to run their own work systems as well as to deliver public services. *Lastly*, human capital, namely the ASN, is the frontline of the public sector. As e-Government is becoming more essential, they need to be equipped with digital skills. However, information and communication technology (ICT) experts are needed to allow the upskilling activities for ASN to optimize the use of technology.

In order to identify relevant digital skills for e-Government, we need ICT competence definition in public sector. However, such documents are lacking. Therefore, we utilize ICT Occupation Map produced by Ministry of Communication and Informatics (MCI) to identify ICT job families and specific jobs. This ICT Occupation Map also provides the rank of each job family and specific job. There are all together 9 ranks starting from the lowest to the highest. We use this information and find 283 digital skills or specific jobs relevant to carry out e-Government. Since ICT Occupation Map also lays out the competence units of these jobs, we can match them with the job descriptions of each functional role of the government. Our matching analysis shows that among ICT functional positions in Indonesia's public sector, *Pranata Komputer* (*Prakom*) takes the majority share of responsibilities to carry out e-Government, with 90% of *Prakom's* job descriptions matching the skills required to implement e-Government. In contrast, the rest of functional positions only contribute insignificantly, with *Manggala* contributing 6% of it, *Sandiman* 2% (both are classified into ICT functional positions), and other roles 1%. In conclusion, *Prakom,* particularly the expert-level *Prakom*, hold an essential role for e-Government. This implies that higher quality of *Prakom* are needed to support e-Government.

The essential role of *Prakom* for implementing e-Government can also be seen in the significantly greater number of *Prakom* compared to other ICT professionals. Based on data from National Civil Service Agency (BKN), it is recorded that at least 77% or 7,954 out of 10,281 ICT professionals are *Prakom*. Nevertheless, the number of *Prakom* is far below a total of 4,344,552 ASN, i.e., 0.24%. Meanwhile, contrary to the low number of *Prakom* – despite their importance – the demand for them exceeds far above the supply. Based on the data obtained from Statistics Indonesia (BPS), we found that during the 2020–2024 period, all ministries and agencies at the central government level need at least 16,348 people to fill in the position of *Prakom* while the current supply is only 2,831 individuals. In other words, an additional 13,517 people are needed to fill in the position of *Prakom* between 2020 and 2024.

In addition to this quantity issue, the current quality of *Prakom* also raises concerns. The delayering policy is indicated to contribute to 23% of *Prakom* having non-ICT educational background or having lower than three-year associate degree. In other words, they are unqualified even for skilled-level *Prakom*. Moreover, only 56% of *Prakom* are of expert-level, i.e., those with at least four-year associate degree or university graduate with ICT educational background. This is below the requirement as our matching analysis shows that it takes 91% (not only 56%) expert-level to e-Government to implement e-Government. However, in terms of age composition, ASN is dominated by boomers and Gen X in general, while *Prakom* is dominated by millennials and generation Z. In addition to concern over the educational background, there are no plans so far on when to organize competency test for *Prakom*.

Clearly, the gap between supply and demand needs to be closed with three possible channels. First, the recruitment channel which can be used to onboard additional PNS, or PPPK, or individual consultants for even shorter contracts than PPPK. Recruitment could also be applied to procure services from vendors when the government intends to outsource the work. Furthermore, a new source of internal recruitment, i.e., through internal job vacancies, also emerges. All these different types of recruitment are discussed from their positive and negative sides. Second, the capacity building channel optimizes the currently available resources. There are various types of capacity building starting from short courses, academic degree, skill certification, expert consultation or in-house training, and conference. They are also elaborated by addressing their positive and negative sides. Third, the retention channels to encounter high turnover of ICT professionals, which include such issues as remuneration, career path, work arrangement, work culture, and leadership are explored.

Some digital government units have applied good practices that they draw from the private sector's experience to make the implementation of e-Government better. For this reason, the study examines some good practices in five digital government units, particularly on three channels of filling in the supply and demand gap. These digital government units are: (i) the Digital Transformation Office (Ministry of Health), (ii) GovTech Edu (Ministry of Education), (iii) Central Transformation Office (Ministry of Finance), (iv) Jakarta Smart City (Jakarta Provincial Government), and (v) Jabar Digital Service (West Java Provincial Government). Having learned from the experience of these digital government units, we underline the necessity to implement a refurbished recruitment method—less-bureaucratic, innovative, and flexible—to attract digital talents into the public sector. This strategy needs to be followed by competitive remuneration as well as offering a non-financial benefit. In recruiting best candidates, the digital government units also employ a strategy of 'selling' the opportunity for the candidates to generate social impacts and improve the lives of society on a large scale. In terms of capacity building, the digital government units make good use of in-house capacity building as the most strategic channel to upskill the capacity of the employees. The in-house capacity building is considered relatively low-cost and can be frequently organized, utilizing internal human resources. *Digital government units apply flexible working arrangements, allowing ICT professionals to work from anywhere and at anytime as long the target can be achieved in a timely manner. They also maintain a less hierarchical and collaborative work culture with less* multiple layers of decision-making. These are necessary *to make the digital talents stay in the public sector.*

Our analysis shows that the problems facing *Prakom* are not only related to quantity, but also very basic quality, i.e., only educational relevance, let alone skill competency. Therefore, despite its prominent role in implementing e-Government, this study does not perceive that recruiting *Prakom* to quench the demand would be the only solution for filling in the supply and demand gap. Instead, using professionals available in the market through vendors would be a better solution. Above all, in many countries, the public sector is not attractive for the best ICT talents. We are aware that out of almost 8,000 *Prakom*, there might be small percentage outliers whose technical capability equals those of private sector. However, with the above-mentioned analysis, it might not be appropriate to force all of *Prakom* to compete technically with ICT professionals of private sectors. Instead, *Prakom* should take complimentary and supervisory roles to ensure that

(i) organization needs are well identified and communicated to vendors, (ii) the work of vendors are supervised and assessed, (iii) the knowledge is sufficiently transferred, and (iv) the simple supporting system be developed, if necessary.

In conclusion, this study recommends:

- Of all **recruitment channels**, the government should prioritize PPPK as the most strategic channel to attract qualified digital talents. This needs to be followed by regulations related to PPPK recruitment for ICT functional positions. By mimicking the strategies applied in digital government units, the government also needs to implement more flexible, less bureaucratic, and innovative strategies to attract digital talents. These strategies should be supported by competitive salaries according to Indonesia's labor market rate and opportunities for digital talent to contribute to the creation of social impact.
- To uphold the **capacity building**, BPS, as the supervisory institution for *Prakom,* is supposed to organize a competency test that will serve as the placement test for further capacity building activities. As a response to the delayering program, which led to quite a considerable number of *Prakom who used to* perform administrative tasks, *Prakom* should reskill themselves independently through Learning Management System. Upskilling programs through formal education also need to be carried out to make the educational qualification and competence of *Prakom* fit with the qualification of *Prakom*. Furthermore, the government should make an arrangement where skill certification is tied with a commitment to work for certain years after the certification. This is a win-win solution to reduce the high turnover among the certification graduates who eye for better jobs in private sectors.
- The training for government leaders should include materials related to collaborative and non-hierarchical work culture as a strategy for **retention measures**, especially to handle *Prakom,* whose majority are millennials and Gen Z. Furthermore, flexible work arrangements should be made possible, starting with ICT professionals with possibilities to spread across other jobs. The process to determine demand of *Prakom* by government units should be carried out prudently to avoid mismatch. With limited supply of *Prakom* as ICT professionals, these resources should be placed according to their competence.

I. Introduction

1.1 Background

Experience during the coronavirus disease 2019 (COVID-19) pandemic has proved that for the public sector to improve in providing its services, digital transformation is a must. Going digital offers public services provision huge potential for improvement. Daub *et al.*, (2020) suggest that digitalization will allow services to (i) be provided 24/7, (ii) save time of providers by up to 50%, (iii) cost less by up to 50%, and (iv) lead to up to 60% cases to be handled. While digitalization could revolutionize the way government provide services as OECD (2001) echoes, it also results in fewer monotonous tasks and, eventually, employees in public sector are expected to be happier performing the job with greater satisfaction.

Prior to COVID-19 pandemic, the global trend of e-Government started in early 2000. In 2003, Government of Indonesia (GoI) passed Presidential Instruction No. 3/2003 on National Policy and Strategy on e-Government. In 2018, digital transformation in the public sector was even more intensified with the issue of Presidential Regulation No. 95/2018 on e-Government or Electronic-Based Government System (henceforth 'Presidential Regulation on e-Government'). To enable this digital transformation, adequate digital skills are needed. Unfortunately, the public sector all over the world, including Indonesia, cannot keep up with private sector in acquiring digital skills.

At the global level, a study of Deloitte (2015) reveals that of 1,200 government officials in 70 countries reveals that majority of government officials perceive that they cannot compete with private sector in terms of digital capability. The difficulties in acquiring talents has become more intensified post-COVID-19 where 'war for talent' has become more widespread, not only among private sectors but also between private and public sectors (Accenture, 2021). Compared to the public sector, digital transformation in the private sector started earlier and has happened at faster pace. It has used new technology in its organization and business process to win fierce market competition. This means private companies know how to meet their need for digital skills. Remunerated with much higher salary, understandably, people with the best digital skills will prefer working in the private sector such as for unicorns, social media or gaming companies, over the public sector. Kinsey (2018) argues that lack of funding is one of the challenges that public sector has to deal with. This leads to a public sector deficit of talent. McKinsey's survey in 28 European Union countries reveals an estimated deficit of 8.6 million individuals by 2023–a sum of 1.7 million people in technological skills, 3,2 million in digital citizenship skills, and 3,7 million in classical skills–to carry out the end-to-end e-Government (Daub et al., 2020).

In the context of Indonesia, the availability of digital talent in the market is a real problem. Quoting the study of Amazon Web Service and AlphaBeta, Kominfo (2022) say that 19% of workers have basic digital skills, and 6% have middle level skills. Meanwhile, the recent diagnostic report of SMERU, Oxford, and UNESCAP (2022) highlighted that fewer than 1% of Indonesian workers have advanced digital skills. Moreover, the study underlines that state capacity to manage digital skill development remains limited. In fact, appendix of this Presidential Regulation on e-Government has explicitly acknowledged the fact that the

number of state civil apparatus (ASN) with adequate digital skills, particularly those with Information and Communication Technology (ICT) expertise, is limited.

1.2 Existing Evidence

There is only scant systematic information on how to develop digital skills in the public sector. Despite the fact that ASN with relevant digital skills is the key to successful digital transformation, the Presidential Regulation on e-Government does not specifically address a strategy for digital skill development in the public sector. At the same time, digital skills in the public sector in Indonesia is a rarely investigated topic. The World Bank published two reports in 2020 on this topic. The first report, 'Accelerating Indonesian Digital Government Transformation Journey' identifies three barriers in e-Government implementation, namely (i) lack of political leadership and implementation discipline, (ii) fragmented authority and lack of coordination, and (iii) the absence of key capabilities in delivering digital transformation (World Bank, 2020a). The study concludes, among other things, that it takes clear and strong governance to achieve government digital transformation. Meanwhile, the government should define its strategy for talent acquisition and talent development. The second report, 'Enabling the Indonesian Digital Government Transformation', finds that the government has no clear definition of digital competency. Some programs are available to develop digital skills, but they are scattered and uncoordinated. Furthermore, the public sector suffers from the absence of critical competency, partly because it has neither strategy for talent acquisition nor overarching policy and regulation to nurture digital capability (World Bank, 2020b).

Finally, a study conducted by Prospera[1] (forthcoming) proposes a framework of digital capabilities consisting of individual and organizational capability; both are bound to digital culture which enhances digital practice in the workplace. The individual capability includes digital literacy, i.e., capability to use data and tools in daily work. Meanwhile organizational capability includes work environment and digital infrastructure. The study collects perceptions from ICT professionals, ICT users and leaders on the framework. It finds that work environment, infrastructure, and culture–rather than digital literacy–are what ICT professionals and users consider challenges. Meanwhile, for leaders they are digital literacy and culture. However, while useful, Prospera's study takes best practice in Australia as its starting point. Our approach is different. We take the framework set out in the Presidential Regulation as our starting point.

1.3 Research Objectives and Methodology

Using four aspects of e-Government, namely governance, services, infrastructure, and human capital, this mix-method study seeks to provide analysis of digital skills development in Indonesian public sector. In particular, we address the issue of supply and demand of ASN as well as its quality to perform e-Government in the public sector, an

[1]Prospera (Australia Indonesia Partnership for Economic Development) is a grant-funded partnership between Australia's Department of Foreign Affairs and Trade and Indonesia's Coordinating Ministry for the Economy. Prospera has been working with 20+ Indonesia ministries to provide evidence-based analysis to support policy formulation on socio-economic development related-issue. For details see https://prospera.or.id/id/beranda-2/.

issue that no one has investigated into until recently. In particular, our study will be focused on:

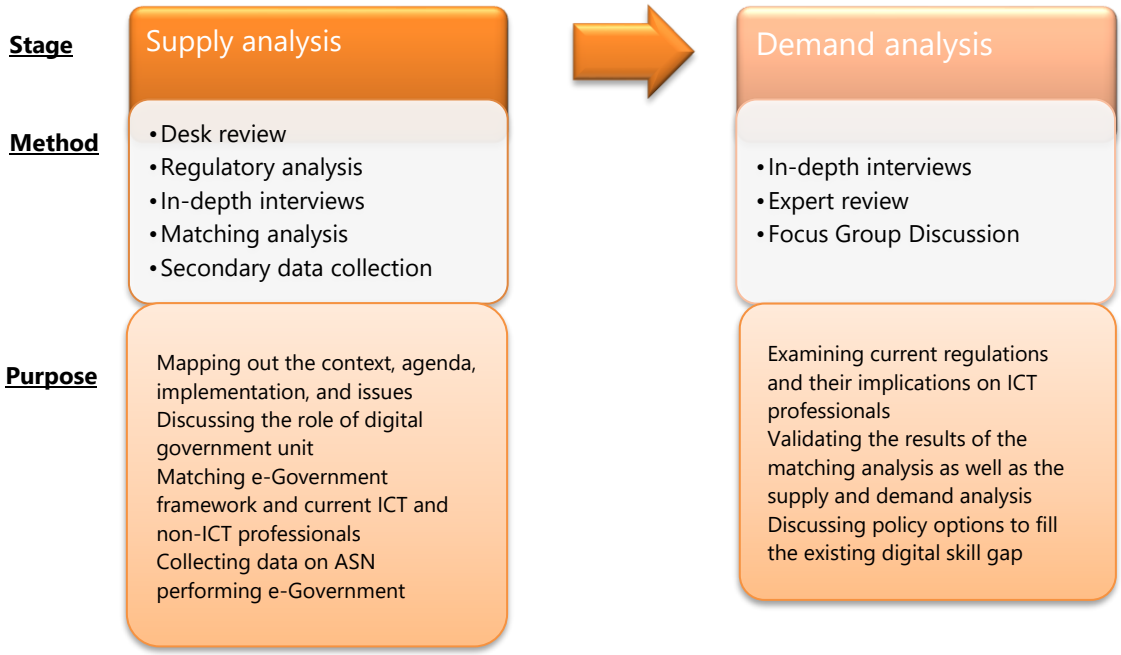
- Examining the supply and demand, both quantity and quality, of ICT and relevant non-ICT professionals to carry out strategic initiatives of e-Government;
- Assessing the good practices in some digital government units; and
- Providing policy recommendations to close the gap in digital skills of public sector.

Taking into account the difficulties in collecting data at local government levels, most of the collected data are limited to central government level – or national (direct aggregation between central government and local governments). As the implementation of e-Government requires the support from those in functional positions, which implies both ICT and non-ICT professionals, we used a multidisciplinary approach in calculating the supply and demand of digital talent in public sector whose proxies are obtained from our matching analysis.

The study consisted of two components. The first component is supply analysis. The supply analysis began with desk review on literature of e-Government as well as regulatory analysis of ASN, that is, the people responsible for implementing e-Government. We then analyzed the supply through in-depth interviews to map the context, agenda, and issues related to ASN as well as to discuss the role of digital government units in filling digital skills gap in public sector. The most important element of this component is the matching analysis where we matched strategic initiatives under e-Government framework with the ICT competencies from an occupation map produced by the Ministry of Communication and Informatics (MCI) in collaboration with other line ministries and the private sector. As the ASN could not be immediately identified from their competencies, we had to once again match this list of ICT competencies with the ICT professionals' job descriptions. From the matching analysis, which ICT and non-ICT professionals are required to implement, e-Government could be identified. We validated our matching analysis result with our informants. Once this was validated, we then collected secondary data of these professionals from the National Civil Service Agency (BKN) and Central Bureau of Statistics (BPS). This is the supply of ICT professionals.

The second component is demand analysis. Having collected data from various line ministries regarding their needs for ICT and non-ICT professionals, we conducted in-depth interviews and expert review to validate the results of supply and demand analyses. Finally, we carried out Focus Group Discussion (FGD) with selected informants to discuss policy options to fill the existing digital skill gap. The informants for in-depth interviews and FGDs are mostly government from line ministries, the officers in the digital government units, and association of government ICT professionals. The list of the informants interviewed and an overview of issues discussed in the interview session is provided in Appendix 1.

Figure 1. Stages of the study



Source: Authors.

This study is structured as follows. Section 2 provides the relevant context and situation of the Indonesian public sector. Section 3 explores aspects of Indonesian e-Government based on its regulation as well as the result of matching analysis between aspects of Indonesian's e-Government and relevant functional positions to operate e-Government. Section 4 presents the follow-up analysis from matching process with the analysis of supply and demand of public sector workers in operating e-Government. It also compares the situation of current public administration to the existing digital government units in Indonesia in assisting more broadly digital transformation and bureaucratic reform in ministries, agencies, and local governments. The final Section of our report, Section 5, concludes this report by summarizing our analysis and provides recommendations to support digital skill development within the Indonesian public sector.

II. The Context of e-Government

2.1 The State Civil Apparatus (ASN)

2.1.1 Context and Data

ASN is the core element in the Indonesian bureaucratic system with its key responsibility being to deliver public services to a diverse citizenry on behalf of the GoI. As laid out in Law No. 5/2014 on State Civil Apparatus,[2] ASN are divided into two based on their employment status, namely (i) Civil Servants (PNS) and (ii) Contractual-term Government Employees (PPPK). Both PNS and PPPK are hired through national recruitment for state civil apparatus candidates (CASN).[3] PNS are hired with a permanent contract. Meanwhile, PPPK are hired to carry out the public sector function as a professional under a short-term contract (ranging from 1 to 5 years at a maximum according to Government Regulation No. 49/2018 on Management of PPPK). They are recruited to fill specific positions/functions in the governmental sector that PNS cannot fulfill—but, they cannot be recruited as PNS because they are hampered by administrative requirements, such as age limits (Sumantoro, 2019).[4] Both types will obtain various monetary compensations during their tenure. However, unline PNS, PPPK will not receive retirement benefits.[5] Following the issue of Government Regulation No. 49/2018 on Management of PPPK, the first recruitment of PPPK was held in early 2019 and the first official data on the number of PPPK in Indonesia was released in June 2022 (CNN Indonesia, 2019; BKN, 2022).

To date, Indonesia's public sector workforce makes up around 1.58% of its population, which is comparable to the size of bureaucracies in other countries in the subnational level (Asian Development Bank, 2021). Based on Table 1, in 2022, Indonesia's public sector employs 4.3 million ASN with 3.9 million (92%) of them being PNS and 352.000 (8%) being PPPK (BKN, 2022). Furthermore, the ASN is spread across two levels: national and sub-national government. In 2022, 963,171 (22%) PNS and 15,481 (1%) PPPK are employed by the national government, with the remaining 3 million (70%) ASN and 339,305 (7%) PPPK being hired by sub-national governments (both provincial and district levels). In terms of their socio-demographic characteristics, 48% of the total ASN are male and around 54% are female. Furthermore, 66% of ASN are those in their forties and fifties and 33% are under 40 years old. Around 1% ASN are 60 years old or older and they usually hold a position at the Expert/Senior rank. This group represents a limited number of ASN who

[2]Before Law No. 5/2014 on State Civil Apparatus was issued, there was no such concept regarding ASN and PPPK in Indonesia.

[3]According to Ministerial Decree of State Apparatus Optimization and Bureaucratic Reform No. 27/2021 on CASN recruitment, CASN selection is under the authority of National Civil Service Agency (BKN). Recruitment of CASN recruitment is held annually, except during Covid-19 pandemic in 2020 and 2021 (The Jakarta Post, 2020).

[4]According to Government Regulation No. 1/2017 on Management of PNS, individuals may be recruited as PNS if they are between 18 and 35 years old.

[5]Other than basic salary, ASN are provided with (i) performance allowance; (ii) spouse allowance; (iii) children allowance; (iv) meal allowance; (v) position allowance; and (vi) general allowance.

have a mastery in certain areas of expertise, either managerial or technical. Considering their educational levels, 70% of ASN have at least a bachelor's degree while the other 30% hold Associate 1 to 4 diplomas and have graduated from junior/senior secondary schools. Appendix 4 shows the latest and more detailed data of ASN based on several demographic characteristics.

Table 1. Number of Employees in Indonesia's Public Sector in 2022

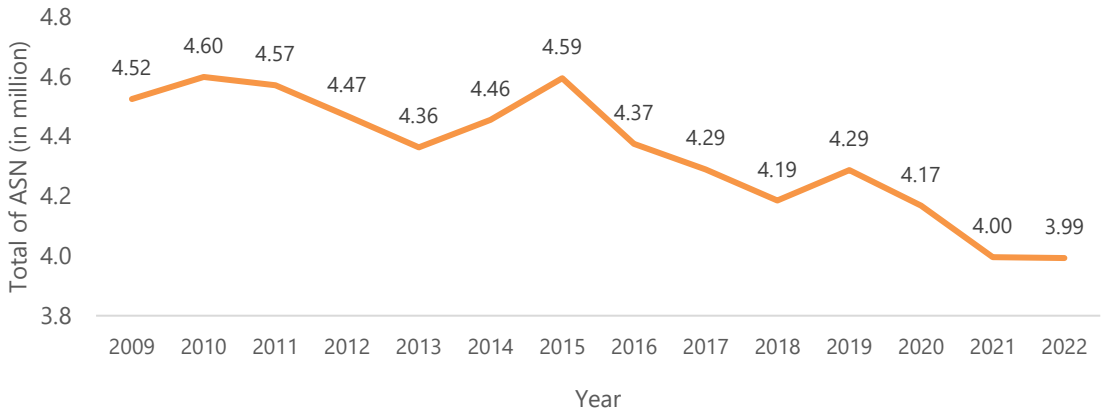
	National	Sub-National	Total
PNS	963,171 (22%)	3,029,595 (70%)	3,992,766 (92%)
PPPK	15,481 (1%)	336,305 (7%)	351,786 (8%)
Total	978,652 (23%)	3,365,900 (77%)	4,344,552 (100%)

Source: BKN, 2022.

Although there are more PNS as compared to PPPK, their numbers have decreased significantly over the years, especially since 2016 (Figure 2). Moreover, during the next CASN recruitment, the GoI will recruit nearly 1.1 million ASN, 95% of whom are PPPK – only 5% are PNS (Kontan.co.id, 2022). These facts support the statement from the Head of BKN in 2021.

> "Following the presence of technology innovation, PNS might become irrelevant in the next ten years. There would be a need for transition towards PPPK." (CNBC Indonesia, 2021)

Figure 2. Number of PNS, 2009–2022



Source: BKN, 2022.

Indonesia's public sector structure consists of three positions with broad categories, namely high leadership position, administrative position, and functional position. In Indonesia's bureaucracy terminology, high leadership and administrative positions are commonly referred as structural positions that predominantly perform managerial functions. These positions are also equal to echelon-level employees where high leadership position is equivalent to echelons 1 and 2 and administrative position is equivalent to echelons 3, 4, and 5. Meanwhile, functional positions focus more on specific technical jobs with certain required skills and competencies. The issue of digital skills in

the public sector, both ICT-based and non-ICT-based positions, is included in the functional position category.

In Indonesia's public sector, functional positions are divided into two, namely functional-expert and functional-skilled. Each of them has four ranks in order of seniority, as shown in Table 2 below.

Table 2. Composition of ASN in Indonesia's Public Sector in 2022

Position	Role	Echelon	No. of Employees	Total
High leadership	Lead Expert	Echelon 1	16	19,808 (0.5%)
	Middle Expert	Echelons 1a and 1b	494	
	Junior Expert	Echelon 2	19,298	
Administrative	Administrator	Echelon 3	94,449	339,457 (7.8%)
	Supervisor	Echelon 4	234,127	
	Implementer	Echelon 5	10,881	
Functional – Expert *(Professional)*	Lead expert	Non-echelon	3,633,513	3,985,287 (91.7%)
	Senior expert	Non-echelon		
	Middle-level expert	Non-echelon		
	Junior expert	Non-echelon		
Functional – Skilled *(Operator)*	Supervisor	Non-echelon		
	Experienced	Non-echelon		
	Skillful	Non-echelon		
Total				4,344,552

Source: Ministry of State Apparatus Optimization and Bureaucratic Reform (MoSA-BR), 2014; BKN,2022.

On the other hand, functional positions have various clusters. Currently, there are at least 27 clusters of functional positions comprising 288 roles within the GoI (INFOASN, n.d.). However, in general, functional positions could be classified into five: (i) teacher; (ii) lecturer; (iii) medical; (iv) technical; and (v) organizer/administrator. Table 3 provides the number of ASN holding functional positions based on general classification in 2022.

Table 3. Number of ASN by Their Functional Positions in 2022

Category	PNS	PPPK	Total
Teacher	1,295,416 (33%)	321,265 (8%)	1,616,681 (41%)
Lecturer	74,888 (2%)	1,344 (0.03%)	76,232 (2%)
Medical	399,411 (10%)	9,616 (0.2%)	409,027 (10%)
Technical	313,535 (8%)	6,055 (0.2%)	319,590 (8%)
Organizer/Administrator	1,550,263 (39%)	13,494 (0.3%)	1,563,757 (39%)
Total	3,633,513 (91%)	351,774 (9%)	3,985,287

Source: BKN, 2022.

2.1.2 Responsible Parties

Five key government institutions are responsible for ASN management and competency development in Indonesia's public sector. MoSA-BR is the leading actor in formulating and synchronizing overall policies on ASN management as well as in overseeing the implementation of policies related to ASN in Indonesia. Meanwhile, *BKN* is responsible for performing the leadership function in CASN recruitment and maintaining the ASN database. Moreover, the State Administration Agency (LAN) plays an important role in leading the implementation of ASN competency development program, especially managerial and socio-cultural competencies (generally, non-technical skills for ASN in structural position) (MoSA-BR, 2014).

Regarding the digital skill development for ASN, two institutions are in charge of it, namely the Ministry of Communication and Informatics (MCI) and *Supervisory Institution of Functional Position*. MCI mandated Human Resources Research and Development Agency (Balitbang SDM) to oversee the ICT technical trainings and provide voluntary general ICT technical trainings across government agencies (World Bank, 2020b).[6] Meanwhile, the Supervisory Institutions are responsible to develop and implement specific ICT competency development program for ASN holding functional position in certain government institutions. In Indonesia, these Supervisory Institutions consist of Statistics Indonesia (BPS) for the functional position of ICT and the State Cyber and Signal Agency (BSSN) for the functional position of ICT Security (World Bank, 2020b). Table 4 below summarizes government institutions' role and function in implementing ASN-related policies.

[6]According to the Ministerial Decree of Communication and Informatics No. 47A/2003 on Guidelines for the Implementation of Information and Communication Technology Technical Education and Training in Supporting e-Government.

Table 4. Government Institutions' Role and Function in Implementing Policies on ASN Management

Function	Responsible Institution	Role
ASN recruitment and HR management	MoSA-BR	• Formulating and synchronizing overall policies on ASN management. • Overseeing the implementation of ASN-related policies.
	BKN	• Performing leadership function in CPNS recruitment. • Maintaining HR database of ASN.
ASN competencies development	LAN	• Creating and implementing ASN competency development program (managerial and socio-cultural competencies).
	MCI (Balitbang SDM)	• Overseeing the ICT technical training across government institutions. • Providing voluntary general ICT technical trainings to every government agency.
	Supervisory Institution of Functional Position	• Developing and implementing specific ICT competencies for ASN holding functional positions in certain government agency.

Source: MoSA-BR, 2014; World Bank, 2020.

2.1.3 Another Type of Government Employees

Other than recruiting ASN, Indonesia's public sector also uses various other channels to meet their human resources needs. According to Presidential Regulation No. 16/2018 on the Procurement of Goods and Services, each government institution is allowed to recruit government employees to be individual consultant to carry out certain functions based on their specific skills and expertise (Hukum Online, 2018). Individual consultants are non-ASN employees hired through procurement of goods and services mechanism with a relatively short-term contract. Considering their expertise, individual consultant whose contract is generally shorter than PPPK received higher remuneration which is based on the average labor market rate.

Furthermore, the government also uses vendors to carry out certain short-term projects. For example, the Ministry of Education and Culture uses the services of PT Telkom Indonesia to establish a digital government unit called GovTech Edu. Some other government institutions also use other vendors' services to develop certain digital platforms/apps. However, aside from requiring strong financial resources, using a vendor's services is challenging, especially in ensuring that knowledge is transferred by the vendor to government employees to strengthen their in-house capability. This is necessary considering that the government employees will be responsible for running and operating the platform after it is established.

Moreover, Government Regulation No. 14/2020 on Education of Government Officials rules that ministries and agencies with strong fiscal capacities should manage their own educational institutions to meet their human resources. Those admitted to these educational institutions will receive a full scholarship, i.e., free tuition fees for their education. Once they graduate, they will be employed as PNS. For example, the MoF obtains qualified employees to fill the positions related to finance and ICT from STAN polytechnic and BPS also obtains 500 human resources supplies annually through its cooperation with STIS Polytechnic of Statistics to fill the statistical functional positions and ICT positions. However, it is possible for students of one government-affiliated educational institution to be placed in government institutions other than their affiliate institution. For example, for STAN polytechnic graduate, they have a chance to be placed in Financial and Development Supervisory Board (BPKP) and The Audit Board of The Republic of Indonesia (BPK).

2.2 Bureaucratic Reform Agenda

Indonesian bureaucrats used to be huge in number and powerful during the New Order regime (Liddle, 2018). Civil servants were the main employees in every city, town, and village of the country and they belonged to the ruling party; bureaucrats also had strong relations with the military. This reflects the fact that the Indonesian bureaucracy is far being politically neutral, a principle that would entail professionalism in service of the public. Consequently, Liddle (2018) explains that it was rife with corruption and public services were delivered poorly and inefficiently. For this reason, one of the milestones of the reform era was bureaucratic reform, following the economic and political reforms. It started when Law No. 43/1999 was issued to amend Law No. 8/1974 on Civil Services. According to this regulation, Indonesia's public service employees are divided into three, namely PNS, TNI, and POLRI (GoI, 1999).

A major effort to reform Indonesia's bureaucracy had been made during the second term of President Yudhoyono's administration in 2009–2014. In January 2010, he issued Presidential Regulation No. 5/2010 on National Medium-Term Development Plan 2010–2014 in which he specified bureaucratic reform as the first out of 11 national development priorities. In June 2010, he issued Presidential Decree No. 14/2010 on the Establishment of Bureaucratic Reform Steering Committee in which the then Vice President Budiono was assigned to be its chairperson. Finally, in December 2010, he issued Presidential Regulation No. 81/2010 on Grand Design for Bureaucratic Reform 2010–2025 which was immediately followed by the issuance of Ministerial Regulation of State Apparatus Optimization and Bureaucratic Reform No. 20/2010 on 2010–2014 Roadmap of Bureaucratic Reform (KSI, 2020; Turner et al, 2022).

The appendix of Presidential Regulation No. 81/2010 underlined three main areas of current bureaucracy where reform was needed: (i) bureaucratic quality, (ii) public services, and (iii) competence of human capital. It also set the expected objectives to be achieved by 2014, namely: (i) 'clean' government which was free from corruption, collusion, and nepotism; (ii) improved public services; (iii) capacity and accountability of bureaucracy; and (iv) professionalism of human capital. By 2019, all these objectives were expected to show significant improvement. Finally, it was expected that by 2025 the country would already

have good governance and bureaucrats and public servants to deliver public service with professionalism and high integrity.

The bureaucratic reform journey is divided into three periods: (i) 1998–2003; (ii) 2003–2010; and (iii) 2010 onwards (Turner, Prasojo, and Sumarwono, 2022). They identify the first period as sporadic change. Although a democratic political system was already in place, decentralization had been initiated, and the police were separated from the military, no road map for long-term bureaucratic reform had been prepared during this period. The second period was one of targeted reform where actors at the international and domestic levels were eager to see improvement in the fight against corruption, collusion, and nepotism. The third period came when Presidential Regulation No. 14/2010, envisioning the creation of world-class public services by 2025, was issued. There are some important changes from 2010 to 2014. Some of these changes include, among other things, a temporary recruitment moratorium in 2010 and 2011 to avoid increasing number of civil servants, computer-based test system for recruitment, open promotional system for senior officials, and a performance allowance for employees to embrace the reform (Turner, Prasojo, and Sumarwono, 2022). One important pinnacle is the issuance of Law No. 5/2014 on ASN which marks the introduction of a merit-based system. The characteristics of New Public Management and New Public Service paradigms are even clearer when President Joko Widodo assumed the office from 2014 onwards (Turner, Prasojo, and Sumarwono, 2022). For example, every official has to sign a contract of performance target. Annual performance evaluation is also set for every government agency. Furthermore, it states that planning, budgeting and performance in government agencies have to be integrated. Finally, it creates an integrity zone where a unit of government agency is selected to be a role model in the implementation of the bureaucratic reform road map.

Box 1
The Law of ASN: The Tip of the Iceberg in Bureaucratic Reform

Law No. 5/2014 on ASN was proposed by parliament in July 2011 to replace Law No. 43/1999. However, the government, particularly the senior executives, showed strong resistance, although President Yudhoyono had given his support. After 30 months of waiting and being discussed in more than 80 meetings, the law was finally passed in December 2014.

The law introduces a career leader service for senior executives, and an independent committee to formulate regulations for a meritocratic civil service. This marks a paradigm change from personnel management to human resource management, from seniority and tenure to skill and competence and from being hierarchical and rigid to being agile and flexible. The law also sets up a scheme of single salary and a defined contribution pension scheme for PNS. These features will ensure that there will be no more "wet and dry" position. It also prohibits bureaucrats from participating in politics. Moreover, the law stipulates that civil servants who have been sentenced for a crime related to their position should be dishonorably dismissed.

However, BKN reported that 2,674 ASN are involved in corruption cases with enforceable verdict. Of this number, only 317 have been dismissed. The rest are still active and receive salaries. To handle this problem, BKN will redo the registration and further investigation to find out where these people are.

Source: Effendi, 2014; Widyastuti, 2018.

2.3 Delayering Policy

In his inaugural speech in 2019, President Joko Widodo enthusiastically expressed how he wanted to accelerate the bureaucratic reform which was one of his five national priorities later outlaid in Presidential Regulation No. 18/2020 on Medium-Term National Development Planning 2020–2024.

> "The President says, 'Bureaucracy should be cut back, echelon should be simplified. Should we have echelons 1 to 5? Can't we just have only 2 echelons? In exchange, they can hold functional position with skills and competence that we rate highly.'" (Widyastuti, 2019)

The President believes that too many layers in structural positions, as reflected in the number of echelons, will delay the decision-making process and, therefore, inhibit improvement in public service provision. Following the President's request, the MoSA-BR immediately issued Ministerial Regulation of State Apparatus Optimization and Bureaucratic Reform No. 28/2019 on Redirection of Administrative Position into Functional Position, also known as 'delayering policy'. This policy aimed to develop a more professional public sector by splitting the roles of ASN at the levels categorized as echelons 3, 4, and 5 into functional position (CNBC Indonesia, 2020). This policy was expected to restructure 430,000 ASN jobs of echelons 3, 4, and 5 (The Jakarta Post, 2019) and simplify the bureaucratic structure by reducing the number of ASN employed in administrative and structural positions and encouraging them to become experts/specialists who could contribute to the specific functional position of the government. By doing so, the state institutions will become increasingly specialized in terms of their functions.

Box 2
Are Functional Jobs the Future of Work?

Moving away from administrative jobs allows civil servants to be more professional. Indeed, there are many plus points in holding functional jobs compared to administrative ones. These allow them to become experts and specialists with clear career path. Moreover, those holding functional positions can continue to build their capacity and collect credit for fast-track promotion. One of the informants, however, underlines the important issue regarding the characteristics of functional jobs in the public sector. She said:

> "Functional jobs in the public sector are not in line with future of work. They are already outdated. It would be difficult to match them with the needs of e-Government. For example, out there, people are talking about big data, developing software, etc. Meanwhile, our functional jobs are still Pranata Komputer (Prakom) Functional Position and Manggala (Informatika) Functional Position, etc. I suppose we need to do a reform that make the relevant jobs for e-Government available in public sector." (Informant, female, 5 August 2022)

The implementation of the 'delayering policy' faces many challenges. First, ASN in structural positions are not ready to work professionally and independently. They used to have power and be more familiar with the managerial function and have subordinates. Now, they need to hold functional positions which require more specific and technical skill sets. Moreover, Indonesia's public sector also requires ASN in functional positions to earn

and accumulate credit scores to get promoted to higher positions. This policy tends to make ASN employed in functional positions more individualistic to earn their own credit scores but less likely to contribute to the state institution. These facts were also confirmed during our in-depth interview with the representative of MoSA-BR, as stated below.

> "This delayering policy, indeed, makes the organizational structure more agile and efficient. However, ASN in functional positions remains to earn and accumulate credit scores for a job promotion. It tends to make them ignore their primary responsibility to contribute to the institution. The MoSA-BR is currently formulating a policy to address this issue." (Informant, Female, 25 July 2022)

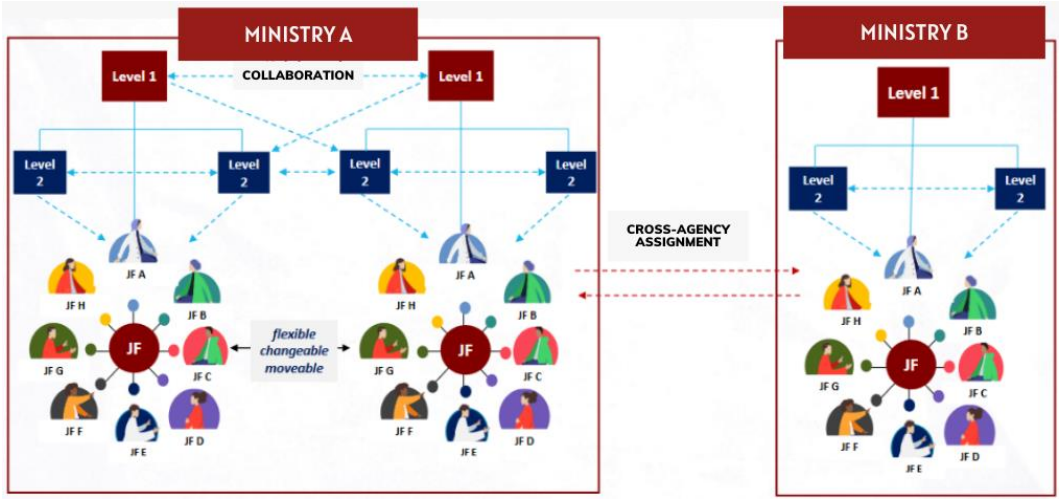
Further, ASN previously employed in the structural position that has just been transferred to a functional position also needs to match their passion, interest, and expertise with the available functional positions. If there is a skill mismatch, the GoI requires a new functional role to be established to accommodate their expertise, which has triggered the creation of a large number of new functional positions in Indonesia's public sector. For instance, in 2020, more than 200 new functional positions were created to accommodate newly transferred ASN from structural positions. This contradicts the government's priority to develop an agile and efficient bureaucratic structure. In response to this issue, MoSA-BR implemented a temporary suspension policy (moratorium) on establishing new functional positions as per Circular Letter No. B/653/M.SM.02.03/2021. This policy was also carried out to better prepare the management system of ASN in the functional position, especially to address the issue related to the absence of a credit score in the newly established functional position.

Since the policy was immediately implemented without proper preparation, after two years of continuous monitoring of its progress, MoSA issued Ministerial Regulation No. 17/2021 on Redirection of Administrative Position into Functional Position which clarifies the previous Regulation No. 28/2019. This regulation specifies steps to be taken in the delayering policy. It urges that delayering policy takes place after simplification of organizational structure. It also ensures that the remuneration of those who move from administrative to functional positions remains the same.

Moreover, to realize the bureaucratic reform agenda in Indonesia, the MoSA-BR also issued regulation No. 7/2022 on Work System in Government Agencies for Bureaucracy Simplification. This regulation pursues a breakdown of silos of the government's working culture, emphasizes the importance of a collaborative work style, and strengthens the teamwork mindset among government institutions. This regulation is expected to build an effective and coherent horizontal coordination in government. In practice, each government unit is allowed to temporarily lend or transfer talent to another government unit that need more resources and where a skill gap occurs. This 'talent exchange policy' offers a huge opportunity to fulfill the need for relevant digital talent in certain government units.

Figure 3 below illustrates the implementation of 'talent exchange policy' under Ministerial Regulation of State Apparatus Optimization and Bureaucratic Reform No. 7/2022.

Figure 3. 'Talent exchange policy' across ministries



Source: Adopted from MoSA-BR, 2022.

Moreover, since Law No. 5/2014 on ASN recognizes only two types of employee, namely PNS and PPPK, the use of other types of employees such as individual consultant and honorary staff should be brought to an end. The direction on this matter is contained in the instruction letter of MoSA-BR No. B/165/M.SM.02.03/2022 on Employment Status in the Central and Local Government Agencies (CNBC, 2022). Following the law, the contract of 400,000 honorary employees should be terminated by the end of 2023 (Tamsir, 2022).

Eliminating individual consultants will generally impact the supply of competent human resources needed to operate public services, including those related to the implementation of e-Government policy. This is because recruiting them is one of the most strategic channels for certain government institutions to obtain a supply of qualified human resources—even though it is only in a short-term working period and the government has to pay relatively high remuneration. These facts were also confirmed through our in-depth interview with the informant, as stated below.

> "Recruitment of individual consultants is actually very important in fulfilling the needs for human resources in a short-term period. They are recruited through a 'pro-hire' mechanism where their remuneration is adjusted to the labor market rate or compared to the private sector rate for similar positions." (Informant, Male, 4 August 2022)

III. E-Government Framework and Relevant Digital Skills

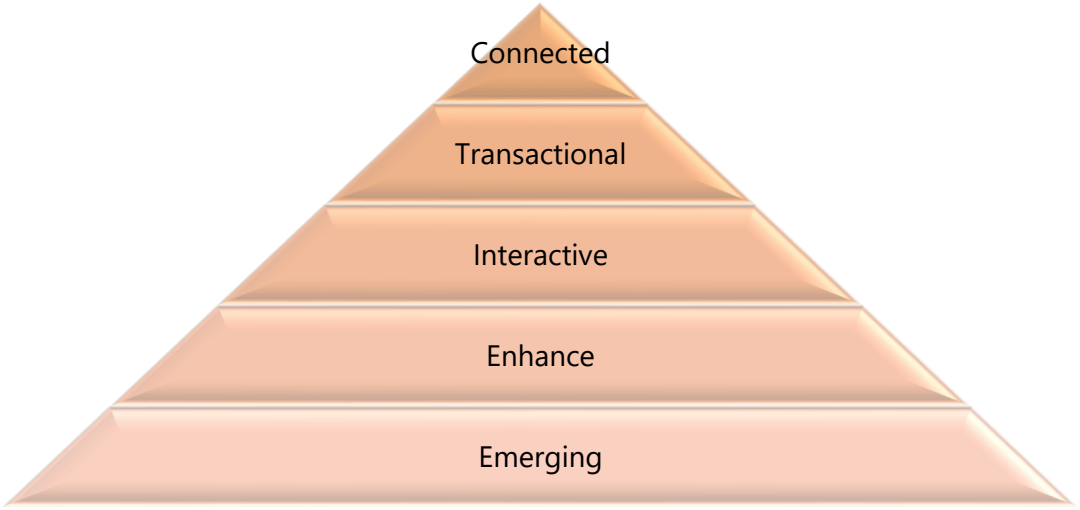
This chapter reflects the past approach to e-Government as well as the current one. These two approaches are discussed in the first sub-chapter to explain the e-Government journey in the last two decades. Following this, we discuss the e-Government framework. This framework is used to determine the relevant digital skills in the public sector–discussed in the subsequent sub-chapter–as well as in analyzing the digital government units in chapter 4.

3.1 Understanding e-Government

E-Government, according to Presidential Regulation No. 95/2018, is the use of ICT by the government in providing public services. Meanwhile, in defining e-Government, OECD (2001) emphasizes the potential of ICT in networking and in changing the structure of the government and the way it operates. On the other hand, World Bank (2015) specifically mentions that ICT brings a change in the relation between government and the citizens, businesses, and other arms of government.

However, e-Government also has a spectrum. The (UN, 2008) specifies five stages of e-Government evolution (Figure 4). The first at the bottom is the emerging stage. This is when e-Government means the government provides official websites at the national and subnational levels. These websites contain static information and offer minimal interaction. The second stage is the enhanced stage. In this stage, the government provides information on public policy and governance, including accessible information related to laws and regulation, reports, newsletters, etc. The third stage is the interactive stage. Moving ahead from the previous stages, in this stage, the government's services, such as tax payment and license renewals, are accessible and downloadable from the websites for citizens' convenience. The fourth stage is transactional stage where the government services enable, not only a two-way interaction and 24/7 access, but also online payment for taxes, license renewal, etc. The final one is connected stage which takes place when the government develops an integrated back office. In this stage, digital transformation of the government has taken place and various government institutions can use the same server, applications, and database to respond to people's needs.

Figure 4. Stages of e-Government, from the least to the most advanced ones



Source: UN, 2008.

The ultimate stage of this UN's (2008) e-Government, namely the connected stage, is similar to the World Bank's (2020) definition of digital government transformation. To achieve that stage, ASN will need to develop their digital skills and competencies. World Bank (2020a) underlines the challenges in achieving this ultimate stage of e-Government, namely (i) the absence of framework on digital competency, (ii) lack of policy to nurture digital capability, and (iii) inadequate strategy to acquire talent.

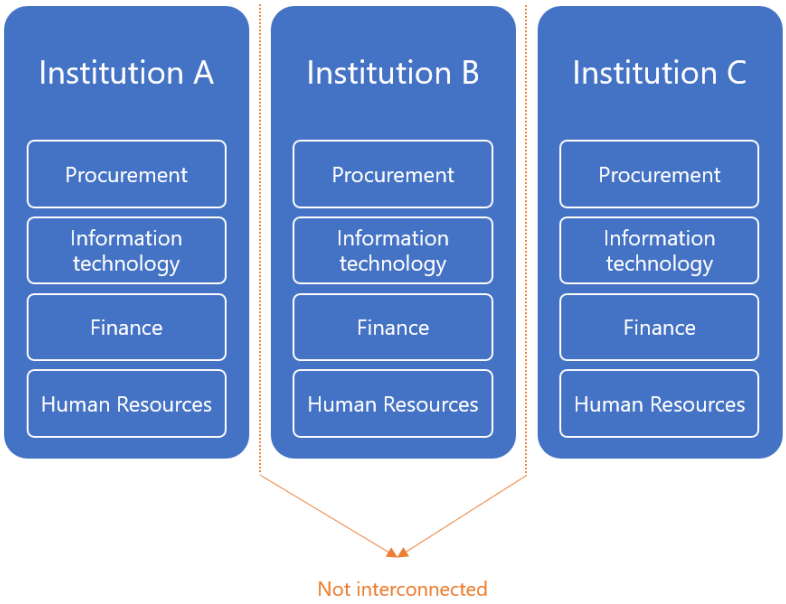
3.1.1 Past Approach to e-Government in Indonesia

E-Government in Indonesia was initiated in early 2000s when the Presidential Instruction No. 3/2003 on National Policy and Strategy on e-Government was issued. This is considered the starting point for Indonesia's digital government transformation journey. The objective of the instruction is to adopt e-Government by accelerating the use of ICT in all government agencies at the central and local government levels in order to improve public services, particularly for transparency purposes. It also aims to change the way government provides information to the public, from using paper-based media to using electronic media. The instruction provides six strategies including the targets to be achieved and stages to proceed. Upon the passing of the instruction, Ministerial Decree of Communication and Informatics No. 41/2004 on Guidance for Quality Standard and Application Development for e-Government was issued. This decree serves as a technical direction for designing websites and other back-office information.

In practice, the approach to e-Government in the past focused on developing government websites and digitizing government documents and, thus, it fits with the emerging and enhanced stages as shown in Figure 4. Particularly for local governments, the road is still long and winding. Wahid (2008) reveals that out of 456 districts, only 67% have their own websites. The rest is either placed on the website of the provincial government or simply unfound. Meanwhile Nurdin, Stockdale and Scheepers (2012) underline the fact that majority of district governments' websites are still in their emerging stage. In addition, several local governments also fail to abide by the technical direction in the Ministerial

Decree of Communication and Informatics No. 41/2004 while others fail to manage and maintain their websites accordingly. As depicted in Figure 5, at the central level, e-Government is developed sectorially, creating agency silos (MoSA-BR, 2018).

Figure 5. Past approach to e-Government: sectorial-based



Source: Adopted from UN, 2008; and MoSA-BR, 2018.

Moreover, in terms of its e-Government policy, Indonesia underperforms compared to other countries. Table 6 below describes Indonesia's ranking on e-Government implementation according to the United Nation e-Government Survey. In e-Government Development Index (EGDI) 2018, Indonesia managed to climb 19 ranks from the previous year's survey to 107th place. Later in 2020, further progress was made by the country as it sat at 88th place out of 193 countries, scoring 0.6612 from a maximum score of 1.[7] Among South-Eastern Asian countries (Figure 6), Indonesia was constantly ranked 6th throughout the years. However, in 2020, Indonesian e-Government improved significantly (~26% growth in EGDI score) compared to the Top 5 of Southeastern Asian region, i.e., Singapore, Malaysia, Thailand, Philippines, and Vietnam.

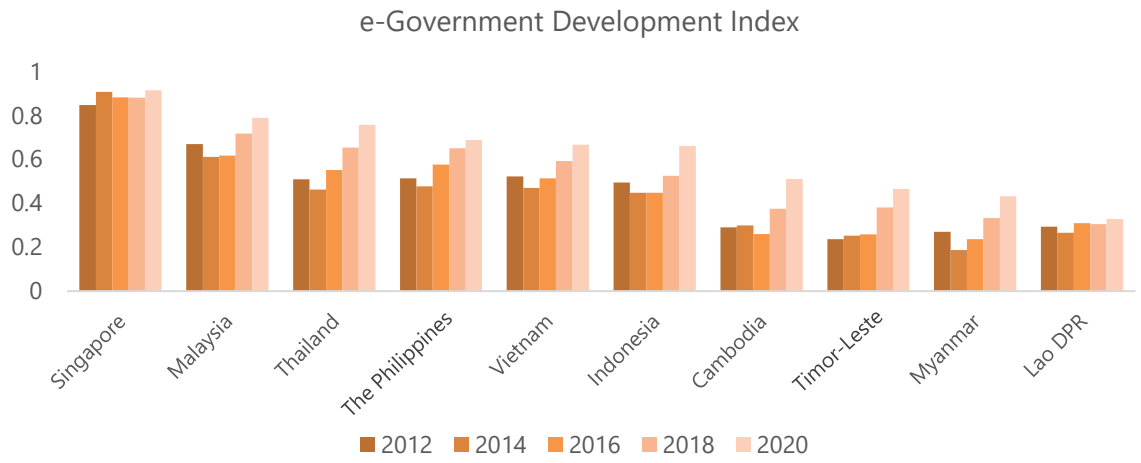
Table 5. Indonesia's Ranking and Accomplishments on e-Government Development Index

	2012	2014	2016	2018
Rank	97	106	116	107
Score	0.4949	0.4487	0.4478	0.5258

Source: United Nation e-Government Surveys 2012, 2014, 2016, 2018, and 2020.

[7]E-Government Development Index (EGDI) uses 3 domains, namely online service index, telecommunication infrastructure index, and human capital index.

Figure 6. Indonesia's ranking on e-Government Development Index compared to South-Eastern Asian countries



Source: United Nation e-Government Surveys 2010, 2012, 2014, 2016, and 2018.

In spite of some progress, as can be seen from both Table 6 and Figure 6, it is safe to say that the promise of e-Government to improve efficiency and effectiveness has not been achieved to date. While the Germany's government could save 59% of work hours thanks to their use of new technology (Stern *et al.*, 2018), the opposite happened in Indonesia. MCI reported that the use of technology as reflected in continuous increase in annual ICT spending has had no impact on its place in the e-Government index – on the contrary it has prefaced a downturn (Jamaludin, 2017). Moreover, MoSA-BR (2018) showed that between 2014 and 2016, government spending increased by more than Rp4.23 billion per year for purchasing hardware and software, yet 65% of that was used to develop similar applications in different government institutions. It can, therefore, be said that the past approach to e-Government was marked by huge, yet ineffective government spending on ICT.

3.1.2 Current Approach to e-Government

To date, the GoI has strengthened its commitment to pushing digital transformation in the public sector as shown by the issuance of Presidential Regulation No. 95/2018 on e-Government. This commitment highlighted GoI's serious effort to address the issue of bureaucratic ineffectiveness by utilizing digital technologies.[8] E-Government policy becomes a key ingredient to achieve high performance of the bureaucracy and public service at the same time—as mentioned in the vision of world-class bureaucracy 2024 by MoSA-BR (LAN, 2021c). This policy enables the government to integrate all government bodies and agencies, both at the central and subnational levels, to adopt a common and

[8]For the last two decades, Indonesia and all countries around the world have paid attention to the issue of bureaucratic ineffectiveness as a part of the bureaucratic reform agenda and good governance campaign promoted by the United Nations through the Millennium Development Goals (MDGs)—later, this agenda has evolved to Sustainable Development Goals (SDGs). Addressing this issue through digital government transformation holds the promise of (i) creating better government, (ii) boosting accountability and transparency, (iii) avoiding mismanagement governance, (iv) distressing corruption, and (v) improving public service delivery to every citizen.

interlinked enterprise architecture using ICT, and to establish a national team to resolve common issues related to public services (World Bank, 2021). Moreover, e-Government policy also offers the potential to improve efficiency in day-to-day operations of government as well as the citizen service experience.

> "Some important differences between past and current approaches to the implementation of e-Government are that the former simply allows government agencies to develop their own applications; the latter specifies what applications can and cannot be internally developed. This is to avoid duplication and unnecessary spending. For the same reason, the procurement of data center and ICT infrastructure, including devices, should also get clearance from MoSA-BR and MCI." (Informant, female, 14 July 2022)

The current e-Government policy chaired by MoSA-BR involves various ministries and other government institutions with different roles under the National e-Government Coordination Team, as described in Table 5 below.

Table 6. The National e-Government Coordination Team in Indonesia

No	Ministries	Roles
1.	MoSA-BR	Coordinates all e-Government activities, including business process, and determining general applications
2.	Bappenas	Coordinates the planning of e-Government, including data management.
3.	MoF	Coordinates the budget of e-Government
4.	MCI	Coordinates the development of applications, ICT infrastructure, and policies of ICT audit.
5.	MoHA	Coordinates business process of provincial and district governments, including implementation of e-Government at the subnational levels.
6.	BSSN	Ensures the security of e-Government, prepares the security standard, and is in charge of security audit of e-Government
7.	National Research and Innovation Agency (BRIN)	Coordinates audit of general application and infrastructure as well as knowledge management and technology transfer.

Source: Presidential Regulation No. 95/2018.

The most significant factor that hinders the GoI from operating the e-Government policy more effectively is what was been described as each government institution's 'sectoral ego' and 'silo perspective'. These characteristics triggered every government body to build their own digital products (e.g., platform, application, and data center), regardless of their low utilization. Some in the Indonesian public sector also hold the perspective that the number of digital products measures the degree of innovation—the more digital products they build, the more innovative they think they are.

Moreover, the MoSA-BR also issued Ministerial Regulation of State Apparatus Optimization and Bureaucratic Reform No. 10/2019 on Integrity Zone towards Corruption-

Free Area (WBK) and Clean and Attending Bureaucracy Area (WBBM) in government institutions. This regulation provokes the government agencies to 'compete' to build as many digital platforms as possible while expecting that their performance accountability will be strengthened, and corruption will be eradicated.

> "WBK and WBBM programs are parts of bureaucratic reform which aims at (establishing) a bureaucracy with capable and accountable organization, clean government, quality public services. One of the indicators under WBK and WBBM programs is innovation. Many government officials interpret innovation simply as the development of applications. Government agencies are racing to pass the evaluation of WBK and WBBM. Prior to the evaluation, they develop applications to show the innovation, regardless of their usability." (Informant, male, 4 August 2022)

In the meantime, there has been a tendency for government institutions to perform this effort just before the MoSA-BR conducts a clean and corruption-free bureaucracy assessment. Once the assessment is done, the platform and application are no longer usable. To make matters worse, the developed applications require users to input personal data, such as information on their national ID cards, when the data security system is still weak and no personal data protection law has been issued in Indonesia (Sugandi, 2022). Thus, the many unused applications pose a high security risk and waste human resources and funds.

Box 3
24,000 Government Apps Have Proven the Ineffectiveness of Public Service

The Indonesian public sector has developed 24,000 digital-based applications to date—an issue that the MoF concerns itself with (CNBC, 2022). Most of these applications have malfunctioned and even the Minister of Finance, Sri Mulyani Indrawati, complains that it has wasted the state budget (Kompas, 2022). This shows that although the regulation on e-Government has set an e-Government enterprise architecture, its implementation has not yet been effective. Each government unit's attempt to develop their own internal applications has only prioritized quantity over quality and no consideration is given to the ways to avoid duplication in activities/initiatives and budget, synchronize policies and regulations, and continuously evaluate progress.

The facts above were also confirmed through our in-depth interview with the representative of the MoF, as stated below.

> "We don't have a good e-Government enterprise architecture, so all ministries/agencies 'compete' to make their own applications. Consequently, we found integrating all those applications difficult because the data structure, programming language, and framework are different. If only we had a good EA from the beginning. In that case, we can identify the kind of applications/services we need to create to free up resources (e.g., budget and talent) tied up in duplication/repetitive digital products." (Informant, Male, 4 August 2022)

Despite the issue of ineffective e-Government EA, the Indonesian public sector has made a relative degree of progress in driving major e-Government initiatives, as proven by the

GoI's success in developing first-generation e-Government services, such as LAPOR![9] and e-Filling.[10] However, the issue of competent human capital with relevant digital skills has not been discussed much, even though it has already been mandated in the current e-Government regulation. Aside from competent ICT technical talents, the Indonesian public sector also requires high-level leaders with a strong political vision and awareness to push the e-Government agenda, especially leaders with sufficient knowledge on re-engineering the whole business process of e-Government policy.

On the other hand, current evaluation of e-Government index (PeGI),[11] conducted by MCI and MoSA-BR, shows remarkably slow progress in the implementation of e-Government policy (Table 7).[12] Indonesia's 2020–2024 RPJMN underlines the GoI target of achieving a score of at least 2.6 (out of 5) by 2024, while the GoI's e-Government has stagnated at around 2.2 since 2019.[13] However, in 2021, most of the ministries have surpassed the score of 2.5 (Good), yet a number of ministries are still exceeding only 1.5 score (Enough) and some others are higher than 3.5 score (Very Good) (Appendix 3).

Table 7. The Government of Indonesia's Rank of e-Government (PeGI), 2018–2021

	2018*	2019*	2020**	2021***
Average national level	1.98	2.18	2.26	2.24
- Average ministries	NA	NA	2.64	2.84
- Average agencies at the national level	NA	NA	3.02	2.58
- Average provincial level	NA	NA	3.03	2.45
- Average district level	NA	NA	3.00	2.15

Source: Ministry of State Apparatus Optimization and Bureaucratic Reform of the Republic of Indonesia.

Note:

*No official publication regarding the achievement of each government institutions is available.

**Official published data in 2020 only captures 9 ministries, 18 agencies, 7 provincial governments, and 93 district governments.

***Official published data in 2021 captures 34 ministries, 38 agencies, 34 provincial governments, and 392 district governments.

[9]This stands for *Layanan Aspirasi dan Pengaduan Online Rakyat* or Citizens' Online Aspiration and Complaint Service, a complaint-handling platform that enables citizens to submit their aspirations and complaints about government services. It was developed in 2011 and since 2016 this platform operates under the MoSA-BR. In English, "*lapor*" means "to report".

[10]An online tax reporting system developed by the Directorate General of Taxes (DGT) under the MoF to simplify the taxpaying process for taxpayers.

[11]E-Government index is a tool to measure e-Government maturity in every government institution (national and subnational levels). MCI and MoSA-BR established this tool based on 3 domains, namely policy, governance, and service.

[12]These facts were quoted in Ministerial Decree of State Apparatus Optimization and Bureaucratic Reform No. 1503/2021 on Result of e-Government Evaluation for Ministries, Agencies, and Local Governments.

[13]These facts were quoted in the appendix of Ministerial Regulation of State Apparatus Optimization and Bureaucratic Reform No. 24/2020 on 2020–2024 Strategic Plan of the Ministry of State Apparatus Optimization and Bureaucratic Reform.

3.2 E-Government Framework

We adopted four aspects in Presidential Regulation No. 95/2018 on e-Government as our research framework and starting point to identify the digital skills needed to implement e-Government. Table 8 lists down a total of ten strategic initiatives in these four aspects. The implementation of these initiatives could bring government's digital transformation to the final stage of e-Government, namely connected stage.

Table 8. Aspects of Indonesian e-Government

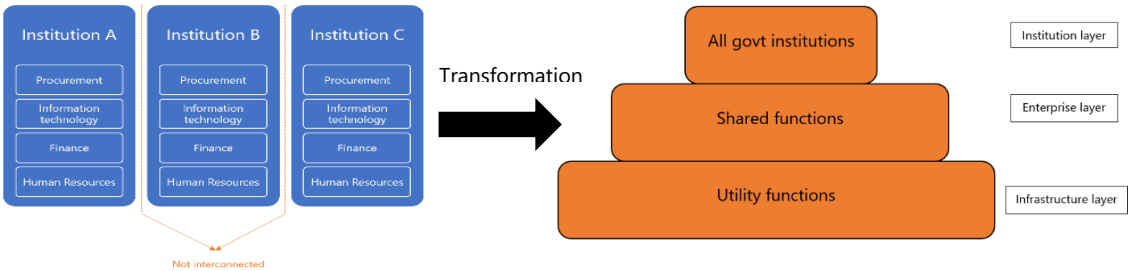
Aspects	Strategic initiatives
Governance	e-Government enterprise architecture
	Data and information
	Business process
Service delivery	Electronic-based administration services
	Electronic-based public services
Infrastructure	National Data Centre
	Intragovernmental national network
	Government services connection system
Human capital	Learning Management System
	Knowledge Management System

Source: Presidential Regulation No. 95/2018, Power Point Presentation on e-Government (MoSA-BR, 2018).

3.2.1 Governance

Governance is an important, yet missing aspect of e-Government framework in the past approach to e-Government. For this very reason, governance is addressed in Presidential Regulation No. 95/2018 to ensure that the implementation of e-Government in each government institution could be integrated (Figure 7). This is because without proper governance, e-Government will be implemented as agency silos.

Figure 7. Transformation from Sectorial-based to Connected E-Government Approach



Source: Adopted from UN, 2008.

> "E-Government has not been effective as government institutions are still working in a fragmented way like silos. For example, we have a general nationwide application known as SP4N Lapor, which is developed by MoSA-BR. This application gives the citizens their right to report to the government regarding their experience in using public services. In theory, all line ministries and local governments should use this application. In reality, each government institution is still using their own public reporting system. Thanks to this, the integration could not be achieved. Silo mentality has to be first handled for e-Government to be effective." (Informant, female, 14 July 2022)

To make e-Government more effective, governance has to be directed toward strengthening the management, coordination, and regulations to push the integration of government services. As central and local governments have to proceed with transformation efforts, they have to use resources more optimally by avoiding duplication in activities/initiatives and budget. Also, within and across central and local governments coordination has to be integrated by intensifying coordination, harmonizing policies and regulations, and continuously evaluating progress. Policies and regulations have to involve various stakeholders at all levels.

Table 8 shows three strategic initiatives under e-Government. The first strategic initiative is to develop a national e-Government enterprise architecture as the foundation of e-Government. The Presidential Regulation No. 95/2018 defines e-Government enterprise architecture as the basic framework defining the integration of business process, data and information, infrastructure, application, and security of e-Government to provide integrated services. The national e-Government enterprise architecture includes that at the central and local government levels.

Article 8 of Presidential Regulation No. 95/2018 stipulates that MoSA-BR develops the enterprise architecture of e-Government. In response to the stipulation, in mid-2022 Ministerial Decree of State Apparatus Optimization and Bureaucratic Reform No. 255/2022 on e-Government enterprise architecture was issued (KemenPANRB, 2022). This e-Government enterprise architecture includes 6 domains: (i) business process, (ii) services, (iii) data and information, (iv) application, (v) infrastructure, and (vi) security. Moreover, e-Government enterprise architecture is formulated based on the business process nationwide. While the business process is ideally consistent and comprehensive, it should also be adaptive towards the services, the stakeholders' needs, and regulatory changes. Nevertheless, applications should be developed–and integrated across sectors and government levels–not only based on the needs but also in harmony with the objectives and target of e-Government.

The second strategic initiative pertains to data and information. Article 9 of Presidential Regulation No. 39/2019 and article 33 of Presidential Regulation No. 95/2018 instruct MCI to regulate the standard of data interoperability. In June 2020, MCI conducted public consultations to discuss the draft of Ministerial Regulation on Data Interoperability (Kominfo, 2020). The final version of the regulation is yet to be issued. This is partly because of the delay in the passing of the Law on Data Privacy Protection which had been initiated since 2016 but is still being discussed in the parliament. Meanwhile, the regulatory framework on digital transformation agenda is overarching. The GoI has issued one data policy (Presidential Regulation No. 39/2019 on One Data of Indonesia) and one map policy (Presidential Regulation No. 213/2021 which revised Presidential Regulation

No. 9/2016 on Acceleration of the Implementation of One Map with Level of Accuracy 1: 500.000 Map Scale). This one data policy intends to synchronize the data collected by each ministry and agency to ensure that the data is accurate and up to date. Meanwhile the one map policy aims to identify plots of land with overlapping utilization plans. This will allow the government to immediately resolve problems when they arise. Nevertheless, without regulation on data interoperability, it is impossible to share data across government institutions and government levels smoothly.

Finally, the third strategic initiative is the simplification of e-Government business process. Simplified business process is important not only for e-Government but also for the bigger context of bureaucratic reform. For this reason, MoSA-BR issued Ministerial Regulation of State Apparatus Optimization and Bureacratic Reform No. 77/2022 on Work System in Government Institutions for Bureaucratic Reform. The regulation consists of three parts: (i) simplification of organizational structure; (ii) delayering; (iii) adaptation of work system. Business process is discussed in the third part. It is simplified by reviewing and evaluating the current business process and adapting the standard operational procedure.

3.2.2 Service Delivery

The GoI has embarked on the journey of digital government by establishing various services through digital technology adoption through Presidential Regulation No. 95/2018 on e-Government. This aims to boost productivity of ASN, reduce services cost, and improve bureaucratic effectiveness and efficiency (administrative simplification) within and across levels of government. According to the Indonesian e-Government strategic plan, digital government service is divided into two: electronic-based government administration services and electronic-based public services.

The electronic-based government administration services is a "back-office service" aiming to streamline and make coherent administrative processes within government bodies (ministries and agencies). It also aims to make current regulations easier to understand and clearer to apply to the other government levels (national and sub-national governments). This service benefits the public sector by making the business process more effective and efficient—this is known as Government to Government (G2G) interaction.

In Indonesia, G2G interactions are performed through common sharing platforms[14] developed and operated by the central government. In 2008, the GoI has developed Electronic Procurement Services (LPSE), a platform to realize clean and good government in the procurement of government goods/services.[15] In 2016, the GoI also has developed a platform called Collaboration Planning and Budget Performance Information (KRISNA) to strengthen accountability and efficiency in government planning and budgeting processes (Knowledge Sector Initiative, 2020). Furthermore, to manage the human resources aspect in the public sector more efficiently, the GoI, through BKN, has developed a platform

[14]Platforms with common standards to be used jointly by all ministries and other government institutions. Aside from the common sharing platforms, each government institution also develops and utilizes their own platforms to accommodate their internal needs.

[15]The platform can be accessed at https://lpse.kominfo.go.id/eproc4/.

called MySPAK[16] Every ASN can update their personal data through this platform and integrate it with the national ASN database.

Meanwhile, electronic-based public services is a "front office service" aiming to deliver services to every citizen more efficiently, ensure citizens' satisfaction regarding the government services, and increase public trust and positive perception of the government (Bellantoni, 2010). This service facilitates an interface between the government and the public or citizens (Government to Citizen/G2C) and between the government and the business sector (Government to Business/G2B).

Since the first e-Government regulation was issued in 2003, GoI has made a relative degree of success in developing the first-generation of e-Government services. As discussed earlier, in 2011, the GoI has developed LAPOR! platform to facilitate G2C interactions.[17] Under the authority of MoSA-BR, LAPOR! has now been successful in integrating 623 government institutions (including 34 ministries, 74 line agencies, and 515 subnational governments) and receiving around 560 daily reports for the past two years (World Bank, 2021).

Another progress the GoI has made to digitize government services was developing e-Filling in 2015. In 2019, DGT has collected 13.4 million annual income tax, and 93% of that was reported through the e-Filling platform (Pajakku, 2020). This accomplishment illustrates the rise of public awareness of using digital technology for reporting income tax.

Moreover, to create a conducive climate for doing businesses and facilitate the G2B interactions, the government has developed a platform known as One Single Submission (OSS). This platform aims to make it easier for people to do business in Indonesia by creating an easy and integrated business licensing system.[18]

Table 9. Examples of e-Government Services under Strategic Initiatives in e-Government Services[19]

e-Government Strategic Plan	Stakeholders of e-Government	Type of Service
Electronic-based government administration services	Government (G2G)	LPSE, KRISNA, MySPAK
Electronic-based public services	Business (G2B)	OSS
	Citizen (G2C)	LAPOR!, e-Filling

Source: Authors.

[16]The platform can be accessed at https://mysapk.bkn.go.id/.

[17]The platform can be accessed at https://www.lapor.go.id/.

[18]The platform can be accessed at https://oss.go.id/en.

[19]The services listed in this table are only examples and do not fully represent all the types of e-Government services the government provides.

3.2.3 Infrastructure

Presidential Regulation No. 95/2018 on e-Government states that e-Government Infrastructure is one of the essential elements to implement e-Government among government institutions. This includes all hardwares, softwares, and facilities that become the main support for the government institutions to run their work systems, applications, data communication, data processing and storage, integration/connection devices, and other electronic devices. According to the regulation, e-Government Infrastructure consists of two elements, they are: 1) National e-Government Infrastructure; and 2) e-Government Infrastructure in Central and Local Government Institutions. In the National e-Government Infrastructure, the strategic plans of the government include the establishment of National Data Center, Intra-Government Network, and Government Services Connection System. For those in the Central and Local Government Institutions, the e-Government Infrastructure focuses on the strategic plans of Intra-Government Network of Central and Local Government institutions as well as the Government Services Connection System in the Central and Local Government institutions.

As a strategic plan, the establishment of a National Data Center[20] aims to increase work efficiency among governments at the central or local level by providing data resources that can be used nationally by central and local government institutions. Several policies are taken for the implementation of the National Data Center. The first policy is infrastructure sharing. For example, 630 central and local government institutions are currently having around 2,700 data centers/server rooms.[21] With its mere 30% utilization, there is an urgent need for efficiency. This is done by integrating these data centers with the National Data Center of e-Government. This allows the number of data centers to be reduced to only between 10 and 20. Second, there needs to set up a standard for technical feasibility and security of these data centers, including the operational and security eligibility. In its use, the National Data Center needs to be reviewed by the MCI for its operation eligibility and by BSSN for its security eligibility.

Another strategic plan, Intra-Government Network, is a closed electronic system network used within institutions and is useful to maintain the security in transmitting data and information between the network nodes of central and local government institutions. Intra-Government Network strategic plan is the most required basic infrastructure of e-Government as this reflects how the governments, either at central or local level, are communicating to each other. Therefore, in the e-Government acceleration plan, this becomes one of the programs that needs to be completed within three years after the release of the Presidential Regulation on e-Government.[22] Similar with the National Data Center, this strategic plan requires a reviewed recommendation both from MCI for the operational eligibility and BSSN for the security eligibility.

[20]Currently, the GoI has established 4 National Data Centers to implement e-Government and to support an efficient, effective, and transparent public services. They are located in Jabodetabek, Batam, Balikpapan, and Labuan Bajo.

[21]Directorate of Government Informatics Application Services, MCI (2021).

[22]National ICT Board (Wantiknas), 2019.

The Government Services Connection System, or system sharing, strategic plan is directed to facilitate the integration of e-Government services between government institutions. All government institutions at the central and local levels are required to use this Government Services Connection System in providing e-Government services, which then leads to the need for interoperability standard between e-Government services. This interoperability standard is determined by the ministry in charge of government affairs in communication and informatics–the MCI. In line with that, and like the previous strategic plans, the MCI also has the responsibility to review the operational eligibility of this plan while BSSN is responsible to provide reviews on the security eligibility.

3.2.4 Human Capital

The framework of e-Government places human capital as one of the essential elements in realizing high-quality and reliable electronic-based bureaucracy and public services. ASN are assigned at the frontline to conduct e-Government. For this reason, they need to be equipped with digital skills, by which we mean the ability to operate, organize, comprehend, consolidate, appraise, and obtain information securely and conveniently (Bashir and Miyamoto, 2020). The absence of adequate digital skills to operate e-Government poses the risk of losing its potential to improve public services over time. Also, since e-Government needs to be developed sustainably and continuously to create proper mechanisms to provide fast, efficient, and accurate public services to the government itself and all citizens,[23] the GoI demands ASN to be competent and innovative with knowledge and skills in digital technologies through digital skills development.

According to Article 51 of Presidential Regulation No. 95/2018, the agenda to produce high-quality human capital in the Indonesian public sector could be done by developing technical competencies of ASN. However, no specific moves have been arranged in the regulation. Nevertheless, through the Education and Training Center (Pusdiklat) and Corporate University (Corpu)[24] of each institution (see Box 2), some government institutions have initiated Learning Management System (LMS) to support ASN's upskilling and reskilling agenda. LMS is a software system for managing all educational and training activities, i.e., administration, documentation, tracking, reporting, automation, and execution of activities (Ellis, 2010). Modern LMS could utilize data analytics to identify skills gaps of individuals to the ideal condition. Individuals may use this tool to arrange training needs, select relevant materials, and choose the desired learning methods to develop competencies (Mooney, 2021). LMS is expected to serve as a medium for facilitating various electronic-based competency development (e-learning) activities, both full e-learning and blended learning. It provides assistances in providing skills and knowledge based on the needs of each directorate and bureau to support their agenda towards the goals of their overall institution (Ministry of Communication and Informatics, 2021). The existence of LMS also gives opportunities for ASN to take distance learning, assisting ASN

[23]From 'Grand Development Design of ASN 2020–2024: Strategies in developing ASN with Integrity and Discipline ', a presentation from Dr. Ir. Setiawan Wangsaatmaja, Dipl. S.E., M.Eng (Medan, April 4, 2019).

[24]Based on the definition from The Global Association of Corporate Universities & Academies (GACUA), Corpu is a competency and organizational development system in matching the needs of the organization and its employees' competencies, i.e., link and match approach, to achieve its strategic goals.

in attending 20-to-24-hour upskilling and reskilling programs within a year without leaving their job behind.[25]

On the other hand, Article 52 of Presidential Regulation No. 95/2018 mandates the importance of having Knowledge Management System (KMS) to manage each government institution's intellectual assets. KMS is a structured and systematic effort to develop knowledge by identifying, acquiring, evaluating, and distributing intellectual assets, including data, information, knowledge, and policies of an organizational governance within a computational system (Koenig, 2018). The presence of KMS assists government institutions in many ways, such as: (i) time and cost savings; (ii) increased number of intellectual assets; (iii) adaptability to sudden changes in governance; and (iv) increased productivity (Satoto, 2017). In the context of human capital, this system could be utilized to reduce the risks of high turnover rates in the public sector, especially those government institutions with significant amount of non-ASN employees. It helps the GoI record their intellectual assets in the system that might be produced by resigned employees and creates standards for operating, improving, or repairing specific actions. Thanks to its functions, KMS also assists the GoI in mapping relevant skills needed for the public sector to support the continuous improvement of LMS and the government's human resources.

[25]According to Government Regulation No. 11/2017 on Management of PNS and Government Regulation No. 49/2018 on Management of PPPK.

Box 4
ASN Corpu

LAN is seeking to produce ASN with future-proof skills by mainstreaming ASN Corpu[26] within an integrated system between ministries, agencies, and local governments. Corpu is currently still an output of each institution's initiative, e.g., the MoF, the Ministry of Law and Human Rights (MoLHR), the Ministry of Industry (MoI), the Provincial Government of DKI Jakarta, and others. ASN Corpu will complement each institution's Corpu, providing an integrated system between all government institutions to construct national strategic plans and actions in developing the competencies of ASN. Prior to mainstreaming ASN Corpu, LAN utilized ASN Competency Development (Bangkom ASN). However, the approach is outdated, simply due to its inability in providing future-proof skills for ASN, i.e., Bangkom ASN, conducted in Pusdiklat LAN, could not meet the demand from each institution because of its conventional approach (Lembaga Administrasi Negara, 2021b).

In supporting the implementation of ASN Corpu, LAN will build ASN Corpu with two pillars, i.e., LMS and KMS. Previously, LAN has released LMS platform called 'ASN Unggul'.[27] ASN Unggul is expected to support effective, efficient, and high-quality learning and training in developing ASN's competencies on various levels. ASN Unggul currently could facilitate several modern education and training mechanisms, such as social learning, retrieval practice, blended learning, and Massive Open Online course (MOOC), helping them to access modules from anywhere and anytime (Lembaga Administrasi Negara, 2021a). These methods also offer benefits for public sectors. By providing flexible learning and training systems, public sectors will not be unecessarily afraid of losing employees when their employees participate in upskilling and reskilling agenda. Unlike individual government institution's Corpu, the scope of learning and training materials from ASN Unggul covers general soft skills, such as leadership, digital literacy, and others. On the other hand, LAN is still developing its KMS, assisting the LMS to create a nationally integrated system of ASN Corpu and becoming the center of excellence which can be the model to be copied by private sector and universities in the future.

3.3 Digital Skills for the Implementation of e-Government

In 2017, MCI along with Ministry of Manpower (MoM), Bappenas, National Profession Certification Agency (BNSP) as well as Indonesian Chambers of Commerce (KADIN) came together to pass a document of occupation map as a national qualification framework for ICT professionals (MCI, 2018).

The document is developed in anticipating ASEAN (Association of Southeast Asian Nations) Economic Community where professionals are allowed to move freely within ASEAN countries. ICT professionals are expected to move intensively considering the high demand for them. For this reason, the GoI take the initiative to issue a reference to be used by public and private sectors to develop ICT competencies that are in line with education and training systems in Indonesia.

[26]According to Government Regulation No. 11/2017 on Management of PNS.

[27]The platform can be accessed at https://asn-unggul.lan.go.id/.

The ICT occupation map (Bappenas, 2020) consists of 16 job families[28] which have been harmonized with those in other ASEAN countries. The development of this map includes not only the line ministries and private sectors but also academics, training institutions, and professional associations. According to MCI (2018), the ICT occupation map is a living document whose contents are expandable depending on the needs and latest development of the industry.

Due to the absence of ICT competence definition in public sector, ICT occupation map cannot be utilized to directly identify which digital skills are needed to operate e-Government. As a context, digital skills are proxied by the sixteen ICT job families available in Indonesia. Based on the possible digital skills inside of the public sector, we can identify relevant functional positions to carry out e-Government strategic initiatives (Table 10). The result is expected to provide insight on which functional positions are essential to operate e-Government. The result of this process will be used to estimate whether the supply quantity and quality of that functional position in the public sector are sufficient to operate e-Government strategic initiatives as well as the demand-side problem in becoming ICT professionals in the public sector (Discussed in Chapter 4).

We use a matching approach to identify digital skills and the roles needed to operate e-Government. Two steps are organized to obtain the results in Table 10. *First*, we match the e-Government strategic initiatives with ICT occupation map to identify the skills needed for e-Government. Then, after we found the relevant digital skills needed, we matched the skills with the job descriptions of each functional position in ICT job family and relevant functional position in non-ICT job family.[29] Results are quantified to check which functional position are essential for-e-Government.

[28]In this document, we unfortunately can only identify that only 15 ICT job families could be matched to e-Government strategic initiatives. Full version and details can be accessed through https://petaokupasi.bappenas.go.id/wp-content/plugins/algori-pdf-viewer/dist/web/viewer.html?file=https%3A%2F%2Fpetaokupasi.bappenas.go.id%2Fwp-content%2Fuploads%2F2020%2F09%2FPeta-Okupasi-Bidang-TIK.pdf.

[29]We conducted the matching according to the Ministerial Regulation of State Apparatus Optimization and Bureaucratic Reform No. 32/2020 on Functional Position of *Prakom*; Ministerial Regulation of State Apparatus Optimization and Bureaucratic Reform No. 6/2022 and No. 31/2022 on Change of Functional Positionof *Manggala Informatika*; Ministerial Regulation of State Apparatus Optimization and Bureaucratic Reform No. 44/2021 on Functional Position of *Sandiman*; Ministerial Regulation of State Apparatus Optimization and Bureaucratic Reform No. 34/2017 on Functional Position of Information System for Population Administration (SIAK) Operator; Ministerial Regulation of State Apparatus Optimization and Bureaucratic Reform No. 35/2017 on Functional Position of Population Database Administrator; Ministerial Regulation of State Apparatus Optimization and Bureaucratic Reform No. 86/2020 on Functional Position of Scientific Data Analyst.

Table 10. Digital Skills for the Implementation of e-Government

e-Government Aspects	Strategic initiatives	Occupation Map		Government's Functional Position in ICT Job Family
		ICT Job Family	Types of ICT professionals	
Governance	Data & information	Data management system	16	90% *Prakom* 6% *Manggala Informatika* 1% *Sandiman* 2% others
Human Capital	Learning Management System			
Human Capital	Knowledge Management System			
Service	Electronic-based administration services & public services	Programming & software development	30	
Human Capital	Learning Management System			
Human Capital	Knowledge Management System			
Infrastructure	Intragovernmental national network	Hardware & Digital Peripherals	14	
Infrastructure	Government services connection system	Network & Infrastructure	16	
Infrastructure	Government services connection system	Operation & system tools	17	
Service	Electronic-based administration services & public services	Information system & technology development	24	
Governance	Business process	IT Governance & management	22	
Governance	Business process	IT project management	22	
Service	Electronic-based administration services & public services			
Governance	Enterprise architecture	IT Enterprise Architecture	8	
Governance	Data & information	IT security & compliance	37	
Human Capital	Knowledge Management System			
Infrastructure	National data center	IT services management system	15	

e-Government Aspects	Strategic initiatives	Occupation Map		Government's Functional Position in ICT Job Family
		ICT Job Family	Types of ICT professionals	
Infrastructure	National data center	IT & computing facilities management	12	
Human Capital	Learning Management System	IT multimedia	18	
Human Capital	Knowledge Management System			
Service	Electronic-based administration services & public services	IT mobility & Internet of Things	11	
Human Capital	Learning Management System			
Service	Electronic-based administration services & public services	Integration application system	21	
Totals				
4	9	15	283	100%

Source: Authors.

Note: Based on authors' matching process between Presidential Regulation No.95/2018 on e-Government and ICT occupation map.

Table 10 enlightens us that 90% of the skills required for e-Government can be delivered by functional role of *Prakom*. *Prakom* takes the majority of responsibilities in all aspects of e-Government: governance, services, infrastructure, and human capital. In fact, the result is supporting our qualitative findings.

> "We are not surprised by SMERU's findings. MoSA-BR once intended to make another functional position specific for e-Government. However, Prakom has done all e-Government works, so why make another one? Internally in the association, we tried matching e-Government and our job descriptions. From our attempt, it was found that none of the job descriptions do not support e-Government." (FGD participant, female, 20 October 2022)

> "Our attempt showed that 100% of e-Government tasks could be carried out by Prakom. However, there are areas where our skills are not that deep. SMERU sees other functional roles could play better roles in these areas." (FGD participant, male, 20 October 2022)

Prakom is responsible for developing and running the entire ICT system, starting from designing, building, implementing, deploying, and maintaining the system. To deliver e-Government service more efficiently, *Prakom* is also responsible for creating new applications and platforms, supporting the existing platform, and ensuring the system keeps running smoothly. Thus, they require a deep understanding of computer hardware

and software and the ability to quickly identify and troubleshoot problems related to ICT issues. They should have digital capability in hardware and digital peripheral, network and infrastructure, and IT computing facilities management: the basic competencies required to implement e-Government Infrastructure, including the use of cloud storage for daily work of ASN.

These are all professional jobs. However, in reality, *Prakom* is associated with very rudimentary duties.

> "There is a tendency that (for) cable, electricity, air con with remote control and sensor, or anything that does not work and need to be fixed, (simply) ask Prakom to fix it. Typing is also Prakom as it is related to computer." (FGD participant, male, 20 Oct 2022)

> "Our colleagues at the local level are doing ICT end to end to support activities in their units. They have to deal with simple tasks from computer cables, PC set up, to develop small application and the governance." (FGD participant, male, 20 Oct 2022)

Aside from *Prakom*, *Manggala* and *Sandiman* also acquire skills to operate e-Government. However, unlike *Prakom*, they only have 6% and 1% of skills to implement e-Government, *respectively. It is quite understandable though. While Prakom has a wide range of job descriptions, Manggala and Sandiman are only responsible* for ensuring its system's security, from building digital security protocols/standards to operating an IT security system, Intra-Government Network and Government Services Connection System both at the central and local government levels. *Manggala* becomes the front-line defense against malicious actors and threats, such as data theft and vandalism. Meanwhile, as language coder, *Sandiman* specifically handles cyber security, starting from risk management, monitoring network security to testing product security. Lastly, there are 2% of skills related to the job descriptions of data analyst, statistician, accountant, human resources analyst, human resource supervisor, and human resource safety and security.

Moreover, if we break down each functional position from column 5 of Table 10 based on their category, i.e., expert-level and skilled-level,[30] e-Government works apparently requires expert-level functional position. An expert-level functional position is expected to obtain higher technical skills and work experiences and combine them with high-level managerial skills such as leadership and decision-making. It is, then, concluded that in operating e-Government, high-quality human resources are required, not only to operate it, but also to continuously improve the implementation.

[30]It is not mandatory to have both levels for each functional position. However, expert-level category has higher level than skilled-level category. To be eligible for the expert-level, ASN/CASN are required to at least have higher level of educational attainment or relevant work experiences. From each category, there are four levels of position: (i) expert-level, from highest to lowest, consists of: lead expert, senior expert, middle-level expert, and junior expert; and (ii) skilled-level, from highest to lowest, consists of: skilled and supervisor.

Table 11. Career Level of Each Functional Position for Implementing e-Government

	Expert-level	Skilled-level
Prakom	91%	9%
Manggala	100%	0%
Sandiman	100%	0%
Others	100%	0%

Source: Authors.

Note: Based on authors' matching process between Presidential Regulation No.95/2018 on e-Government and ICT occupation map.

IV. Analysis of Supply and Demand Sides

At the end of section 3, we learned that 90% of skills required to implement e-Government can be delivered – theoretically – by *Prakom*. This implies that *Prakom* is the most prominent ICT profession to sustain government transformation. However, we need to dig down to find out whether, in practice, *Prakom* as a public sector ICT professional could come up to expectation. In this section, we explore the quantity and quality of *Prakom* and the demand of *Prakom*. Exploring them will allow us to notice if a gap exists. Then, ways to close the gap are identified.

Box 5
Two Versions of Data on *Prakom*

ASN data, including *Prakom,* is held by two institutions: BKN as well as BPS as the supervisory institution of *Prakom*. ASN data is surprisingly very difficult to collect. While educational background and age cohort is obtainable, we could not acquire data on the level of *Prakom*. In contrast, from BPS, we can obtain the data on level of *Prakom* but not their education and age. There is also discrepancy issue. While the total number of *Prakom* nation-wide according to BKN is 7,954, BPS suggests that Indonesia only have 4,835 *Prakom*. At this point, the assumption is that the data collection process of these government agencies contains error or unstandardized procedure. Another possibility is that BKN data includes additional *Prakom* resulting from delayering program. In any case, this qualifies a momentum to standardize the ASN data collection process.

For practicality, this report will utilize both sources of data. When quality of *Prakom* is to be analyzed, BKN data is used. Meanwhile, BPS data is used for comparing supply and demand of *Prakom* at the central government level.

4.1 Quantity of Supply Side

The matching analysis identifies five categories of ICT job family in public sector which are relevant for e-Government. Table 12 shows the roles and current supply of ASN with ICT job family.

Table 12. Number of ASN Classified as ICT Job Family

ICT roles under ICT job family	Number of ASN (person)	% Total ASN
Prakom	7,954	
Manggala Informatika	165	
Sandiman	724	
Population Administration System Operator	57	
Population Database Administrator	1,356	
Scientific Data Analyst	82	
Total	**10,338**	**0.24%**

Source: BKN, 2022.

Note: The number of ASN reflects real-time data until July 2022. The total number of functional positions ASN used for percentage is 3.9 million and 4.3 million, respectively (June 2022).

As shown in Table 12, the ICT roles in terms of all available functional roles and ASN is less than 1%. The percentage is quite astonishing. While e-Government agenda are essential to support digital transformation inside public sectors and the main actor of the agenda is ICT roles, i.e., *Prakom*, *Manggala,* and *Sandiman*, it can only be represented by less than 1% of all ASN. Several factors contributed to this lack of ICT roles. *First*, public sector with its inflexibilities might not be the popular sector for ICT professionals.

> "Adopting ICT in the public sector means adopting a market approach. There should be a balance between rigidity of public sector for ICT professionals while at the same time keeping the accountability principle. This is the big challenge." (Informant, male, 4 August 2022)

Second, competency test to become *Prakom* is infamously difficult for ASN candidates. This reduces the attractiveness of *Prakom* compared to other public sector jobs even among ICT graduates.[31]

> "Once we open vacancies and candidates for ICT roles [Prakom], we will organize competency test. Unfortunately, this test has failed many candidates albeit their ICT educational background." (Informant, female, 31 October 2022)

Third, there is an issue of insufficient information regarding specific ICT roles when government publish job vacancies.

> "Lack of dissemination can contribute to low supply. Vacancies for ICT roles [Prakom] are not well-spread. It should be displayed intensively in various media platforms." (Informant, female, 31 October 2022)

While it is still unclear what the ideal number of ICT roles inside public sectors in supporting e-government agenda is, we can conclude that the current number might

[31]There are opinions that ICT graduates applying for government job are the ones who know they could not compete in the private sector.

seems insufficient to support a massive agenda like e-Government, as public sectors sometimes recruit contractual-based experts or hire vendors in assisting the provision of websites, applications, or others.

In terms of all ICT roles, *Prakom* possesses the majority share of ICT roles. Since *Prakom* can essentially do anything, other ICT roles are less attractive for the demand side. This accounts for low quantity of other ICT roles compared to *Prakom*. *Prakom* is mandated to work in the areas of IT governance, IT infrastructure, information system, and multimedia.[32] Nevertheless, they sometimes are assigned by ASN to work on another IT-relevant field, for example advanced tasks like data analysis or digital security or basic tasks like repairing printers or photocopy machines. In contrast, *Manggala Informatika* and *Sandiman* are specialized in the field of digital security only.[33] Low demand for non-*Prakom* job roles is in line with the matching analysis where 90% of skills to implement E-Government can be performed by *Prakom*. For further discussion, we will limit our analysis only on *Prakom* as the main actor of e-Government.

> "We have Prakom that basically can do anything [generalist with simply no area of specialization]. On the other hand, we also have Manggala Infomatika [and Sandiman] with very high specialization [in the field of digital security]. This is quite problematic." (Informant, male, 16 June 2022)

In terms of level*, Prakom* has two classifications, namely skilled-level and expert-level *Prakom*.[34] Skilled-level *Prakom* is the one with technical skills and knowledge of ICT. On the contrary, expert-level *Prakom* is responsible for utilizing their ICT knowledge for decision-making and leadership roles.

4.2 Quality of Supply Side

Digital skills in the public sector are not only about quantity. A closer look at pervasive issue of the quality is needed.

> "Solving the (issue) of quantity of digital skills through recruitment does not automatically solve the problem. There are issues related to quality. ICT is very specific knowledge whose cycle is short and rapid changing due to fast transformation." (Informant, male, 28 October 2022)

> "It has become a public secret: Good applications and software are not the ones developed by ASN." (Informant, male, 1 August 2022)

[32]Ministerial Regulation of Minister of State Apparatus Optimization and Bureaucratic Reform No. 32/2020 on the Functional Position of *Pranata Komputer*.

[33]According to Ministerial Regulation of Minister of State Apparatus Optimization and Bureaucratic Reform No. 44/2021 on the Functional Position of *Sandiman, a Sandiman* is primarily focused on coding, cybersecurity, and information security. And based on Ministerial Regulation of Minister of State Apparatus Optimization and Bureaucratic Reform No. 6/2020 on the Functional Position of *Manggala Informatika*, a *Manggala Informatika* has an expertise on security management information system.

[34]Ministerial Regulation of Minister of State Apparatus Optimization and Bureaucratic Reform No. 32/2020 on the Functional Position of *Pranata Komputer*.

As a proxy to quality of the supply side, two approaches are used: (i) the relevant educational background of *Prakom*; and (ii) the age cohorts of *Prakom*.

4.2.1 The Relevant Educational Background of Prakom

According to its regulation, the main requirement to become *Prakom* is having at least three-year associate degree in ICT (for skilled-level)[35] and recruited either through first appointment, transfer, or promotion.[36] Nevertheless, delayering policy – as mentioned in the previous section – leads to the presence of *Prakom* from non-ICT graduates or having lower than three-year associate degree (Table 13).

> "Skilled-level Prakom is required to obtain at least a three-year associate degree in ICT. The existence of Prakom who comes from general or vocational high school, one- or two-year associate degree, or non-ICT graduates is the impact of delayering policy. None of the other functional positions correspond to their previous position – most of them held administration function roles prior the implementation of delayering policy – so they need to be allocated to *Prakom*." (FGD participant, female, 20 October 2022)

Table 13. Prakom and Its Educational Background

Highest educational attainment	Number of *Prakom* based on educational background (person)		Total	Proportion (% of all *Prakom*)
	ICT	Non-ICT		
General/Vocational Senior High School	0	118	118	1.5%
1-year and 2-year Associate degree	3	18	21	0.3%
3-year Associate degree	1,674	115	1,789	22.5%
Bachelor's degree	3,933	878	4,811	60.5%
Master's degree	505	703	1,208	15.2%
Doctoral degree	3	4	7	0.1%

Source: BKN, 2022.

Note: The number of *Prakom* reflects all time data received by BKN until July 2022. The total number of *Prakom* used for this percentage is 7,954 people.

The applicable rules have stated that by 2024, all *Prakom* are required to meet the minimum criteria of having at least three-year associate degree in ICT for skilled-level

[35]We use similar rule as study from SMERU, Oxford, and UNESCAP (2022) in classifying ICT graduates. Individuals are classified as ICT graduates if their field of study is computer sciences, logic, mathematics, information sciences or information systems, computer/ telecommunication/ informatics/ software engineering, or related fields.

[36]Ministerial Regulation of Minister of State Apparatus Optimization and Bureaucratic Reform No. 32/2020 on the Functional Position of *Pranata Komputer*.

Prakom or at least bachelor's degree in ICT for expert-level *Prakom*.[37] If they fail to meet the condition in time, they will be disqualified for the role.

Two scenarios are employed in the attempt to examine the quality. Scenario 1 uses relevant educational background of skilled *Prakom* as the benchmark; thus, at least three-year associate degree in ICT. Meanwhile, scenario 2 uses relevant educational background of expert-level *Prakom* as the benchmark. However, with limited data, we made the following assumptions. *First*, *Prakom* with master or doctoral degree is assumed to have bachelor degree in ICT. *Second*, as portfolio of *Prakom* is unobserved, relevant educational background is assumed to represent quality of *Prakom*. Further exploration is needed to include portfolio as well as independent learning activities as they are mostly available in the internet era. These variables are highly important to determine quality of *Prakom*.

Table 14 identifies the proportion of *Prakom* that qualify for skilled-level *Prakom* (scenario 1) and the proportion of *Prakom* that is eligible for expert-level *Prakom* (scenario 2). Unfortunately, 24% of *Prakom* still could not satisfy the minimum criteria of skilled-level *Prakom*. In other words, only three-fourth of *Prakom* are basically capable of conducting the basic jobs of *Prakom*. This is below the standard of e-Government as the matching analysis found that e-Government agenda requires 91% activities to be performed by expert-level *Prakom* and only 9% by skilled-level *Prakom*.

Table 14. Scenario of Educational Qualification

Scenario 1 (3-year associate degree or higher)		Scenario 2 (Bachelor's degree or higher)	
Number of *Prakom* (person)	% of all *Prakom*	Number of *Prakom* (person)	% of all *Prakom*
6,112	76.8%	4,441	55.8%

Source: BKN, 2022.

Note: The number of *Prakom* reflects all time data received by BKN until July 2022. The total number of *Prakom* used for this percentage is 7,954 people.

Meanwhile, when the benchmark is increased (scenario 2), table 14 shows that 44% of *Prakom* failed to meet the requirement. In other words, almost half of the *Prakom* need to improve their quality in integrating technology for leadership and decision-making processes.

4.2.2 Age Group

Age also indicates the distinction of work approach and work performance of each generation. In general, the current ASN consists of four generations: (i) baby boomers, (ii) generation X, (ii) generation Y (millennials), and (iv) generation Z.[38] These four generations have their own unique approach to technological device utilization in their work activities

[37]Ministerial Regulation of Minister of State Apparatus Optimization and Bureaucratic Reform No. 32/2020 on the Functional Position of *Pranata Komputer*.

[38]Here are the details of each generation's range of birth year: Baby boomer (1955–1964), Gen X (1965–1980), Gen Y/Millennials (1981–1996), and Gen Z (1997–2012) (Beresford Research, n.d.).

– although younger generation (millennials and generation Z) is classified as digital natives.[39] Older generations (baby boomers and generation X) usually only utilize technology to complete specific given tasks and requires procedures in using it. On the other hand, younger generations have capabilities in utilizing latest generation of technology to create more convenient way of working (Berkup, 2014). As a result, the older generations tend to be hampered in utilizing the latest technologies. Otherwise, they might have capabilities to employ technology, but tend to be more confident to employ usual yet paper-based procedures.

> "Older generation of ASN actually have capabilities to transform their work approach. However, they feel more comfortable with the work procedures they have become accustomed to." (Informant, female, 28 July 2022)

Table 15. Prakom and Its Age Groups

Age group of *Prakom*	Number of *Prakom*	% of all *Prakom*
21–30	958	12.0%
31–40	3985	50.1%
41–50	2420	30.4%
51–60	590	7.4%
61 or older	1	0.0%

Source: BKN, 2022.

Note: The number of *Prakom* reflects all time data received by BKN until July 2022. The total number of *Prakom* used for this percentage is 7,954 people.

Table 15 shows the composition of *Prakom* by age groups. *Prakom* is currently dominated by the younger generations, with more than 60% of them being those aged between 21 and 40 years old, and thus making them eligible for millennials and generation Z categories.[40] In contrast, the overall ASN is dominated by the older generations, i.e., more than 60% of ASN are categorized as generation X or baby boomers. The greater presence of younger generations in *Prakom* is relevant to the operating model of *Prakom* with its agile, firm, outcome-driven, and collaborative human capital. These are more likely to come from the millennials and generation Z than baby boomers and generation X.

Prakom, filled by younger generation, may serve as the backbone to support the sustainable agenda of e-Government throughout the years. Meanwhile, the adaptability of older generations that dominate ASN composition might become a hindrance to the agenda. On the other hand, having abundant younger generations that may have desire to obtain instant success and sentiment towards lack of remuneration may also inflict the

[39]Both generation Y and generation Z are born in a digital, media-saturated world. Generation Y acts as a pioneer of digital natives and Generation Z as the true digital natives (Moran, 2016; PatientMetRx, 2021).

[40]The data we received are categorized into age groups, rather thanan individual-level one; it limits us in separating them into each generation, i.e., baby boomers, generation X, generation Y (millennials), and generation Z.

progress of e-Government agenda. The role of leaders who embrace each generation's potential is becoming more essential in this period.

4.3 Quantity of Demand Side

The essential role that *Prakom* plays to perform e-Government has to be supported by adequate availability of *Prakom*. In other words, ideally no gap should be allowed between the supply and demand of *Prakom* for all government agencies. In this section, we attempt to analyze the gap between supply and demand of *Prakom*. We provide the supply and demand data from government agencies at the central government level. The number of supply is collected from the current availability of *Prakom* in ministries or agencies. On the other hand, the number of demand, i.e., the ideal number of *Prakom* in each ministry or agency comes from Position Analysis (Anjab) and Workload Analysis (ABK) for the period of 2020–2024.[41] A gap can be identified when the demand exceeds the supply. Negative values of the gap indicates that the demand for *Prakom* is higher than its current availability. Furthermore, this gap can be considered as the number of *Prakom* that should be recruited by 2024.

Table 16. The Supply, Demand, and Gap of Prakom in Government Agencies at Central Government Level

Category of *Prakom*	Supply	Demand	Gap
Skilled level	601	5,674	-5,073
Expert level	2,230	11,074	-8,844
Total	**2,831**	**16,348**	**-13,517**

Source: BPS, 2022.

Note: The data was collected from 71 ministries and agencies at central government level.

Table 16 provides data on the supply, demand, and gaps of both skilled- and expert-level *Prakom* in all ministries and agencies at central government level. The data was collected from BPS in November 2022. The data suggests that demand for expert-level *Prakom* is more than two times higher than the demand for skilled-level *Prakom*. It supports our previous finding that *Prakom* with expert category are more essential to support e-Government agenda. On the other hand, the amount of demand for *Prakom* significantly exceeds its supply, i.e., 16,348 and 2,831, respectively. The gap between them reaches more than 13 thousand. While we could not find the demand at local government level and there is no demand for ICT roles in 4 ministries,[42] these findings at least capture the essentiality of *Prakom* as ICT roles that potentially could do any ICT-related tasks and support e-Government agenda in all government agencies.

[41]Based on MoSA-BR, Anjab and ABK are organized once every five years.

[42]Before we utilized data from BPS, we attempted to collect data from four ministries, i.e., Bappenas, MoSA-BR, MoE, and MoH. As we find that there is a significant gap of demand and supply for *Prakom* (1,640 vs 488), they do not have the demand and supply for other ICT roles (*Manggala* and *Sandiman*).

Based on the data obtained from BPS, we found that for 2020– 2024 period, all ministries and agencies at central government level need at least 16,348 individuals to fill in the position of *Prakom*. However, as of now, they only have 2,831 *Prakom*. meaning that they need an additional 13,517 individuals to fill the position between 2020 and 2024.

4.4 Quality of Demand Side

In addition to discussing quantity of demand which exceeds that of supply, there is also an important issue of quality of demand side. Here, quality of demand has something to do with:

- whether the organization really needs certain qualifications;
- whether the placement is in line with the skills of ICT professionals; and
- whether the tasks allocated to the ICT professionals are within their job description.

We can wrap these concerns into the issue of skill mismatch from the demand side point of view. This can be serious because while the number of supply is already much lower than expected, misplacement occurs in the public sector where overqualified ICT professionals are put in positions that do not require their high skills.

> "I don't understand how local governments plan their needs. They must have done it in a hurry. They say they need expert-level Prakom; those with at least a bachelor's degree. In fact, these people are placed as an entry data operator that is a part of job description for skilled-level Prakom." (FGD participants, female, 20 October 2022)

> "What the employers want is we contribute to the organization, irrespective of our skills." (FGD participants, male, 20 October 2022)

Meanwhile, for *Prakom*, working against their job descriptions means misplacement. Misplacement or mismatch damages their career path.

> "There might be a mismatch in public sector. Training and daily work of ASN are not in line with their career. There, they have difficulties in collecting credit points for promotion. Training is carried out to support their daily work, not their career." (Informant, male, 28 June 2022)

If what they are doing is not in line with their job descriptions, then they will have difficulties collecting credit points for promotion. Moreover, those who work hard but are unable to get promotion due to insufficient credit points will get demotivated.

> "We all know that in ICT things change very fast, regulation is formulated much slower and could not pace with it. For example, credit points are regulated much later than the real work of ICT professionals. Therefore, regulation for ICT skills have to be made more flexible. We cannot let our Prakom get demotivated because their tasks are already too much, but these are not counted in (their) credit points." (Informant, male, 15 July 2022)

> "We have to be professional and only do our job descriptions. For example, if we are assigned to take care of procurement outside of (our) job description, we have to be able to say no. Our job description is formulated by BPS as the supervisory institution. If we violate this, we betray ourselves." (FGD participant, male, 20 October 2022)

The uphill battle is to mediate between *Prakom* as individuals fighting for their career interest and the organization leaders struggling to carry out their immediate targets. Ensuring that *Prakom* can claim their work for promotion is important to maintain high motivation of these ICT professionals. This motivation is important for *Prakom* to contribute their best in achieving the targets of their organization units.

4.5 Closing the Supply and Demand Gap

From the in-depth interviews, it is clear that there are three channels to close the gap in the quantity of supply and demand of digital skills. These channels are in line with the OECD framework where public sector can use to bridge the gap in talents and skills (OECD, 2021). First, government agencies can recruit PNS, PPPK, individual experts, internal recruitment, and Vendors. Second, the government can upskill the current supply through short courses, scholarships for academic degrees, skill certification, conference attendance, and in-house training. These two channels are very common for all ASN. However, as ICT professionals are dominated by millennials and high turnover prevails, then there is an urgency to consider the third channel, namely retention. In this channel, remuneration, career path, work culture, and leadership are all key.

4.5.1 Recruitment Channel

Recruitment of PNS candidates would mean permanent addition of supply side or sustainable knowledge for the organization (Table 17). For PPPK, it is more flexible as candidates can be recruited for a minimum of one year and extendable up to five years, depending on their performance.

Table 17. Recruitment Channel of Digital Skill

	Positive side	Negative side	Some issues
PNS candidate	Permanent, sustainable knowledge with low turnover	Lengthy recruitment, centralistic	Unattractive for ITC professionals, dilemma of having civil servant vs. using digital talents from the market
PPPK	More flexible, no career path needs to be considered	Lengthy recruitment, centralistic, unsustainable for organization, knowledge transfer	Recruitment should be accelerated and made more frequent in a year
Individual consultant and expert	Flexible depending on needs, hirable at any time, no overhead cost, work together with government employees	More expensive than PPPK, knowledge transfer, only applicable prior to November 2023	Unclear what happen after November 2023
Vendor	Hirable at any time, guaranteed quality	Expensive due to overhead cost, not necessarily work together with government employees, knowledge transfer, issue of after-sale services	Dependency issue
Internal job vacancy	Could be temporary placement for short-term need, candidates can be easily traced internally	Administration procedure is rather complex	Career path might be disrupted

Source: Authors.

In general, the turnover of ASN is expected to stay low, although for ICT professionals might be higher recently than previously.

> "It used to be low, but in the last five years, the turnover in our ministry has been increasing. Thus, in the past we thought civil servants were those with high loyalty. Recently, we realize this is not the case, we also experience increasing turnover although at a lower percentage than in private sector." (Informant, male, 26 July 2022)

> "In our institution, the turnover is increasing. Opportunity out there is also promising. Even though we are tied as we are graduates from government-affiliated Vocational College, with sanction of not less than Rp500 million, yet some graduates are leaving the job. It seems like they will get salary of two digits, much better than working as government ICT professionals." (FGD participant, male, 20 October 2022)

However, the recruitment of PNS candidates and PPPK is centralistic. It is lengthy and could not be used to fulfill immediate needs of the organization.

> "The procedure of ASN recruitment is rigid and fully controlled by the MoSA-BR." (Informant, male, 1 August 2022)

It is no longer a secret that being a government employee is unattractive for youth (millennials and generation Z). In particular, the best ICT professionals would prefer to work for private sectors or unicorns. It remains a dilemma for the government when deciding whether to recruit civil servants for lifetime employees or just use digital talents in the market according to the needs of organization.

> "Public sector is unattractive for ICT professionals. At the end, we will not get the best talent. Government should be ready to pay more for talent with above-average competence." (Informant, male, 4 August 2022)

> "We have difficulties recruiting digital talent from well-known state universities. We could only acquire the second, third, even the fourth ring. ASN salaries are not attractive for graduates from the first ring." (Informant, male, 4 October 2022)

> "Should we recruit Prakom as ASN to solve the problem? There are issues like low capacity, unbalanced remuneration, etc. However, let's think about this. Should our ASN develop applications? I don't think this is what ASN should do. Why not use those whose daily routine is developing applications, so it is their professional work. We just pay them. It is expensive but you are demanding good quality." (Informant, male, 12 July 2022)

Currently, the most common practice to close the gap is by using individual consultant where the issue knowledge transfer still prevails.

> "We have to use consultant as a solution, taking into account the current condition of functional job. It is almost impossible to use the public sector approach if we want to go for the best digital product." (Informant, male, 16 June 2022)

However, individual consultants are preferable than vendors as they are more likely to involve their government counterpart in their services. They are also less expensive than vendors in terms of overhead cost. However, at the end of next year, individual consultants are no longer eligible for government use.

> "This is really a dilemma to us. We are used to having their services for short-term needs. If next year we cannot do this, then the only possible way is PPPK. However, it would take one year to acquire the service of PPPK. We find this inefficient for immediate needs." (Informant, male, 4 August 2022)

> "For new technology, we have to use vendor as we have no capacity to do that. However, when we order services, we have to be strict with specification so we can still supervise their work. The key is their technology should be within our range." (Informant, male, 15 July 2022)

For the last source to fill in the gap, internal job vacancy could also be an alternative. For example, when there is a need for service, an offer is made internally within the ministry. The candidates can be from different directorate generals.

> "Internally, our ministry gives an opportunity for the interested employees to fill the demand for Prakom. Nevertheless, the candidates should satisfy the prerequisites." (Informant, female, 13 October 2022)[43]

[43]This response was sent by informant in written.

4.5.2 Capacity Building Channel

Among different ways of skilling, reskilling, and upskilling, expert consultation or in-house training and short courses are mostly preferred (Table 18). When the organization requires big data analysis, they can invite experts, organize in-house training or send one or two ICT professionals for short courses to learn about specific application.

Table 18. Capacity Building Channels of Digital Skills

	Positive side	Negative side	Some issues
Expert consultation or in-house training	Relevant for immediate needs, many beneficiaries at once, free of charge when using the internal source	Expensive when using external source, finding capable trainer is extremely hard	Additional work for internal source to prepare the training
Short course	Suitable for immediate needs, time and cost efficient	Less extensive knowledge, requires frequent training activities, less impact for career path	Difficult to evaluate the impact
Skill certificate*	Proof of competence	Fear of turnover for better remuneration	Dilemma of skill certificate
Academic degree	Suitable for skills needed in the future, long-term investment, government provides scholarship, good for career path	Expensive tuition and long time away from the office, thus high opportunity cost	Reward for academic degree could be counterproductive particularly for irrelevant knowledge
Conference **	Enlarging network	Increase knowledge but not skills, could be irrelevant to organization's need	Used as non-financial benefits
Learning Management System	Could be done independently at any timeand less costly	Requires strong motivation and endurance,could be combined with offline training	Not all learners can finish the whole training videos

Source: Authors.

Note: * Despite its urgency, it has not been used for career ladder.

** Only for high-rank officials.

Expert consultation or in-house training is preferred as it is different from mainstream classroom training. Instead, it serves as the space where the trainees and the trainers can work together on a small project. The trainers can also do couching clinic after the training activities. Thus, knowledge transfer has an immediate impact on finalizing the job. This is another way of upskilling where experts are invited to work in tandem for a short term, for example two weeks.

> "It is a short course but organized like a bootcamp. The course is directed toward the current project being undertaken. Training materials can be directly applied in the project." (FGD participants, female, 20 October 2022)

Short courses are also popular as, unlike academic degree that requires deployment, they do not interrupt the routine work. However, short courses might not leave much effect on promotion and, hence, they do not have significant impact on career path. This poses the main difference compared to an academic degree.

> "Short course is much more effective than independent learning. The short course provides a learning map. However, it has no impact on one's career as the government has not tracked one's experience. Our career mostly advances with time and remuneration depends on educational background. That is why scholarship for academic degree is better for remuneration." (FGD participant, female, 20 October 2022)

There are issues related to the evaluation whether or not short courses are effective in skill improvement in day-to-day work.

> "The best we can do is to compare the pre-test and post-test to see whether the trainees are learning effectively." (Informant, male, 4 August 2022)

Actually, short courses could be more useful if they are combined combined with a skill certificate. This is one of the ways to prove learners' competence and to boost their level of confidence.

> "When we partner with vendors, we require vendor to have certificate. Funny enough, we ourselves so far do not have certificate while we have to assess those with certificate. In government, certificates have not yet become a scheme for career path. Certificate has no impact on promotion. Meanwhile, a certificate is important for ICT professionals. It is also difficult to get permission from the office in order to acquire certification. We will be asked what the use of certificate in career advancement is." (FGD participant, female, 20 October 2022).

Box 6
Dilemma in Certification for ICT Professionals in The Public Sector

Certification is extremely important to show that an organization has capable ICT professionals to carry out the work. Yet, it is not included in the career development options for government employees, including its ICT professionals. Unlike formal education with which the government could tie their employees for work tenure – for example 2n+1 for master's degree, 3n+1 for doctoral degree –, certification is considered as informal education where binding is not applicable. Regretably, once ICT professionals have their certification, their selling value increases, and they are more likely to demand higher salary. However, government rules on salary is rigid. Meanwhile, out there, the private sectors are willing to pay them accordingly. This has happened quite often. In some cases, they are even willing to pay a compensation in order to leave a government job. If left unhandled, this could damage the organization when many of its ICT professionals resign at the same time. Considering this possibility, the current solution is to put ICT professionals in training, such as short courses for skill upgrading, but not in certification acquisition. As a result, albeit no proof, the organization has good engineers, i.e., those with high capacity for ICT works.

Source: In-depth interview with informant (male, 4 August 2022).

Meanwhile, startups and unicorns value skills more than degree. There, ones can win the vacancy without an academic degree as long as they can prove their skills and capability. The case of the public sector is completely different. This is also against the ICT industry.

> "There is bureaucratic culture in government which honors academic degree more highly. Meanwhile, the knowledge acquired in these degrees might not be the ones that the organization needs." (Informant, male, 28 October 2022)

4.5.3 Retention Channel

Issues of turnover for ICT professionals must not be overlooked. Those managing data centers can be an example of how serious this matter is. Being an important facility, the handling of these data centers cannot be outsourced. Only PNS could take care of them. However, taking care of the data center for some continuous years would be boring. Managing data centers, as well as contact centers, are among the jobs with the highest turnover. Therefore, it is important to consider all tools under the retaining channel to slow down the turnover rate among ICT professionals (Table 19). At the same time, this means making sure that, at least, the gap is not widened.

Table 19. Retention Channel of Digital Skills

	Some issues
Remuneration	Financial and non-financial
Career path	Talent management
Work arrangement	Work-life balance, flexible working hours, work from everywhere, non-cubical workplace
Work culture	Competitive, collaboration, lifelong learning
Leadership	Visionary, egalitarian, inter-generational approach, couching, mentoring, counseling, eager to learn

Source: Authors.

Remuneration has been cited to be the first cause of turnover. Considering the rigid salary for government employees, non-financial incentives have to be thought of.

> "For those with good performance, they should be given priority for academic scholarship, access to training even in foreign countries. Some training activities have nothing to do with skill development, but more of travelling. These are non-financial incentives." (Informant, male, 4 October 2022)

Meanwhile, career advancement is also equally important.

> "Talent management is for all ASN, and not only for ICT professionals. However, chances for promotion should be more abundant for ICT professionals as they are low in number, making the competition (between them) not so stiff. Moreover, the more works for them to do should mean higher opportunity to prove their performance, and hence faster career path." (Informant, male, 4 October 2022).

Box 7
Talent Management

The government is developing talent management for ASN that will be the embryo for merit-based system. Although this has not yet been optimally implemented, they are moving to that direction. With talent management, ASN could be mapped according to their performance, competence, and attitude. Talent management consists of nine boxes. The higher the box where an employee is in, the more likely one gets promoted. When employees are in box three, for example, they will know what they lack and will learn more to improve their competency. Those in box 7, 8, 9 will move up and they know their possible positions.

Source: In-depth interview with informant (female, 31 October 2022).

Aside from talent management, according to our informant, the ICT occupation map could also be used for career path. Certificate in each level could be taken according to one's passion as well as market need. A certificate is valid for three years.

Also, it is high time that the government adopt work arrangements for ICT professionals in unicorns.

> "Last week, I signed an approval for resignation of some civil servant candidates. They are millennials who on paper justify their leaving because of family matters, education pursuit, etc. I asked their working units to find out the real reasons. Apparently, their account is not only about salary, but also the freedom to work from anywhere at any time. But being civil servants, ones are tied with 7.30-16.00 working hours. In startups, they can work from home. You can't do this in a government office, in normal conditions [not during the COVID-19 pandemic]. I wonder if in the future civil servants could work from home, using online tools, as long as their output is achieved." (Informant, male, 3 October 2022)

In terms of work culture, the ICT industry is competitive in nature. Things change highly rapidly that the culture has to allow competitiveness for innovation to be generated. At the same time, industry also requires collaborative working. Being collaborative will protect the organization from working in a silo. With good collaboration, the organization will become more agile to new ideas. In fact, new ideas come from close collaboration where knowledge is shared. In this digital era, collaboration is even easier. People can use many tools for communication; collaboration does not require face-to-face meetings. Moreover, ICT professionals should not stop learning. They have to always be given the challenge to come up with new innovation.

The one responsible for creating this kind of work culture is the leader. Leadership, therefore, is important not only to retain the ICT professionals but also to optimize their capability. For one thing, the leader has to be visionary.

Moreover, to allow competitiveness and to enable collaboration, a leader has to be egalitarian and non-hierarchical. She/he should not take criticism personally as what is criticized is the idea, not the person. She/he has to apply two-way communication. Being directive and unreachable is not suitable for the ICT industry.

No matter how good the product of ICT professionals is, if the leader is not supportive, there will be no impact to organizational change.

> "With bureaucratic reform, we are entering the era of functional position. Different from structural position where hierarchy prevails, in functional position there should not be an issue of leader and subordinates." (Informant, male, 1 August 2022)

Moreover, as ICT professionals are dominated by millennials (Table 15), it needs a leader who applies inter-generational approach. She/he has to understand how the other generations work. While the boomers and generation X might be used to hard work and given order around, the millennials are different. According to our informant, millennials have to be given a challenge and they need to be listened to. The leader has to give coaching, mentoring, counselling. These are all important for millennials.

V. Digital Government Units: Additional Supply of Digital Skills

The public sector must adopt private sector management practices to attract and retain qualified talents and ensure that the institutions receive a sufficient supply of competent digital talents.[44] Improving the public sector's performance by applying lesson learned from the private sector's experience is unavoidable, considering an assumption that the private sector organizations have a much better understanding of digital talent management (UNDP, 2015). The private sector is also one step ahead of their public counterpart in developing ICT governance and ICT services, providing decent infrastructure, and setting up a conducive working environment to support digital talents' performance and make them stay with the organization. The GoI could adopt some good practices from it and adjust them to the public domain accordingly.

The GoI has made progress in fostering digital transformation by mimicking the private sector's strategy. They establish various working units at multiple levels of government, both at the ministry and regional levels, to lead the digital transformation agenda in the public sector or so-called as 'digital government unit'.[45]

At the central government level, Indonesia's public sector has Digital Transformation Office (DTO) established by the MoH, Centre Transformation Office (CTO) by the MoF, and GovTech Edu (locally known as Warung Teknologi or WarTek in short) by the MoE. Meanwhile, Jabar Digital Service (JDS) established by the West Java Provincial Government and Jakarta Smart City (JSC) by DKI Jakarta Provincial Government became the champion of the digital government unit at the regional level. These working units play influential roles in supporting the government to provide and deliver digital services to every citizen regarding health, education, social protection, population administration, etc.

This section aims to provide good practices recommended for the public sector to attract sufficient digital talents by drawing it from the digital government unit's experiences. This section will start by describing each digital government unit in Indonesia, followed by an analysis of the digital government unit's strategies to recruit, retain, and build the capacity of digital talents.

[44]This approach is relevant to New Public Management (NPM) concept introduced in the 1980s that aims to fix government by running it like a business sector (IGI Global, n.d.).

[45]Although the digital government unit is considered something new for Indonesia's public sector, the GoI has many relevant experiences in establishing special government working units to carry out certain government missions. For example, in 2009, President Yudhoyono established Presidential Working Unit for Development Supervision and Control. Further, in 2012, the then DKI Jakarta Governor Joko Widodo established the Governor's Team for the Acceleration of Development in DKI Jakarta Province.

5.1 DTO: Turning a Crisis into an Opportunity for Accelerating Digital Transformation

In Indonesia, the challenges of healthcare access and quality were already clear even before the pandemic (Hoeng, 2020). As the COVID-19 pandemic continued to fluctuate over the last two years, the MoH has been forced to deliver healthcare processes and solutions into a new model by utilizing data and digital technology. This aims to build modern operating models and to deliver a more efficient healthcare service to citizens by adopting remote-care options to improve patient experiences, such as telemedicine, remote patient monitoring, and remote intensive care units (Kolding and Sundblad, 2021). This digital transformation is essential considering that the healthcare issue will remain at the forefront for the foreseeable future.

To drive digital transformation in the healthcare sector in Indonesia, the MoH established DTO through the Ministerial Decree of Health No. HK.01.07/MENKES/635.2022 on Digital Transformation Office (Menkes, 2021). This working unit has three priority missions: (1) to enable electronic medical records (EMR) to be accessible for every individual and across healthcare facilities, (2) to simplify the system for health workers to make them more focused on saving lives rather than administrative matters, and (3) to propel policy innovation in strengthening the health-tech (Kemenkes, 2021).

However, establishing digital government is incredibly difficult without each department's political support. Therefore, the government has set up internal alignment between DTOs and the MoH's organizational structures. DTO's organizational structure consists of 9 tribes[46] where each tribe will work daily with each directorate general and working units at the MoH (MoH, 2021).

Table 20. MoH and DTO's Organizational Structures

MoH's Organizational Structure	DTO's Organizational Structure
Directorate General of Health Services	Tribe for Primary Healthcare
	Tribe for Secondary Healthcare
Directorate General of Public Health	Tribe for Health Security
Directorate General of Pharmacy and Health Equipment	Tribe for Pharmacy and Health Equipment
Center for Health Financing and National Health Insurance	Tribe for Health Financing Service
Human Resources for Health Development and Empowerment Agency	Tribe for HR Service
Health Research and Development Agency	Tribe for Health Innovation Ecosystem
Unidentified	Tribe for Internal Service
Unidentified	Tribe for Biotechnology

Source: Ministry of Health of the Republic of Indonesia.

[46]In the business and organizational context, "tribes" associated with social groups linked by leaders, shared purpose or goal, and common culture and organizational boundary.

Since its establishment in March 2021, DTO has succeeded in building two leading platforms that have become champions to support the transformation of health-tech in Indonesia as well as to combat the COVID-19 outbreak, namely the Indonesia Health Service (IHS) platform and the Citizen Health App (Peduli Lindungi).

The IHS platform has an essential role in integrating 400+ different internal systems under MoH, consolidating various healthcare applications built by 30+ growing health-tech start-up players in Indonesia, and centralizing over ten million data to be hosted and protected centrally (Kemenkes, 2021).

Furthermore, Peduli Lindungi is an integrated health platform that stores all personal health data of the citizen. It provides a tracing and testing feature that helps the government monitor the spread of the COVID-19. Through this application, citizens can access their personal health reports through electronic personal health report features and obtain recommendations to maintain optimum health through telemedicine service integration, health promotion, and health insurance features.

5.1.1 Recruitment

In a year, DTO employs around 261 young digital talents. Most of these talents have a distinguished profile and background: they graduated from top-notch universities worldwide and have plenty of experience working with the top technology companies in Indonesia, such as Tokopedia, Gojek, Grab, etc. These talents have a significant responsibility to actualize MoH's special mission in accelerating digital transformation across Indonesia's healthcare sector.

DTO recruits experienced young professionals through the goods and service procurement with employment status as experts. However, such employment status leads to a less attractive compensation and remuneration that they these talents receive compared to the private sector which provides Religious Festivity Allowance *(THR)*, insurance, bonuses, and a relatively higher salary rate. Moreover, their employment status as temporary employees with short-term contract also makes it tough for them to fulfill their personal needs, such as applying for bank loans, which usually requires them to be in a permanent employment contract. These constraints hinder DTO's opportunity to attract many qualified digital talents.

Despite its less competitive monetary benefit, DTO offers another value for its employee by allowing them to get involved in a meaningful project and generating value on social impact, especially in saving the lives of millions of people during the COVID-19 pandemic. Putting this aspect as a strategy in attracting qualified talents also allows DTO to keep a low turnover rate (only 8-9% a year).

5.1.2 Capacity Building

In order for improving its talents' capabilities, DTO is currently establishing a Corpu as a center of digital skills development in the public sector—both for the DTO staff and ASN in the MoH. This strategic channel is complementary to the annual performance evaluation and review conducted by DTO top management to assess each DTO's staff capacity and ensure whether or not their performance still fits the organization.

5.1.3 Retention

In terms of digital leadership of high-level leaders, the establishment of DTO is directly supported by the Minister of Health of the Republic of Indonesia and its operations are funded by the State Budget (APBN). This shows that high-level leaders in the MoH have a strong commitment and clearly show a vision to embrace digital transformation as a key to transforming healthcare delivery in Indonesia.

Moreover, DTO offers a work culture where every employee has a chance to be working closely with the high-level policymakers in the MoH. DTO also arranges a flexible ways of working where all individuals have the freedom to choose their working place and time and a fast and non-multiple layer decision-making process at the top management level.

To address the aforementioned challenges, DTO rebrands its institution to target more experienced digital talents to employment in the governmental sector. It is done by promoting an agile working culture, less bureaucratic and non-multiple process of decision making, and offering an opportunity to work closely with the strategic policymakers across the MoH.

5.2 GovTech Edu: Utilizing Technology as the Driving Force for Education System Transformation in Indonesia

The COVID-19 pandemic presents a dramatic change in Indonesia's education system. Despite the fact that it forced students to study at home due to school closures, it also stimulated the need for digital solutions to make the education system operates smoothly during the COVID-19 crisis and its aftermath. Further, Indonesia also has a long experience of learning crisis and a steep disparity in the quality of education between regions and social groups (Kurniawati and Suryadarma, 2019). Especially during the COVID-19 pandemic, digital technology is marked as one of the most powerful tool to address the aforementioned challenges.

In 2020, the MoE established a collaboration with GovTech Edu,an independent unit that operated under the Directorate of Digital Business and Technology of Telkom Group.[47] This collaboration aims to carry out an early effort to digitally transform Indonesia's education system. GovTech Edu holds a key position as a "shadow organization"[48] or "ad-hoc team"[49] to solve various problems related to education by building large-scale, high-quality, and user-centric tech products to transform Indonesia's education system.

After three years of its establishment, GovTech Edu has contributed significantly in

[47]Telkom Group is one of the best tech companies in Indonesia with the highest value (>26 Billion USD), most profitable (>135 Trillion IDR annual revenue) and ranked 299 globally by Forbes World's Best Employers 2022.

[48]This term was mentioned by Minister of Education, Culture, Research, and Technology, Nadiem Anwar Makarim, in Transforming Education Summit 2022 in the United Nations Headquarters, New York, in September 2022.

[49]GovTech Edu works with MoE through the procurement of goods and services mechanism or tender, as can be seen from https://lpse.kemdikbud.go.id/eproc4/evaluasi/11984025/pemenang.

building various tech products to support each episode of the Freedom to Learn or *Merdeka Belajar* policy.[50]

To support the execution of *Kampus Merdeka* program, GovTech Edu plays an important role in developing the *Kampus Merdeka* portal[51] that aims to centralize information related to the *Kampus Merdeka* program and offer students a better experience of participating in the program.

Further, GovTech Edu also developed the *Merdeka Mengajar* portal[52] that provides various features to help teachers gain inspiration to prepare suitable learning materials to be used in the classroom, assess the readiness and ability of each student to participate in learning activities, and enable teachers to participate in various training related to teaching skills independently.

Moreover, in April 2022, Minister Makarim launched *Rapor Pendidikan*[53] to help teachers, principals, and local governments to evaluate teaching quality and develop plans to identify, reflex, and fix the core problems in their respective schools (GovTech Edu, 2022). This platform provides data on education system evaluation results which are formulated from various instruments, surveys, and systems related to education. By utilizing this product, the evaluation process of education quality conducted by teachers and principals will take place in a simpler and more centralized way (no more manual form-filling).

However, even though GovTech Edu has been progressively helping the digital transformation journey in Indonesia's education sector,[54] there is a different perception among citizens regarding this shadow organization.

Box 8
A Public Debate on the Establishment of the Digital Government Unit

In September 2022, Indonesia's Minister of Education, Nadiem Anwar Makarim, gave a speech about the role of the digital government unit in driving digital transformation in Indonesia's education sector at the United Nations Headquarters, New York. He said, "Right now, we have 400 product managers, software engineers, and scientists that have created a shadow organization attached to our ministry." These statements lead to a public debate related to the digital government unit like GovTech Edu, which could potentially lead Indonesia's bureaucratic system to die because external parties could completely replace and take over the operation of Indonesia's bureaucracy (CNN Indonesia, 2022).

[50]Freedom to Learn Policy is a new vision of the Indonesia's education policy framework, launched by Minister Makarim in 2020 and containing 22 episodes/series of policy. For details see http://ditpsd.kemdikbud.go.id/hal/merdeka-belajar.

[51]The platform is accessible for public at https://kampusmerdeka.kemdikbud.go.id/.

[52]The platform is accessible for public at https://guru.kemdikbud.go.id/.

[53]The platform is accessible for public at https://raporpendidikan.kemdikbud.go.id/app.

[54]The platform is accessible for public at https://teknologi.kemdikbud.go.id/.

5.2.1 Recruitment

To date, GovTech Edu employs 400+ young professionals from diverse backgrounds and experiences. Most of them have been working with tech unicorns, FAANG (Facebook, Amazon, Apple, Netflix, Google), multinational companies, management consulting firms, and leading institutions, such as the United Nations, World Bank, Office of the Presidential Staff, etc. At GovTech Edu, they occupy specific positions according to their expertise and skill, such as product manager, UX researcher, UI designer, etc.

Regarding the human resources recruitment strategy, GovTech Edu utilizes digital communication channels, such as LinkedIn and Medium, and professional networks through employee referral program.[55] This strategy allows employees to endorse qualified candidates from their professional networks to fill the current position needed in GovTech Edu. In return, they will receive rewards once the proposed candidate is accepted in GovTech Edu.

Further, they also receive competitive remuneration equal with the rates in leading organizations and companies in the Indonesia's labor market. Despite competitive remuneration, GovTech Edu also offers a non-financial advantage to its employees, namely providing an opportunity to focus on making social impacts benefiting 5 million teachers and 24 million students in Indonesia. This aspect becomes the most determinant factor to push the low turnover rate in GovTech Edu, besides a strict and competitive selection process since the beginning to attract candidates with suitable value to this institution. This was confirmed by one of the employee's stories who chose to work at GovTech Edu instead of receiving an exciting material offer from a giant company like Facebook.

Box 9
It Is Not Only about Financial Advantages, but a Chance of Creating Impacts[56]

In 2020, Ibrahim Arif, Chief Technology Officer of GovTech Edu, declined the offer from Facebook London and decided to work with GovTech Edu instead. While joining Facebook would be one in a thousand opportunities to build a career in Europe, he decided to join GovTech Edu because he believed that sometimes it was not only about money, but also a sense of fulfillment. When he got hired by GovTech Edu, he thought it was a rare opportunity to show the world that Indonesia could do something better with technology.

5.2.2 Capacity Building

GovTech Edu implements in-house capacity building to upskill employees' digital skills. It is done by inviting internal employees with certain skills/expertise to provide training to their fellows. To date, GovTech Edu has conducted in-house training in project management, data-driven communication, and stakeholder communication management. Moreover, GovTech Edu also initiates inter-division sharing sessions regarding each

[55] *Ibid.*

[56] Read the full story of Ibrahim Arif through https://medium.com/govtech-edu/sometimes-it-isnt-about-the-money-8faceb1c9f7f.

division's good practices in managing the operationalization of partnership and community programs.

5.2.3 Retention

The establishment of GovTech Edu cannot be separated from the role of the Indonesia's Minister of Education, Nadiem Anwar Makarim, who was previously the CEO of Gojek, Indonesia's first unicorn that is now transformed into Southeast Asia's leading multi-service tech platform providing access to a wide range of services (transport, payment, food delivery, etc.). Minister Makarim's background in tech industries indicates that he has sufficient knowledge and experience in developing user-centric and high-quality tech products as well as a good understanding of creating effective business processes and conducive work culture to support digital transformation. When President Widodo assigned him to become Indonesia's Minister of Education in 2019, he brought his knowledge and experiences along with his career-switching from the private to the public sector.

Further, to nurture the organization's sustainability, GovTech Edu also implements flexible ways of working in terms of time and place of work with a target-based orientation, responsibility to comply with deadline, and perform accountability at work. GovTech Edu also enforces a working culture where everyone has the opportunity to work closely with the strategic policymakers in the MoE. This effort is in line with the function of GovTech Edu as a policy execution accelerator and to report its progress to high-level leaders in the MoE, mainly to the Directorate General and the Minister.

5.3 CTO: Advancing the Digital Transformation and Institutional Reform in Indonesia's Financial Sector

The MoF began the bureaucratic reform and institutional transformation (BRIT) as the consequence of economic crisis that hit Indonesia in 1998 (Ministry of Finance, n.d. a). The crisis caused people's distrust towards the government. People's assertion managed to encourage the government to issue two legal packages.[57] These two packages served as the foundation to enforce reforms within the GoI, including the MoF. Recently, the MoF has gone through five stages of BRIT, starting from 2002.[58]

During the third stage of BRIT, precisely between 2013 and 2016, the MoF designed the Blueprint on Institutional Transformation Program 2014–2025. The blueprint has 87 transformation initiatives, divided into five themes consisting of core, taxation, budgeting, treasury, and customs and excise. One of the mandates entrusts the establishment of a Central Transformation Office (CTO), which was then founded in 2014.

[57]People's Consultative Assembly Decree No. XI/1998 on Clean and Free-Of-Corruption State Actors and Law No. 28/1999 on the Implementation of Clean and Free-Of-Corruption State Actors.

[58]Stages of bureaucratic reform and institutional transformation, as follows: (1) modernization of state financial management (2002-2006), (2) massive bureaucratic reform (2007-2012), (3) setting and implementing the blueprint of BRIT (2013-2016), (4) connecting the dots (2016-2018), and (5) digital transformation (2019-now).

CTO plays a role in formulating and overseeing the reform and transformation agenda within the MoF and supporting as well as investigating the implementation of strategic initiatives in priority Echelon I units, such as General Secretariat, IT, HR, Directorate General of Taxes, Directorate General of Customs and Excise, Directorate General of Budgeting, and units with treasury function. In addition, CTO team coordinated with the Program Management Office (PMO)[59] team to implement the reform and transformation at the Echelon I Unit level. Through the cooperation between CTO and PMO, they could identify and escalate potential issues that might hinder the implementation of strategic initiatives.

The organizational structure at CTO is relatively unique compared to other units in the MoF, supporting the mandates of the Minister of Finance to execute flexible staffing model.[60] While serving in the CTO, ASN will not be incorporated on any structural or functional positions. CTO owns three working teams tasked to handle (i) Change Management, (ii) Reporting, and (iii) Digital Transformation. Table 21 shows the functions and roles available in the current CTO team.

Table 21. Functions and Roles Available in CTO

Function	Team Leader	Staff
Change Management	Change Management Officer I	Change Management Officer I A
		Change Management Analyst I A
		Change Management Officer I B
		Change Management Analyst I B
	Change Management Officer II	Change Management Officer II
		Change Management Analyst II
Reporting	Chief Reporting Officer	Reporting Officer
		Reporting Analyst
Digital Transformation	Chief Digital Transformation Officer	Digital Transformation Officer I
		Digital Transformation Analyst I
		Digital Transformation Officer II
		Digital Transformation Analyst II

Source: MoF.

[59]PMOs in the Ministry of Finance are various teams from each one of Echelon I Units with responsibilities in formulating transformation initiatives from research and evaluation of strategic initiatives for their respective units.

[60]Ministerial Decree of Finance No. 36/KMK.01/2014 on Ministry of Finance's Blueprint on Institutional Transformation Program 2014–2025.

5.3.1 Recruitment

CTO currently has 27 employees led by the Secretary General and its daily chief executive is assumed by the Expert Staff in Organization, Bureaucracy, and Information Technology of the MoF, as well as CTO secretariat (Ministry of Finance, n.d. b).

As a newborn unit in 2014, employees of CTO were appointed directly by the Minister by considering certain criteria, such as education background, capabilities, and experience during their tenures as ASN. Nonetheless, today, CTO utilize standardized examination to recruit employees from the outside of the MoF or within the MoF by transferring them to the CTO. The MoF is well-known for its environment to provide best experiences for ASN to improve their quality. As a result, this phenomenon attracts demands for its talents from other ministries or agencies, making the MoF a *leader's factory* for the government.

Further, CTO provides distinctive experiences to its staff compared to other units in the MoF, i.e., contributing to reforming and transforming the MoF. However, CTO still offers remuneration using similar salary standards as other public servants, i.e., based on wage regulation to pay ASN and contract values to pay non-ASN. It is still challenging for the MoF, especially in securing reliable and experienced talents, if the offered remuneration cannot compete with the private sector.

5.3.2 Capacity Building

CTO and other working units at the MoF utilize Corpu to develop their employees' competencies. Provided materials are expected to develop specific skills in assisting CTO and MoF's performance improvement as a whole. Three learning models are offered, namely structured learning,[61] social learning,[62] and learning-while-working models.[63]

5.3.3 Retention

CTO and other units in the MoF have conducted new working methods in public sector due to the pandemic, namely Compressed Work Schedule (CWS) and Flexible Working Space (FWS) since 2021.[64] CWS is the regulation of flexible working hours by providing leisure-time compensation, i.e., working hour reduction or compensation leave, if employees have excessive accumulated working hours and meet certain criteria from the applicable regulations. On the other hand, FWS is a regulation that provides work-from-anywhere approach during a certain period by maximizing information communication

[61]It could be done using classical method as provided in Pusdiklat or *Balai Latihan Keuangan* or using digital approach through Ministry of Finance Learning Center (KLC). It can also be done with several learning approaches, i.e., education, training, course, upgrading, seminar/conference/workshops, technical guidance, socialization, outbound, distance training (PJJ), synchronous e-learning, asynchronous e-learning and digital collaboration.

[62]Collaborative deep learning in the community could be provided in several ways, such as coaching-mentoring, community of practice, benchmarking, and job shadowing.

[63]Experiential working learning activity aims to provide real experiences. To learn from experience, one could join such activities as internship, secondment, exchange program between civil servants and state-owned enterprises, action learning, job enlargement, job enrichment, task force, and assignment.

[64]Ministerial Regulation of Finance No. 221/PMK.01/2021 on Working Days and Hours and Enforcement of Discipline in Relation to Allowance Payment for Employees withinthe Ministry of Finance.

technology to increase and maintain employee productivity and ensure that duties and functions of the MoF continue to be implemented.

5.4 JSC: Pioneering the Development of Smart City in Indonesia

Smart city has become popular globally in 2008 when Palmisano, the then IBM CEO, proposed his "three I's: instrumented, interconnected, intelligent" idea. Indeed, the use of ICT system can only be enabled when it is interconnected where decisions are made based on analysis, modelling, and artificial intelligence (Van den Bosch, 2018). Since then, cities have been claiming to be smart for various reasons, not only for employing ICT system but also for having educated citizens.

In 2020, MCI along with other ministries was initiating the so-called 100 smart city movement (Ministry of Communication and Informatics, 2017). In three years, it is expected that 100 cities could be established to inspire other cities to use ICT system in solving problems and developing a smart government (Rizkinaswara, 2020).

To support the central government's initiative in developing smart city, Jakarta Provincial Government took an early action by establishing Jakarta Smart City (JSC), which was first launched in 2014 and intended to act as a complain-handling mechanism using ICT. Citizens can immediately post their complaints in QLUE application, and the government and police can respond to them in CROP application (Rudi, 2014). These applications enable the government to monitor the performance of the headmen and award them on this basis. When the administration changed in 2017, JSC or the so-called *kota pintar 4.0* shifted to an ecosystem development approach, knowing that government alone cannot solve the city problems (CNN, 2020).

In 2020, JSC which was a technical implementation unit (PLT) turned into a regional public service agency (BLUD) as stipulated in Governor of DKI Jakarta Regulation No. 17/2020. This is the milestone for JSC. With its new institutional standing, JSC is allowed to manage its own finance and no longer relies on the province's budget. It can also set collaboration with external parties to improve services to people (Wildan, 2019).

Being BLUD, JSC is obliged to generate revenue from its services. In 2021, the provincial government of DKI Jakarta issued Governor of DKI Jakarta Regulation No. 44/2021 on the Tariff of JSC Service. The regulation lists ten services that JSC can charge. These are (1) research; (2) replication of smart city; (3) report writing; (4) advertising; (5) dissemination; (6) data analysis; (7) application development; (8) digital content; (9) ICT architecture; and (10) consultation.

5.4.1 Recruitment

As BLUD, JSC will be allowed to have immediate recruitment process in the case of staff resignation. It can also recruit talents flexibly based on its needs. The non-civil servant talents are contract-based, with the contract term varying from 3 to 12 months. They

receive sufficiently competitive salaries at the national level, even possibly equal to the unicorn level.

JSC is a home of about 100 non-civil servant talents and about two dozen of civil servant talents. The latter are of those assuming functional positions with digital competency. The organizational structure of JSC itself basically consists of four units: (i) research and analysis, (ii) communication and marketing, (iii) infrastructure and ICT, and (iv) system development. The government occupies managerial line as well as finance, institute secretary and procurement.

5.4.2 Capacity Building

There are two types of training in JSC: (1) sharing among staff members; and (2) training from external sources – from government or private sectors – to staff. Technical training is also conducted whenever new instruments are installed in the field. For example, water resource agencies conduct training to introduce how new pump works. As JSC has partnership with other provinces and districts/cities, a plan is set to organize training for these provinces and districts/cities regarding ITC skills such as data analytics, data science, and product development.

5.4.3 Retention

JSC's employees are offered flexible working arrangements. For example, they are allowed to moonlight and some talents are even allowed to work outside JSC as lecturers. Moreover, JSC arranges a conducive learning culture to enable talents to work longer and nurture the organization's sustainability. This is to prevent high turnover that inhibits the organization from accelerating the achievement. For example, talents are expected to work for 2 years in website development of JAKI. This duration enables them to accumulate knowledge and perspectives to improve the website. If they can only work for 3 months instead of 2 years, the ideas are not whole and, hence, the product would not be optimal. On top of that, there is intangible costs attributed to recruitment process, such as knowledge transfer and onboarding process. It is also burdensome for the leaders and manager to get to know and learn how the newly recruited staff work in such a short time.

One important issue in JSC is high turnover, particularly because most, if not all, of their talents are millennials who always like new challenges. Their expertise while working in JSC is an important asset for them to apply to private sectors. However, startups also experience high turnover. This is unsurprising considering the limited number of digital talents in the market.

To manage this shortcoming, JSC developed a system to allow employees to report on monthly or quarterly basis to those in the upper levels. As a result, when one talent resigns, his/her successor can take over the work. Certainly, having worked for JSC will give talents better bargaining position to work elsewhere.

> "Our supervisor always says that JSC serves as a campus for talents and the steppingstone [for future career]." (Informant, female, 12 July 2022)

Further, JSC combines the government mode of work, where bureaucracy still exists, and the quick-pace work of startups. Being bureaucratic is not necessarily bad. In a way, reporting to supervisor and their feedback are necessary as JSC should be accountable to public. However, pace is important in achieving deliverables. As an example, when new talents are needed, as long as the need is properly defined, the process is sufficiently fast. In terms of security reasons, data management in JSC is kept in repository and can only be accessed by government staff.

5.5 JDS: Championing Digital Government Transformation at the Sub-national Government Level

After Ridwan Kamil, the Governor of West Java (2018–2023), was inaugurated, he and the JDS founding team immediately began to construct the ideal ways to realize West Java as the first 'digital province' in Indonesia. However, they faced significant challenges in realizing this mission. *First*, West Java was in 19th place in the list of provinces with the highest proportion of internet users across Indonesia.[65] *Second*, there was a significant gap in internet users between the urban and rural populations in West Java.[66] This phenomenon is caused by the limited digital infrastructure available in rural areas, resulting in villagers having difficulty reaping the maximum benefits from digital technology.[67] *Third*, the government's human capital, especially regional governments at the city/district level, still maintains manual work methods. As a result, public services for citizens are sluggishly provided. Moreover, at the bottom of the government level, namely sub-districts/urban communities/villages, many ASN are still not capable of using digital technology (BisnisBandung, 2022).

> "Within the government structure, there are still roles [honorary staff] that provide minimum benefits in providing public services. They are tasked with retrieving files, numbering letters with manual methods, delivering letters, and other roles." (Informant, Male, August 5, 2022)

Jabar Digital Service (JDS) or Regional Technical Implementation Unit (UPTD) of the Center for Digital Services, Data and Geospatial Information was officially established on 29 July 2019. JDS is a unit that operates under the Communication and Informatics Agency of West Java which was established to narrow the digital divide, assist the efficiency and accuracy of providing evidence-based policies, and revolutionize technology utilization among residents and all government institutions inside West Java. JDS has three main missions: (i) to realize data-driven policy making, (ii) to accelerate the Government of West Java's digital transformation, and (iii) to facilitate residents' lives with digital technology.[68]

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[65]Based on data from West Java Provincial Government in 2021. Data can be accessed at https://opendata.jabarprov.go.id/id/visualisasi/akses-internet-di-jawa-barat.

[66]Based on our raw estimation from Indonesian National Socioeconomic Survey (SUSENAS) 2021, there is a significant wide gap of people accessing internet between urban areas (68%) and rural areas (49%).

[67]*Ibid.*

[68]According to Ministerial Regulation of Home Affairs No. 12/2017 on Guidance in Forming and Classifying Branch Office and Regional Technical Implementation Unit, UPTD is an organization that carries out operational and technical activities and/or certain supporting technical activities at the regional agency.

Since its establishment, JDS has succeeded in implementing various projects and bringing digital ecosystem transformation in West Java (Jabar Digital Service, 2022). In 2019, JDS has been operating a 'Super Application' called *Sapawarga* as a one-stop portal of digital services to provide convenient public services and information for the residents of West Java. This application contains a variety of information, such as the latest news and employment opportunities, media for conveying aspirations to the West Java Provincial Government, public administration, and *Rukun Warga* (RW)[69] activities. JDS also established West Java's Data Ecosystem that aims to provide an open and easy access to high-quality and up-to-date data for residents and all government institutions. Lastly, JDS established Digital Village,[70] West Java's Covid-19 Information & Coordination Center (Pikobar),[71] and West Java's Command Center.[72]

5.5.1 Recruitment

There are three career paths for JDS employees, i.e., junior, senior, and coordinator. Junior positions are opened for fresh graduates, while senior and coordinator positions are available for experienced individuals. JDS provides a range of opportunities for applicants working in various positions that are not linear to their educational background or previous work experiences. These opportunities are wide open, especially for those who have working experiences or good portfolios. Moreover, each applicant has an equal opportunity to fill vacant positions. Pre-test is the most essential part of application. Therefore, regardless of his/her educational background or previous working experiences, as long as they have the capabilities and strong desires to create social transformation for all, applicants may fill the positions.

> "Our product manager graduated from School of Pharmacy at ITB." (Informant, Female, 5 August 2022)

As most of employees are non-ASN, JDS has high turnover rate – with its highest rate being recorded in 2020. This was because in that year, the COVID-19 outbreak first occurred in West Java. As soon as the outbreak was revealed, JDS employees were ordered to build Pikobar. This left JDS employees with no choice but to work overtime and occasionally need to be prepared for a 24-hour working day. However, as non-permanent employees, even experts working for JDS had no right to receive any monetary benefits other than their remuneration, such as health insurances and overtime allowances. In response to this, contracts of experts are renewed every year and its remunerations uses the Standards of Exclusive Cost (SBK),[73] created by the Governor of West Java, Ridwan

[69]Administrative unit comprising several *Rukun Tetangga* (RT), neighborhood unit comprising several households.

[70]Locally known as *Desa Digital*, it is a program to reduce digital gap in West Java. This program provides digital infrastructure for villages, digital literacy, and digital marketplace training as well as ways to optimize the use of internet through Internet of Things or e-commerce to improve the villagers' productivity.

[71]Pikobar is a healthcare information system for all citizens of West Java.

[72]West Java's Command Center is West Java's center of data visualization and integration in assisting the monitoring, coordination, and decision-making agenda.

[73]*Standar Biaya Khusus* is standard costs that are utilized for specific activities by ministries, agencies, or local governments in certain areas (Ministry of Finance, 2009).

Kamil. This is to justify the salaries of JDS employees that are relatively more competitive than usual public sector's remunerations.

5.5.2 Capacity Building

In 2021, to reduce the high turnover rate, various online courses were provided for JDS employees. However, they are no longer receiving any free online courses in 2022 since the budget to handle the COVID-19 pandemic has been reduced. JDS shifts to self-development approach for employees by providing specific budgets for each department to invite experts as speakers for their upskilling agenda.

> "Every morning until lunch break on Friday, we call it as 'no-meeting day'. Employees have spare time to conduct any type of upskilling agenda." (Informant, Female, 5 August 2022).

5.5.3 Retention

JDS provides flexibility for its employees in carrying out their work. JDS employees may adopt either online-based working approach from anywhere or offline-based working approach in the office. Moreover, JDS has implemented a full work-from-anywhere approach exclusively for several roles, such as data engineer and other operational or technical roles. On the other hand, JDS employees may carry out their work outside the official working hour. However, employees are still obligated to submit a monthly performance report as a prerequisite of monthly earnings.[74]

> "Our working approach [shift] to work-from-anywhere has been reprimanded. However, this method does not provide any failure but success within our projects and goals." (Informant, Female 5 August 2022).

However, JDS still has limited operational budgets to implement various projects. Unlike JSC which has been able to generate income thanks to its status as BLUD, JDS currently is still a UPTD that basically reserves no rights to generate income from their projects. However, if JDS becomes BLUD, it will change the usual approach of JDS in providing free digital services into monetized ones. It is still being discussed internally within JDS which methods it may use to provide maximum benefits to the residents and all government institutions in West Java.[75]

5.6 Analysis of Digital Government Units

The insights in this section were gleaned from the digital government unit's experiences. This section analyzes the digital government unit's strategy to attract qualified digital talents, build their capacity, and make the necessary talents stay in a public sector role.

[74] *Ibid.*

[75] *Ibid.*

5.6.1 Recruitment

The public sector, in general, is well-known for having an outdated hiring method: a rigorous and lengthy recruitment process. This makes digital talent candidates less attracted to joining the governmental sector. Unlike the public sector in general, the digital government unit underscores the necessity to implement refurbished recruitment methods to bring digital talents into the public sector, including utilizing social media platforms, such as Instagram, LinkedIn, and Medium. In the case of GovTech Edu, another unique strategy is also implemented through an employee referral program that allows the public sector to receive competent candidates to harness the internal professional network.

Additionally, the digital government unit also offers a comparative advantage to its employees on top of financial benefits, namely an opportunity to generate social impact and improve the lives of society at large scale. This is one of the most strategic ways to rebrand the public sector as a digitally innovative institution while hoping to attract more competent talents to join the public sector.

Moreover, the private sector tends to be more successful in recruiting digital talents because it offers a more attractive remuneration than the public sector. Considering that lagging compensation inhibits the public sector from attracting digital talents, digital government units eliminate this constraint by offering competitive salaries equal to similar positions in Indonesia's labor market. However, digital government units only provide a single salary without additional monetary benefits like what the private sector offers, such as insurance, bonus, and THR. Addressing this constraint requires the digital government unit to provide additional value in the form of non-monetary benefits, such as flexible working arrangements and dynamic working culture, as described in the following section.

Table 22. Digital Government Unit's Strategies to Attract Competent Digital Talents

	Strategy	Remuneration	Calling
DTO	• Using the procurement of goods and services mechanism to recruit individual consultant • Utilizing social media platform (LinkedIn, Instagram)	• Competitive salary compared to similar industry in Indonesia's labor market • Single salary (no insurance, bonuses, and THR)	• Promoting opportunity to create social impact in Indonesia's healthcare sector
GovTech Edu	• Using the procurement of goods and services mechanism to employ vendors • Utilizing digital communication channels (LinkedIn, Medium) • Utilizing internal professional networks	• Competitive salary compared to similar industry in Indonesia's labor market	• Promoting opportunity to create social impact in Indonesia's education sector

	Strategy	Remuneration	Calling
	through employee referral program		
CTO	• Internal recruitment: recruiting and allocating talents from other units of MoF.	• Remuneration rate similar to salary standards of other public servants (based on ASN salary standard regulation)	• Offering distinctive experiences to contribute to the reform and transformation of the MoF and Indonesia's financial sector
JDS	• Using the procurement of goods and services mechanism to recruit individual consultant • Utilizing digital platform (LinkedIn, Instagram, website)	• Competitive salary in Indonesia's labor market • Single salary (no insurance, bonuses, and THR)	• Promoting opportunity to create social impact and accelerating digital transformation in West Java
JSC	• Annual recruitment through the procurement of goods and services mechanism to recruit individual consultant • Recruiting ASN employees through CASN recruitment according to BKN's policy	• Competitive salary in Indonesia's labor market, even competing with unicorn level • Single salary (no insurance, bonuses, and THR) • For ASN employees, remuneration rate similar to salary standards of other public servants (based on ASN salary standard regulation)	• Promoting opportunity to create social impact and contribute to state development

5.6.2 Capacity Building

The digital government units carry out various ways to build employees' digital capacity. Most of them foreground in-house capacity building by allowing internal staff with certain digital skills to provide regular training and share their knowledge with their peers. *This is the foremost strategy to improve the government employees' digital skills considering its efficiency, low-cost tariff, and the possibility of being conducted regularly.*

Other strategies are also implemented. Organizing training by inviting external experts and utilizing training centers from external parties and other government units, such as Corpu, are two of them.

Table 23. Digital Government Units' Strategies to Improve Employees' Digital Capacity

	Capacity Building
DTO	Establishing a corpu as the training center
GovTech Edu	In-house capacity building by inviting internal employees with certain digital skills to provide training
CTO	Utilizing corpu to provide training
JDS	Inviting expert to provide capacity building
JSC	• In-house capacity building by inviting internal employees with certain digital skills to provide regular training • Utilizing training center provided by government and private sector

5.6.3 Retention

Making digital talents stay in government has been a persistent challenge for the public sector. This is because the competitor (the private sector) offers so many comparative advantages for digital professionals, such as a clear career path, competitive compensation, and easier access to ICT development programs.

Realizing these hindrances, digital government units reform the public sector image renowned as a slow-moving bureaucracy with a traditional work environment. Digital government units transform the public sector's ways of working by implementing a flexible working arrangement in terms of time and place of work. In the case of JSC especially, flexibility is manifested through the freedom for its staff to find other jobs outside the JSC, but with a target-based orientation and responsibility to comply with the deadline and to perform accountability at work.

Regarding the work culture, digital government units enforce a working culture where everyone has the equal opportunity to work closely with the strategic policymakers in each institution, such as working with the directorate general, governor, and minister. Further, rather than perpetuating the public sector's reputation as an institution with a strict hierarchy and multiple layers of decision-making, the digital government unit rebuild its image by promoting fast and non-multiple layers of decision-making, non-hierarchical relationship between senior and junior and collaborative working culture between divisions.

Table 24. Digital Government Units' Strategies to Retain Digital Talents

	Ways of Working	Work Culture
DTO	Flexible working arrangement with a target-based orientation	• Non-hierarchical relationship between senior and junior • A chance to work closely with strategic policymakers • Fast and non-multiple layers of decision-making
GovTech Edu	Flexible working arrangement with a target-based orientation, compliance with deadline, and accountability at work	• Non-hierarchical relationship between senior and junior • A chance to work closely with strategic policy makers • Fast and non-multiple layers of decision-making
CTO	Flexible working arrangement with a target-based orientation	• Non-hierarchical relation between senior and junior • A chance to work closely with strategic policy makers • Fast and non-multiple layers of decision-making
JDS	Flexible working arrangement with a target-based orientation, except for the general affairs, HR, and M&E teams	• Non-hierarchical relation between senior and junior • A chance to work closely with Governor of West Java • Fast and non-multiple layers of decision-making
JSC	• Flexible working arrangement with a target-based orientation • Allowing staff to find other jobs outside JSC	• Conducive learning culture • Collaborative arrangement between units • Non-hierarchical relation between senior and junior • A chance to work closely with strategic policy makers • Fast and non-multiple layers in decision-making

VI. Conclusion and Recommendations

Using the ICT Occupation Map produced by the MCI along with other line ministries and the private sector, this study identifies necessary ICT skills for e-Government. It takes 283 digital skills under 15 job families to carry out four aspects of e-Government; and 90% of these skills can be delivered by *Prakom*. While *Prakom* takes the majority share of responsibilities for implementing e-Government, the rest of ICT functional positions perform insignificant contributions, with 6% of it being contributed by *Manggala*, 2% by *Sandiman*, and 1% by other functional positions. This is possible because Prakom is highly generalist position while other ICT jobs are highly specialist roles. At the same time, this implies the prominent roles of *Prakom* in implementing e-Government.

The essential role of *Prakom* for implementing e-Government can also be seen in the dominant number of *Prakom* compared to other ICT professionals. It is recorded that at least 77% or 7,954 out of 10,281 ICT professionals are *Prakom*. Nevertheless, the number of *Prakom* is far below that of total ASN, lower than even 0.24% to be precise. Meanwhile, contrary to the low number of *Prakom* – despite their essentiality – the demand for them exceeds far above the supply. Based on the data obtained from BPS, we found that during the 2020–2024 period, all ministries and agencies at the central government level need at least 16,348 people to fill in the position of *Prakom*. However, as of now, they only have 2,831 *Prakom*, meaning that they need an additional 13,517 people to fill in the position of *Prakom* between 2020 and 2024. Despite the great demand, ICT professionals show little interest in working for the government. Moreover, the competency test to be *Prakom* is infamously difficult, even for ICT graduates. Some other administrative factors also contribute to the low number of *Prakom*. The process of ASN recruitment is long and rigid. Candidates need to wait for not less than 8 months to complete all selection stages. This is too lengthy compared to that of private sectors or startups.

In addition to quantity issues, the current quality of *Prakom* also raises concerns. The delayering policy is indicated to contribute to 23% of *Prakom* being from non-ICT educational background or having lower than three-year associate degree. In other words, they are actually unqualified even for skilled-level *Prakom*. Moreover, only 56% of *Prakom* are of expert-level, i.e., those with at least four-year associate degree or university graduate with ICT educational background. This is below the requirement as our matching analysis shows that it takes 91% (not only 56%) expert-level to e-Government to implement e-Government.

As a conclusion, the problems facing *Prakom* are not only related to quantity but also very basic quality, i.e., only educational relevance, let alone skill competency. Therefore, despite its prominent role in implementing e-Government, this study does not perceive that recruiting civil servant *Prakom* to quench the demand would be the only solution for filling the supply and demand gap. Instead, using professionals available in the market through vendors would be a better solution. Above all, in many countries, the

public sector is not attractive for the best ICT talents. We are aware that out of almost 8,000 *Prakom*, there might be small percentage outliers whose technical capability equals those of private sector. However, with the above-mentioned analysis, it might not be appropriate to force all *Prakom* to compete technically with ICT professionals of private sectors. Instead, *Prakom* should take complimentary and supervisory roles to ensure that (i) organization needs are well identified and communicated to vendors, (ii) the work of vendors is supervised and assessed, (iii) the knowledge is sufficiently transferred, and (iv) the simple supporting system is developed, if necessary.

This study recommend improvement in recruitment channels. Of all recruitment channels, the government should prioritize PPPK as the most strategic channel to attract qualified digital talents. However, regulations related to PPPK recruitment for ICT functional positions should be formulated. The only existing regulation for PPPK is the Ministerial Regulation of State Apparatus Optimization and Bureaucratic Reform No. 72/2020 on PPPK recruitment of teachers, lecturers, health workers, and agricultural extension workers. Furthermore, the recruitment process has to be more flexible, **less bureaucratic, and innovative by mimicking the strategies applied in digital government units. These** digital government units have been using social media in spreading information related to ICT job vacancies and rebranding the public sector as an innovative institution. Job vacancies should also posted based on job category rather than user category, such as this or that ministry or agency. They also 'sell' the opportunity for ICT candidates to contribute to the creation of social impacts and improvement of people's lives. Last but certainly not least, providing competitive salaries according to market rate is important to attract the best talents. This powerful strategy needs to be adopted by the public sector to win the war for ICT talents.

This study also recommends to uphold the capacity building. As the supervisory institution for *Prakom*, BPS is supposed to organize competency test for them. This competency test will serve as the placement test for further capacity building activities. As a consequence of delayering program, currently there are quite a considerable number of *Prakom* who used to perform administrative tasks. In their new position as *Prakom*, they need to reskill themselves independently through Learning Management System. Therefore, contents and materials for them should be prepared as soon as possible. Meanwhile, upskilling programs through formal education and upskilling should also be supported in such a way that educational qualification and competence can fit with the qualification of *Prakom*. Our study also finds that the government face a dilemma to support skill certification. While the government needs it badly, it could possibly result in high turnover among the graduates who eye better jobs in private sectors. To mediate these problems, we recommend that skill certification be tied with commitment to work for certain years after the certification. Thus, this mimics the commitment applied in formal education. This is a win-win solution for both the government and *Prakom*. Finally, improvement and regular updates in ASN database is a must for better planning & decision making. To ensure the update takes place, the annual performance evaluation should be based on the updated ASN database.

As our analysis shows that 60% of *Prakom* is millennials and Gen Z, strategy for retention is important. These youth are to be handled differently, for example with two-way communication instead of instruction-based order. Therefore, it is imperative that

leaders in government organizations be equipped with such a skill. Since civil servants have to go through compulsory training sessions to be leaders, we recommend that the training include topics related to collaborative and non-hierarchical work culture which is important for retention measures. We also recommend that flexible work arrangements be made possible, starting with ICT professionals with possibilities to spread across other jobs. This has been applied in the Ministry of Finance, thus, it is no longer new for the public sector. Finally, the process to determine the demand of *Prakom* by government units should be carried out prudently to avoid mismatch. With limited supply of *Prakom* as ICT professionals, these resources should be placed according to their competence.

Finally, as the closing remark, we would like to emphasize that research and publication on public sector are currently still low in numbers. This diagnostic study focuses on the implementation of e-Government to achieve high performance of bureaucracy as well as public services. With limited time to finish the study, our main informants, except for the digital units of Jakarta and West Java, include only government officials from various ministries and agencies at the central level. Meanwhile, e-Government should also cover local governments. Their realities are way too different from those at the central level, particularly when taking into account the development stages of the region. It is, therefore, important to conduct research focusing on challenges facing local governments in the implementation of e-Government.

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Presidential Regulation No. 213/2021 on One Map of Indonesia.

Appendices

Appendix 1
Table A1. List of informants

No.	Ministry/Institution	Directorate/Division
1	Ministry of State Apparatus Optimization-BR (MoSA-BR)	e-Government Policy Implementation
2		Human Resource, Organization & Law Bureau
3	Ministry of Communication and Informatics (MCI)	Human Resource R&D Agency
4	National Development Planning Agency (Bappenas)	State Apparatus and Bureaucracy Reform
5		Center of Data & Information of Development Planning
6		Human Resources Bureau
7	Ministry of Education, Culture, Research, and Higher Education (MoE)	Organization and Governance Bureau
8		GovTech Edu
9	Ministry of Health (MoH)	Digital Transformation Office
10		Human Resources Management Bureau
11	Ministry of Finance (MoF)	Central Transformation Office
12		Center for Information and Technology
13		Center for Education and Training
14		General Directorate of Budgeting
15	Jakarta Smart City (JSC)	Development and Data Analyst Team
16	Jabar Digital Service (JDS)	Human Resources/General Affairs Team
17	Central Bureau of Statistics (BPS)	Education and Training
18		Human Resources Bureau
19	State Administration Agency (LAN)	Center for Policy Analyst Training
20		Center for Competency Development
21	National Civil Service Agency (BKN)	Personnel Information System
22	Policy Analyst Association (AAKI)	N/A
23	Pranata Komputer Association (IPRAKOM)	N/A
24	World Bank Jakarta (WB)	Digital Government Team
25	Prospera-DFAT (Prospera)	Public Sector Reform

Source: Authors.

Appendix 2
Table A2. E-Government Development Index in ASEAN, 2012–2018

Countries	Year	Online Service Index	Telecommunication Infrastructure Index	Human Capital Index	Total Score
Singapore	2012	1	0.6923	0.85	0.8474
	2014	0.9921	0.8793	0.8515	0.9076
	2016	0.971	0.8414	0.836	0.8828
	2018	0.9861	0.8019	0.8557	0.8812
Malaysia	2012	0.7908	0.451	0.7691	0.6703
	2014	0.6772	0.4455	0.7119	0.6115
	2016	0.7174	0.4397	0.6953	0.6175
	2018	0.8889	0.5647	0.6987	0.7174
Thailand	2012	0.5098	0.2361	0.7819	0.5093
	2014	0.4409	0.2843	0.664	0.4631
	2016	0.5507	0.4117	0.6942	0.5522
	2018	0.6389	0.5338	0.7903	0.6543
The Philippines	2012	0.4967	0.2082	0.8341	0.513
	2014	0.4803	0.2451	0.7051	0.4768
	2016	0.6667	0.3791	0.6839	0.5765
	2018	0.8819	0.3547	0.7171	0.6512
Vietnam	2012	0.4248	0.3969	0.7434	0.5217
	2014	0.4173	0.3792	0.6148	0.4705
	2016	0.5725	0.3715	0.5989	0.5143
	2018	0.7361	0.389	0.6543	0.5931
Indonesia	2012	0.4967	0.1897	0.7982	0.4949
	2014	0.3622	0.3054	0.6786	0.4487
	2016	0.3623	0.3016	0.6796	0.4478
	2018	0.5694	0.3222	0.6857	0.5258
Cambodia	2012	0.1895	0.0814	0.5997	0.2902
	2014	0.1732	0.2075	0.5189	0.2999
	2016	0.0507	0.2486	0.4785	0.2593
	2018	0.25	0.3132	0.5626	0.3753
Timor-Leste	2012	0.2157	0.0649	0.429	0.2365
	2014	0.2047	0.0704	0.4831	0.2528

Countries	Year	Online Service Index	Telecommunication Infrastructure Index	Human Capital Index	Total Score
	2016	0.2174	0.0728	0.4843	0.2582
	2018	0.3125	0.2937	0.5387	0.3816
Myanmar	2012	0.1046	0.1046	0	0.2703
	2014	0.0236	0.0084	0.5288	0.1869
	2016	0.1594	0.0655	0.4837	0.2362
	2018	0.2292	0.2565	0.5127	0.3328
	2020	0.2588	0.5234	0.5125	0.4316
Lao DPR	2012	0.2157	0.0998	0.5651	0.2935
	2014	0.1417	0.1618	0.4941	0.2659
	2016	0.2826	0.1537	0.4907	0.309
	2018	0.1667	0.2246	0.5254	0.3056

Source: United Nation e-Government Surveys 2012, 2014, 2016, and 2018.

Appendix 3
Table A3. Result of The Government of Indonesia's Ranking of e-Government 2021

Ministries	2021
Ministry of Communication and Information Technology	3.82
Ministry of Finance	3.72
Ministry of Law and Human Rights	3.68
Ministry of Public Works and Public Housing	3.44
Ministry of Agriculture	3.44
Ministry of Trade	3.42
Coordinating Ministry for Human Development and Culture	3.38
Ministry of Education and Culture	3.33
Ministry of Home Affairs	3.17
Ministry of Agrarian Affairs and Spatial Planning/National Land Agency	3.05
Ministry of Energy and Mineral Resources	2.99
Ministry of Cooperatives and Small and Medium Enterprises	2.99
Coordinating Ministry for Economic Affairs	2.95
Ministry of Women's Empowerment and Child Protection	2.92
Ministry of Manpower	2.9
Ministry of State Secretariat	2.88
Ministry of Foreign Affairs	2.87
Ministry of Transportation	2.84
Coordinating Ministry for Maritime Affairs	2.8
Ministry of Investment/ Investment Coordinating Board	2.8
Ministry of Health	2.79
Ministry of Maritime Affairs and Fisheries	2.75
Ministry of Environment and Forestry	2.62
Ministry of State Apparatus Optimization and Bureaucratic Reforms	2.61
Ministry of Tourism/Tourism and Creative Economy Agency	2.59
Ministry of National Development Planning/National Development Planning Agency	2.56
Ministry of Defense	2.48
Ministry of Sports and Youth	2.48
Ministry of Religion Affairs	2.35
Ministry of State-owned Enterprises	2.16
Coordinating Ministry for Political, Legal, and Security Affairs	1.98
Ministry of Social Affairs	1.56
Ministry of Industry	1.38

Source: Ministry of State Apparatus Optimization and Bureaucratic Reform of the Republic of Indonesia, 2021.

Appendix 4
Table A4. Number of ASN in 2022 by Selected Demographic Characteristics

Type of ASN	Characteristics	Total	Proportion
PNS	Sex		
	- Male	1,868,915	47%
	- Female	2,123,851	53%
	Level of education		
	- Primary – Senior High	650,807	16.3%
	- Diploma/Associate	629,217	15.8%
	- Bachelor	2,712,742	67.9%
	Age		
	- 18-20	1,144	0.02%
	- 21-30	317,041	8%
	- 31-40	916,143	23%
	- 41-50	1,245,421	31%
	- 51-60	1,476,137	37%
	- >60	36,880	0.9%
PPPK	Sex		
	- Male	122,164	35%
	- Female	229,622	65%
	Level of education		
	- Primary – Senior High	5,823	2%
	- Diploma/Associate	11,063	3%
	- Bachelor	334,900	95%
	Age		
	- 21-30	55,923	15%
	- 31-40	167,777	48%
	- 41-50	102,695	29%
	- 51-60	27,274	7.7%
	- >60	117	0.03%

Appendix 5
Table A5. ICT Roles and Its Educational Attainment Background

ICT roles	Scenario 1 (Associate degree in ICT or higher)			Scenario 2 (Bachelor degree in ICT or higher)		
	Number of ASN (person)	% of all employees in each ICT roles	% of all employees in all ICT roles	Number of ASN (person)	% of all employees in each ICT roles	% of all employees in all ICT roles
Pranata Komputer	6,112	76.8%		4,441	55.8%	
Manggala Informatika	49	24.9%		48	24.2%	
Sandiman	235	32.5%		208	28.7%	
Population Administration Information System Operator	23	19.30%		1	1.8%	
Population Database Administrator	153	11.3%		148	10.9%	
Scientific Data Analyst	5	6.1%		5	6.1%	
Total	6,577		63.2%	4,851		46.9%

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