THIRTEENTH PARLIAMENT OF SINGAPORE

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THIRD REPORT OF THE ESTIMATES COMMITTEE

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ESTIMATES COMMITTEE

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REPORT OF THE ESTIMATES COMMITTEE

THIRD REPORT OF THE ESTIMATES COMMITTEE

The Estimates Committee, appointed in pursuance of Standing Order No. 100 (3), had agreed to the following Report:

1 The Estimates Committee considered the Budget for the Financial Year (FY) 2018/2019 (Paper Cmd. 13 of 2018) and enquired into certain matters, specifically, on the monitoring of the implementation of recommendations by the Committee on the Future Economy (CFE), the push towards a Smart Nation, progress updates on the Changi Airport Terminal 5, borrowing by Statutory Boards and Government-owned Companies (SBGCs) and the Whole-of-Government (WOG) approach to budget management and delivery of solutions.

2 In the course of its enquiry, the Committee received two memoranda from the Ministry of Finance on 6 July 2018 and 30 August 2018.

MONITORING THE IMPLEMENTATIONS OF RECOMMENDATIONS BY THE COMMITTEE ON THE FUTURE ECONOMY (CFE)

3 The Committee noted that in his Budget 2017 speech, Minister for Finance Heng Swee Keat spoke about the different measures to build Singapore's capacity for the future economy and that these measures were derived from ideas put forth by the CFE, which included the Industry Transformation Maps (ITMs). The Committee further noted that at the time of the issuance of the Second Report of the Estimates Committee (Paper Parl. 9 of 2017), 14 ITMs had been launched. Subsequently, Minister for Finance Heng Swee Keat, in his Budget 2018 speech, had updated that 21 out of the 23 proposed ITMs had been launched and the remaining 2 would be launched by end March 2018.

Productivity and Manpower Targets under the ITMs

4 In light of the above, the Committee enquired into the finalised Productivity and Manpower Targets for the 23 industries under the ITMs.

5 MOF shared the Productivity and Manpower Targets for the 23 industries under the ITMs in Table 1.

Table 1 – Productivity and Manpower Targets for 23 industries under ITMs

S/N	**Cluster**	**ITMs**	**Value-added and/or Productivity Targets** *(Nominal unless otherwise stated)*	**Manpower Targets**
1	Manufacturing Cluster	Precision Engineering	8.0% VA CAGR (2014-20)	3,000 new PMET jobs by 2020
2		Energy & Chemicals	1.4% VA CAGR (2015-2025)	1,400 new jobs by 2025
3		Marine & Offshore Engineering	1.5% VA CAGR (2015-2025)	1,500 new jobs by 2025
4		Aerospace	5.0% VA CAGR (2015-2020)	1,000 new jobs by 2020

S/N	Cluster	ITMs	Value-added and/or Productivity Targets *(Nominal unless otherwise stated)*	Manpower Targets
5		Electronics	3.2% VA CAGR (2015-2020)	2,100 new PMET jobs by 2020
6	Trade and Connectivity Cluster	Wholesale Trade	Real VA CAGR: 3.3%-3.5%, Real VA/Worker CAGR: 2.5% - 2.6% (2016-20)	10,000 new jobs by 2020
7		Land Transport	No VA or VA/worker targets. Focus is on providing a reliable public transport system	8,000 new bus and rail jobs by 2030
8		Sea Transport	Grow VA by $4.5 billion by 2025 (2016-2025)	5,000 new jobs by 2025
9		Air Transport	Real VA CAGR of 2.9% (2015-20)	8,000 new jobs by 2025
10		Logistics	5% VA CAGR (2015-20)	2,000 new PMET jobs by 2020
11	Essential Domestic Services Cluster	Healthcare	No VA or VA/worker targets. There is no globally-accepted definition of productivity in the healthcare industry.	9,000 new jobs for new facilities/expansions between 2017-2019
12		Education	No VA or VA/worker targets for both Training and Adult Education (TAE) and Early Childhood (EC) sub-sectors. Alternative productivity indicators are tracked. TAE: Adoption of productivity solutions[1] by 50% of SSG TAE partners by 2020. EC: Roll-out of central administrative and tracking system by 2020.	TAE: No job creation target. Focus is on creating a high quality and responsive TAE sub-sector to support skills development efforts in the other ITMs. EC: 1,000 new EC professionals annually from 2016-2020
13	Modern Services Cluster	Professional Services	4.6% VA CAGR (2015-2020)	5,500 new PMET jobs annually until 2020

[1] The productivity solutions for the TAE sub-sector refers to the automation of training administration through Training Management solutions (TMS). TMS aims to drive productivity and improve support to learners.

S/N	Cluster	ITMs	Value-added and/or Productivity Targets *(Nominal unless otherwise stated)*	Manpower Targets
14		Financial Services	Real 2.4% VA CAGR (2015-2020)	3,000 net jobs annually until 2020
15		ICT and Media	6% VA CAGR (2015-2020)	13,000 new PMET jobs by 2020
16	Lifestyle Cluster	Food Manufacturing	4.5% VA/Worker CAGR (2015-20)	2,000 new PMET jobs by 2020
17		Food Services	2% VA/Worker CAGR (2015-20)	No manpower growth
18		Hotels	2.0% VA/Worker CAGR (2015-20)	200 new PMET jobs annually until 2020
19		Retail	1% VA/Worker CAGR (2015-20)	No manpower growth
20	Built Environment Cluster	Construction	2-3% YOY Site Productivity[2] (m^2/manday) Improvement (2016 - 2020)	No manpower targets, manpower demand fluctuates based on construction cycles
21		Security	8% VA CAGR (2015-2020)	500 new PMET jobs by 2020
22		Environmental Services	Real 1-2% VA/Worker CAGR (2016-2025)	No manpower growth
23		Real Estate	No VA or VA/worker targets. Alternative productivity target[3] is tracked – to grow annual number of transactions per full time property agent at 2% CAGR (2018-2020).	No manpower targets. Focus is on increasing productivity and technology adoption.

Source: MOF

6 In explaining the variations in the Productivity and Manpower targets for the ITMs, MOF shared with the Committee that each sector faced different opportunities and challenges. During the process of developing each ITM, industry partners, trade associations, and public

[2] Site Productivity (m^2/manday) is a better indicator for actual construction productivity on site for building projects, as it is less affected by the economic and construction cycles that could cause VA figures to fluctuate.
[3] Annual number of transactions per full time property agent is a better indicator than VA as the latter is highly sensitive to property market sentiments.

agencies considered key dimensions of growth, like the need to internationalise (to capitalise on fast-growing markets), digitalise, increase productivity, and innovate. As such, each ITM necessarily had different targets to measure the effectiveness of strategies best suited to each ITM. For example, the Manufacturing cluster was focused on anchoring and developing new areas of growth, hence the Economic Development Board had set Value-added (VA) targets. By contrast, VA/worker targets were used for the Lifestyle cluster, where there was scope to raise productivity. Where relevant, past performance and industry trends were taken into account to ensure that the targets were "stretch" targets. These targets represented the ambition of each sector and should not be interpreted as macroeconomic projections.

Education ITM

7 The Committee was of the view that the Education ITM was a strategic sector that was critical to the transformation of education in Singapore. This was especially so for the Training and Adult Education (TAE) sub-sector. Consequently, the Committee queried on why there were no Value-added (VA) or VA/worker targets or job creation targets for the Training and Adult Education (TAE) sub-sector under the Education ITM.

8 MOF reemphasised to the Committee that each ITM sector faced different opportunities and challenges. As such, each ITM necessarily had different indicators and targets to measure the effectiveness of strategies best suited to each ITM. There were no VA, VA/worker, or job creation targets for the Training and Adult Education (TAE) sub-sector under the Education ITM as these were not focus areas for the sub-sector. Instead, the TAE sub-sector's focus was on creating a quality and responsive sub-sector to support skills development efforts in the other ITMs. This was not measured by VA, VA/worker, or job creation. Nevertheless, MOF assured the Committee that SkillsFuture Singapore (SSG) tracked other indicators for the TAE sub-sector which reflected its priorities, such as learners' feedback on quality of training for SSG-funded programmes[4].

ITM Indicators

9 While acknowledging the Productivity and Manpower targets as one form of an outcome indicator, the Committee sought clarification from MOF on other indicators which could be used to gauge the performance of the ITMs. To this regard, the Committee queried on the performance of ITMs that had been launched, in terms of (i) meeting their Key Performance Indicators (KPIs); (ii) their Value-For-Money (VFM) reviews; and (iii) wage growth. With regard to KPIs, the Committee enquired whether the KPIs established were later confirmed to be relevant and germane to the respective industries and whether these KPIs translated into tangible results such as wage growth and concrete job opportunities. The Committee also queried on some of the measurable outcomes and specific deliverables that arose from Ministries productively allocating their funds to the ITMs.

10 MOF briefed the Committee that the ITMs were a work-in-progress. Majority of the ITMs were only rolled out last year, and the last ITM on Marine and Offshore was introduced only in March 2018. The ITMs' success depended on the joint effort by industry partners, trade associations, and public agencies to support the transformation of the sector. The Government's role was to bring industry stakeholders in the different sectors together to catalyse action.

[4] The results of the quality surveys are published onto the MySkillsFuture.sg portal to help future learners make better CET decisions.

11 The ITM process had galvanised industry stakeholders to initiate projects to transform their companies and generated momentum among them to collaborate on transformative projects for their sectors. For example, in line with the Food Services ITM's strategy to raise productivity, more than one-third of food outlets in the Food Services industry had adopted at least one technology solution to improve productivity, as of end-2017. Investments in automated kitchen equipment had saved an average of two headcounts per outlet, while automated dishwashing had saved at least 12 man-hours per week per outlet. Such productivity gains allowed for employees to be redeployed to higher value-added tasks such as customer engagement, thus making the business more competitive. Such transformative efforts would take time and continued commitment by all stakeholders to change and improve.

12 MOF confirmed that productivity was a key pillar of the ITMs. MOF had conducted a review of its productivity schemes to improve value-for-money. The introduction of the Productivity Solutions Grant (PSG) was the outcome of a multi-agency review to rationalise various schemes to support enterprises in acquiring off-the-shelf pre-approved productivity solutions. Most of the sectoral initiatives were still at the early stages of implementation, and VFM reviews were typically conducted after these initiatives had run for a few years.

13 On the issue of wage growth, MOF informed the Committee that, as many of the ITMs were launched in 2017 and 2018, it was too early to discern their impact on wage growth. Nevertheless, MOF assured the Committee that it would continue to monitor this.

Transformative Projects

14 While the Committee noted the example of how transformative projects had arisen in the Food Services ITM, the Committee was interested to know whether there were other examples of sectoral transformative projects in other ITMs and what lessons were there for other sectors that could be derived from the success of the Food Services ITM model, in relation to the partnership between the industry, trade association and Government.

15 MOF furnished the Committee with other examples by which sectoral transformative projects had occurred in other ITMs and one such example was in the Sea Transport sector. For the Sea Transport sector, the Maritime Port Authority (MPA) together with Singapore Shipping Association (SSA), and industry partners Glee Trees, Leo Shipping and Eng Lee Shipping, had undertaken a Proof of Concept (POC) project to use Robotic Process Automation (RPA) technology to help shipping agencies, a traditionally documentation-intensive sub-sector, improve productivity by utilising software robotics to reduce manual repetitive work[5]. Preliminary trials had shown positive results and the full findings were expected to be released by 4Q2018. MPA was working with SSA to roll out this initiative to more shipping agencies upon the successful conclusion of the POC.

16 The experience of the ITMs showed that transformation would be more effective, more immediate, and more pervasive when there was strong participation by industry stakeholders and support from trade associations and chambers (TACs). TACs could amplify the Government's reach to get enterprises to digitalise and innovate, since many of them had a large pool of members. For example, as part of the Electronics ITM, the Singapore Semiconductor Industry Association (SSIA) had been appointed as the programme manager for Electronics Professional Conversion Programmes (PCPs), and had so far facilitated more

[5] The RPA technology automates repetitive functions such as inputting shipping requests, creating bookings in firms' shipping management systems, printing of container release orders and invoices, etc.

than 260 PCPs. The Government will continue to work closely with industry and TACs to implement and refine the ITMs.

Programmes under the Committee for Future Economy

17 On the progress of other initiatives and programmes under the auspices of the CFE, the Committee queried on what had been the participation rate of enterprises in the (i) SMEs Go Digital Programme; (ii) Operation & Technology Road-Mapping; (iii) International Partnership Fund; (iv) Global Innovation Alliance; and (v) SkillsFuture Leadership Development Initiative. Furthermore, the Committee enquired if the lead Ministries had a target outcome for the participation rate of enterprises in the programmes and initiatives described.

18 MOF elaborated on the various programmes and initiatives under the auspices of the CFE. The SMEs Go Digital Programme aimed to help SMEs achieve internal efficiencies, reduce cost and provide better service offerings. For a start, the programme had prioritised its efforts in six sectors, namely Retail, Wholesale, Food Services, Logistics, Security and Environmental Services. Thus, for a start, the programme's target was to help 6,000 SMEs across the six focus sectors over four years from 1 Apr 2017. The SMEs Go Digital Programme was on track to meet this target, having helped more than 1,500 SMEs as of end-July 2018.

19 A*STAR helped SMEs develop technology strategies through its Operations and Technology Roadmapping (OTR) programme. This initiative helped companies make better-informed decisions in their firm-level innovation strategies, including decisions related to R&D investments, intellectual property strategy and potential R&D partners. Since 1 April 2017 to 31 July 2018, a total of 178 companies had joined the programme. A*STAR was on track to achieve 400 OTRs from FY17 to FY20, and would be monitoring progress to meet this target.

20 The International Partnership Fund (IPF) was an equity fund that would co-invest alongside Singapore-based firms in investment opportunities that allowed them to scale up and internationalise, with a focus on Asian markets. Through these opportunities, Singapore-based firms could partner other promising Asian companies to extend product lines, brands or value chains, or to gain access to markets, channels, technologies or other critical resources. The number of companies that Heliconia would invest in depended on the investment opportunities and the size of each investment.

21 The Global Innovation Alliance (GIA) was initiated in 2017 to strengthen Singapore's connections to major innovation hubs around the world. Since then, the GIA Programme Office (GIA PO) with its partners, had made considerable progress by supporting the participation of about 50 companies in Innovation launch-pad activities across four cities (i.e. Bangkok, Beijing, Jakarta and San Francisco). The GIA Programme Office (GIA PO) collaborated with partners on two types of activities for enterprises to connect into other leading innovation ecosystems around the world – Innovation Launchpads and Partnership Forums. To date, more than 130 companies had participated in Innovation Launchpads run by GIA Operating Partners, while more than 120 participants had been involved in Partnership Forum events. The GIA PO was expanding the GIA network and has estimated that by Mar 2021, about 500 companies would have participated in activities at Innovation Launchpads across the cities in the GIA network, and about 600 company executives would have participated in Partnership Forum events. In addition, GIA PO had also been actively working with MOE – as well as National University of Singapore, Nanyang Technological University, Singapore Management University, and Ngee Ann Polytechnic – to scope and scale up different types of overseas student programmes aimed at increasing students' exposure to entrepreneurship and innovation.

22 Announced in Budget 2017, the SkillsFuture Leadership Development Initiative (LDI) aimed to strengthen the pipeline of Singaporean talent to take on leadership roles in companies. Participation rate of enterprises was not a primary target outcome for LDI. Instead, LDI focused on developing aspiring Singaporean leaders, and helped them to acquire necessary leadership competencies and experiences. This was achieved through partnerships with companies and training providers on company-centric programmes and market/sector-specific programmes respectively. Since its introduction, the Government had partnered 27 companies to train Singaporeans through on-the-job leadership development opportunities, and is in discussion with approximately 23 more companies. As of Jul 2018, companies had committed to train about 450 Singaporeans under LDI. Agencies were on track to meet the target of supporting 800 Singaporeans by Mar 2020, as announced in Budget 2017.

23 The Committee commended MOF and other lead agencies on the progress of the implementation of recommendations made by the CFE. Nevertheless, the Committee enquired on whether were any potential areas of concern and emerging issues that had been flagged by Ministries and public agencies through existing review mechanisms and/or external stakeholders (including companies, business associations and unions) for the ITMs that had been launched, and if so, what were some of the adjustments that had been made to the various ITM strategies.

24 MOF informed the Committee that it had identified that a key area of focus was to improve understanding of the ITMs among businesses and workers. The most sustainable way of building awareness and sustaining change was for industry stakeholders and leaders to take charge of the transformation that needed to be made. As such, the Government worked closely with TACs and unions to support them in their leadership role to increase awareness of ITMs, and build the momentum for transformation. For example, during the 2017 inaugural Singapore Business Federation (SBF) Future Economy Conference and Exhibition, ITM consultation clinics manned by industry TAC representatives were set up to explain to SMEs on how to tap on the ITM initiatives. The Government had also been working with the unions to help workers understand the ITMs and prepare them for industry transformation. For example, as part of the Environmental Services ITM, the Building Construction and Timber Industries' Employees' Union (BATU), Young NTUC, and NEA worked together through platforms such as the Green Jobs Symposium held in Feb 2018 to showcase how technology could make work more efficient.

Funding of ITMs

25 On the Committee's query on whether any of the ITMs had come to the end of their respective funding periods and if so, whether there had been any revisions to funding allocation after reviewing their progress, MOF informed the Committee that none of the ITMs had come to the end of their respective funding periods.

26 The Committee also looked into whether the funding for ITMs and their KPIs were benchmarked against international standards.

27 MOF explained that as each ITM industry faced different opportunities and challenges, KPIs and funding were varied accordingly to address the unique circumstances of each industry. Agencies took into account both domestic considerations of the sector and international benchmarks. For example, in setting a real VA CAGR target of 2.9% (2015-2020) for the Air Transport ITM, CAAS took into account projections for passenger growth at Changi against the global backdrop of growing air demand, intensifying airport and airline competition in the region, as well as Singapore's land and manpower constraints.

28 As a further example, MOF shared with the Committee on how the Financial Services sector aimed to establish Singapore as a leading global financial centre in Asia and an international FinTech hub. The Financial Services ITM had thus assessed Singapore's international standing in key areas, such as in specialised insurance and re-insurance[6], and foreign exchange[7].

29 Other sectors, such as Healthcare, were more focused on delivering quality outcomes whilst ensuring the affordability of such services for domestic needs. MOH regularly monitored Singapore's progress against OECD countries, in terms of health outcomes such as life expectancy and infant mortality, and with respect to expenditure on healthcare, e.g. per capita expenditure on healthcare.

30 On the funding facet of the ITMs, the Committee sought for an update on how much of the $4.5 billion earmarked for the Industry Transformation Programme had been committed to date and whether remaining funds were sufficient to see the programme through its completion.

31 The Committee noted that as at end-FY2017, $1.7 billion had been committed. MOF assured the Committee that it would continue to monitor the commitment and prudent utilisation of these funds to ensure sufficiency.

32 The Committee further queried on the breakdown of the $1.7 billion that had been committed, in terms of disbursement to the various ITMs and how were these funds deployed.

33 MOF informed the Committee that the $1.7 billion that had been committed went to supporting companies in the areas of capability development ($1.54 billion), market access ($125 million), and financing ($30 million). These funds were deployed by several agencies, such as ESG and EDB, which supported companies from various sectors. The Government typically accounted for and tracked spending by agencies and was currently working with ITM lead agencies to do a stocktake of Government funding that went towards supporting the ITMs. This exercise would require some time and would give a more detailed breakdown of Government spending for each ITM sector when completed.

34 With regard to the Industry Manpower Plan (IMP), the Committee asked what portion of the $4.5 billion allocated to the ITMs had been used in furtherance of the IMP and concomitantly, how prevalent was the ownership of IMPs within each Ministry and whether concrete examples could be provided of Ministries having played a greater role in ensuring growth and capacity building in furthering the objectives of the ITMs.

35 MOF updated the Committee that the Industry Manpower Plan (IMP) nomenclature had been dropped. It was now referred to as jobs and skills but the substance remained the same. The ITMs were roadmaps tailored to the needs of each industry, including jobs and skills. However, it was difficult to delineate precisely the spending for jobs and skills for industry- or company-centric interventions, as funding support could be for multiple objectives. For example, the Lean Hotel Initiative (LHI), launched in March 2017 as part of the Hotels ITM, was a four-month programme that helped hotels achieve higher productivity by using diagnostic tools to assess their operational performance and develop solutions. As part of a

[6] Singapore is the leading specialised insurance and re-insurance hub in Asia. (As measured by market share of Asia-originated reinsurance premiums in 2017, collated by Insurance Intelligence Centre.)

[7] Singapore is the largest foreign exchange centre in Asia, and the third largest globally. (As measured by trading volume and ranked by Bank for International Settlements' triennial central bank foreign exchange survey 2016.)

holistic approach, it also incorporated job redesign and skills retraining, such as classroom training and fieldwork to help hotel staff familiarise themselves with lean hotel operations.

36 As jobs and skills was a key area of focus for each ITM, each ITM had a lead Government agency that worked with industry stakeholders on this. MOM/WSG and MOE/SSG provided support to these ITM lead agencies. For example, MOM/WSG worked with ITM lead agencies such as MOH, MCI, IMDA, MAS, EDB, and ESG on the '5 growth sectors' initiative announced by MOM in July 2018. Under this initiative, the Financial Services, Professional Services, Healthcare, Wholesale Trade, and Infocomm and Media industries were identified as having significant potential for good job creation, while also being subject to disruption as job and skill demands transformed. MOM/WSG worked with the ITM lead agencies to customise and ramp up Adapt & Growth programmes in these sectors, such as the International Trading Professional Conversion Programme for the Wholesale Trade sector.

Role of Trade Associations

37 On the role of specific stakeholders in the ITMs, the Committee inquired into what had been the role of Trade Associations (TA) in the ITMs and what outcomes had been achieved through their contributions.

38 MOF confirmed that Trade Associations and Chambers (TACs) played a vital role in the development and implementation of the ITMs. They were well-placed to drive outreach to businesses and spearhead relevant initiatives in their sectors, as they possessed understanding of the needs, opportunities and challenges faced by companies in their industries. For examples, TACs had helped implement industry level projects in different areas:

a. Technology development and deployment. As part of the Logistics ITM, four TACs and the Centre of Innovation for Supply Chain Management at Republic Polytechnic had come together, with support from ESG, to form the Logistics Alliance and launched a Transport Integrated Platform (TRIP), an integrated digital platform to enable easier tracking of container trucks, and reducing idling time. To date, the pilot has on-boarded 25 companies.

b. Internationalisation. Through shared resources and stronger Singapore branding enabled by TACs such as the Singapore Manufacturing Federation (SMF), local food manufacturers had been able to reap economies of scale and access highly competitive supermarket chains in Southeast Asia. This is an initiative under the Food Manufacturing ITM.

Observations and Recommendations

39 The Committee expressed their appreciation to the Ministry of Finance (MOF) for sharing on the progress made on the implementation of the recommendations made by the Committee for the Future Economy (CFE), particularly on the Industry Transformation Maps (ITMs), programmes and initiatives.

40 The Committee observed that the Government had to calibrate the indicators and targets to measure the effectiveness of individual ITMs, as each ITM faced different opportunities and challenges. The Committee was heartened to learn that MOF was tracking other forms of outcome indicators, namely KPIs and Value-for-Money (VFM). The Committee urged the Government to continue to track wage growth as an indicator. The aforementioned outcome indicators would then assist in providing a holistic view of the effectiveness of ITMs.

41 The Committee acknowledged that the Government was taking pro-active measures in encouraging participation by various stakeholders in driving the transformation that will come through ITMs. The participation of industry stakeholders, Trade Associations and Chambers

(TAC) and agencies was instrumental in building awareness amongst businesses and workers. The Committee was of the opinion that greater outreach programmes would invoke greater participation in, and eventual adoption of, the ITMs.

42 The Committee noted that of the $4.5 billion earmarked for the ITMs, $1.7 billion had been disbursed to date. The Committee learned that much of the disbursed amount had been utilised in supporting companies in areas of capability development, market access and financing. The Committee urged MOF to ensure that there was prudent, diligent and cautious spending so that there was a productive allocation of resources, which would translate into tangible benefits, like increased productivity levels and wage growth. The Committee supported MOF in how it had been exercising fiscal prudence in the disbursement of public monies in relation to the ITMs, by accounting for and tracking spending by agencies and was working with ITM lead agencies to do a stocktake of Government funding that went towards supporting the ITMs.

43 Moving away from the ITMs, the Committee also recognised the progress that had been made on the other programmes and initiatives (namely, SMEs Go Digital Programme, International Partnership Fund (IPF), Global Innovation Alliance (GIA) and SkillsFuture Leadership Development Initiative (LDI)) under the auspices of the CFE. In this regard, it was noted that ITM lead agencies had set target outcomes for the participation rate of enterprises in such programmes and initiatives, where applicable. While the participation rates were on track and encouraging, the Committee urged the Government to take pro-active measures in the dissemination to relevant stakeholders on the availability of such programmes and to revamp programmes and initiatives should participation rates wane.

SMART NATION MOVEMENT

44 The Committee noted that in his Budget 2018 speech, Minister for Finance Heng Swee Keat spoke about the emergence of new technologies as a major shift and how the Smart Nation movement aimed to make the best use of these new technologies to improve Singapore, uplift the quality of life, enhance economic competitiveness and promote social inclusion. The Committee further noted that such a transformation could only be wrought through a national effort by the Government, together with the private and people sectors.

Initiatives, Targets and Outcomes

45 In light of the push towards a Smart Nation, the Committee looked into the Smart Nation initiatives which the Government had implemented on a national level and across the Public Sector. The Committee also asked whether targets had been established for such initiatives and how their outcomes were monitored.

46 MOF confirmed with the Committee that the Smart Nation movement was about transforming Singapore, harnessing technology to improve living, empowering citizens to achieve their aspirations through creating exciting jobs and opportunities, and encouraging businesses to innovate and grow.

47 The Government had started its Smart Nation efforts in late 2014, and had made progress in rolling out digital applications and initiatives to improve the lives of citizens. To further advance Smart Nation ambitions and enable Government to be more integrated and aligned towards this strategy, the Smart Nation and Digital Government Group (SNDGG) was formed in May 2017. The Government was putting in place policies and legislations to facilitate innovations, such as making available data sets collected by public agencies and enacting the Cybersecurity Act. The Government was also implementing action plans for the economy, Government, and society to facilitate whole-of-nation transformation. This included Industry Transformation Maps and blueprints, such as Digital Economy Framework for Action, and the Digital Readiness Blueprint.

48 At the national level, the Government wanted to enable a vibrant and innovative digital economy, and was in the midst of implementing the following Strategic National Projects (SNPs) to lay the key digital platforms and infrastructure:

a. National Digital Identity (NDI) system, which aimed to increase citizen convenience and business productivity for online transactions. The NDI system would also enable new digital services and business models, by introducing capabilities such as digital signing and biometrics authentication;

b. E-Payments, which would allow everyone to make simple, swift, seamless, and safe payments. The banks had already implemented PayNow, which was a fund transfer option that required just a mobile phone number or NRIC number;

c. Smart Nation Sensor Platform, which deployed sensors and other Internet of Things devices to make Singapore more liveable and secure; and

d. Smart Urban Mobility, which leveraged on data and digital technologies, including artificial intelligence and autonomous vehicles, to enhance public transport.

49 At the Public Sector level, the Government was transforming itself to become more digital and data-driven to improve service delivery and policy making. Deputy Prime Minister

Teo Chee Hean had announced the Digital Government Blueprint (DGB) in June 2018, which set out the vision to be a Government that was "digital to the core, and serving with heart". The Public Sector would use data, connectivity, and computing to transform the way citizens and businesses were served, and to enable public officers to contribute fully to their work. These efforts would include:

a. Moments of Life, which was an SNP that bundled Government services across different agencies to the citizen at different moments of his life;

b. Business Grants Portal, which brought Government grants for businesses into one place, making it easier to search and apply for grants; and

c. OneService Application, which allowed citizens to provide feedback on municipal issues.

50 The SNPs were projects that enabled the Digital Economy, Digital Society and Digital Government. These platforms enabled many innovations and applications to be developed by both the public and private sector, to deliver significant benefits to citizens and businesses, and to transform the capabilities of Government agencies.

51 Broadly the key milestones for the SNPs were as follow:

52 To date, the Government was on track to deliver on the following interim outcomes:

a. National Digital Identity system. Currently, over 150 Government and private sector services were already linked to MyInfo, which would eliminate repetitive form-filling and document verification, and enhance accuracy. For example, in the banking sector, the use of MyInfo had resulted in up to 80% reduction in application time for users, and up to 15% higher approval rate due to MyInfo's better data quality. By FY18, it was targeted to onboard more than 200 public and private sector services. Overall, the aim was to allow citizens to share data safely and securely with other organizations, driving the use of digital signatures to facilitate paperless transactions by 2020.

b. E-payments. PayNow was launched by the banks last year for peer-to-peer (P2P) fund transfer, and was enhanced in August 2018 to allow corporate fund transfer. The number of PayNow registrations (as at May 2018) was 1.4mil and the monthly transaction volumes had been increasing 23.5% month-on-month. In addition, eligible CPF members over 55 years old were now able to receive their lump sum withdrawal through PayNow. Overall, the aim was to lower transaction costs for both businesses and citizens, and expand opportunities, especially for small businesses, freelancers and entrepreneurs. By FY 2023, every Government transaction would have at least one e-payments option, and it was expected that almost all transactions would be completed via e-payments.

c. Smart Nation Sensor Platform. The trials for various aspects of the Smart Nation Sensor Platform were ongoing, such as the wireless sensor trials in Orchard Road. This aimed to build a more responsive transport network, better public security, and improve urban planning. It was targeted to complete ten proof-of-concept projects over five years, and to achieve 15% cost savings or cost avoidance through utilisation of common networks or shared services through this SNP.

d. Smart Urban Mobility. The Common Fleet Management system was launched in mid-2017 to improve bus arrival regularity. Also launched was the Centre of Excellence for Testing & Research of Autonomous Vehicles (CETRAN) Test Centre, to facilitate testing of autonomous vehicles.

53 At the public sector level, the progress of initiatives was as follow:

a Moments of Life. The pilot app was launched in June 2018. It allowed parents to access a suite of services from multiple agencies, such as registering the baby's birth online, applying for Baby Bonus, view medical appointments and immunisation records, and search for preschools near them. This reduced the need for citizens to transact with multiple Government agencies and enabled a more seamless and convenient experience. The suite of services and information available would be expanded based on feedback from the pilot phase.

b Business Grants Portal. The portal had simplified and streamlined the grants application process for 6 grants from different agencies. By 2019, at least 80% of Government grants would be on the portal.

c OneService Application. To date, the application had garnered more than 100,000 registered users, with about 130,000 feedback cases reported. The application had also expanded from six to eleven reporting categories, to enable residents to report municipal issues beyond the purview of Government agencies to Town Councils and private entities. To complement the application, MSO also introduced the OneService Portal. The portal provided residents with aggregated municipal information such as block washing schedules, and events and information related to communities and the living environment.

54 On the establishment of targets and monitoring of outcomes, MOF shared with the Committee how the Government had also made public the key performance indicators and milestones for digital Government in the recently announced Digital Government Blueprint. For example, by 2023, it was aimed that at least 75% of citizens and businesses would be very satisfied with the Government's digital services, all digital services would have end-to-end digital options, and 20,000 public officers would be trained in data science or data analytics. Presently, a Digital Government Perception Survey (formerly known as e-Government Perception Survey) was conducted annually to assess citizens' and businesses' satisfaction with key digital Government services and to identify areas for further improvement. Over the last 5 years, on average, about 70% of citizens and 65% of businesses indicated that they were very satisfied with the Government's digital services. In the most recent survey conducted in 2017, 72% of citizens and 64% of businesses were very satisfied with the Government's digital services.

55 The progress of the Smart Nation initiatives was monitored through the Ministries and agencies' existing review mechanisms. Regular updates were provided to a Ministerial Committee chaired by DPM Teo Chee Hean.

Funding

56 On the funding aspect of the Smart Nation movement, the Committee considered the total investment outlay into the push towards Smart Nation and how much of these had been utilised and how much more would be committed to these efforts.

57 MOF explained to the Committee that Smart Nation was a priority area for the Government. In the push towards Smart Nation, about $2 billion in ICT tenders had been called for annually. In FY2018, it was estimated that $2.4 billion to $2.6 billion of ICT tenders would be called, to support Singapore's digitalisation efforts. There would be investments in areas such as communications infrastructure, data analytics, robotics and cyber security. MOF and SNDGG would be reviewing the utilisation and allocation of resources as the initiatives were being implemented.

58 In a follow-up query, the Committee enquired on what proportion of the $2 billion spent on ICT tenders annually was earmarked for cybersecurity measures and what measures had been put in place to ensure the security of citizens' information on digital platforms.

59 MOF informed the Committee that cybersecurity was critical to support developments towards a Smart Nation. Under Singapore's Cybersecurity Strategy published in 2016, it had targeted to set aside approximately 8% of total annual Government ICT expenditure for cybersecurity spending. To safeguard the confidentiality and integrity of data within the public sector, technical measures had been put in place, such as Internet Surfing Separation, as well as internal rules and processes to ensure that only authorised personnel had the permissions for system administration. The public sector also had policies for data protection which governed, amongst other things, proper procedures for access, care, and retention of citizens' information. Legislatively, the Public Sector Governance Act formalised data sharing arrangements between all public sector agencies, and introduced 3 criminal offences for the misuse of data to ensure that individual officers were responsible and accountable for safeguarding information.

60 In addition, SNDGG regularly audited Government agencies to check that the necessary controls were in place, and engaged them after each audit on the actions they should take to

further strengthen their IT governance. Following the cyber breach of SingHealth's IT systems, SNDGG was working closely with agencies to implement additional measures for critical Government systems, to strengthen the ability to detect and respond quickly to cybersecurity threats.

61 Legislations had also been enacted to safeguard the security of citizens' information on digital platforms in the private sector. The Personal Data Protection Act would serve to govern the collection, use, and disclosure of personal data by all private organisations in Singapore, which included protecting personal data in their possession or control. The Cybersecurity Act would serve to establish a legal framework for the oversight and maintenance of national cybersecurity in Singapore, with an emphasis on the proactive protection of Critical Information Infrastructure (CII) against cyber-attacks. The Cybersecurity Act also authorised the Cyber Security Agency to prevent and respond to cybersecurity threats and incidents, and established a licensing framework for cybersecurity service providers.

Redundancy of Technologies

62 In light of the advent of new technologies, the Committee asked how the Government was keeping pace with this, so that redundant and obsolete technologies did not hinder the drive for a Smart Nation, and how had the Government catered for redundancy in the allocation of resources for Smart Nation initiatives.

63 The Committee was briefed that nurturing manpower with technological expertise was the best way to build up long-term capabilities and keep pace with the advent of new technologies.

64 This would be achieved by deepening technical capabilities through a Centre of Excellence (or CentEx) for ICT and Smart Systems, where specialist engineering expertise would be grown to support the WOG. The CentEx would house capability centres such as Data Science and Artificial Intelligence, ICT Infrastructure, Application Design, Development and Deployment, Sensors and Internet of Things (IoT), Cybersecurity, and Geospatial. Through the Centex, bigger pools of specialist manpower would be nurtured who could take advantage of technology opportunities as they presented themselves. The Smart Nation Scholarship would also be launched this year to grow the talent pool.

65 To complement the Government's in-house capabilities, the Government would proactively collaborate with industry and research institutions, especially those in emerging technology areas. Such partnerships would allow for learning from industry and research and development (R&D) players, to deepen knowledge and stay ahead of technology trends.

66 It was necessary to stay nimble to keep pace with technological advancements. Smart Nation initiatives were funded with some amount of flexibility, and allowed review of the scope and outcomes of the Smart Nation initiatives as they evolved. If the initiatives involved new and unproven technologies, pilots and experiments would be embarked upon, before scaling the initiatives.

Public Sector Manpower

67 While the Committee welcomed the various programmes and measures that would deepen technological capabilities, it was also interested to understand the specific measures in place which would expand the talent pool in the Public Sector to drive the Smart Nation movement. To this regard, the Committee was interested to understand how large was the current pool of public officers trained in data science or data analytics and how were new skills assessed and the effectiveness of training evaluated for digital skills to be acquired.

Importantly, the Committee queried whether there was sufficient manpower and expertise in the public sector to drive the Smart Nation movement.

68 MOF shared with the Committee that currently, GovTech had a small team of data science specialists. Beyond working on more complex data science projects, these specialists also strengthened the Government's data science capabilities by helping various agencies build in-house data science teams, and developed a community of practice for data science enthusiasts across the Government. Furthermore, since the start of efforts to grow data science capabilities in the public service in 2017, more than 4,000 public officers had been trained in basic data science or data analytics to support their regular work.

69 MOF elaborated that efforts to grow the talent pool went beyond data science training. To aid public officers in acquiring new digital skills, a basic ICT competency framework for the public service was being developed, which would serve as a benchmark for the relevant digital skills at different competency levels, and to curate training programmes for public officers to attend. In the development of the competency framework, inputs were sought from individual training providers, who provided assessments on the competency levels of their course curriculum.

70 Overall, to ensure sufficient manpower and expertise to drive the Smart Nation efforts, there was a need to build up a talent pool to support priority areas. As mentioned, technical capabilities were being deepened through a CentEx for ICT and Smart Systems, where specialist engineering expertise would be grown to support the Government's digital needs. It was aimed to grow a core group of 250 professionals in GovTech and the Cyber Security Agency to drive key digital capabilities in areas such as data science and cybersecurity.

Catering for the Elderly and Persons with Disabilities

71 To ensure that the Smart Nation movement was a digital inclusive movement, the Committee sought clarification on how the Government was ensuring that no citizen, particularly the elderly and persons with disabilities, would be left behind. The Committee also asked what outreach programmes had been put in place to ensure that the citizens and businesses were able to understand the programmes and kept up with digitalisation and the move to e-services.

72 MOF assured the Committee that the push to make Singapore a Smart Nation was an inclusive one, and that no one would be left behind. To this end, the Digital Readiness Blueprint was recently launched which laid out recommendations to prepare all Singaporeans for an economy increasingly disrupted by digital innovations.

73 The immediate priority was the digitally vulnerable segments such as the low-income, and some seniors, who generally faced more challenges in embracing technology. For the public at large who were already comfortable with technology, the focus was on literacy, specifically, strengthening info media literacy in the face of deliberate online falsehoods or online scams. For the youth, the focus was on cyber wellness and how they could use technology to benefit the larger community.

74 The blueprint recommendations would build on existing programmes that cater to the different segments and their specific needs. These programmes include:

a. <u>In terms of providing digital access:</u>

- IMDA's Home Access programme offered broadband access to low-income households at subsidised rates.

• Enable IT programme provided grants and raised awareness of assistive technology for PwDs and their caregivers.

b. In terms of building digital literacy:

• The Media Literacy Council was spearheading the Better Internet Campaign which aimed to promote the safe and responsible use of digital technology especially among youths and children.

• NLB's S.U.R.E. campaign would inculcate information literacy skills (Source, Understand, Research, Evaluate) in students and the general public.

• IMDA's Silver Infocomm Initiative (SII), launched since 2007, promoted IT awareness and literacy among seniors aged 50 and above, so as to empower them with a more engaged and connected lifestyle. More than 190,000 seniors had benefitted from the SII initiative and activities such as the Silver IT Fest Plus mass training and roadshows, classes at Silver Infocomm Junctions, and Intergen IT Bootcamps.

c. In terms of creating opportunities to learn and use technology:

• There were Pixel Labs at regional libraries which were open to everyone to tinker and create, e.g. code and 3D print.

• IMDA also had a Digital Maker Programme for students and anyone interested that introduced digital making with a pocket-sized code-able device called a micro:bit.

75 As part of the Digital Government Blueprint, the Government was also committed to providing services that wee user-friendly, accessible and beneficial to different population segments. They would comply with a set of digital standards and design principles, which GovTech would publish by end-2018. To achieve greater digital inclusion, Government would also pilot select digital services in vernacular languages.

76 For businesses, IMDA, together with relevant agencies, had established various programmes to help them keep up with digitalisation, such as:

a. SMEs Go Digital. SMEs would be able to adopt the digital solutions under the SMEs Go Digital programme to help them digitalise. SMEs would be able to obtain specialist digital technology advice through the SME Digital Tech Hub, such as in areas of data analytics and cybersecurity. They would also be connected to ICT vendors and consultants, and attend relevant workshops and seminars.

b. Productivity Solutions Grant. SMEs could obtain grant support for pre-approved digital solutions under the grant.

77 The Committee noted that the IMDA's Silver Infocomm Initiative had reached more than 190,000 seniors. To ensure that seniors retained the IT awareness and literacy obtained under this initiative, the Committee asked about the learning pedagogy employed and how the Government was navigating the infrastructural challenges in establishing digital access for all citizens, especially digital-vulnerable segments.

78 MOF explained that despite a significant increase in Internet usage by seniors from 2012 to 2016, about 60% of those aged 60 and above were still not using the internet. To encourage these seniors to embrace technology in their daily lives, the Silver Infocomm Initiative had been raising awareness through events such as roadshows and seminars;

amplifying messages through human interest stories and social media; developing a pool of senior savvy advocates in the community; and encouraging continuous independent learning through an online resource portal, and through senior-friendly learning hubs at Silver Infocomm Junctions.

79 In meeting the needs of seniors, the design of each IT curriculum, including the Basic Digital Skills curriculum, was aligned with the overall Silver Infocomm Curriculum framework which identified 3 levels – iBegin (getting started/introduction to usage of devices/tools), iLive (skills and apps for daily living); and iDiscover (higher order lifestyle skills such as coding and creating). Where possible, IMDA would validate and co-develop the curriculum closely with content owners (e.g. Apple, Google, GovTech, POSB, OCBC, Facebook, etc.) to ensure that curriculum was kept current and updated for seniors.

80 In terms of delivery, the courses were offered in short modules with clear learning outcomes. The courses were curated to ensure that it was paced appropriately, with classes being kept small and guided (with help of volunteer cyberguides or assistant trainers, which were often seniors themselves). Feedback was gathered for every class for regular review to ensure that learning outcomes were met and random audits were done. In FY17, 93% of course participants surveyed agreed that they had picked up useful digital skills.

81 In the area of setting up digital access for citizens, currently, the following programmes had been made available to support the vulnerable segments in their digital needs:

a. Since 2006, the NEU PC Plus programme provided students and persons with disabilities from low-income households with a PC-Bundle (subsidised computer and 3 years of free broadband) to support their learning needs. For full-time students who could not afford the co-payment, further financial assistance was provided under the iNSPIRE Fund scheme, whereby students would receive a fully-paid PC-Bundle by performing 3 to 12 hours of community service. To-date, more than 36,000 households had benefited from the programme.

b. Since 2014, Home Access provided low-income households (with no students) with subsidised broadband with an option of an infocomm device. To-date, more than 9,700 households had benefited from the programme.

c. To support persons with disabilities (PWDs), IMDA funded SPD, a voluntary welfare organisation, in setting up and managing an Infocomm and Assistive Technology (IT/AT) Loan Library. Through this loan library, PWDs, social service organisations and special education schools were able to loan IT/AT devices for a period of time to determine their appropriateness in supporting the disabilities prior to purchasing them. These technology interactions would also help to equip PWDs with the relevant IT/AT skills and ICM experiences, thus encouraging the adoption and use of IT/AT in enhancing their daily living skills

d. The National Library Board (NLB) offered one hour of free Internet at 24 public libraries (all except library@chinatown and library@orchard) to Singaporeans and PRs aged 50 and above, who logged in to the multimedia stations with their myLibrary ID.

e. Lastly, Wireless@SG programme provided free Wi-Fi services in public areas such as hawker centres, community centres and MRT stations, in collaboration with venue owners and service providers.

82 MCI and IMDA were also exploring partnerships with industry and community stakeholders to conduct a pilot on the basic access packages to needy segment without basic

means, so as to better ascertain their needs in the area of digital access. The basic access package would include a basic mobile-connected device pre-installed with essential apps and services, allowing them to participate in day-to-day activities.

Schools

83 The Committee opined that to fully realise the Smart Nation movement, there was a need for younger generations to learn and embrace the culture of a Smart Nation and be prepared for the changes that technological innovations would bring about. As such, the Committee asked about the efforts to incorporate the Smart Nation movement objectives as part of the school curriculum.

84 MOF confirmed that students were given opportunities to make effective use of information and communication technology (ICT) in schools, from primary to post-secondary education. For example:

a. MOE partnered IMDA to provide enrichment programmes like the ‘Code for Fun’ and ‘Lab on Wheels’, which sought to expose and enthuse a broad base of students to the possibilities of technology. Since April 2014, a total of 182 schools (115 primary and 67 secondary) had embarked on the ‘Code for Fun’ programme, benefitting 93,000 students. The Digital Maker Programme by IMDA aimed to introduce digital coding and making to schools. Since April 2017, a total of 176 schools (81 primary, 92 secondary, 3 junior colleges) had embarked on the programme, benefitting 40,000 students.

b. Students also learned about the use of ICT through co-curricular activities like Infocomm Club and Robotics Club, as well as technology-related Applied Learning Programmes. For example, 41 secondary schools had included programming modules in their Applied Learning Programmes.

c. In line with the industry need for a more digitally-literate and competent workforce, selected secondary schools, polytechnics, ITE and Autonomous Universities (AUs) offered a range of ICT-related modules and courses for students. For instance, as part of ITE’s Higher Nitec Electronics Engineering curriculum, a new specialisation in Internet of Things (IoT) and Communications, with an annual intake of 400 students, was introduced two years ago. Subjects like Computing, Electronics, Smart Electrical Technology and Mobile Robotics were also being offered as elective subjects in selected secondary schools. In the AUs, the National University of Singapore (NUS) and the Nanyang Technological University (NTU) had made basic computational thinking modules compulsory for all students, while the Singapore Management University (SMU) had incorporated Technology Studies as part of its core curriculum.

d. Technology had also been used to design different learning experiences for students. The Singapore Student Learning Space (SLS), which had been rolled out to all primary and secondary schools and junior colleges, provided all students with access to quality, curriculum-aligned resources, and supported collaborative and self-directed learning. The SLS also provided teachers with tools to design and deliver active learning experiences in class. The polytechnics and ITE had also come together to develop a next generation digital learning environment (NGDLE) to enhance higher education through experimentation, collaboration and sharing of applications of technologies in teaching and learning.

Job Creation

85 In terms of job creation under the Smart Nation movement, the Committee sought clarification on the number of jobs that had been created and how many more were expected to be created over the next decade. The Committee further queried if resources were being channelled into re-training workers and equipping them with correct skill-sets so that they would not be made redundant.

86 MOF informed the Committee that the Smart Nation initiatives were expected to create new jobs and opportunities in the Infocomm Media (ICM) sector. Today, over 190,000 people were employed in the ICM sector. By 2020, the ICM sector would be expected to create more than 13,000 new PMET jobs. Most of these were expected to be in areas of cybersecurity, and artificial intelligence and data science. There might also be spill-over effects on job creation in other sectors.

87 The Government launched initiatives to train and equip workers with the relevant skillsets. As part of the broader SkillsFuture initiative, TechSkills Accelerator (TeSA) was launched in 2016 to support ICT professionals to upgrade and acquire new skills to stay competitive in the digital landscape. This had helped to achieve strong employment outcomes and maintain the skills relevancy of the local ICT workforce. More than 34,000 training places had been taken up or committed till date. An additional 20,000 training places would be created by 2020, with a focus on areas such as artificial intelligence, data analytics, cybersecurity, Internet of Things and immersive media.

Economies of Scale

88 With the development and introduction of several mobile applications and a refresh of WOG systems by the Government, the Committee was interested to know if economies of scale had been reaped thus far and what economies of scales could be realised in the future.

89 MOF confirmed that the Government was able to obtain economies of scale, and achieve cost and time savings by consolidating and standardising our agencies' ICT needs as much as possible. For example:

a. Alliance for Corporate Excellence (ACE). 19 agencies were brought together on the ACE programme to develop a shared HR and Finance system, and this helped agencies cut IT infrastructure costs by an estimated 30%.

b. Content Websites Platform (CWP). GovTech launched CWP in 2016 to centrally provide hosting and security services so that agencies would only have to manage their own websites and did not have to spend resources to manage their own hosting and security solutions. The simplified process for agencies had reduced the time taken for developing and deploying websites, from previously months to weeks or even days. Around 70% of Government websites had migrated to the CWP.

c. NECTAR. NECTAR was a WOG hosting platform for microservices-based applications. Mobile applications that utilised NECTAR included the Ideas! portal, Myinfo, and Workforce Singapore. NECTAR eliminated the need for agencies to acquire and maintain software and physical infrastructure, thus allowing them to focus their resources on developing better applications and services to service citizens better.

90 Going forward, the Government would continue to make available common digital services and infrastructure to all Government agencies through the Singapore Government

Technology Stack. This would allow individual agencies to deploy new digital solutions to citizens and businesses with lower cost and greater speed, and also provide for a more seamless user experience when interacting with the Government.

91 The Government would also be consolidating systems where possible. For example, PSD and MHA were working on the Human Resource Payroll System (HRPS) which integrates previously separate Payroll and HR systems serving public officers and National Service Police Officers. HRPS aimed to bring about productivity savings of 30% by streamlining and digitalising processes.

92 In the drive to develop shared systems and services to reap economies of scale, the challenge was to balance between standardising agencies' common requirements while catering for individual agencies' unique processes.

Co-Creation of Programmes

93 The Committee asked about the efforts put in place to allow the Smart Nation movement to evolve as a "bottom-up" initiative and not as solely "top-down", specifically, whether the Government would provide information on co-creation programmes that had seen public and private sector collaboration and participation.

94 MOF stated that the Smart Nation was a whole-of-nation effort, and the goals of Smart Nation and Digital Government could not be achieved through the efforts of the Government alone. Collaboration and co-creation would be key to idea generation.

95 The Government had been actively partnering the industry in Smart Nation efforts. For example, IMDA had been working with industry to share data with one another to solve common business problems through industry-led Data Collaboratives. IMDA, PricewaterhouseCoopers (PwC), and a Singapore-based startup, DEX, had entered into the first Data Collaborative Pilot, which was launched in April 2018.

96 There were also several opportunities for citizens, Government and businesses to co-create together. For example:

a. Ideas! was a one-stop portal where Government agencies organised crowdsourcing activities to generate ideas and solutions, such as app development competitions, hackathons, and campaigns.

b. Tech Kaki was a community set up by GovTech for citizens to test and give feedback on current as well as new Government digital services before they went live.

c. Data.gov.sg was a one-stop portal where public agencies shared their datasets with the public so that they could use the data for analysis and research.

d. Other co-creation initiatives by Government agencies. For example, Enterprise Singapore had issued a Call-for-Collaboration to seek e-payment solutions from the industry to support micropayment at hawker centres. These co-creation opportunities facilitated greater involvement from citizens and businesses in the evolution of Smart Nation.

97 These co-creation initiatives had seen an encouraging take-up rate thus far. For example, the Ideas! portal had seen a total of 1,130 ideas submitted since its launch in 2017. About 1,500 people had also joined the Tech Kaki community since its launch.

Observations and Recommendations

98 The Committee noted and acknowledged the various initiatives being driven by the Government at the national level and across the public service, how these efforts were geared towards the rolling out of digital applications and initiatives to improve the lives of citizens at the national level, and how the Government was transforming itself to become digital and data-driven to improve service delivery and policy making, at the public sector level. On this note, the Committee recommended that the Government periodically review the Digital Government Blueprint so that KPIs and milestones for a digital Government remained relevant and were not overtaken by technological advancements.

99 On the issue of relevancy, the Committee was mindful of the redundancy of obsolete technology in light of the fast changing pace of new technologies. The Committee noted and welcomed the Government's approach of keeping abreast with new technology through the nurturing of manpower with technological expertise.

100 The Committee encouraged the Government to continue its efforts in nurturing manpower through the expansion of the talent pool in the public sector, which could then support priority areas. The establishment of a basic ICT competency framework for public officers was a step in the right direction but the Committee highlighted that it would be necessary to develop officers with deepened technical capabilities who would be the drivers of specialist areas like data science and cybersecurity. With regard to this, the Committee was encouraged that the Government aimed to grow a core of 250 professionals in GovTech and the Cyber Security Agency. The Committee urged the Government to continue its efforts in recruiting and building up a significant pool of specialist officers to ensure that it is building talent at the cutting edge of technology and not be dependent on outsourced vendors and consultants for skills and expertise.

101 The Committee expressed its concern on how the digitally-vulnerable segments of society would be left behind in the Smart Nation movement but welcomed the efforts of the Government, which had implemented programmes such as Silver Infocomm Initiative (SII) which promoted IT awareness and literacy amongst seniors and implemented various programmes that would assist low-income families in having access to IT services. The Committee urged the Government that it should continue focusing on such digitally-vulnerable segments of society as the Smart Nation movement would only be successful if it was inclusive and all-encompassing.

102 The Committee was heartened to learn that the Smart Nation movement would be instrumental in job creation and that the Government was focusing on the re-training of workers and equipping them with correct skills-set. To this regard, the Committee was pleased to learn that the Smart Nation movement would create 13,000 new PMET jobs in the Infocomm Media (ICM) sector and there could be spill-over effects on job creation in other sectors.

CHANGI AIRPORT TERMINAL 5

103 The Committee had observed that the Ministry of Transport's budget had become the second largest amongst Ministries, after MINDEF, and ahead of MOH, MND and MOE. Among its key expenditures, the Ministry highlighted in its 2018 Committee of Supply debate that the entire Changi East project was expected to cost tens of billions of dollars. The Government would invest substantially in Changi East and would foot the majority of the costs and to date, the Government had already committed more than S$9 billion into the project.

Breakdown of Costs

104 In terms of funding for Changi Airport Terminal 5 (T5), the Committee sought information on what was the breakdown of the cost that was to be borne by the Government, Changi Airport Group and through the Airport Development Levy (ADL). With regard to the ADL, the Committee queried whether further increases in the ADL was envisaged for the future. The Committee further enquired on how much had been accumulated in the Changi Airport Development Fund, how much more did the Government envision that it would need to inject into this fund and what options for borrowing had the Changi Airport Group considered and whether the Government had explored and considered other sources of funding for the building of T5.

105 MOF explained to the Committee the components to the Changi East (CE) project and that Terminal 5 (T5) was one a part of the larger CE project, which comprised three programmes:

a. The first programme was the three runway system (3RW), to extend an existing military runway and construct accompanying taxiways to allow Changi Airport to operate with three runways.

b. The second programme was a network of tunnels to allow the transfer of passengers, baggage and airside vehicles in within T5, and between T5 and the existing T1 – T4. This included specialised systems such as the baggage handling system and automated people mover system.

c. The third programme was T5, which would allow Changi Airport to serve up to an additional 50 million passengers per annum (mppa) in its initial phase and also provide 100 additional aircraft stands.

106 As the CE project was still in the planning and design phase, cost estimates were still being finalised. Preliminarily, the CE project was expected to cost tens of billions of dollars. The cost estimates for the CE project would become clearer once detailed design and engineering studies were completed around 2020.

107 The CE project would be funded through a joint contribution model by the Government, the airport operator (Changi Airport Group, CAG) and airport users, namely passengers and airlines. The exact breakdown of cost borne among the various contributors would become clearer when the cost estimates for the CE project had been firmed up.

a. The Government would fund the majority of the costs, given the strategic importance of the project.

- Government contribution into CADF. To date, the Government had committed more than $9 billion, including $4 billion of funds injected into the CADF[8]. Government may inject further funds into CADF if the fiscal position allowed for it.

b. CAG would commit a substantial portion of its reserves and future surpluses and take on debt.

- Borrowing options explored by CAG. CAG was studying the most optimal mix of debt instruments. The need to keep borrowing costs low was one of the main considerations. The Government was also studying the possibility of providing a guarantee for CAG's borrowings to lower financing cost, and was discussing the issue with the President and the Council of Presidential Advisors (CPA).

c. Airport users would contribute through airport charges and the ADL, in line with the "user pays" principle. Charges for airlines and passengers would be kept to the minimum necessary and benchmarked to similar charges being imposed by competing air hubs to maintain Changi Airport's competitiveness. Government had announced ADL rates of $10.80 and $3.00 for origin-destination and transfer-transit passengers respectively, with the ADL taking effect from 1 Jul 2018. On the issue of further increases in the DL, MOF informed the Committee that the Government could review the ADL so that airport users would continue to pay a share towards the development and operations of the airport while ensuring Changi's competitiveness.

108 Considering the vast amounts of investment being channelled into the T5 project, the Committee asked if there were KPIs put in place to ensure that the project was completed by 2030.

109 MOF shared with the Committee that PS (Transport) chaired an inter-agency committee which tracked the key project milestones and progress very closely. These project milestones, which were agreed amongst the key stakeholders, were then reflected in the contractual agreements between CAG and the contractors. CAG could rely on the contractual levers at the operational-level to ensure that construction milestones were adhered to. These included penalties on the contractors to pay liquidated damages if they were not able to meet the project milestones as stated in the contract(s).

Monitoring for Value-for-Money and Cost Effectiveness

110 In trying to ascertain the exercise of financial prudency and monitoring mechanisms established, the Committee enquired into firstly, how was value for money and cost effectiveness realised in the expenditure incurred to build T5 and secondly, what monitoring systems had been established to ensure prudent spending and the avoidance of further increases in the cost for building the T5.

111 MOF informed the Committee that the Government had a cost management framework for large publicly-funded development infrastructure projects such as the CE project.

112 MOF was supported by the Centre for Public Project Management (CP2M) with a team of architects, engineers and quantity surveyors who reviewed the scope, design and cost

[8] The CADF Balance as at 31st March 2017 is $4,048,254,000 - consisting of $4 billion of funds from government, and interest income. (Source: CAAS Annual Report FY16-17. Annual Report for FY17-18 has yet to be released)

reasonableness of the proposals. Where necessary, changes would be made to revise the project scope or optimise project design to achieve greater value-for-money.

113 MOF was also supported by a Development Projects Advisory Panel (DPAP), comprising senior public officers, academics and industry practitioners with deep technical expertise and experience in major infrastructure developments. The DPAP was convened to assist to review the overall design, construction method and procurement approach to achieve greater value-for-money and cost-effectiveness.

114 These reviews were still underway, as the terminal design was still in progress. MOT and MOF, together with the DPAP and CP2M, would be monitoring the design plans to ensure cost effectiveness was achieved before the final project approval. The scrutiny on project cost management would be on-going and would continue even during the construction stage. Any cost increases would similarly have to be reviewed by MOT and MOF with CP2M, and in consultation with the DPAP where necessary.

Benefits and Outcomes

115 In light of the long timeline to completion of the T5 project, the Committee sought information on what milestone deliverables could airport users benefit from between now till the completion of the project in 2030 and at the completion of the project, what tangible and intangible benefits that Singapore stands to gain.

116 MOF reiterated that the expansions at Changi Airport such as T3, T4, Changi Jewel, and the upcoming 3RW were funded by CAG through revenue collected from the aviation system.

117 In terms of terminal capacity, T4’s opening had added 16mppa in capacity to the existing terminals at Changi West. The upcoming Jewel Changi Airport, set to open in 2019, was a mixed-use terminal complex with hotel, attractions, aviation facilities and retail and dining offerings. Jewel Changi Airport would also add 3mppa in capacity to the airport. This would bring the handling capacity of Changi Airport to 85 mppa.

118 CAG would also be embarking on various initiatives to upgrade the systems and facilities in the existing terminals, such as the upgrading of the Skytrain system and the Baggage Handling System, as well as a revamp of Terminal 2. These improvements would alleviate congestion during peak hours and improve the airport experience for passengers.

119 In terms of runway capacity, the current two-runway system would be reaching its capacity limit by around early 2020s. The third runway would be ready for civil aviation use by 2020 and would help mitigate the reduction in runway capacity while the second runway would be closed temporarily during construction of T5 tunnels. The three-runway system was expected to be fully operational in the early 2020s.

120 By then, airlines would be able to start reaping the benefits of additional airfield capacity. The additional airfield capacity would allow more flights to take off and land at the existing terminals in a safe and efficient manner. This would reduce the chance of flight delays for passengers and cargo.

121 The CE project would allow Changi Airport to stay ahead of other regional air hubs with similar expansion plans, enable Singapore to capture new demand growth and maintain the aviation sector’s significant contribution to the economy.

122 Economic benefits. Today, the aviation sector directly contributed around 3% of GDP to Singapore's GDP and generated around 76,000 jobs. The sector's contribution was expected to continue to grow with the new Changi East development project.

123 Connectivity opportunities. In addition, the excellent connectivity provided by Changi Airport enhanced Singapore's value proposition as a business centre, was an important catalyst for tourism, investment and trade, and enabled Singaporeans and Singapore businesses to tap into new markets overseas. Changi Airport was Singapore's gateway to the world and was connected to more than 400 cities globally through passenger and freight services. Additional airport capacity would enhance Singapore's connectivity to key and emerging economic centres.

124 For airlines, the increase in capacity would enable them to grow and tap on new markets, which would boost Singapore's connectivity even further. Passengers and businessmen would benefit from additional flight choices as well as more competitive air fares.

125 Intangible benefits. Changi East would allow Changi Airport to stay ahead of the regional hub competition, where competitor hubs were similarly making plans to tap into the strong projected air travel demand with their expansion plans. With this bold vision and long-term growth strategy firmly in place, the Government was confident that Changi Airport will continue to be the icon that Singaporeans had come to pride themselves on.

Funding Other Infrastructure Projects

126 The Committee enquired into whether the model for funding and infrastructure development used in T5 had portability to other comparable mega infrastructure projects, including the Tuas Mega Port. On the issue of the Tuas Mega Port, the Committee sought clarification on whether borrowing had been done for the Pasir Panjang Port and whether this would be done for the Tuas Mega Port.

127 MOF informed the Committee that it would study and apply the appropriate funding model for major infrastructure developments on a case-by-case basis, depending on factors such as economic benefits of project to Singapore, scale and bankability of the project.

128 There was already an established funding model for ports. Pasir Panjang Port was progressively opened over four phases between 2000 and 2015. For the Pasir Panjang Port, the Government had funded the land reclamation cost, and the port operator, PSA, had funded all infrastructure and equipment cost required for terminal operations. The funding model for the Pasir Panjang Port would be applied to the Tuas Mega Port. PSA issued bonds, from time to time, to finance its capital and operating expenditures, including that of Pasir Panjang Port.

129 For the Tuas Mega Port, the Government would fund the land reclamation cost. PSA, as a private company, would borrow to fund its infrastructure and equipment investments. The extent of borrowing would be subject to PSA's business considerations.

Observations and Recommendations

130 The Committee noted that the T5 was part of the larger Changi East (CE) project, which comprised 3 limbs. The first programme was to build a third runway, the second programme was to build a network of tunnels for better connectivity between T5 and the existing terminals and finally to serve a greater volume of passengers. Such an endeavour would necessarily require a large investment outlay and would be undertaken through a joint contribution model by the Government, Changi Airport Group (CAG) and airport users. The Committee noted that

the Government was to be the largest contributor owing to the strategic importance of the project.

131 As the Government was providing the greatest source of funding for the T5 project, the Committee suggested that the Government ensure that there was a monitoring of established KPIs and project deliverables so as to enable the timely completion of the T5 project. The Committee welcomed the establishment of an inter-agency committee that was tasked with tracking key project milestones and progress.

132 Another area that the Committee identified as integral was the exercise of financial prudence and the monitoring mechanisms that ensured this. The Committee was encouraged to learn that the Government had a cost management framework for large publicly-funded development infrastructure projects like T5 and MOF was supported by Centre for Public Project Management (CP2M) and Development Projects Advisory Panel (DPAP) which housed technical experts, academics, senior public officers and industry practitioners whose experience, skill and expertise could be drawn upon.

133 The Committee noted that the T5 project was already bringing about tangible and intangible benefits even before completion in 2030. It noted that T4's opening had added to existing passenger capacity and the Jewel Changi Airport was expected to increase that, when opened in 2019. Upon its completion, T5 would be expected to bring about tangible benefits like job creation and increased contributions to the GDP. Moreover, T5 would enhance Singapore's value proposition as a business centre and also benefit citizens and businesses through increased connectivity.

BORROWING BY STATUTORY BOARDS AND GOVERNMENT-OWNED COMPANIES

134 The Committee noted that in his Budget 2018 speech, Minister for Finance Heng Swee Keat had spoken about the option for Statutory Boards and Government-owned companies which undertook large infrastructure projects to borrow to finance these projects. He had added that this would assist in spreading the cost of certain larger investments over many years and hence help to distribute the share of funding more equitably across generations.

Funding for Large Infrastructure Projects

135 The Committee enquired whether there was a need for Statutory Boards and Government-owned companies to borrow from financial institutions when these infrastructure projects could be funded through the reserves and what advantage could be accrued from borrowing from external parties. The Committee further enquired whether there had been past instances where borrowing was not the right decision in financing large infrastructure projects.

136 MOF provided historical background to the Committee on how borrowing by Statutory Boards and Government-owned Companies (SBGCs) had been in place for a few decades. For example, from the 1990s, SBGCs had periodically issued bonds to finance larger infrastructure projects. Between 1998 to 2017, HDB, LTA and PUB had issued $47 billion of bonds to finance public housing, rail and water infrastructure respectively. SBGCs borrowed for a variety of reasons; these included utilising a more optimal debt/equity financing ratio for certain projects, imposing more financial discipline on the SBGC, and helping to share the infrastructure funding more equitably across generations.

137 Together with other revenue sources, SB borrowing had helped to improve the diversity and resilience of Government's financing sources. Further, borrowing for infrastructure instead of directly drawing on reserves had allowed the reserves to remain invested to generate returns. This had preserved the strategic roles of the reserves: (1) as a crisis fund, which was only drawn on during the global financial crisis; and (2) as an endowment fund, to support the annual budget. The reserves were the largest contributor to Government's revenues through the Net Investment Returns Contribution (NIRC), and the contribution was larger than any other single tax type. The Government would continue to use the reserves carefully and prudently for the benefit of all generations. On the issue of whether borrowing was the correct financing approach for large infrastructure projects, MOF elaborated that the financing mix of large infrastructure projects, including borrowing (if any), was determined based on projects' individual characteristics and policy objectives. MOF was cognisant of the risks associated with borrowing, including interest costs and re-financing risks which could lead to higher project costs. Hence, the Government, Statutory Boards and Government-owned Companies only undertook borrowing when it was fiscally / financially sustainable and contributed to policy objectives.

138 There had not been any expectation of a default on any borrowing. The Government would continue to closely monitor outcomes and scrutinise the financing mix of large infrastructure projects in the future.

Coupon Rate for Bonds

139 In a follow-up query, the Committee enquired what the coupon rate was for bonds issued by Statutory Boards to finance large infrastructure projects and how it compared to investment returns from the reserves during the 1990s.

140 MOF shared with the Committee that in the 1990s, some Statutory Boards (SB) had issued bonds to finance infrastructure projects. The largest issuers had been HDB, LTA and PUB which issued bonds for public housing, rail and water infrastructure projects respectively. These bonds had been issued for policy objectives including utilising a more optimal debt/equity financing ratio for certain projects, imposing more financial discipline on the SB, and helping to share infrastructure funding more equitably across generations.

141 On average, coupon rates of SB bonds were 3.5% between 1998 and 2009, and 2.1% between 2010 and 2017. The average investment returns one would have earned from a globally diversified portfolio passively invested 50% in stocks and 50% in bonds[9] since 1998 was about 4.5% in nominal Singapore dollar terms.

Tenure of Borrowing and Repayment

142 The Committee enquired into the Government's rationale in determining which infrastructure projects warranted borrowing from financial institutions, and what were the typical tenure periods for loans obtained. On the issue of cost being passed on to present and future citizens, the Committee enquired how the Government ensured that repayments by SBGCs did not lead to increased costs in the provision of services, and whether the benefits to be accrued by future generations from these infrastructure projects were compelling enough for them to be bound to it.

143 MOF explained to the Committee that each major project's financing structure, such as the amount and tenure of borrowing (if any), would be determined on its own merits and basis, taking into account that project's individual characteristics. Tenure periods took into account project-specific characteristics and prevailing market conditions (e.g. funding requirements, revenue generation profile, interest costs and market depth at different tenures). Based on these, bonds of various tenures had been issued, which ranged from 1 year to 40 years.

144 Where the objective of borrowing was to spread the cost of long-lived capital investments over a longer period to better match when their benefits were to be realised, the Government would look at major long-term infrastructure projects like Changi Terminal 5 (T5) and the Integrated Waste Management Facility (IWMF), as the benefits of these infrastructure projects would be enjoyed mainly by future generations. T5 would enhance Singapore's value proposition as a global business centre, and would be an important catalyst for tourism, investment and trade, and creating jobs for future generations of Singaporeans. IWMF would maximise energy and resource recovery while minimising the environmental impact of waste treatment, and achieve significant land savings that could be used by future generations.

[9] From 1998 to 2016, the average annualised nominal returns of a 50/50 portfolio in MSCI All Country Equity Index (SGD) and Barclay Capital Global Aggregate Bond Index (SGD) was 4.5%.

145 As with all major development expenditures, such infrastructure projects and their costs were scrutinised and put through a series of reviews in the Gateway Process before funding approval. This was to ensure judicious spending and value-for-money, with the aim of optimising the project's overall design, use of space and cost-effectiveness. This process tapped on a panel of senior public officers and industry practitioners with relevant professional and technical expertise in major infrastructure development.

Gateway Process

146 On ensuring the efficacy of monitoring systems when large infrastructure projects were undertaken, the Committee asked whether SBGCs were subjected to the Gateway Process and what monitoring processes were in place within organisations to ensure that the Gateway Process was not marginalised.

147 MOF informed the Committee that SBs were subjected to the Gateway Process as long as they embarked on infrastructure projects above $500 million in value. GCs' projects would be subjected to Gateway where the projects were funded by the Government. Furthermore, SBs were required by the Public Sector Governance Act to comply with development policies, which included the Gateway Process. In similar vein, if GCs used Government funds for their development project, they would be required to comply with the requirements that the Government had put in place to ensure fiscal prudence.

Monitoring Mechanisms to Ensure Value-for-Money

148 To ensure that borrowing would be undertaken responsibly, the Committee queried what measures were in place to ensure that SBGCs engaged in sustainable borrowing. Specifically, the Committee was interested in understanding what mechanisms were in place to evaluate and monitor spending so as to ensure value-for-money and accountability on outcomes and spending.

149 MOF assured the Committee that the Government was not proposing to borrow to spend on recurrent needs like healthcare, education, and security, but to support major long-term infrastructure, which would yield economic benefits for Singapore over many years in the future.

150 Operationally, SBGCs ensured financial sustainability by borrowing based on the strength of their balance sheets. Each SBGC observed the necessary corporate governance and was governed by a board of directors, including independent directors from outside the public sector. The board had the duty to ensure that the SBGC remained solvent and maintained a sustainable capital structure, including any borrowings. MOF worked with SBGCs to decide on the financing structure for each infrastructure project on a case-by-case basis, and would continue to monitor borrowing by SBGCs to ensure sustainability of their finances.

151 SBGCs were also subject to market discipline on their borrowings and creditors would expect a reasonable return on their funds based on the risk of the projects. Pre-development, large infrastructure projects funded by the Government were subject to the Gateway Process to ensure value-for-money. Post-development, they were also required to track and report key outcomes.

Observations and Recommendations

152 The Committee was satisfied that borrowing by Statutory Boards and Government-owned Companies (SBGCs) was not a new development and had been in place for some decades. It also recognised that borrowing was undertaken for a variety of reasons, which

included a more optimal debt/equity financing ratio for certain projects, the imposition of more financial discipline on SBGCs and, importantly, for the equitable sharing of infrastructure costs across generations. The Committee agreed that directly drawing on reserves would diminish the level of investments which could be undertaken and concomitantly lower the returns that these investments would generate. In providing a specific example of this, MOF shared how the coupon rates for bonds issued by SBs for the funding of large infrastructure projects had been 3.5% between 1998-2009 and 2.1% between 2010 and 2017. Conversely, the average investment returns from a globally diversified portfolio would have generated 4.5% for the aforementioned periods.

153 The Committee noted that the cost of borrowing for large infrastructure projects would entail such costs being passed to future generations and wondered whether that was an appropriate model as future generations might not be compelled to be bound to them. MOF had clarified to the Committee that the full advantages and benefits that such large infrastructure projects (for example, T5 and Integrated Waste Management Facility (IWMF)) would only be realised after its completion. As such, the cost of borrowing should be spread over a longer period for long-lived capital investments.

154 The Committee welcomed the monitoring systems for large infrastructure projects, like the Gateway Process and Public Sector Governance Act. These ensured that fiscal prudence was exercised and development policies were achieved. Furthermore, SGBCs were bound to observe the necessary corporate governance expected of a private enterprise and were assisted by MOF to decide on the financing scheme for each infrastructure project. The Committee was assured that such measures would encourage SBGCs to engage in sustainable borrowing and to impose financial discipline when undertaking infrastructure projects.

'WHOLE-OF-GOVERNMENT' APPROACH TO BUDGET MANAGEMENT AND DELIVERY OF SOLUTIONS

155 The Committee noted that that in his Budget 2018 speech, Minister for Finance Heng Swee Keat emphasised that Singapore's spending needs would continue to grow, especially in areas such as healthcare, infrastructure, security, and education. He also mentioned that the pace of Ministries' budget growth would be further moderated, by reducing the rate at which Ministries' block budgets were allowed to grow from 0.4 times of GDP growth to 0.3 times from FY2019. This was on top of permanent 2% downward adjustment to the budget caps of all Ministries and Organs of State from FY 2017 onwards announced in Budget 2017.

Managing Expenditure Growth

156 In light of this, the Committee asked as to what was the WOG approach for agencies to be more efficient and effective in their spending, with specific focus on what key strategies were agencies adopting to carefully manage their expenditure growth and obtaining the best value for expenditures. Concomitantly, the Committee sought information on how the WOG approach had led to a sharing and leveraging of best practices in budgeting and delivery of solutions across Ministries and Statutory Boards.

157 MOF explained that the Government had a range of budget mechanisms and controls in place to manage agencies' expenditure growth while ensuring efficient and effective spending of public monies. To support mandatory practices, best practices were also shared continuously across agencies. The strategies and process were categorised into three levels: WOG, agencies, and individual officer level.

158 At the WOG level, Ministries and Statutory Boards were incentivised to realise productivity savings in their work so that resources could be re-allocated to new priorities.

a. <u>Managing overall expenditure growth</u>. MOF imposed expenditure control through the Block Budget Framework, under which most ministries' baseline expenditures were capped over a period of five years. Block budgets were allowed to grow at below GDP growth rates to encourage Ministries to be more productive, and to reserve resources for new priorities or areas of increasing need. This was also how resources were re-allocated from areas where there was less need than before (e.g. smaller student cohorts) to areas of new need.

b. <u>Managing outcomes</u>. Within the expenditure caps, Ministries were given the flexibility to manage their budgets to achieve their objectives efficiently and effectively. MOF tracked and published programme outcomes or WOG outcomes in the Budget Book and Singapore Public Sector Outcome Review (SPOR). MOF took into account the outcomes achieved when reviewing programmes at the end of their funding tranche, and when considering new funding decisions. In this way, the Block Budget Framework promoted spending discipline while incentivising Ministries to strive for cost-effectiveness.

c. <u>Gateway evaluation for large projects</u>. Large infrastructure projects across all Ministries and Statutory Boards were subjected to the Gateway Process. This was a rigorous multi-stage process that scrutinised the requirements, scope and design of projects at key milestones to ensure effective and efficient spending, before project approval was given. This had helped ensure cost discipline and cost effectiveness in infrastructure projects across agencies.

d. Transforming finance processes for greater efficiency and greater value-add. MOF streamlined and automated finance processes to achieve cost and manpower savings, and to focus resources on higher value work. For example, to raise public sector workplace productivity, AGD, PSD, MOE and MHA worked together to revamp and simplify HR and finance processes to save time spent on claims and leave matters. The PaC@Gov mobile app was also introduced to enable common staff transactions to be performed on-the-go and cater to the increased mobility demands of public officers.

e. Sharing of best practices. To complement the above, MOF organised various engagement platforms to inculcate a culture of Value-For-Money (VFM) in the public sector by sharing best practices and learning points across WOG. These platforms such as the annual "Finance and Procurement Leaders Retreat" held in May and biannual Director of Finance meetings instilled a culture of collaboration and sharing between agencies. The VFM Office also put together Good Practice Guides which agencies could refer to when planning projects. For example, a cost-benefit analysis (CBA) guide for co-location projects was issued following a review of past co-location projects. The guide detailed the CBA framework and methodology, which are being used by agencies to guide the planning of future co-location projects. Learning points on how to minimise costs and optimise benefits of projects were also shared. As another example, a guide on life-cycle costing (LCC) for Public-Private Partnership (PPP) projects was issued for agencies to use when considering the use of the PPP model. Learning points such as risk mitigating strategies and critical successful factors of PPP projects were also shared.

159 At the Ministry and Statutory Board/Agency level, there was also a concerted push to achieve VFM in spending by extracting greater value from each dollar spent through:

a. Streamlining processes and harnessing technology to improve service delivery. Automation and process re-design enabled faster payments and responses to public feedback. The use of mobile apps and one-stop portals enabled more seamless interaction with the public, while reducing manpower.

- One example was the Singapore Police Force's effort to optimize its manpower by deploying e-Kiosks in redesigned Neighbourhood Police Posts or NPPs. The public would have round-the-clock access to police services like report-lodging and automated drop boxes for depositing found property. This had also helped to free up police officers manning NPPs to be re-deployed to other frontline duties under the Community Policing System (COPS) initiative.

- Another example was the Parking.sg app developed by GovTech, HDB and URA. Drivers now had a quick and convenient way to pay for short-term parking – drivers were charged on a per minute basis and could extend their parking sessions remotely, instead of having to return to their vehicles to add more coupons.

b. "Doing more with less" through innovation. Agencies generated value by challenging the status quo and using intelligent technology to enhance work effectiveness and attain manpower savings.

- For example, MOM's drones supporting the inspection of buildings and construction sites had helped to complement safety enforcement. The drones widened the inspection coverage by inspecting working conditions in previously less accessible places. With this, MOM had seen a 50% savings in manhours.

- Another example was how JTC had partnered with NTU to develop a robot to facilitate building inspection works. The robots enabled high quality inspections that were more precise and consistent, and reduced the manpower and time required to conduct inspections by 50%.

c. Managing lifecycle cost and using alternative building techniques and design strategies to achieve infrastructure cost savings. Agencies like HDB and JTC had incorporated BCA-issued functionality and maintainability guidelines into projects for safer, more labour-efficient and cost-effective maintenance downstream. Agencies also explored the use of alternative materials and building techniques to achieve infrastructure cost savings.

- For example, to address limited space for the growing amount of waste in Singapore, in Phase 2 of the development of Semakau Landfill, NEA adopted an innovative single cell layout as compared to the multi-cell layout used in phase 1. This design maximized the landfill capacity and minimized the volume of sand used for bunds, lowering the cost of construction by 87%, from \$240 million to \$33 million.

- In another example, PUB's Tuas Water Reclamation Plant was integrated with NEA's Integrated Waste Management Facility to achieve a number of synergies and optimise land-use. Within this integrated facility, co-digestion of food waste from NEA's facility with used water sludge from PUB's facility generated more biogas, and enhanced energy production. These allowed both facilities to be self-sufficient in energy. The two plants also enjoyed other synergies such as the sharing of common administrative facilities.

160 At the individual officer level, culture played an important role. MOF encouraged the culture of VFM at the management as well as individual officer levels, and engaged agencies to help them see the benefit of VFM in their daily work. Individual officers were more directly aware of potential inefficiencies on the ground and had more potential to identify where resources would be more cost-effective.

161 Likewise, the culture of innovation - to try another way of doing things that would lead to better service delivery or more cost-effective outcomes - was most effective when it was driven ground-up rather than top-down. To this end, the Public Service had embarked on the next phase of Public Service Transformation (PST). Agencies would have programmes to encourage officers to innovate in their domains, and also collaborate with other agencies to pursue innovation projects. There were awards at the agency-level and WOG-level to recognise officers and projects that were innovative. Some examples of winning projects were the National Steps Challenge and Parking.sg.

Centralised Procurement

162 The Committee enquired if MOF had considered a WOG approach to centralise procurements for Ministries and SBs, thereby allowing the Government to realise economies of scale in the purchase of goods and services from external parties, and if there were inherent advantages and disadvantages in adopting such an approach.

163 MOF shared with the Committee that it had sought to centralise procurement wherever appropriate. For example, the use of a common procurement system portal enabled one-stop visibility for the Government to identify commonalities across agencies and conduct comparisons to learn best practices. MOF also aggregated the demand for common purchases

across agencies to be procured by one agency. There were over 70 types of bulk contracts, accounting for about one-third of Government spending in goods and services. The commonly-purchased categories included office equipment, graphic design, travel-related services, and infocomm-related products and services.

Demand Aggregation Advantages:

a. Minimised procurement effort, administration costs

b. Quantity discounts (economies of scale)

Demand Aggregation Disadvantages:

There was a limit to how much centralisation or standardisation was optimal. Overdoing this could create other problems, such as:

a. Aggregating WOG demand to particular suppliers to reap economies of scale would mean a higher concentration of risk and over-reliance on particular suppliers.

b. There was a need to be mindful of providing sufficient opportunities for SMEs. If there existed too large a contract, it was more likely to be taken up by the big suppliers only.

c. Too much centralisation or standardising also limited flexibilities or variations to meet unique needs of agencies or situations.

So there was a need to strike a judicious balance.

Accounting Methods

164 The Committee was cognisant to the different accounting methods used by Ministries (cash accounting) and Statutory Boards (accrual counting) and enquired whether the adoption of different accounting methods would act as an impediment to the WOG approach to easing budgetary constraints, especially in infrastructure spending.

165 MOF clarified that the difference in bases of accounting (cash or accrual) was not be an impediment as Government and SBs were able to extract the relevant accounting numbers to cater to various planning and budgetary needs.

166 The Government adopted a cash basis of accounting, which was simple to understand, objective and easily verifiable. By directly reporting the cash collected or spent by Government, cash accounts gave Parliament the most direct control on the resources to be made available to Ministries and Organs of State. For funding provided by Government to SBs, Government recorded the disbursements on a cash basis in Government’s financial statements.

167 Statutory Boards (SBs) on the other hand, were autonomous agencies formed to carry out operating or regulatory functions on behalf of the Government. Adopting accrual basis of accounting allowed them to match expenses to revenue, to better define their operating surplus/deficit from carrying out their functions.

Personal Support for Seniors and Individuals

168 In terms of delivery of solutions, the Committee had observed that more services were being provided online and enquired whether the Government would ensure that public servants continued to provide face-to-face channels or personal support for individuals and seniors who were unable to complete the online Government transactions or processes on their own.

169 MOF informed the Committee that the Government provided many of its services online so that citizens could be served anytime, anywhere and on any device. Even as the Government persevered in its digital inclusion efforts, it would retain touch-points (such as in the community centres) where help could be provided to those who are unable to interact digitally to access Government services.

170 The Digital Readiness Blueprint sought to ensure that every Singaporean was digitally ready to benefit from technology in everyday living. IMDA and NLB currently have initiatives in place providing assistance to seniors and mature adults in their navigation of technology. More efforts were planned to increase the outreach and awareness of Government websites and apps, so that citizens were able to transact with Government digitally.

Transformation of Public Service

171 The Committee enquired on what are the long term plans that the Government had established to transform the Public Service so as to better deliver on the Government's priorities. Specifically, the Committee enquired into how Ministries and agencies were transforming their operations and services to deliver better integrated programmes, services and solutions. The Committee further enquired if the Government has planned to partner businesses, citizens and relevant shareholders to better develop programmes and solutions and whether examples could be provided of such integrated programmes and solutions and their efficacy.

172 MOF informed the Committee that the Public Service had embarked on the next phase of Public Sector Transformation, which aimed to accelerate transformation, and go deeper, in order to build a future Singapore that remained competitive and relevant to the world. In doing so, every public agency was reviewing how it delivered its policies, programmes and services.

173 Digitalisation was key to this transformation movement. In that regard, DPM Teo announced the Digital Government Blueprint (DGB) on 5 June 2018, which set out a vision to be a Government that used data, connectivity and computing decisively to transform the way citizens and businesses were served, and the way public officers were enabled to contribute fully to their work. A Digital Government would continue to be one that "Serves with Heart", where work was automated where possible, so that a personal touch was provided in a way that enriches the experience of the engagement between Government and citizens.

174 The DGB articulated concrete milestones for specific initiatives and elaborated on the approach that the Government would take to achieve this vision. In essence,

a. To organise itself around its mission and stakeholders, instead of Ministries and agencies;

b. To strengthen integration between policy, operations and technology to support the Government's mission and better serve the stakeholders;

c. To build common digital and data platforms for the WOG, operate reliable, resilient and secure systems, and raise our digital capabilities to pursue innovation; and

d. To partner the community and businesses to embrace technology and drive adoption.

The blueprint would have to be improved iteratively as technology evolved and needs changed.

175 The Public Service was committed to delivering citizen-centric services, using technology as an enabler and integrating services across different agencies. Recent initiatives demonstrated this. For instance, MSF's Social Service Offices or SSOs aimed to better coordinate service delivery and improve client support. This was being done through by firstly, equipping frontline officers in Government agencies and community with knowledge to provide clients with basic information on schemes and services beyond those offered by the agency that clients first approached. Second, by making it more convenient for clients to apply for assistance schemes and services from different agencies by sharing information and assessments across agencies to avoid clients submitting the same documents or information. Third, by strengthening cross-agency coordination so that clients received more holistic and coordinated assistance from the agencies and voluntary welfare organisations (VWOs) that were supporting them.

176 Another example was the OneService Application administered by the Municipal Services Office (MSO), which today had expanded from six to eleven reporting categories to enable residents to report municipal issues beyond the purview of Government agencies to Town Councils and private entities. MSO also introduced the OneService portal, which aggregated municipal information for residents, such as block washing schedules, events and information (compiled from multiple agency websites) relevant to communities and the living environment.

177 The Government would implement more such initiatives in the next year. The Moments of Life (Families) app was rolled out from June 2018. This was the first pilot of the Smart Nation Moments of Life Strategic National Project, which aimed to bundle together relevant Government services at a single touchpoint, across different agencies, to the citizen at key moments of his life. This reduced the need for citizens to transact with multiple Government agencies, for a more seamless and convenient experience. By the second half of 2018, the SingPass Mobile app would also be launched as part of the transition to National Digital Identity (NDI) framework to enhance security and provide greater convenience to the SingPass users.

178 Public agencies would actively engage and partner businesses, citizens and other stakeholders. There are mechanisms to obtain feedback from businesses through Pro-Enterprise Panel. There were also new channels reach citizens through Youth Conversations and 4G "discussion series". Innovative approaches to engagement were also being introduced. An example was MOH's Citizen Jury on diabetes.

Observations and Recommendations

179 MOF had explained to the Committee that MOF's range of budget mechanisms and controls which managed expenditure growth, ensured efficient and effective spending of public monies and the sharing of best practices in the aforementioned areas, were being practiced at the both the macro and micro levels, cascading from WOG to Ministries and agencies and downwards to the individual officer. For example, at the WOG level, overall expenditure growth was managed through the Block Budget Framework which encouraged Ministries to exercise productive resource allocation. At the agency level, there was a concerted push to achieve Value-for-Money (VFM) in spending by extracting greater value through streamlined

processes and the harnessing of technologies. At the individual officer level, a culture of VFM and innovation was encouraged to lead to better service delivery and more cost-effective outcomes. The Committee urged the Government to engage officers at the individual level, as they understood the business processes better and could highlight where efficiencies could be obtained.

180 MOF also explained to the Committee that centralisation of procurements was undertaken where possible. For example, demand aggregation meant that economies of scale could be achieved across the Public Service. MOF, however, also pointed to the downsides of such an approach and highlighted that centralisation, in certain instances, could limit flexibility to meet the unique needs of agencies or situations. Hence, centralisation was not always the solution and still required the striking of a judicious balance.

181 In the push for services being placed online, the Committee urged the Government to pay attention to individuals and seniors who could be inadvertently marginalised owing to limited IT skills. This group would still require face-to-face channels and personal support. MOF assured the Committee that even while the Government persevered in its digital inclusion efforts, it was mindful that there was need to retain physical touch-points for segments of the population who are unable to interact with the Government digitally.

182 The Committee was also informed that the Public Service had embarked on its next phase of Public Service Transformation, which has led to public agencies reviewing how it delivered its policies, programmes and services. A hallmark of the transformation concerned digitalisation and a Public Sector which was digital but not detached, a Public Service which continued to be one that” Serves with Heart”.

Appendix

MINUTES OF PROCEEDINGS

10th Meeting

Tuesday, 22nd May 2018

12.00 pm

PRESENT

Ms Foo Mee Har *(in the Chair)*
Miss Cheng Li Hui
Dr Chia Shi-Lu
Mr Darryl David
Mr Christopher de Souza
Assoc Prof Daniel Goh Pei Siong
Mr Alex Yam Ziming

ABSENT

Mr Lee Yi Shyan

1. The Committee deliberated.

Adjourned to a date to be fixed.

MINUTES OF PROCEEDINGS

11th Meeting

Tuesday, 31st July 2018

12.00 pm

PRESENT

Ms Foo Mee Har *(in the Chair)*
Miss Cheng Li Hui
Dr Chia Shi-Lu
Mr Darryl David
Mr Christopher de Souza
Assoc Prof Daniel Goh Pei Siong

ABSENT

Mr Lee Yi Shyan
Mr Alex Yam Ziming

1. The Committee deliberated.

2. The Committee considered a Memorandum submitted by the Ministry of Finance in respect of (a) monitoring of the implementation of recommendations by the Committee on the Future Economy (CFE); (b) the Smart Nation movement; (c) Changi Airport Terminal 5; (d) borrowing by Statutory Boards and Government-owned Companies (SBGCs); and (e) the Whole-of-Government (WOG) approach to budget management and delivery of solutions.

3. The Committee further deliberated

Adjourned to a date to be fixed.

MINUTES OF PROCEEDINGS

12th Meeting

Tuesday, 9th October 2018

12.00 pm

PRESENT

Ms Foo Mee Har *(in the Chair)*
Miss Cheng Li Hui
Dr Chia Shi-Lu
Mr Christopher de Souza
Assoc Prof Daniel Goh Pei Siong
Mr Alex Yam Ziming

ABSENT

Mr Darryl David
Mr Lee Yi Shyan

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1. The Committee deliberated.

2. The Committee considered a further Memorandum submitted by the Ministry of Finance in respect of (a) monitoring of the implementation of recommendations by the Committee on the Future Economy (CFE); (b) the Smart Nation movement; (c) Changi Airport Terminal 5; (d) borrowing by Statutory Boards and Government-owned Companies (SBGCs); and (e) the Whole-of-Government (WOG) approach to budget management and delivery of solutions.

3. The Committee further deliberated

Report

4. The Chairman's report brought up and read the first time.

5. Resolved, "That the Chairman's report be read a second time paragraph by paragraph."

6. Paragraphs 1 to 182 inclusive read and agreed to.

7. Resolved, "That thus report be the report of the Committee to Parliament."

8. Agreed that the Chairman do present the Report to parliament when copies are available for distribution to members of Parliament.

Adjourned sine die.