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JANUARY 2022

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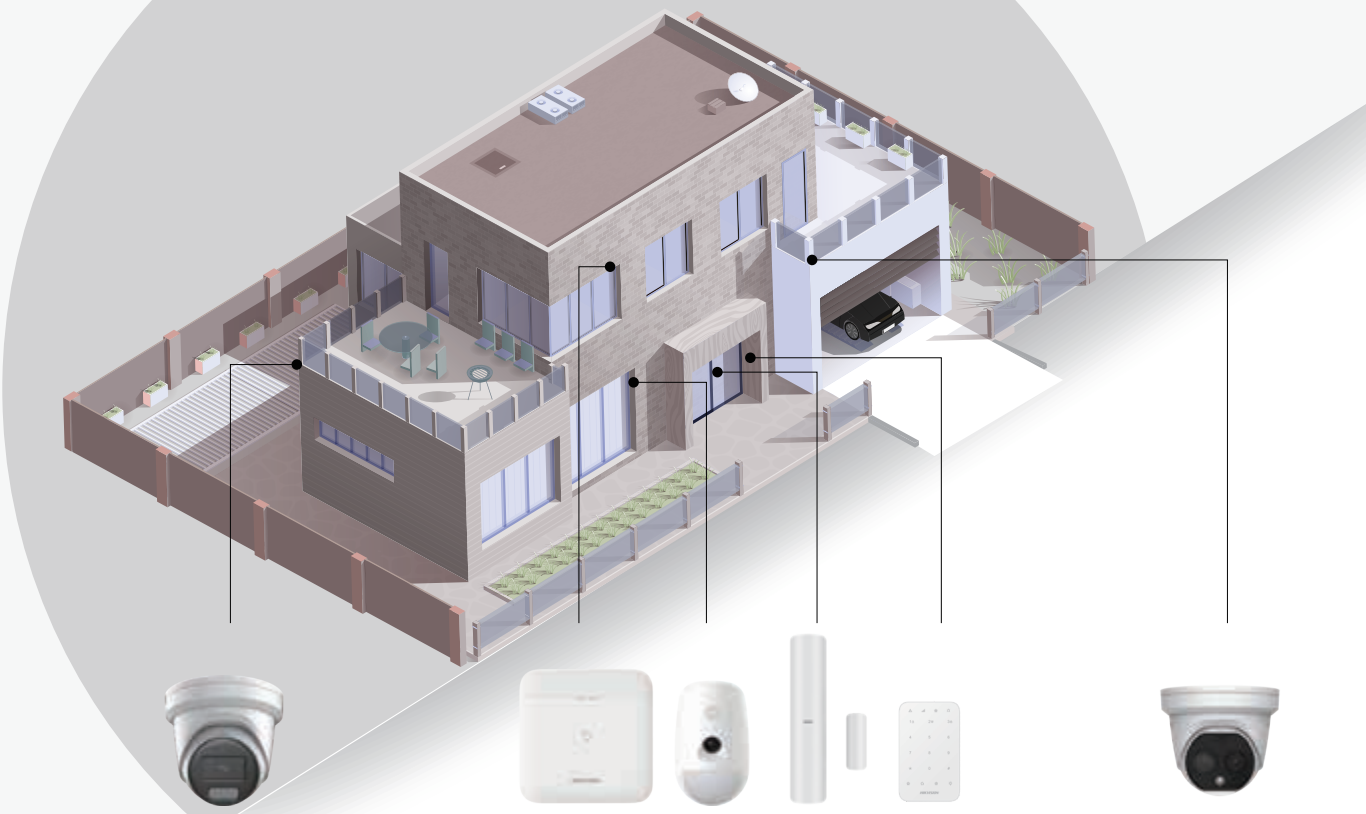

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by Ir. Tiong Choong Han
Chairman, Urban Engineering Development Special Interest Group (UEDSIG)

COVER NOTE

New Urban Developments: Inclusive, Harmonious & Progressive

JURUTERA kicks off 2022 with the Urban Engineering Development Special Interest Group (UEDSIG) focusing on new urban developments which are inclusive, harmonious & progressive.

The Cover Story by UEDSIG founding chairman Ir. Dr Wang Hong Kok centres on building new towns to meet housing needs, highlights the causes of shortages in affordable housing as well as motivations and challenges in re-introducing new towns.

A feature article by Dr Maggie Ooi Chel Gee, Ir. Dr Wang and Ir. Tiong Choong Han talks about smart construction in the 21st century as the way forward. This covers Building Information Management, Virtual Delivery Construction and Integrated Digital Delivery as the 3 independent digitalisation processes. In the 2nd feature article, Ir. Dr Wang, Ir. Tiong and Ir. Ng Sean Lok, outline an analysis using the Ostrom's SES framework on collective action of low-cost housing.

In the first forum report of a webinar presentation, Ir. Ang Kok Keng summarises the salient points of claims and defences in anticipation of the CIPPA process. The second forum summarises noteworthy points on hillslopes and highlands development as well as approaches and challenges incorporating technological advancement in environmentally challenging areas from a webinar presentation by industry veterans Ir. Dr Valen Tew Kia Hui and Ir. Chee Shai Choon. ■

EDITOR'S NOTE

New Year, New Look

by Ir. Prof. Dr Zuhaina binti Zakaria
Principal Bulletin Editor

Happy New Year, readers! This is normally that time of the year when resolutions are made or renewed, depending on what we have achieved in the previous year. Let's hope 2022 will be a better year for all of us, especially after the Covid-19 pandemic and the massive flooding in several states last month where thousands of people were forced to leave their houses.

As we welcome the New Year, we are also giving the first issue of *JURUTERA* 2022 a new look. The editorial board hopes the new layout will attract and engage more readers. This year, we have lined up interesting news and the latest articles on new technologies from the technical divisions and standing committee, with the exception being the May 2022 issue which will be dedicated to the 63rd IEM Annual General Meeting.

For January, the bulletin focus on new urban development with issues of inclusivity that's harmonious but yet progressive. These elements are important to ensure that development of new towns and cities will not increase disaster risks such as flooding.

Finally, the editorial board would also like to wish our Hindu readers Happy Thaipusam. ■

Re-Introducing New Towns to Meet Housing Needs: A Definitive Panacea for M40*

Written and Prepared by: Ir. Dr Wang Hong Kok & Ir. Tiong Choong Han

Note: *UEDSIG acknowledges permission granted by RISM for reprinting this article which was presented at the 30th Pan Pacific Congress of Real Estate, Appraisers, Valuers & Counsellors on 4-6 October 2021.*

In the Greater Kuala Lumpur metropolis, 2 new townships in the south-west region are deemed successes. Petaling Jaya was developed in the 1950s as a satellite town to the then emerging Kuala Lumpur (capital of Malaysia) and Shah Alam was developed in the 1960s as the capital of Selangor State. Both were developed by the state-owned Selangor Economic Development Corporation.

This paper examines the current shortage of affordable housing faced by the M40 sector as a result of price hikes in 2004-2016. The free-market is unable to meet demands for affordable housing units priced below RM300,000. It also looks at the priority of economic freedom over political freedom, free-market and democracy which have caused inequality and poor wealth distribution. When private enterprises are given free rein, profit maximisation sets in and few right-thinking developers would want to build affordable housing.

Finally, the concept of new towns, in terms of origin, nature, motivations and functions, is re-visited in the last section of this paper. The government may want to re-consider introducing state-led new towns in its efforts to provide more affordable housing for the M40 population.

Three questions are asked in this paper:

1. What caused the shortage of affordable housing in Malaysia in recent years?
2. Are economic inequality and poor wealth distribution caused by the public policy of hyper-globalisation and free-market?
3. Is building new towns the solution to affordable housing shortage?

Causes of Affordable Housing Shortage

University of California, Berkeley, Professor and author of 14 books, Robert Reich, argued that as assets (housing) rose in price, wage earners found it harder and harder to acquire properties. He then wondered if this problem could be solved by either free-market or government intervention. Reich observed (2016, p. 4) that the "free-market" does not exist in the wilds beyond the reach of civilisation. Competition in the wild is a contest for survival in which the largest and strongest typically win. Civilisation, by contrast, is defined by rules; rules create markets and governments generate the rules".

"Rules, if they are not fair, must be corrected for the good of the masses," reiterated Reich who asked: "What if certain players gained the power to change them for their own benefits? Such had been the case in America and many other nations in recent decades."

In the Malaysian context, do we have players such as private housing developers who can change these rules? The more pertinent question to ask is perhaps whether housing for the M40 is under-supplied?

M40 refers to the middle-income group whose median household income is RM6,275 per month (Khazanah Research Institute, 2015). Any house that is priced 3 times the median annual household income (i.e. 3 x 12 x RM6,275 = RM225,900) is considered to be not within the affordable range for the M40.

What follows next is a discussion in three areas of housing provision that may explain the causes of shortage of affordable housing: Developmentalism (state-led) versus neoliberalism (market-led), current shortage for the M40 and the possible re-introduction of new towns.

Developmentalism vs Neoliberalism

Three National University of Singapore (NUS) researchers expressed their support for a developmentalist state (e.g. Singapore) as a means to address the housing shortage for the masses instead of leaving it to the free-market (Yeung, 2000, Yuen, 2007 and Pereira *et al.,* 2008). In line with Johnson's (1982) model, when the "free-market" failed, the state could re-regulate the economy (Yeung, 2000). Yuen (2007) posited that in the area of housing, Singapore was often cited as a successful example of affordable housing production in Asian cities. Pereira *et al.,* (2008) said it was mind-boggling that Singapore, as a small island-state taking on the developmentalist approach, could produce impressive results while the much larger nation of Malaysia, embracing a mostly neoliberal "free-market" policy, was

just barely tottering along in terms of affordable housing (Harvey, 2015).

Current Shortage of Housing Provision for M40 in Malaysia

Four influential papers share a common view that, as a result of property price hikes from 2004-2016, housing for the M40 with an affordable price tag of below RM300,000 per unit will be harder to come by over the years (Shuid, 2016, Yap and Ng, 2018, Trofimo, Aris, and Xuan, 2018, Khazanah Research Institute, 2019). For example, 75% of residential properties launched in 2008 were priced below RM250,000 per unit (Figure 1). By 2013, only 30% of residential properties launched were priced below RM250,000 per unit.

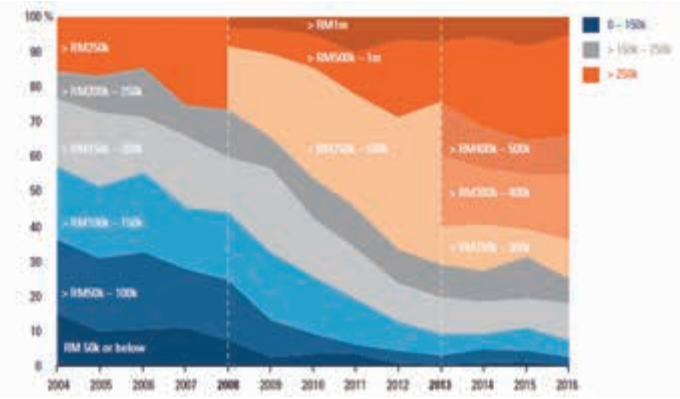

Figure 1: Dwindling supply of affordable housing, 2004-2016
Source: Khazanah Research Institute (2019, p. 25)

Re-Introducing New Towns

This brings us to the question about the role of the government in meeting the housing needs of the M40. Should the government intervene? In Britain, when the government undertakes the development of a new town, it provides the land (by way of compulsory acquisition if necessary), sets up a development corporation, builds and sells houses that meet all strata of the new town, determines the industries allowed, ensures adequate infrastructure and amenities and finally manages the new town.

Petaling Jaya (built in the 1950s) and Shah Alam (built in the 1960s) were successfully implemented as new towns (Dasimah, 2008; Ju, Zaki, Choi, 2011). After the 1980s and 1990s, no state-led new towns were developed.

What then should be the role of a democratically-elected government as far as affordable housing provision is concerned? At this point, it may be helpful to look into the issues of poverty and poor wealth distribution facing the poorer sections of the society.

Inequality & Poor Wealth Distribution

At the 47th G7 summit in Cornwall, United Kingdom, on 11-13 June 2021, the United States continued its rhetoric, urging allies to unite together to take on China as the latter purportedly challenged the existing rules-based order (electoral democracy and free-market).

For several decades, at the behest of the US, and after the 1989 collapse of the Berlin Wall, globalisation reached a fever pitch when associated institutions such as the World Bank and the International Monetary Fund (IMF) pushed developing countries to adopt liberal market-economies and free-market, wherein private enterprises presumably were more productive; correspondingly, governments should play a minor role in economic development such as the provision of affordable housing. All these governments were encouraged to remain small and to leave economic development to private enterprises.

In a democracy system, capitalist private enterprises are free to pursue profit goals with little regulations from the "small governments". Economic inequality and poor wealth distribution appeared when the rich became richer and the poor became poorer. Figures 2(a-d) show the Gini Index of selected countries: The advanced developed country (US), the former-Soviet Union country (Ukraine), the Asian Tiger economy (Taiwan) and the developing country (Malaysia). All subscribed to a democratic form of government and promoted liberal market-economies.

Indeed, liberal market economies produce economic inequality and wealth distribution. Figure 3 depicts, in a dramatic way, the uneven income distribution across the globe for the 1988-2008 period, made popular by Branko Milanovic (2012). First, the global elite of top 1% captured the lion's share of global income growth (the trunk). They are successful private entrepreneurs or super-managers; when left alone, they are able to seize opportunities to enrich themselves. Second, the global upper middle class in rich countries suffer from income stagnation (the trough). The result of globalisation is lost jobs as more factories moved to developing countries. A prime example is the US.

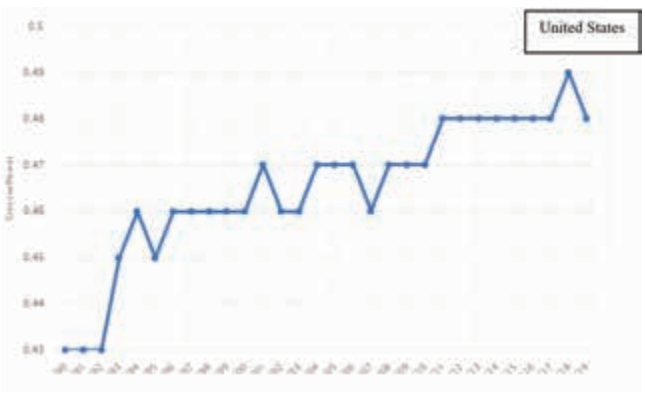

Figure 2a: Gini Index of United States, 1990-2019
Source: https://www.statista.com/statistics/219643/gini-coefficient-for-us-individuals-families-and-households/, retrieved on 20 June 2021

Note: *The US is one of the most unequal societies that proffered free market-economy. "Since 1980, three-quarters of the income gains in US have gone to the top 1%," observes Piketty (2014), cited in Butler-Bowdon (2017, p. 221).*

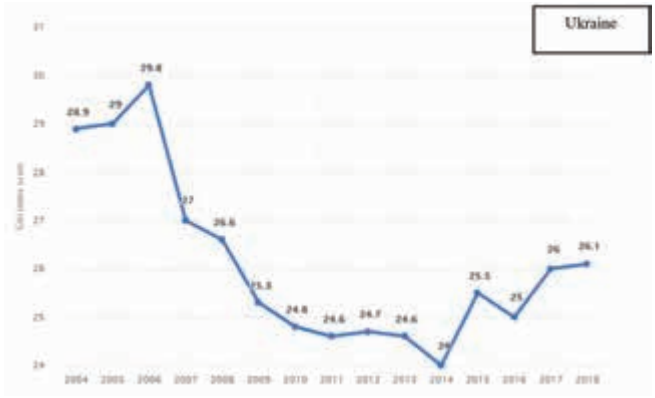

Figure 2b: Gini Index of Ukraine, 2004-2018 (gained independence in 1991, following the dissolution of the Soviet Union)
Source: https://www.statista.com/statistics/873374/gini-index-score-of-ukraine/, retrieved on 20 June 2021

Note: *Ukraine's Gini Index had been rising in recent years as it embraced a free-market economy.*

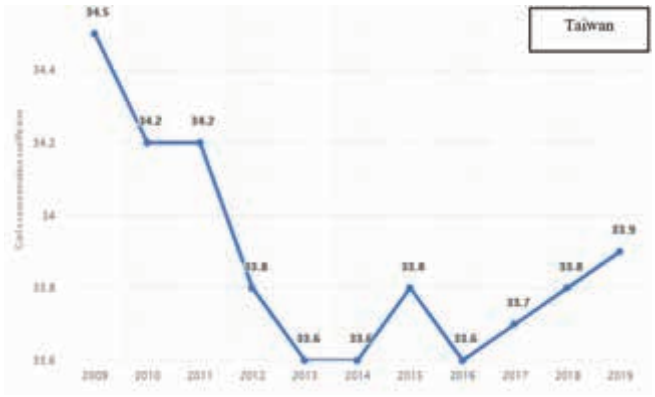

Figure 2c: Gini Index of Taiwan, 2009-2019
Source: https://www.statista.com/statistics/922574/taiwan-gini-index/, retrieved on 20 June 2021

Note: *Taiwan's Gini Index increased as inequality persisted in recent years.*

Figure 2d: Gini Index of Malaysia, 1984-2015
Source: https://www.theglobaleconomy.com/Malaysia/gini_inequality_index/, retrieved on 20 June 2021

Note: *The middle-income group expanded under the New Economic Policy since 1969. Hence the Gini Index appeared to be improving in recent years.*

Third, a large impoverished population in China was lifted into the middle class (the torso), the outcome of socialist China implementing poverty eradication plans, since China practises state capitalism; the only exception they made was to look after the workers' interest as well. Fourth, the global extreme poor were left behind in many countries (the tail) due to inaction of the democratically elected governments.

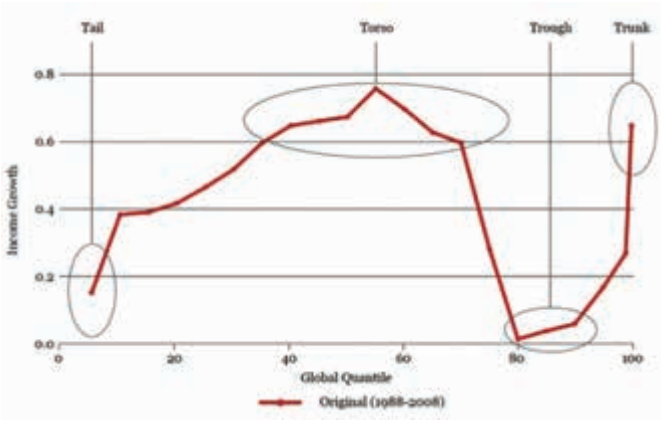

Figure 3: Original Elephant Chart and the Uneven Income Distribution, 1988-2008
Source: Kharas and Seidel (2018)

Many put the blame on the resultant "small governments" which failed to meet the needs of the lower-income group (the labour) in the provision of affordable housing.

Next, we will examine economic inequality and poor wealth distribution due to democracy, economic freedom over political freedom and free-market from the works of prominent researchers. See Figure 4. In this regard, substantial contributions from Butler-Bowdon (2017) in *50 Economics Classics* is acknowledged.

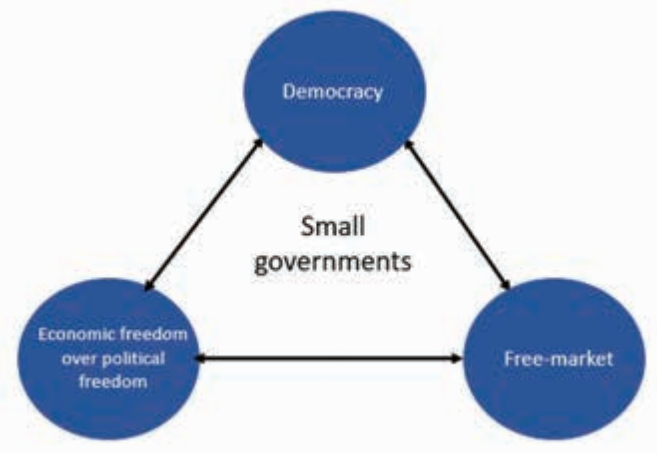

Figure 4: Economic ideologies create small governments

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- **PAUL KRUGMAN.** The MIT-trained professor at the Graduate Center of the City of New York is the 2008 Nobel Prize Winner for economics. In his popular book, *The Conscience of a Liberal* (2007), he declared that "the growing inequality in US was not due to technological change or globalisation but was the product of political values and decisions which could be reversed". If there is an intention to make the US more equal, the working class must be given real political power. The power of the wealthy must be curtailed.
- **NAOMI KLEIN.** The Canada-born figurehead of an anti-capitalist movement has a large following. In her book, *The Shock Doctrine* (2008), she reminded that free-market, as proposed by Milton Friedman of Chicago School, had failed when applied to the real world. The case in point was Chile where economy ground to a halt after the free-market concept was introduced; free-market did not result in democracy either. What actually happened was "the elimination of public sphere, total corporate freedom and skeletal public spending." Does that sound familiar?
- **DANI RODRIK.** The professor at Harvard's John F. Kennedy School of Government is famous for his "trilemma theory". In his book, *The Globalisation Paradox* (2011), he pointed out: "Nations have a right to protect their own institutions, values and legal system if that is what people vote for." In making decisions, countries can only choose 2 of these elements at any one time: Hyper-globalisation, democracy and national self-interest. Take Malaysia: If hyper-globalisation is chosen, private enterprises will go for profits and the country will benefit in terms of taxes but labour will be sidelined.
- **HA-JOON CHANG.** The Cambridge-trained Economics professor stayed on in Cambridge University after he completed his PhD in 1991. In his book, *23 Things They Don't Tell You About Capitalism* (2011), his arguments can be crystallised into 2 views.
    1. The assumption that free-markets are efficient is flawed. It is wrong to assume that if people and businesses are left to themselves, they will find the best way.
    2. Capitalism is fair. It is equally wrong to assume that with higher productivity, society as a whole will be better off. Instead, Chang urges decision-makers to consider the following: Protect the industry, limit foreign direct investments and, where necessary, allow state-owned enterprises. In the end, he prefers living in "states that have markets", than to live in "market states" — the latter is controlled by self-interested private entrepreneurs.
- **THOMAS PIKETTY.** The influential professor of Paris School of Economics obtained his PhD from EHESS in Paris and the London School of Economics in 2000. In his 700-page book, *Capital in the Twenty-First Century* (2014), originally written in French but later translated into English, he exposed the canard of orthodoxy that "a rising tide raises all boats" as many economists would believe. He added: "In order to produce a just society, regulating markets or upholding law and order are insufficient. The society must seek to increase social mobility and minimise the effect of lottery by birth."
- **NOAM CHOMSKY.** The prolific Professor Emeritus of linguistics and philosophy at MIT wrote a number of influential books. For example, in *Who Rules the World* (2016) he wrote: "US rhetoric of freedom and human rights so often diverges from its action".

"In Chomsky's view, a truly democratic society is one in which all persons have a say in public economic policy," opined McGilvray (2014). The US is a de facto one-party state of Business Party, according to Chomsky, so it is not a true democracy.

We may conclude this section by echoing the general observation of many prominent researchers that economic ideology has a number of weaknesses. Decision-makers are advised to seek out the facts rather than blindly follow economic ideologies (Krugman 2007, Chang 2011, Rodrik 2011, Chomsky 2016). In summary, the following are worth noting:

- Democracy in the true sense of the term must bring opportunities and equality to all. In practice, democracy may not, unless supervised.
- The preference for economic freedom (allowing private enterprises to have a greater role over the state role) to come first before achieving political freedom may not happen in practice.
- Free-market may not bring benefits to all. Private enterprises will seek unlimited profits at the expense of the lower-income group. What then is the state's role?

If it is wrong to rely on private enterprises to meet the affordable housing demands of the lower-income groups, what are the options left for the Malaysian government? This topic is discussed next.

Re-Introducing State-Led New Towns

If the free-market has failed to deliver affordable housing to the M40, state-led development of new towns can be considered as a solution. A brief history of new towns exploring five areas – origin, nature, motivations, functions and the reasons for the decline in the 1970s – is outlined below:

Origin: The term "new town" is in fact not new; its origin can be traced to early reformist philosophers (e.g. Fourier, Constant, Robert Owens) in Britain way back in the 1800s. These "urbanist thinkers" promoted the concept of a well-balanced environment that took on the form of utopian towns during the industrialisation and urbanisation phases (Osborn and Whittick 1977, Panait 2013). In Britain, the pattern of human settlements evolved through time over 3 broad phases: Utopian towns in the 1800s, garden cities in

the 1900s and new towns in the 1960s (Panait 2013).

The new town movement waned after the 1970s when advocates of neoliberalism and free-market came about. However, there is a resurgence of new towns today. Currently, the Harvard Professor of Urban Planning, Ann Forsyth (2019) said 553 new towns are scattered around the world and, in some cases, are picking up momentum. See Table 1.

Nature: What is a new town? According to Encyclopedia Britannica, a new town represents "a form of urban planning designed to relocate population away from large cities by grouping homes, hospitals, industry as well as cultural, recreational and shopping centres to form entirely new, relatively autonomous communities."

Table 1: Countries with 5 or more new-towns started by decades

Decade started	1940	1950	1960	1970	1980	1990	2000
Total new towns	58	114	115	88	26	40	111
Countries 5+ new towns	Russia 14	Russia 28	USA 21	Singapore 10		China 11	China 49
	UK 10	India 11	UK 15	Russia 6		Singapore 5	India 14
	India 6	Israel 11	Russia 9	Japan 6			
		China 10	Japan 8	S. Africa 6			
		USA 7	N'lands 5	USA 5			
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Source: Forsyth (2019)

***Note:** There is no mention of any Malaysian new town in her paper. Notice however that China built new towns aggressively from the 1990s.*

Early British garden cities such as Letchworth (built 1904-06) and Welwyn (built 1920-26) were designed for 32,000 residents. Later, new towns were designed to accommodate populations of more than 100,000 (Zhou 2012, Panait 2013).

Motivations: What are the motivations of state-led new towns? According to Osborn & Whittick (1977, p. 1), firstly, new towns are built to reduce the high concentration of people and workplaces in very large towns. For example, Petaling Jaya was built in 1950s as a satellite town of Kuala Lumpur, Malaysia (Ju, Zaki, Choi, 2011). Secondly, new towns provide work opportunities for those displaced in agricultural regions due to mechanisation in farming. There are other reasons too. Provoost (2013) said that worldwide, 50% of new towns were built to house company employees such as those in Russia, 40% to de-concentrate metropolitan areas and the remaining 10% as capitals (for example Putrajaya in Malaysia, Canberra in Australia, Xiong'an in China).

In Singapore, when the new government was formed in the 1960s, the then Prime Minister, Mr. Lee Kuan Yew, created the "home-owning society" concept by building affordable flats in new towns as a means to foster unity and loyalty to the state (Lee, 2000, pp. 116-117). Today, state-led public housing in Singapore is scattered across the island-state. In Shanghai, China, university towns are built to spur economic development while others built characteristic towns — Tese Xiaozhen (Ruoppila and Zhao, 2017, Wu, Chen, Deng, 2018).

Functions: What are the functions of new towns? Provoost (2013) said new towns were especially popular in Asia as the needs of the residents were largely met. Those who migrated from rural regions in search of work in the metropolis found new towns to be comfortable and devoid of urban congestion. As new towns grew, they acquired "an assortment of facilities for social life, entertainment and culture" (Osborn & Whittick 1977, p. 93). There are downsides, though. For example, new town residents in Hong Kong faced 2 major challenges: Inadequate number of schools and being located too far to commute to work in downtown areas (Hui & Lam, 2005). A good account about governance issues facing new towns was given by a UK think-tank (Bennett 2005). Clapson (2017) provided a helpful assessment of factors leading to the success of new towns in Britain. The 5 planning principles in state-led new towns are as follows:

- Socially mixed and balanced communities
- Community and association in the new towns
- Communications and road planning: Traffic and pedestrian separation
- Economic containment
- Governance: The development corporations as delivery agencies.

Decline of new towns movement. What contributed to the decline of new towns after the 1970s? The simple answer is neoliberalism. In the 1970s, the World Bank and its allied agencies promoted neoliberalism as the guiding principle to drive economic development in developing countries. Herein, raising household income was more important than the states providing subsidised public housing for the people. Housing was treated as a merit good. From the 1970s, the supply of housing was largely met by private developers.

In an interesting paper, Prof. Lawrence Lai of Hong Kong University cautioned against the dangers of market-led housing provision since profit was foremost in the minds of developers (Lai *et al.,* 2014). This was the exact reason why "free-market" developers in Malaysia failed to deliver adequate affordable housing for the M40.

At the core, this paper illuminates the powerful views of many important economists on the weakness of neoliberalism policies and the free-market. When private developers are roaming around the towns with little regulations, particularly for affordable housing, a large portion of the society (M40) will be left unattended to.

The parting words for this paper are perhaps remarks made by one of the foremost thinkers of our time (Polanyi,

1944): If civilisation has its meaning, "markets must serve society, not the other way around". The last and probably most viable recourse is for the Malaysian government to take full responsibility for the supply of affordable housing for the M40 in the form of state-led new towns. ■

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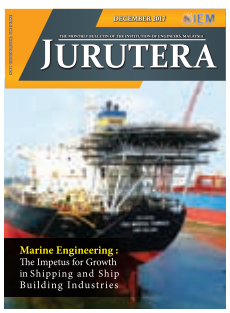

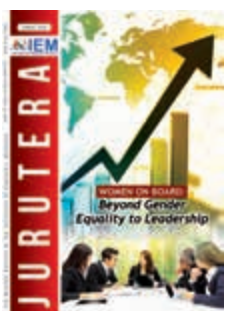

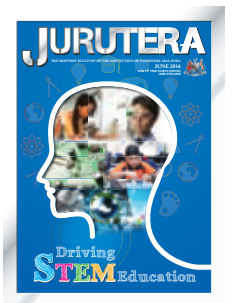

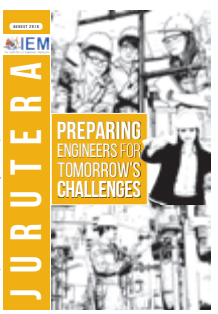

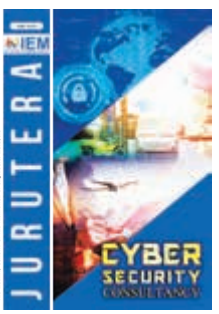

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Smart Construction in the 21st Century

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The term "smart construction" can be a misnomer. It does not refer to smartness in the true sense of the word but instead, it focuses on doing things that can tangibly deliver the desired outcome. Smart construction entails the entire process of designing, construction, handing over and maintenance of a product through a planned collaborative effort by all concerned and makes full use of digital technologies and industrialised manufacturing techniques to improve productivity, saving time and resources as well as delivering quality products for end-users.

The Malaysian construction industry had long been plagued by inefficiency in management, wastages of construction material and shortage of skilled labour (Sambasivan & Soon, 2007). In addition, the industry is known for the 3Ds (dirty, dangerous and difficult) and, as a consequence, drives away many talented professionals. Unless we accept the need to improve productivity through a paradigm shift by embracing new technology, the industry is not likely to attract young talents. This article is about the way forward for the industry through digitalisation. One way is to introduce 4th Industrial Revolution (4IR) concepts and the associated Construction 4.0. To do that, we ask three questions:

1. What is the Malaysian Government's policy with respect to Construction 4.0?
2. Why is it necessary to fully adopt Building Information Management (BIM), Virtual Delivery Construction (VDC) and Integrated Digital Delivery (IDD) practices?
3. Why do we need Government assistance to achieve the above (Q2)?

MyDigital & Construction 4.0

Malaysia is set to embrace digitisation economy in a big way; former Prime Minister Muhyiddin Yassin announced the Malaysian Digital Economy Blueprint (MyDigital) on 19 February 2021 (EPU 2021). The official definition of digital economy is "economic and social activities that involve the production and use of digital technology by individuals, businesses and the government". The world is becoming increasingly aware that digitisation will improve quality of life and standards of living. The benefits are (Figure 1):

- People. Through digital literacy, people can expect better paying jobs, improved social wellbeing and environmental sustainability.
- Businesses. More cost efficient. Business can expand regionally or even internationally.
- Government. Provide improved services to people as well as be more efficient and more transparent.

People	Businesses	Government
• Creation of 500,000 new jobs	• 30% uplift in productivity across all sectors by 2030	• 100% civil servants to possess digital literacy
• 100% household with access to internet	• 22.6% of digital economy to Malaysia's GDP	• 80% end-to-end online government services
• All students to have access to online learning	• 875,000 micro, small and medium enterprises (MSMEs) adopt eCommerce	• All ministries and agencies to provide cashless payment option in 2022
	• Attract 2 unicoms (homegrown or foreign)	• 80% usage of cloud storage across the government in 2022
	• RM70 billion investment in digitisation	
	• Increase the number of start-ups to 5,000	

Figure 1: Benefits from MyDigital (EPU, 2021)

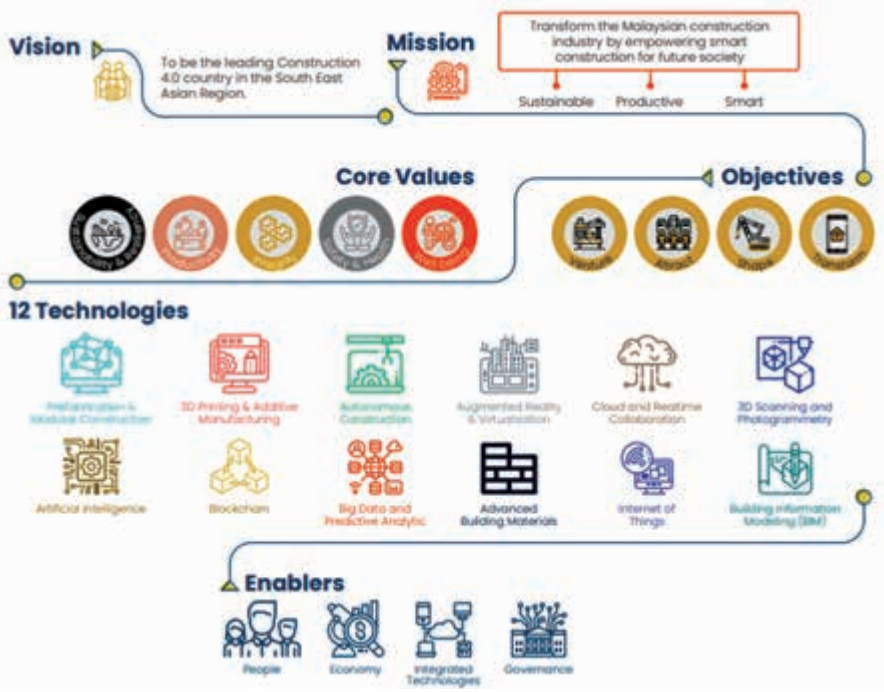

Figure 2: Construction 4.0 strategic plan 4.0, 2021-2025 (CIDB, 2020)

Muhyiddin said: "MyDigital, however, will not overlap with earlier Government plans such as the 12th Malaysia Plan and Shared Prosperity Vision 2030. MyDigital is expected to create 500,000 new job opportunities in the digital economy which is expected to contribute 22.6% of our gross domestic product (GDP) by 2030."

Where does Construction 4.0 come in? MyDigital had identified the key thrusts relevant to the industry in T2 broad economic competitiveness through digitisation using certain strategies: Digital adoption, enhancing local participation and digital industry cluster. Therefore, the quick adoption of technology relevant to digitisation becomes urgent if the goals of MyDigital are to be achieved.

The answer to fulfilling the aspirations of MyDigital lies in Construction 4.0 Strategic Plan 2021-2025, launched by the Government in 2020 (CIDB 2020). The plan is to bring together the Government, industry, academia and construction industry to respond to the rapid changes towards 4IR. A long-held notion about construction is the complaint about 3Ds (Yap, 2021). In an attempt to boost the image, productivity and safety of the construction industry, the following changes are expected if digitisation is successful:

- Improve skills
- Income diversity of workforce
- Create new opportunities
- Boost economic growth
- Reshape the construction industry

As part of the launching of Construction 4.0 Strategic Plan 2021-2025, the CEO of CIDB, Datuk Ir. Ahmad Asri Abdul Hamid, pointed out the essence of digitisation: "The move is to encourage digital adoption by industry players as Malaysia launches Industry 4.0." Construction 4.0 is a subset of Industry 4.0, applicable to the construction industry which, according to Government sources, will produce RM3.4 trillion in GDP by 2030. This makes the move to digitisation an urgent task.

What is Construction 4.0 Strategic Plan 2021-2025 in a nutshell? Here is the framework (Figure 2):

We can see that 12 technologies have been targeted for quick adoption and of these, at least 5 are relevant to smart construction:

- Cloud and real time collaboration
- Building information management (BIM)
- Augmented reality and virtualisation
- Prefabrication
- Advance building materials

This brings us to the next topic on the future of construction industry (Figure 3).

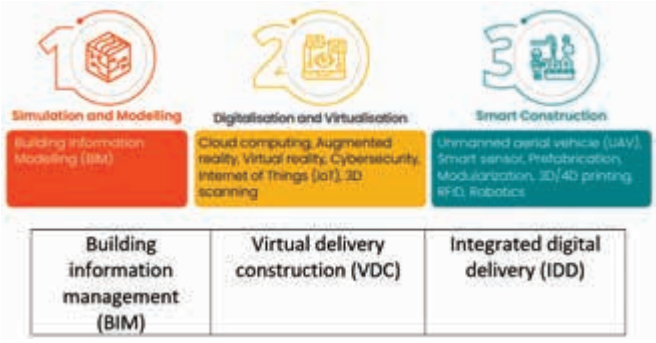

Figure 3: Future of construction industry (CIDB, 2020)

Table 1: Challenges faced in BIM adoption (BCA, 2011)

CHALLENGES FACED BY FIRMS DURING BIM ADOPTION	BCA STRATEGIES
Lack of demand for BIM	To allow the public sector to take the lead, BCA: > Collaborated with government procurement entities (GPEs) to request the use of BIM for their projects from 2012 > Worked with GPEs and their industry partners in preparation for the new requirements To promote success stories, BCA: > Established the Centre for Construction IT (CCIT) to promote BIM and guide businesses and professionals in the industry > Conducts seminars, workshops and conferences on the use of BIM for the industry to promote the benefits of the technology
Entrenched in current 2D drafting practices	To remove impediments, BCA: > Developed a set of submission templates and guidelines to help professionals understand the new process of regulatory submission using BIM > Works with GPEs, professional bodies and buildingSMART Singapore to develop project collaboration guidelines and an object library standard
Steep learning curve to build up BIM expertise	To build BIM capability and capacity, BCA: > Launched short courses and the Specialist Diploma in BIM at BCA's training arm, the BCA Academy > Engaged various tertiary institutions to include BIM training in their curricula > Provides "chaperon" services to businesses who need assistance in their first BIM project implementation and regulatory submission
Lack of ready pool of skilled BIM manpower	To incentivise BIM adopters, BCA: > Introduced the BIM Fund*, which covers the costs for training, consultancy services and purchase of hardware and software for businesses and projects * Part of the Construction and Capability Fund (CPCF) for BIM adoption

Full Adoption of BIM, VDC & IDD

BIM: An article in Built Smart (BCA, 2011) opined: "BIM is advanced computer technology that allows building preference to be simulated digitally so that design conflicts can be collectively resolved upfront to avoid costly abortive work at the construction."

At least 3 benefits can be expected with the adoption of BIM:

- Improve productivity among built environment professionals.
- Help save cost due to greater efficiency and achieve zero errors in design.
- Force all key players to commit to the design which is made known to and shared by them.

In essence, BIM involves converting traditional 2D drawings to 3D models that are understood by all key players. What are the challenges? See Table 1.

Resistance to the adoption of BIM is expected. It is only natural as existing employees may have to move from their comfort zone to learn new things. Four challenges have been identified in Table 1:

- Lack of demand as most firms have no knowledge of the costs and benefits. Both the public and private sectors have their roles to play in leading the industry towards digitisation.
- Existing employees may prefer the old practice of producing 2D drawings. Resisting change can be expected. The key is that stakeholders should see the benefits instead of cost. A long-term view will produce a different perspective of looking at the challenge.
- One can expect a steep learning curve to acquire the new skill but who will bear the costs? In this paper, and as practised in our neighbouring country, the government may consider playing the leading role.
- Shortage of ready BIM manpower. Only a sudden interruption will force the industry to move away from its current practice. Again, change will not come unless determined efforts are made. Again, both public and private sectors may consider leading the way.

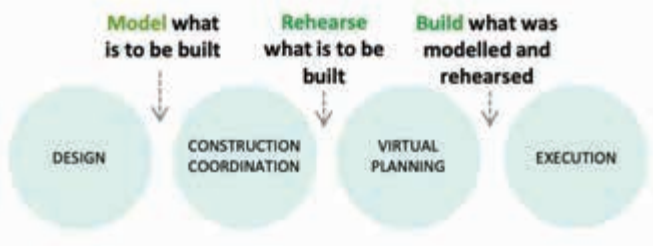

Figure 4: Building twice… first virtual, then real (BCA, 2017)

VDC: VDC builds on the foundation of BIM to create a virtual model before actual construction begins (Figure 4).

So VDC is considered a framework (Figure 5) and BIM a component. VDC is "applicable to any scenario by any project team or any organisation to meet targeted goals and to improve performance." (BCA, 2017).

Figure 5 shows the current gap and design outcome under VDC framework. At present, the construction industry has a reputation for inefficiency as the inconsistency of drawings by various consultants is a fact. The building designs prepared are meant for regulatory requirements. BIM can improve the situation by demanding that drawings be carried out beyond the submission stage and introducing a collaboration period for all designers to coordinate and synchronise all designs. The end product is the virtual design fit to build virtually.

The key to solving the current haphazard way of issuing uncoordinated drawings by various consultants, is to rely on VDC. VDC is the foundation during the confirmation of the final drawing. For example, during the intense collaboration period (ICP) and progressive collaboration period (PCP), there is a black-out period with no more drawings until every drawing is coordinated. This practice greatly reduces the inconsistency of drawing and errors therein (Figure 6).

IDD: If VDC creates a virtual design that is free of errors, IDD pushes the boundaries of productivity. For example, the introduction of prefabricated prefinishes volumetric construction (PPVC) technology will greatly reduce time and cost but yet will greatly improve quality due to controlled environment of fabrication works and finishes works.

Government Assistance

The objective of this article is to answer the 3 questions mentioned earlier. What is the government's policy with respect to Industry 4.0 and the associated Construction 4.0? It is actually very clear. Benefits expected from implementing digital technology are many and quantifiable.

As for why it is necessary to adopt BIM, VDC and IDD in the construction industry, the answer is that all 3 technologies help reduce wastage, improve productivity and potentially retain talents.

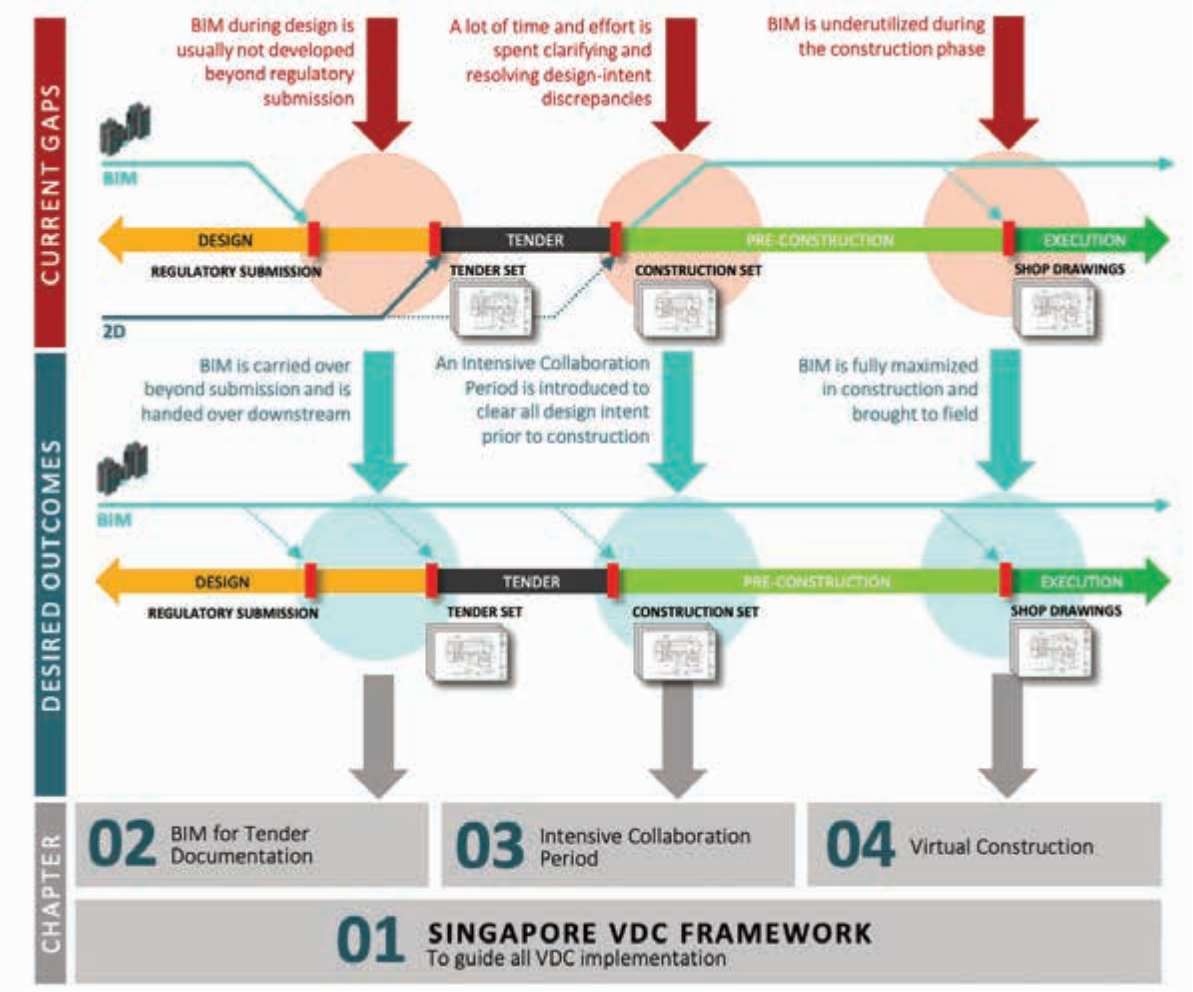

Figure 5: VDC framework (BCA, 2017)

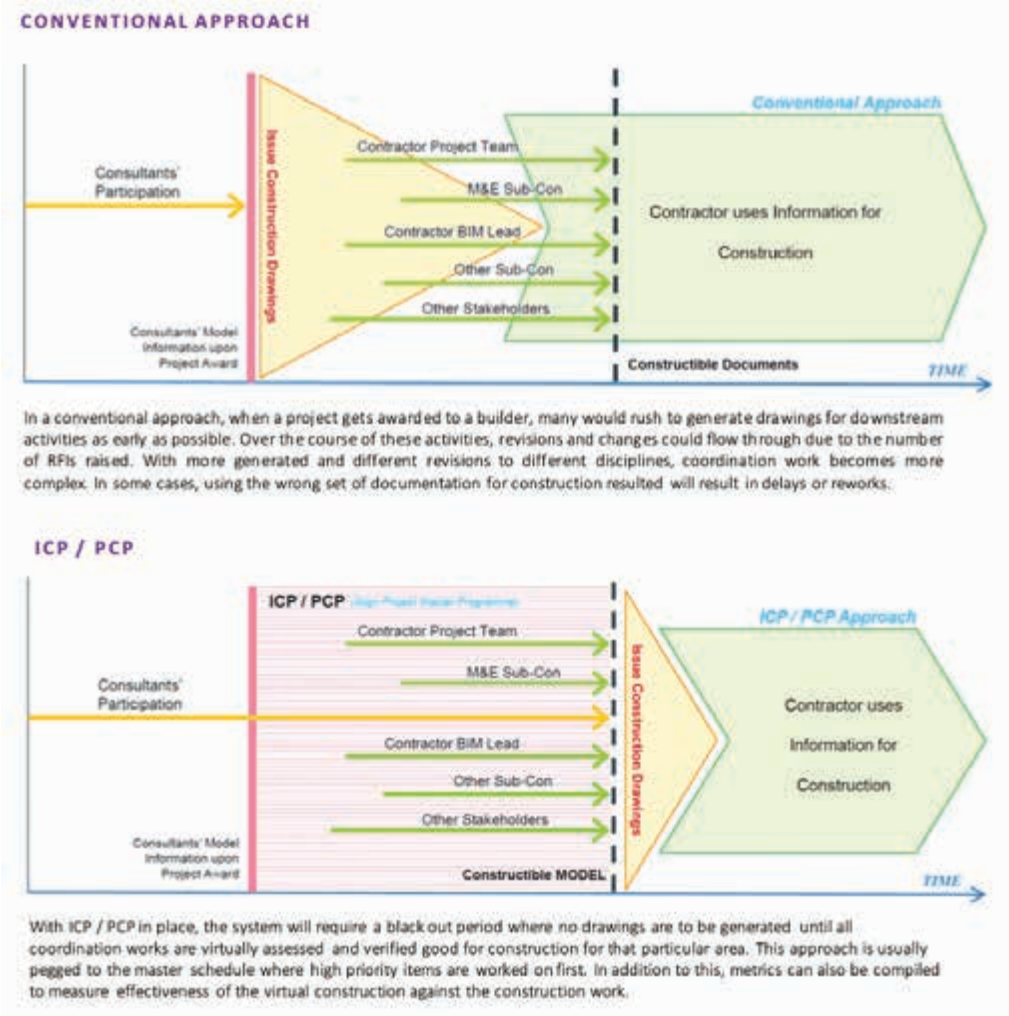

Figure 6: VDC results in change process (BCA, 2017)

Is government support needed? As expected, a lot of capital outlay may be required to introduce BIM, VDC and IDD. Few private companies have the luxury of spending tens of thousands or hundreds of thousands of ringgit to invest in something without knowing the outcome. As an incentive, government assistance may be necessary in the initial few years to promote new digital technologies.

Figure 3, which shows the future of the construction industry (CIDB, 2020), lists BIM, VDC and IDD as 3 independent processes for implementation. Therefore, in our quest to adopt Construction 4.0 as envisaged by CIDB, government assistance in terms of grants is expected, failing which the momentum is not built to kickstart digital technologies for Construction 4.0.

A survey conducted by CIDB shows that a promising percentage of respondents (95%) is willing to implement BIM within their organisation (CIDB, 2017]. The paradigm shift and transformation into the Construction 4.0 era with the maturity of the technology, people acceptability and government mandate are in place. ■

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Collective Action Components in High-Rise, Low-Cost Housing

Written and Prepared by:

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Spent 31 years working in the property industry. He joined TAR University College as a Principal Lecturer before his retirement in June 2020.

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Individuals will take care of and look after their private properties such as their homes. What about those living in an apartment or condominium with common areas such as guardhouse, car park, lift lobby, lift, corridor, rubbish bin area, landscape, swimming pool, gymnasium, multi-purpose hall and car park lighting, all of which are jointly owned by all unit owners?

Rationally speaking, parcel holders in high-rise, low-cost housing may be unwilling to pay the monthly maintenance fees to the management – the developer, Joint Management Bodies (JMB) or Management Corporations (MC) as the case may be under the law – because they know they will still have access to the common areas despite defaulting in payment. In most cases, shared properties (or common properties) are poorly maintained, unhealthy and unsustainable.

Collective action refers to community behaviour when they use shared properties for the good of the community as a whole. Collective action problems arise when parcel holders behave opportunistically by not obeying the house rules and, in some cases, even vandalise the shared properties. Shared properties in high-rise, low-cost housing are common-pool resources (CPR). In the literature on CPR, CPRs are susceptible to overuse and thus, are prone to "tragedies of the commons" which are present when individual and group interests are in conflict. According to Britannica (2021): "In the case of fishing, fishermen face the temptation to harvest as many fish as possible because if they do not, someone else will. Collectively, this leads to a tragedy of the commons, even though no one intended it and all realise that they would be better off if they avoided it."

The problem of faulty and inefficient lifts often angers multi-storey residential owners but, unwittingly, this often stems from their own actions in failing to pay the maintenance fees. This statement describes one of the most significant current discussions among many property veterans, depicting an aspect of the maintenance and management problem of high-rise residential buildings in Malaysia (Malaysian Institute of Estate Agents [MIEA], 2020). Maintenance and management problems are varied, complex and multifaceted. Many low-cost parcel holders feel that the management is at fault for poorly attending to maintenance and management (Tiun, 2009, Noraziah Wahi *et al.,* 2018). The truth is that since maintenance of shared properties is not a profitable business, this part is frequently ignored by the developer in the initial period after handing the housing over to parcel holders. In the next stage, when the shared properties are under JMB or MC, the condition remains the same due to inexperience.

On the other hand, from the management point of view, many researchers cited poor collection of the maintenance fees as one major reason that maintenance and management could not be carried out efficiently (Zairul Nisham Musa *et al.,* 2020). In a survey involving 50 property managers of high-rise condominiums in Malaysia, 66% viewed the collection of service charges as an excruciating experience (Latif Azmi, 2006).

It is necessary here to clarify what is meant by the terms used in the title. Collective action component is a problem when CPR (for example, shared properties in low-cost housing) proprietors fail to "organise and govern themselves to obtain continued joint benefits when all face the temptation to free-ride, shirk or act opportunistically" (Ostrom, 1990, p. 29). For example, Buchanan (1965) compared the characteristics of club goods with CPR. A golf club member pays monthly fees to the management to remain a member and be allowed to enter the premises as otherwise, the guard will bar him/her from entering the club premises. However, although parcel owners have not paid the monthly maintenance fees, the guard at the high-rise, low-cost housing cannot stop them from entering their units. So, unlike managing a club, managing shared properties is an uphill task.

Low-cost housing in the Malaysian context refers to

houses with a selling price of RM42,000 or below per unit, depending on the location, and with a design specification of 650 sq ft in area. Figure 1 shows the social-ecological system (SES) framework promoted by Ostrom (2007) as a complex human-ecology system. A CPR, such as high-rise, low-cost housing, is always in a state of flux, turmoil and panarchy due to the uncooperative attitude of many parcel holders.

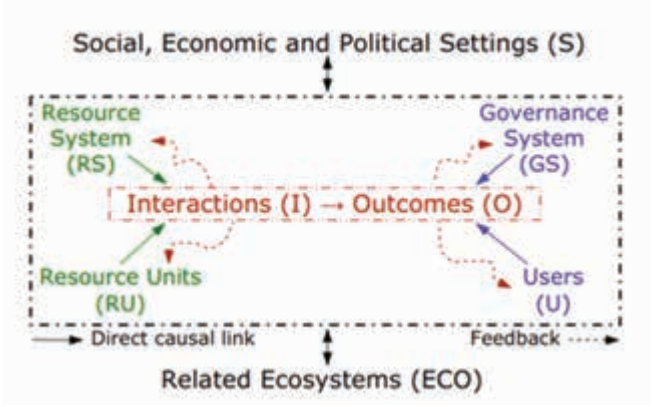

Figure 1: A multi-tier framework for analysing an SES
Source: Ostrom (2007)

Issues of Maintenance & Management

Past discussions indicate that issues under contest by the management and house buyers or parcel holders are complex. Tiun (2009) identified the following problems: Lack of planning, ignorance of buyers, lack of regulation on property managers, insufficient legislation and ineffective management. Zairul Nisham Musa *et al.,* (2020) noted that problems included building repair, poor collection of service charges, poor administration of the sinking fund, management and house-buyers relationship, vandalism of common properties and a lack of mechanism to promote community living.

Although issues raised by past researchers (Tiun, 2009; Zairul Nisham Musa *et al.,* 2020) were related to user behaviour, namely not paying fees and vandalism as well as management behaviour, namely not attending to repair and poor management of sinking fund, maintenance and management issues were more complicated. Table 1 shows the maintenance and management issues that may be grouped under Institutional Analysis Development (IAD) framework proposed by Ostrom *et al.,* (1994).

Despite improvements made in the law, maintenance and management problems persisted over the years, even after 2015. The complaints filed with the Housing Tribunal numbered 2,642 cases in 2016, 4,964 cases in 2018 (Afig Aziz, 2019) and 5,675 cases in 2019 (MIEA, 2020). In view of the increasing number of complaints, the Ministry of Urban Wellbeing, Housing & Local Government, on 9 July 2018, appointed an additional 10 Housing Tribunal Presidents to the existing 29. It can be deduced that law change will not reduce the number of conflicts in the management of housing projects. Hence, the problems need to be dissected differently. Problems are related to the management of shared properties, such as car parks, community halls, corridors, staircases, lifts, lift lobbies, landscape, rubbish bin areas and lighting in car parks and corridors, etc. The shared properties are, in fact, "action arenas" in Ostromian parlance where parcel holders socialise, enjoy the shared properties or fight (Ostrom *et al.,* 1994). We next turn to the IAD framework and, later, the SES framework.

Table 1: Maintenance and management issues in high-rise, low-cost housing

IAD components	Key issues faced
Housing context	Many low-cost housings were mandated to be built by private developers. Upon completion, maintenance was not given high priority by developers. When the maintenance was shifted to parcel holders later on, funding would become a glaring problem.
Attributes of community	Nature of neighbours or neighbourhood Degree of community participation Degree of civic consciousness Demographics Degree of vandalism
Attributes of physical world (common properties)	Quality of housing units owned by parcel holders Cost of lift maintenance Standard of maintenance of common properties Location of low-cost housing Adequacy of common properties
Rules-in-use	Quality of management provided by developer, JMB, or MC as the case maybe Degree of government support Transparency of accounting statement by the management

Maintenance & Management Issues Explained by IAD and SES Frameworks

The IAD components (Table 1) include context, attributes of community, attributes of physical worlds and rules-in-use (Ostrom *et al.,* 1994). They are the first-tier variables of the IAD framework. This framework is used to study the self-organisation of common resources which are shared by proprietors or parcel holders. Although the IAD framework has a clear analytical logic that particularly explains institutional impacts on resource collective action, it is difficult to comprehensively encapsulate and explain the complexity of shared properties management issues. Therefore, this study adopts the social-ecological system (SES) framework, building on the IAD framework with more detailed variables and analysing the problems of commons management more systematically and holistically (Ostrom, 2007). Strata high-rise, low-cost housing is an SES by

Moffatt and Kohler's (2008) definition. In the CPR research, condominium or apartments are under-represented (10% of total papers published), whereas fisheries have 48% and water irrigations have 43% of the total papers published, respectively (Kremer *et al.,* 2019).

A considerable amount of literature has been published on shared properties maintenance and management of apartments or condominiums in Hong Kong relating to collective action theories or CPR theories (Chen & Webster, 2005; Gao & Ho, 2016; Yau, 2018).

Literature Review

Conceptual SES framework

For the purpose of conducting a survey, not all second-tier variables need to be considered in the high-rise, low-cost housing study (Ostrom, 2007). There is no hard and fast rule evolved as yet. The onus is placed on the researchers who use their own judgement to determine variables most relevant in a given circumstance. Table 2 is a summary of the relevant second-tier variables for designing a survey questionnaire.

Table 2: Summary of relevant second-tier variables in low-cost housing

Social, economic and political settings (S) • S4--Government resource policies	
Resource system (RS) • RS1--Sector • RS2--Clarity of boundary • RS3--Size • RS4--Human constructed facilities • RS9--Location	Governance system (GS) • GS4--Property-rights system • GS5--Operation rules • GS6--Collective choice rules • GS7--Constitutional rules
Resource units (RU) • RU4--Economic value • RU5--Number of units (Note: Resource units to be considered together with resource system)	Users (U) • U1--Number of users • U2--Socio-economic attributes of users • U3--History of users • U4--Location • U5--Leadership/entrepreneurship • U6--Norms/social capital • U7--Knowledge of SES mental model • U8--Importance of resource
Interaction (I) • I4--Conflicts among users • I7-- Self-organising activities (Note: These two variables will not be further measured)	Outcome (O) • O1--Social performance measure • O2--Ecological performance measure • O3--Externality to another SES
Related ecosystem (ECO) • Not applicable	

Notes: Some terminologies in the IAD framework have been renamed in the SES using more specific terms. Attributes to community is renamed users. Attributes to physical world is renamed resource system/resource units. Rules-in-use is renamed governance system.

In Table 2, 5 second-tier variables are discussed in the preparation of the survey questionnaire: Outcome (O), resource system (RS), users (U), governance system (GS) and social, economic and political settings (S).

Meanwhile, three issues need to be highlighted. The first set of questions centres on the outcome, direct feedback from parcel holders of low-cost flats, a measure of satisfaction on the upkeep of common properties.

Second, resource system (RS) and resource units (RU) combined together are the common properties of parcel holders, including common corridors, lifts, lift lobbies, car-parks, landscape, rubbish bin areas, community halls, common corridor lighting, etc. This operation is based on the logic of the IAD framework because the essence of the study is the social management problem for low-cost housing.

Third, 2 additional second-tier variables are being considered: Historical development/adaptability to a new environment and ethnic condition based on the result of face-to-face interviews with a group of 6 experts on the contributing factors to collective action in the self-organisation of common properties in low-cost housing in the Malaysian context, which are discussed in the methodology and the results sections below. The variables are:

Historical development/adaptability to a new environment. One of the better sources that described the inability of farmers who found adapting to living in high-rise flats most challenging was Lee (2000). According to Mr. Lee, the Prime Minister of Singapore, ex-farmers who were relocated from farms to high-rise Housing Board of Singapore (HDB) flats continued to show their displeasure by rejecting his political efforts in every general election. The episode showed that farmers who used to live in timber dwellings, faced difficulties adapting to living in a concrete flat. The situation became more complicated when the management expected them to follow house rules and be a part of the community.

Ethnicity. In the CPR literature, the effectiveness of self-governing is largely due to the homogeneity of proprietors using the resource (Ostrom, 1990). From economic development literature, Easterly (2006) argued that the more fragmented a country was, the less cohesion was expected of its people and, by extension, they were less able to face collective action components. Hence, the composition of residents by ethnicity may affect the level of self-organisation.

Conclusion

Based on the literature review, the conceptual framework is constructed of 7 components, namely outcome, resource system, users, governance system, social, economic and political settings, historical development or adaptability to a new environment and ethnicity. ■

Upcoming Activities

Webinar Talk on Product Recall for Customer Satisfaction in Automotive Industry

Date	: 12 January 2022 (Wednesday)
Time	: 4.00 p.m. – 6.00 p.m.
Venue	: Digital Platform
Approved CPD	: 2
Speaker	: Ir. Ts. Sukhairul

Virtual Training Series on API RP 577 Welding Inspection and Metallurgy Professional Course and Exam Preparation - Part 1

Date	: 15 January 2022 (Saturday)
Time	: 8.00 a.m. – 5.30 p.m.
Venue	: Digital Platform
Approved CPD	: 6
Speaker	: Ir. Ts. Pragash Krishasamy

Four Principles for Attaining Manufacturing Excellence

Written and Prepared by:

Ir. Dr Oh Seong Por

The Past Chairman of IEMNS and Director of Samsung SDI Energy (M). Sdn. Bhd. He regularly contributes articles in the Jurutera. He also serves as Industrial Advisory Panel in University Malaya.

The manufacturing sector is one of the key sectors that contributes to the economic development of many industrialised nations. It is also the sector that creates many job opportunities.

In Malaysia, according to the Department of Statistics Malaysia, manufacturing sales in January 2021 stood at RM122.8 billion and provided jobs for 2,225,697 people with average monthly wages of RM3,396 per person. As such, sustaining manufacturing is deemed crucial to the wellbeing of the country and the population.

However, like any other economic sector, manufacturing constantly faces challenges, both internally and externally, which can lead to disruption. Some common internal failures are poor management and lack of vision while external factors can be technology advancement, competition from peers and the unprecedented pandemic like Covid-19. To overcome these, manufacturers, regardless of size, must strive to achieve and sustain manufacturing excellence.

Manufacturing excellence can be defined as the best model for a manufacturer to benchmark and create essential internal value for strengthening competitiveness, generating profit and sustaining growth. To achieve this, a manufacturer needs to focus on building its value-added capacity to deliver the goals which may be guided by structured principles.

Based on my 30 years of experience leading a manufacturing organisation, I have converged on 4 principles which companies can apply in order to attain manufacturing excellence.

These are (1) Safety, (2) Good Housekeeping, (3) Empowering Workers to Become Innovators and (4) Standard Operating Procedures. These are well known principles in manufacturing but are often neglected or there is a lack of management commitment or leadership to see them implemented effectively throughout the company.

All the principles are people-centric and need the participation of all employees. The 4 principles are inter-dependent and support each other. A company aiming to attain manufacturing excellence must set the right strategy, continuously educate and harness all employees to adopt the principles as part of their mandatory job responsibility.

Principle No. 1: Safety

Safety is the first and foremost principle for achieving excellence, not only in manufacturing but other fields as well. Safety actually reflects the attitude of the people working in the plant.

The right mindset is that all safety accidents are preventable. It is only the unconcerned attitude of the workers that causes safety accidents, such as defying work instruction, not wearing proper protective equipment or committing unsafe acts while working.

The management plays an important role to educate workers about safety, to establish and enforce safety rules on the shop floor and to create a safe working environment. Managers or supervisors who constantly emphasise safety and the need to eradicate hazards, will eventually mould the attitude of workers who will then also care for their own wellbeing.

Over time, the workers will pay more attention to their work performances, make fewer mistakes and produce less defective products. In terms of loss, safety accidents can lead to various kinds of losses, such as monetary loss spent to treat the injured worker, reduction in work hours leading to productivity loss and line stop for investigations resulting in production time loss.

There is a saying that "a plant with a high number of safety accidents can never produce quality or safe products for the customer". Therefore, safety has a broader perspective now as it also reflects the manufacturer's commitment to deliver quality and safety reliable product to its customers.

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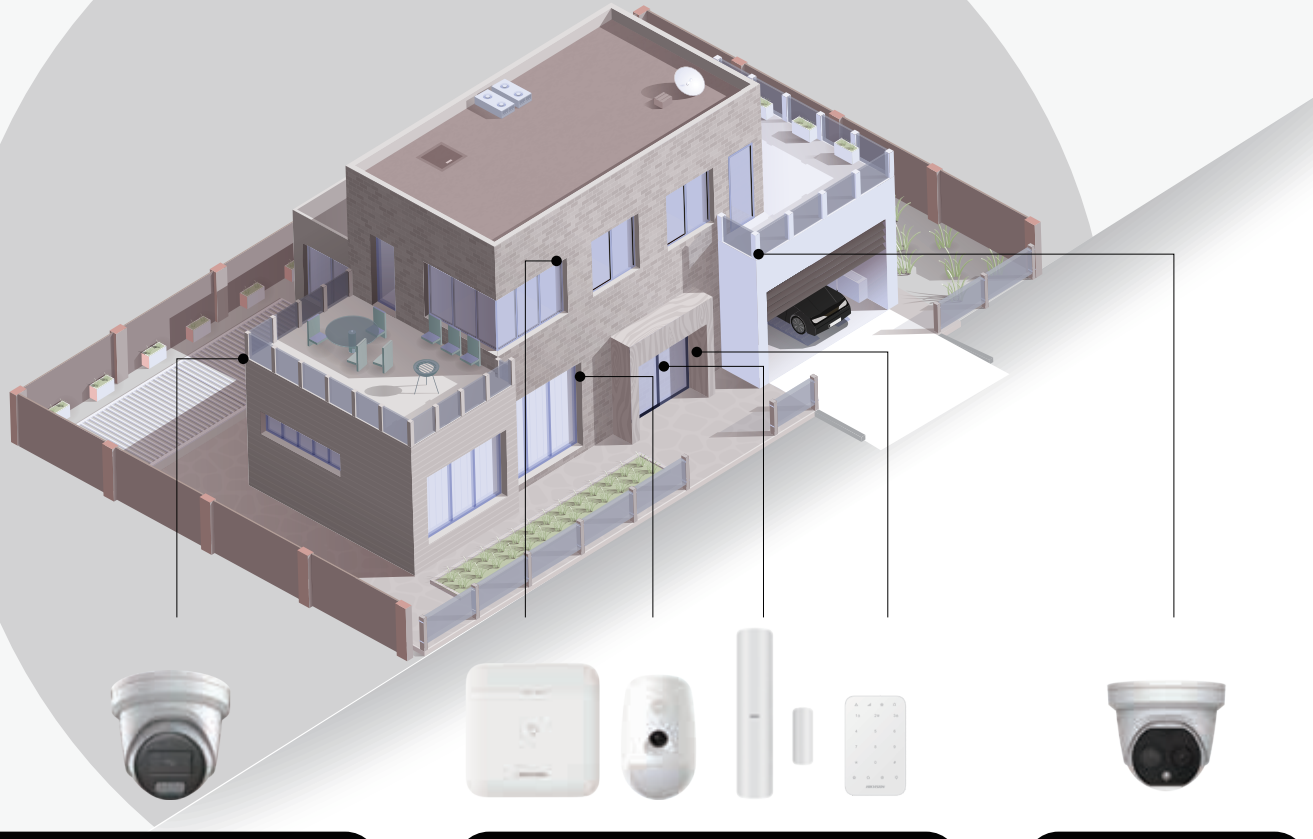

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When properly conducted, traditional safety programmes such as training, meetings, audit and developing safety procedures, have been proven to reduce or prevent safety accidents. However, these initiatives are usually top-down focused, meaning it is the management or safety manager that sets the safety programmes for workers to follow. Sometimes, hidden safety hazards may be neglected.

Another approach is to implement safety as a team process where the safety team formed consists of a safety officer, a supervisor and a few shop floor workers. As workers spend more time at the work site, they are more familiar with the work environment and should be encouraged to seek out hidden hazards as well as to contribute ideas for improvement. The management role here is to support the workers' efforts as much as possible. This is a bottom-up approach. Safety improvements, when implemented, will then be more adoptive and better complied by the workers.

Safety performance must be quantified; this can be done by counting the number of hours or days of "no accident" from the last recorded accident. The longer the number of hours or days, the better is the safety performance. This performance must be communicated to all workers to create awareness and to serve as a reminder to continuously be concerned about safety at work.

It is also important to include safety performance as one of the evaluation criteria for appraising workers and frontline leaders such as supervisors and line managers. Whenever a worker is involved in a safety accident, the related supervisor and managers must also be held accountable as co-responsible leaders. This will send a clear message that safety is everyone responsibility. Supervisors and managers must consistently manage the safety of workers and workers must adhere to all safety instructions and regulations.

Principle No. 2: Good Housekeeping (Quality Environment)

Cleanliness, neatness and proper arrangement of things (right materials of right quantities in the right locations) make a well-organised environment that reflects the working culture of a plant. These indicate how workers take responsibility and ownership of their workplaces, materials, tools and tasks. Workers who practise this noble culture logically will be more productive and quality focused which are a value-added capacity to achieving manufacturing excellence. The effective way to cultivate this working culture is through the 5S initiative.

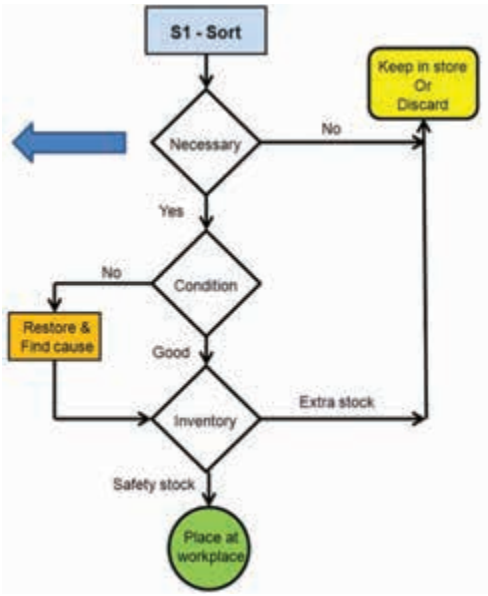
The term 5S is derived from the Japanese words representing the elements that drive transformation in the workplace. The words Seiri, Seiton, Seiso, Seiketsu and Shitsuke can be translated as Sort, Stabilise, Shine, Standardisation and Sustain.

5S consists of 5 sequential steps, with each step having its own purpose and method of implementation. The final essence of 5S is not only to create a conducive workplace but more importantly it is the development of quality and knowledgeable workers who are dedicated, effective and productive.

Step 1. Sort (Seiri):

Purpose. To distinguish between necessary and unnecessary things (tools, materials, equipment, parts etc.) and to make the decision to discard what is unnecessary. This will put the workplace in the right order with no congestion and will open up opportunities for the next step of improvements.

Method. Apply stratification management based upon usage frequency. Things which are used frequently are placed in the workplace while things that are seldom used or not used are removed, discarded or kept in the store area. When doing segregation, it is possible to find necessary things in a bad condition. These must be restored to their normal condition so that they are ready for use. Usage rate of necessary thing must be analysed so that an adequate quantity is placed at the workplace to avoid congestion. Figure 1 illustrates the Sort step and guidelines.



General Guideline for Segregating Things

Level	Usage Frequency	Storage Method (Stratification)
Low	-Things not in used in the past year -Things used once in the last 6 ~12 months	-Discard -Move to store
Middle	-Things used once in the last 2 ~ 6 months -Things used more than once a month	-Store in the central place at workplace
High	-Things used once a week -Things used everyday -Things used hourly	-Store near to work station at workplace

Figure 1: Sort Step

Step 2. Stabilise (Seiton)

Purpose. To place sorted necessary things in the right place so that they can be easily retrieved without wasting time to search for them.

Method. Apply functional management and eradicate search function. Functional management comprises 4 considerations:

1. To study how often things are utilised. Things which are used frequently must be placed near the user.
2. To identify the right location to place things so that users can retrieve them in the fastest time, with the least distance to reach in order to quickly perform jobs.
3. To decide the best method to place things so that users can identify them easily.
4. To establish rules and ensure that every user obeys and places things in the designated location at all times. Visual management to constantly keep users aware is the best approach. Some practical examples are standard labelling of things, colour coding, notices or special markings. Figure 2 shows the Stabilise step and guidelines.

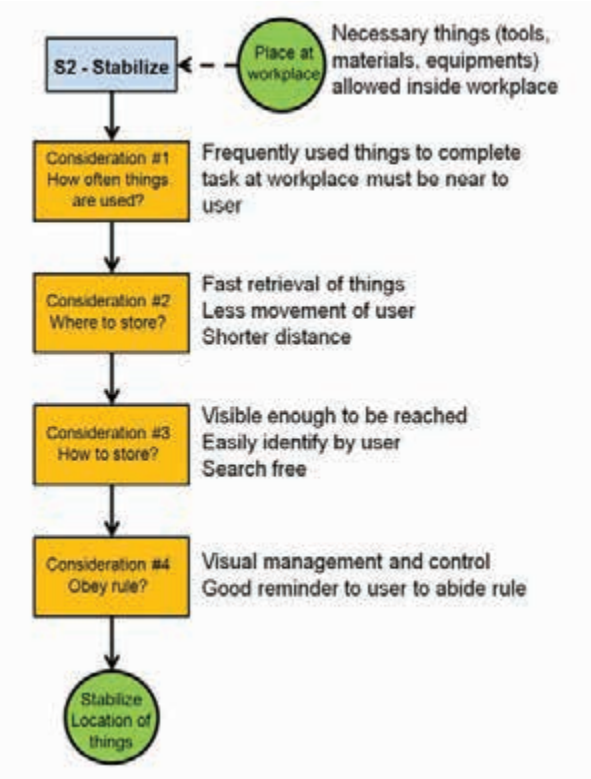


Figure 2: Stabilise step

Step 3. Shine (Seiso)

Purpose. Cleaning is a way to cultivate the commitment to be responsible for all aspects of things used and to ensure they are maintained in tip top condition. Cleaning also helps to eliminate safety hazards. So the Shine step is considered the core essence of 5S movement.

Method. Cleaning must be done in a systematic way as described below.

1. Identify the things or areas that need to be cleaned.
2. Set the cleaning procedures such as right cleaning method, cleaning frequency, type of personal protective equipment or PPE and cleaning tools, including detergent.
3. Improvement circle. Once basic cleaning activity is in order, workers are encouraged to contribute improvement ideas such as ways to eliminate the source of contaminants and to detect potential problems.
4. Motivation. Identify the best worker or team that has the best performance in cleaning of part, equipment or area and a token of appreciation or incentive can be awarded to him/them. This is a way to encourage and motivate workers to continuously engage in cleaning. Figure 3 illustrates the Shine step and guidelines.

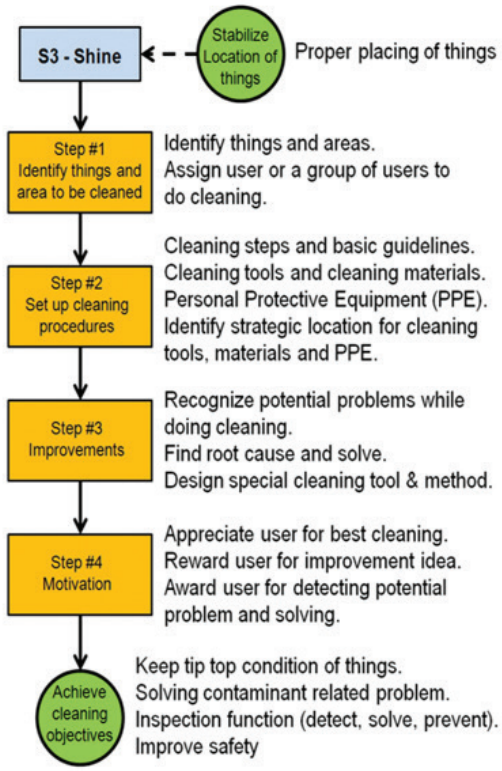


Figure 3: Shine Step

Step 4. Standardisation (Seiketsu)

Purpose. To regulate the earlier three 5S steps (Sort, Stabilise and Shine) and to ensure workers consistently execute them effectively.

Method. To apply visual control to trigger awareness and understanding in workers. It actually relates to human behaviour where seeing is believing, seeing triggers actions and seeing generates compliance of rules. Based on that, 5S movement visual control is to create awareness and understanding in workers and so encourage internal

voluntary action to implement guided activities (Sort, Stabilise and Shine) and to sustain the tip top condition of things (tools, materials and machines) and the workplace. Visual control is achieved by using visual aids. Below are some effective visual aids.

1. Instruction notices to guide workers on how to operate things or perform tasks.
2. Signages to alert danger/hazard/safety precaution.
3. Labels containing important information such as name, application and specification.
4. Indication of material to describe type, category, application and specification.
5. Signages to name place or location.

Figure 4 displays the Standardisation step and guidelines.

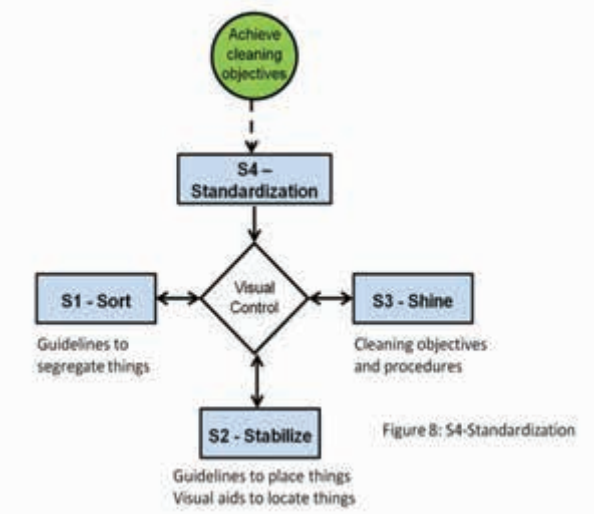


Figure 4: Standardisation Step

NOTE:

In the next issue of Jurutera, we will discuss the final 5S step of Sustain (Shitsuke) and the last 2 Principles for attaining excellence in manufacturing. ■

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Upcoming Activities

1 Day Virtual Course on Advanced Python Programming

Date	: 15 - 16 January 2022 (Saturday - Sunday)
Time	: 1.00 p.m. – 5.00 p.m.
Venue	: Digital Platform
Approved CPD	: 8
Speaker	: Dr Chaw Jun Kit

Webinar Talk on Earth-Retaining Structure Engineering Design and Construction in Malaysia

Date	: 15 January 2022 (Saturday)
Time	: 9.00 a.m. – 12.30 p.m.
Venue	: Digital Platform
Approved CPD	: -
Speaker	: Ir. Tu Yong Eng

Webinar on Building of The Future From Lighting Control's Perspective

Date	: 17 January 2022 (Monday)
Time	: 4.00 p.m. – 6.00 p.m.
Venue	: Digital Platform
Approved CPD	: -
Speaker	: Mr. Alan Jackson

Webinar Talk on Open Data Validation of The Performance of a Smart City Application in Transport: Transit Signal Priority Request Via the Public Transport Information and Priority System

Date	: 22 January 2022 (Saturday)
Time	: 10.00 a.m. – 12.00 p.m.
Venue	: Digital Platform
Approved CPD	: 2
Speaker	: Mr. Teck Kean Chin

Virtual Training Series on API RP 577 Welding Inspection and Metallurgy Professional Course and Exam Preparation - Part 2

Date	: 22 January 2022 (Saturday)
Time	: 8.00 a.m. – 5.30 p.m.
Venue	: Digital Platform
Approved CPD	: 6
Speaker	: Ir. Ts. Pragash Krishasamy

Technical Talk on Project Financial Modeling – How to Conduct Feasibility Studies using the Engineering Finance Methodology to Optimise the ROI and Enhance the Long-Term Sustainability

Date	: 22 January 2022 (Saturday)
Time	: 10.00 a.m. – 12.00 p.m.
Venue	: Digital Platform
Approved CPD	: 2
Speaker	: Ir. Dr Maulud Abdul Latif

Joy in Every Drop

Written and Prepared by:

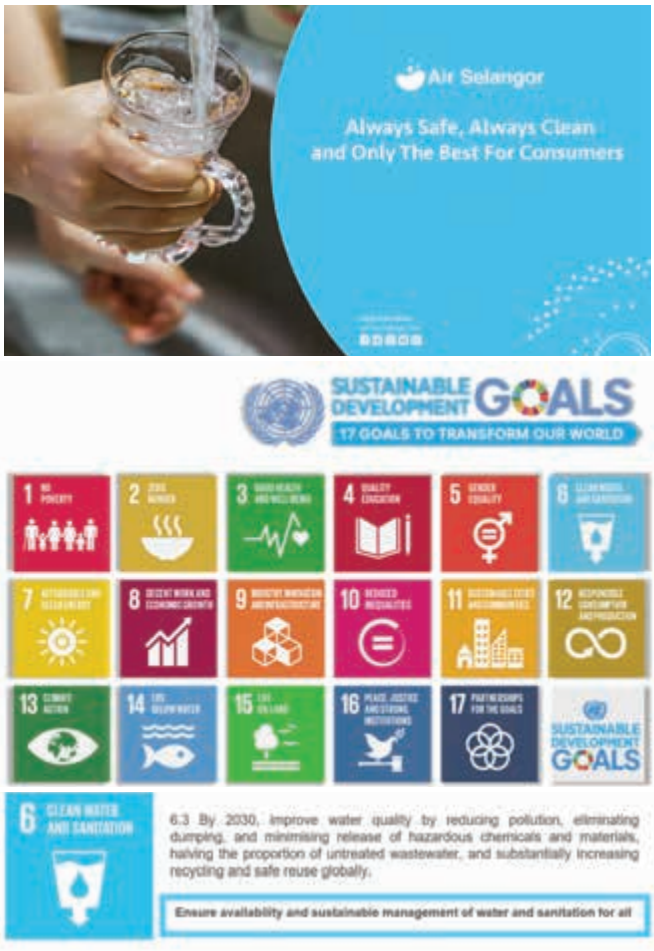
Air Selangor

Air Selangor goes beyond just ensuring a continuous supply of water to 8.4 million consumers in Selangor, Kuala Lumpur and Putrajaya. It is part of our efforts to bring joy in every drop to our consumers – be it the water they consume, the communities that benefit from our Sesama Mara programmes or our water conservation initiatives to ensure sustainable water supply for future generations. That is our brand promise.

Consumers are at the heart of everything we do. As the biggest water operator in the country, we are committed to providing the best customer service experience through the distribution of clean and safe treated water supply. In our laboratories, our experts work tirelessly to ensure that the water we supply to consumers is safe for consumption.

Inspired by Goal #6 of the United Nations Sustainable Development Goals (SDG), "Ensure availability and sustainable management of water and sanitation for all"[1], Air Selangor is on track to ensure that consumers can drink water directly from the tap by 2028. This is at the back of the Trust Our Tap 2028 initiative to ensure compliance with National Drinking Water Quality Standards set by the Malaysian Ministry of Health (MOH)[1]. It is a privilege that we would like our consumers to have a right to, because we ourselves are water consumers too.

Air Selangor serves over 2.5 million customer accounts or the equivalent to 8.4 million people in Selangor, Kuala Lumpur and Putrajaya. To ensure that we do so successfully, effectively and efficiently, we have a total pipeline network of over 29,000km as well as 2,000 reservoirs and pumphouses. As we work towards providing nothing but the best to our continuously growing consumer base, we ensure that the treated water we produce and distribute meets the water quality parameters of the National Drinking Water Quality Standards set by MOH, including the key parameters of the Quality Assurance Programme (QAP) standard, with a compliance of 99% and above. The QAP quality compliance covers all major parameters such as turbidity level and Free Residual Chlorine (FRC) scale as well as the presence of E.coli and aluminium in the treated water supply.



United Nations' Sustainable Development Goals [1]

In 2020, MOH conducted periodical water quality monitoring of all water operators in the country, based on 5 key testing parameters of the QAP, i.e., E.coli + FRC, E.coli, turbidity level, FRC and aluminium. Air Selangor was highly regarded by MOH and Suruhanjaya Perkhidmatan Air Negara (SPAN) for scoring 5 out of 5, which placed us in the Top 5 ranking nationwide. Breakdown: Kuala Lumpur ranked at No. 1, Selangor at No. 3 and Putrajaya at No. 4.

[1]Based on the World Health Organisation (WHO) Guidelines for Drinking Water Quality [3].

Innovation Plans	(1) Water Resources Management	(2) Water Quality Monitoring	(3) Water Quality Diagnose	(4) Water Quality Remediation
Success Factors	Maximise Existing and Exploring New Sources	Hybrid Distribution Real-Time Water Quality Analyser (HYDRA)	Accredited Regional Laboratories	Scheduled Reservoir and Pipe Cleaning
	Watershed Management	Water Quality Sampling Stations	Mobile Laboratories	Pipe Cleaning Zone with Compression Gear & Isolation (POLIGON)
	Raw Water Security	Reservoir Water Quality Assessment		Off-Plant Autonomous Chlorine Injection System (OACIS)
	Raw Water Monitoring			

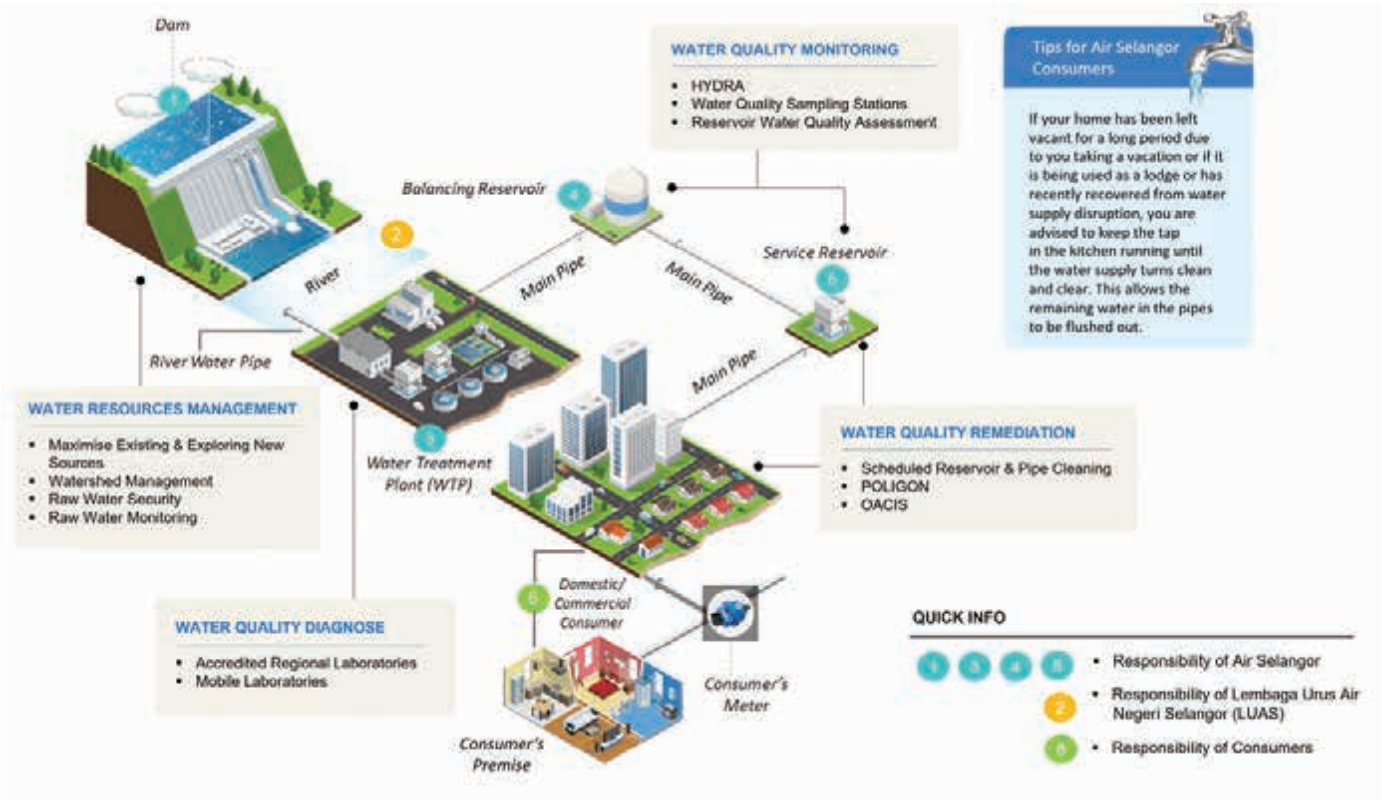
Air Selangor also scored an EXCELLENT status for Drinking Water Quality Index (DWQI) in December 2020[2]. These achievements are a significant assurance of the quality of treated water supplied by Air Selangor.

Trust Our Tap 2028 Initiative

The Trust Our Tap 2028 initiative is a commitment by Air Selangor under the Strategic Plan & Initiatives (SPI) 4 – Best Customer Experience. It includes a holistic approach to ensuring safe and clean water supply through 4 main pillars: 1. Protection of raw water resources, 2. Control and monitoring of water quality, 3. Increasing laboratory capacity and capability to diagnose and 4. Preservation of treated water quality. This requires a multi-faceted commitment by the various stakeholders, from industry players, communities and related agencies to the authorities.

The Trust Our Tap 2028 initiative encompasses long-term plans to be implemented in Selangor, Kuala Lumpur and Putrajaya over a period of 9 years. It started in 2020. It will be executed through 4 targeted Innovation Plans which complement the 4 main pillars of the SPI 4 and are supported by targeted success factors.

[2]This is not inclusive of Port Klang and KLIA Sepang, which have their own water management (not under the responsibility of Air Selangor).



Innovation plans & success factors

Innovation Plans & Success Factors

To support the efforts of the Innovation Plans, Air Selangor is also developing the Trust Our Tap Policy and Water Resources Management Policy. The Trust Our Tap Policy details out the strategies and operational plans governing potable water from the tap as well as water quality conservation post-production.

In addition, the Water Resources Management Policy spells out strategies and operational plans to ensure raw water resources are sustainable and secure for the future through conservation and diversification of sources to meet the needs of water treatment plants. To fully achieve these aspirations by 2030, these policies cover sustainability of raw water resources, supervision of raw water pollution, water quality monitoring, preventive maintenance and remediation works from raw water sources to the consumers' meter points.

Joy in Every Drop

Although the various efforts are in place, Air Selangor's responsibility is still limited to the pipeline network which ends at the water meters of the homes of consumers, as stipulated in the Water Services Industry Act 2006 (Act 655) [2]. We encourage consumers to play a proactive role to ensure the quality of the water in their homes by constantly checking that their internal water supply system and piping network are properly maintained. This includes ensuring that water taps in the kitchen are kept clean always, cleaning the water storage tanks regularly, replacing old indoor pipes and repairing leaks in the internal water supply system when necessary to prevent any form of contamination which may affect the quality of water.

Providing safe and clean water to consumers is Air Selangor's call of duty. We strive to continuously explore various innovative mechanisms for treating raw water to ensure that it will always be fit for consumption. The aim of the Trust Our Tap 2028 initiative is to provide the best quality water to consumers. To do so, we shall all play our roles collectively so that ultimately, we can bring joy in every drop to our consumers. ■

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IEM
The Institution of Engineers, Malaysia

Form of Contract for Civil Engineering Works [CE 2011]

Did you Know? 9

CE 2011

on materials to be supplied by Employer

states that it can be either as part of the Contract or as a separate supply agreement under Clause 33.

Clause 33

Did you Know? 10

CE 2011

on excavated materials ownership & disposal

states that ownership belongs to the Employer and Engineer's written approval must be obtained for disposal.

Clause 34

Did you Know? 11

CE 2011

on Site Possession

expressly states that Possession of Site must not be taken as for the sole and exclusive use of the Contractor but constitute nothing more than a revocable license granted by Employer to Contractor.

Clause 11.1

Did you Know? 12

CE 2011

on Master Programme

states that it must :

(a) be in such form as the Engineer reasonably requires
(b) be in sufficient details of nature of Works requires
(c) identify/highlight any construction activities critical to Works
(d) completion and float time of non critical activities if applicable
(e) indicate rate of construction of major activities of the Works

Clause 14.2

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Documents in Anticipation of CIPAA

Written and Prepared by:

Ir. Ang Kok Keng

The Construction Industry Payment & Adjudication Act 2012 (Act 746) (hereinafter known as CIPAA 2012) came into effect on 15 April 2014 to facilitate regular and timely payment, to provide a mechanism for speedy dispute resolution through adjudication, to provide remedies for the recovery of payment in the construction industry and to provide for connected and incidental matters .

Generally, an adjudication proceeding takes 106 working days from the issuance of payment claim with the adjudicator delivering a decision within 45 days from the service of adjudication response or adjudication reply (whichever is later). Adjudicators would normally conduct the proceedings based solely on "documents only" unless the parties request otherwise, or the invocation of the adjudicator's power by the adjudicator under Section 25 of CIPAA 2012 to request for meeting, oral hearing, carry out inspection, order for evidence under oath, order for discovery and production of documents etc.

Therefore, it is important for both parties (either unpaid or non-paying party) who are bound to the construction contract to ensure proper documentation upkeeping during and after construction in anticipation of a possible claim or defence in an adjudication proceeding.

In an adjudication proceeding, the common heads of claim by the claiming party are certified payment, uncertified payment, final account , variation orders, losses and expenses , retention sum, delay payment interest and consultancy fee . The burden of proof for certified payment and statement of final account are easily discharged with the relevant certificates under the express terms of the contract. On the contrary, challenges arise for uncertified payment and final account as the claiming party would need to support its claim with documents such as claim submission, signed joint site evaluation, delivery order, variation order instruction and independent evaluation by a professional quantity surveyor.

For losses & expenses, apart from the tabulation of actual losses & expenses, the claiming party is required to meet the notices threshold expressly stipulated in the contract provision and to prove that the delay events are not culpable to them through a delay analysis by an expert.

Another common claim in CIPAA 2012 is retention sum despite the monies being held in trust in a separate account by the non-paying party . This is prevalent especially for domestic sub-contractors as they are unable to discharge the burden of proof which requires a Certificate of Practical Completion (CPC) or a Certificate of Making Good (CMGD) by the Contract Administrator under the main contract. Simply put, they would never be given a copy of such documents and so, remedies such as invocation of the adjudicator's power under Section 25(n) of CIPAA 2012 supported by evidence of completion or handing over is required.

Consultancy fee claim would require a clear express provision on percentage and stage of payment with cost of works . An argument arises if the project is abandoned or terminated. Therefore, the claiming party must discharge its burden of proof with the relevant instruction to proceed to a certain stage of works, transmittal of completed design & drawings and an estimated cost of works by a professional quantity surveyor.

In response, the defending party would raise matters such as applicability of CIPA Act 2012, payment not due, defects rectification, liquidated damages, payment on behalf to 3rd party, diminution in value and any other set-off allowed for under the express terms of the contract.

Applicability of CIPA Act 2012 are issues of law raised by the defending party to defeat the claim at the outset. It ranges from contract not in writing , not a construction contract or consultancy contract as defined in Section 4 of CIPA Act 2012 , impugned payment claim under Section 5 of CIPA Act 2012 , natural person for own occupancy of less than 4 storeys under Section 3 of CIPA Act 2012 , contract entered into prior to 15 April 2021 and government contract under the first schedule of exemption order. Over the above, when a payment is not due, it is in-futuro payment and CIPA Act 2012 would not apply.

A defence of defects rectification would require documents such as validly served notification under the contract with 3rd party back charge cost and professional quantity surveyor evaluation. Subject to the express terms of the contract, liquidated damages would generally require a Certificate of Non-Completion and contract administrator evaluation of all extension of time claims submitted. A delay analysis by an expert confirming the unpaid party being culpable for the delay would greatly support the set-off for liquidated damages. Other set-off defences available include payment on behalf of and diminution in value depending on the express terms of contract.

In an adjudication process, both parties are inflicted with an outcome which invariably ends with one party declared the winner (lose less) and the other, the loser (lose more). Naturally, it would be wise for the claiming party to prepare and collate in advance all documents before commencing the adjudication proceeding and, for the defending party, in the anticipation of defending a claim. ■

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Hillslopes & Highlands Development in Environmentally Challenging Areas

Written and Prepared by:

Ir. Koh Wei Sang

Property development in environmentally challenging areas, particularly hillslopes and highlands, has been mushrooming worldwide due to scarcity of land and Malaysia is no exception.

To address this, the Urban Engineering Development Special Interest Group (UEDSIG) organised a 4-hour webinar titled Technical Event on Hillslopes & Highlands Development: Approaches & Challenges Incorporating Technology Advancement In Environmentally Challenging Areas on 29 May 2021.

The webinar covered the latest approaches and challenges with technological advancement for property development on hillslopes and highlands with emphasis on the layout planning, geological, geotechnical, erosional, environmental, ecological, hydrological and socio-economic impacts on the general public.

Hopefully, with the specific approaches taken for development control, it will be beneficial to the knowledge-based community worldwide in moving a step closer towards a better understanding of land development issues and its after-effects, thus ensuring that a sound and sustainable development can be carried out in future.

The speakers for the forum were Ir. Dr Tew Kia Hui, Ir. Chee Shai Choon and Ir. Dr Ooi Teck Aun (Panelist/Moderator). Ir. Koh Wei Sang was Moderator/Organiser.

Ir. Dr Tew Kia Hui obtained his Bachelor and Master's Degree in Civil Engineering from University Technology of Malaysia and PhD. (Civil & Geo-Environment) from University of Malaya. He started his career as a research officer with University Technology of Malaysia and subsequently, MARA University of Technology, to carry out specialised research on geo-environmental related issues in various environmentally sensitive areas (ESAs), particularly highlands and expressways. In fact, he also went to great lengths to carry out in-house and collaborative R&D with local institutions of higher learning as well as other related government agencies in Malaysia.

Dr Tew explained that 8 important elements should be taken into consideration in hill site developments.

1. **Layout Planning Impact:** This is the first component to be considered as one must fit all the development components into the proposed site. This move will therefore avoid major earth cutting or filling activities as well as ecologically sensitive zones. Usage of UAV drone mapping technologies will help to capture the latest information on ground for planning purposes.
2. **Geological Impact:** Geological impact is one of the major issues for consideration as geology is an earth science concerned with the earth and as such, the identification of the geological setting and features which include geological terrain mapping and geohazards on-site, is crucial in the layout planning.
3. **Geotechnical Impact:** Geotechnical impact is very much related to the geological impact as mentioned; the engineer will need to carry out terrain and slope stability analysis and have a fairly good understanding of the natural terrain landslide hazards on-site, earth retaining wall design and long-term ground movement monitoring works.

4. **Erosional Impact:** Erosional impact during earthwork activities would require specific measures to be implemented on-site, such as the preservation of existing vegetation and waterways as well as the provision of Best Management Practices (BMPs) for the Erosion & Sediment Control (ESC).
5. **Environmental Impact:** Environmental impact is crucial, especially in maintaining the natural landform, by minimising earthwork activities and having air, water and noise pollution impact control measures in place. However, challenges will include the change of land use development components due to urbanisation of the proposed development site and the high cost in management and maintenance of the environment.
6. **Ecological Impact:** Ecological impact is prominent, especially for development projects in highlands. Therefore, specific approaches such as the identification of endemic and endangered flora species as well as the relocation of fauna species may be required as necessary. However, challenges include inaccessible site conditions, high cost involved during fauna relocation works and the need for re-establishment of biodiversity for post-construction works in these areas.
7. **Hydrological Impact:** Hydrological impact requires the engineer to provide site specific mitigation measures to cater to increased surface runoff and to account for changes in hydrological regime and impacts from upstream areas. As such, the Water Sensitive Urban Design (WSUD) may be introduced for hillslopes and highlands development where rain water will be treated as an opportunity rather than a problem. Nevertheless, challenges include unpredictable impacts of catchment upstream especially during heavy downpour and the high cost involved in considering the hillslopes and highlands development.
8. **Socio-Economic Impact:** Socio-economic impact mainly involves the human factor surrounding any proposed development and so, there will be a need to consider socio-economic implications, especially to the surrounding built-up areas. Among the challenges faced are public objections which may delay the planned development and, in some cases, development on hillslopes and highlands may have to be called off in view of such strong objections.

The second panelist, Ir. Chee Chai Choo, talked about his software for assisting civil engineers in earthwork design, cut and fill, calculation of run-off for earth drain design and etc.

The locally developed ZeonEarth SE software consists of basic earthworks design for issues such as managing development of hillslopes. It further extends into environmental issues such as soil loss and sediment yield. ZeonEarth SE has been integrated into the Urban Stormwater Management Manual for Malaysia 2nd edition (MSMA2) and Guideline for Erosion & Sediment Control in Malaysia by the Department of Irrigation & Drainage Malaysia. However, the application of this section is not widely understood by civil engineers in country, largely due to a lack of resources on this topic.

Here are the benefits of using ZeonEarth SE:

- The engineer is able to learn about soil loss and sediment yield through interaction with the software.
- ZeonEarth SE has a further feature of turning information on soil loss and sediment yield into a map system.
- This feature is available in software like ArcGis software. However, ZeonEarth SE local data has been integrated into the software. The computation will directly follow our local requirements like MSMA2.
- Besides this local data integration, 3D modelling is available with ZeonEarth SE. With full 3D models, engineers can get a clearer idea of the terrain. Terrain information include cut and fill area, cut and fill depth, high and low elevation, water flow path and land-uses according to MSMA2.
- Slope classification as required in Environmental Impact Assessment (EIA).
- Auto profiling can further assist engineers to make better judgement calls. All such information can be obtained with ZeonEarth SE.
- One unique thing about ZeonEarth SE is that it is able to read data from drawings directly. As soon as drafting is ready, the data entry is ready for use with ZeonEarth SE. There is minimum double entry needed.

The Q&A session that followed showed a high interest in the topics with numerous questions from the participants.

The webinar helped create awareness for government bodies (in approving development plans), engineers (in design and supervision work) and property developers. ■

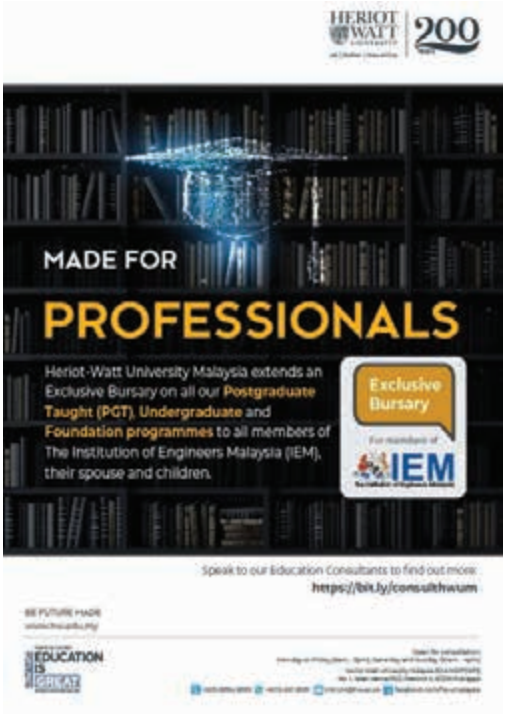
Professional Partnership Between IEM & Heriot-Watt University Malaysia

Written and Prepared by:

Ir. Dr Bhuvendhraa Rudrusamy

On 1 September 2021, The Institution of Engineers, Malaysia (IEM) and Heriot-Watt University Malaysia (HWUM) signed a Memorandum of Agreement (MoA) on professional partnership between both institutions. Because of the COVID-19 restrictions, the ceremony took place on a virtual platform.

In addition to the existing Memorandum of Understanding (MoU) with HWUM, this exclusive professional partnership was extended to benefit IEM graduate members, who would be offered 10% bursary discount for all taught postgraduate programmes offered at the university. Spouses and children of IEM members would also be eligible for the bursary discount for Foundation and Undergraduate programmes.



The ceremony started with the welcoming of all guests of honour from both institutions, including the HWUM IEM Student Section, who joined in to witness this event. A HWUM corporate video presentation was shown during the ceremony to introduce 200 years of pioneering in education institution with a unique 10-year international campus presence in Putrajaya, Malaysia.

This was followed with a short speech by the Provost & CEO of HWUM, Prof. Mushtak Al-Atabi, who recognised the professional partnership with IEM and the importance of continuous learning for nation building. He also emphasised on positive education to develop students' emotional intelligence, teach them strategies to cope with and manage their time effectively, cultivate a positive mindset and develop self-confidence, interpersonal and communication skills as well as a sense of purpose to realise their full potential. He also emphasised on developing resilient graduates maintaining a healthy mindset, managing stress and developing meaningful social relationships in a landscape that had become increasingly digitised.

Then, an IEM corporate video presentation was shown to introduce the institution which was founded in 1959 with the aim to be the premier learned engineering society championing the adoption of ethics and professional best practices in all sectors of the industry.

In his short speech, IEM President Ir. Ong Ching Loon also acknowledged the professional partnership with HWUM to promote the advancement in science and the profession of engineering. He said "Collaboration is driven by Cooperation", fostering an environment of engagement, trust and teamwork, where the individuals and teams feel empowered to help each other and with the flexibility of new ways of working. Secondly, he talked about "Communication", from informal channels to forums and support networks, with compelling content and ways to make it easy to capture and spread ideas. Lastly, he emphasised on "Coordination", enough structure and training and management so that the collaboration space is used in building the knowledge base to navigate, use and reuse easily.

The audience then witnessed the signing ceremony and the exchange of the partnership agreement which marked another milestone for both institutions. The ceremony ended with a group photo session. ■

Pine Cone Train from Côte d'Azur to Provence

Written and Prepared by:

Ir. Chin Mee Poon

Ir. Chin Mee Poon *is a retired civil engineer who derives a great deal of joy and satisfaction from travelling to different parts of the globe, capturing fascinating insights of the places and people he encounters and sharing his experiences with others through his photographs and writing.*

A colourful train plies the 151km route between Nice in Côte d'Azur and Digne-les-Bains in Provence, both arguably the most irresistible regions in France.

My wife and I began a two-month exploration of the Mediterranean area from Nice, a popular gateway to the world-famous French Riviera. It so happened that the Ironman70.3 World Championship was taking place in the city over the weekend but that failed to arouse much excitement in us. Neither were we profoundly attracted by the pebbly beaches which were very different from the golden sandy beaches on the east coast of Peninsular Malaysia.

Instead, the Pine Cone Train heading for Digne-les-Bains definitely held a much stronger appeal for us. Popularly known as Train des Pignes in France, pignes being the southern French dialect for pine cones, the narrow-gauge railway line of 1-metre width on which the train runs, was mostly completed in 1892. In the early days, pine cones were, at times, used to supplement coal in the steam locomotives. Today a historic steam locomotive is still used on the sector between Puget-Théniers and Annot on specific days from May to October.

It took us 10 minutes to walk from our hotel to Gare de Sud, an attractive railway station built in 1892, the same year the railway track was completed, but the building lost its function as a railway station in December 1991 due to old age. It was turned into a library in 2013 and later, a food court. The new Pine Cone train station was housed in a more functional building barely 100m away.

Our brightly painted two-coach Pine Cone train in red, yellow and white departed promptly from Gare de Nice at 9.25 a.m. It was almost packed. It had very large glass windows, so passengers had an unobstructed view of the passing scenery. The appeal of Provence, with its verdant mountains, deep gorges, pebbly rivers, bridges of various designs and quaint village cottages, revealed itself in a kaleidoscope of beautiful scenes.

After stopping at 12 little stations, the train finally pulled into Saint André-les-Alpes at 11.40 a.m., where all passengers had to alight. According to the train conductor, the railway track from here to Digne-les-Bains had been out of service for some time due to a tunnel collapse. A bus was waiting to take us on the last 42km of the journey to Digne-les-Bains. We reached that terminal station in about an hour.

From there we walked to the town centre in 15 minutes. The town is at the centre of a UNESCO Geopark and has a few interesting rock formations nearby. We only had time to eat lunch and visit Cathedrale Saint Jerome before returning to the station to catch the 2.25 p.m. bus for the return journey. At the Saint André station, the train departed at 3.25 p.m. and arrived at Annot station 45 minutes later.

Walking 1km to the village, we obtained a map and leaflet from the tourism office before exploring the old village quarter that dates back to the 11th Century. It was very satisfying to wander through the labyrinthine network of alleys here. A footpath led gently uphill through an open field, crossing a railway track into the woods and finally to a chapel on a hillock, passing by some unique buildings that had been cleverly built around rocks. From the chapel, we had a superb panoramic view of the village and beyond.

We boarded the 7.10 p.m. train in Annot and arrived back at Nice at 9.00 p.m. We certainly enjoyed every moment of the entire 12 hours on the move. ■

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Tarikh: 8 Disember 2021

Kepada Semua Ahli,

SENARAI CALON-CALON YANG LAYAK MENDUDUKI TEMUDUGA PROFESIONAL TAHUN 2022

Berikut adalah senarai calon yang layak untuk menduduki Temuduga Profesional bagi tahun 2022.

Mengikut Undang-Undang Kecil IEM, Seksyen 3.8, nama-nama seperti tersenarai berikut diterbitkan sebagai calon-calon yang layak untuk menjadi Ahli Institusi, dengan syarat bahawa mereka lulus Temuduga Profesional tahun 2022.

Sekiranya terdapat Ahli Korporat yang mempunyai bantahan terhadap mana-mana calon yang didapati tidak sesuai untuk menduduki Temuduga Profesional, surat bantahan boleh dikemukakan kepada Setiausaha Kehormat, IEM. Surat bantahan hendaklah dikemukakan sebulan dari tarikh penerbitan dikeluarkan.

Ir. Dr David Chuah Joon Huang
Setiausaha Kehormat, IEM
(Sesi 2020/2021)

PERMOHONAN BARU / PERPINDAHAN MENJADI AHLI KORPORAT

Nama	Kelayakan
KEJURUTERAAN AWAM	
CHEAH JEN PING	BSc (MONTANA UNI SYSTEM) (CIVIL, 1986) MSc (WASHINGTON) (CIVIL, 1989)
NURUL FAZILA BINTI ABDUL AZIZ	BE HONS (UTHM) (CIVIL, 2006)
KEJURUTERAAN BAHAN	
AZZURA BINTI ISMAIL	BE HONS (USM) (MATERIALS, 1999) MSc (USM) (MATERIALS, 2003) PhD (LEEDS) (2014)
SUFIZAR BINTI AHMAD	BE HONS (USM) (MATERIALS, 2002) MSc (USM) (MATERIALS, 2003) PhD (UKM) (MECHANICAL & MATERIALS, 2010)
KEJURUTERAAN ELEKTRIKAL	
ABDUL MUHAYMIN BIN MOHAMAD FAUZI	BSc (ALBERTA) (ELECTRICAL, 2011)
MUHAMAD RIYASRUDIN BIN MYDIN ABDUL GHANI	BE HONS (UTP) (ELECTRICAL & ELECTRONICS, 2009)
KEJURUTERAAN MEKANIKAL	
ASBA MADZIDAH BINTI ABU BAKAR	BE HONS (UTP) (MECHANICAL, 2010)

PERMOHONAN BARU / PERPINDAHAN MENJADI AHLI KORPORAT

Nama	Kelayakan
KEJURUTERAAN AWAM	
MAZLAN BIN MUSTAPHA	BE HONS (USM) (CIVIL, 1999)
KEJURUTERAAN ELEKTRONIK	
FAIRUL AZHAR BIN ABDUL SHUKOR	BE HONS (UPM) (ELECTRICAL & ELECTRONICS, 2003)

PERPINDAHAN AHLI

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
43109	LAU SEE HUNG	BE HONS (UNIMAS) (CIVIL, 2008) ME (UNIMAS) (2010) PhD (UNIMAS) (2015)
29121	NGU SENG HING	BSc (MICHIGAN TECHNOLOGICAL) (CIVIL, 1998)
KEJURUTERAAN ELEKTRIKAL		
60518	ABDUL HADYAN SYAFIQ BIN ABDUL JALIL	BE HONS (UiTM) (ELECTRICAL, 2016)
37917	HAMIZAH FARHAH BINTI MUHAMMAD ANUAR	BE HONS (UTM) (ELECTRICAL, 2008)
90070	HO LIN WEI	BE HONS (USM) (ELECTRICAL, 2015)
115482	KALAIVARNNAN A/L SELVARAJOO	BE HONS (UNITEN) (ELECTRICAL POWER, 2017)
86150	MAHADIR BIN MOHD TAZRIN	BE HONS (UTeM) (ELECTRICAL (INDUSTRIAL POWER), 2010)
87574	MIKE NELSON DONIL	BE HONS (UMS) (ELECTRICAL & ELECTRONICS, 2011)
116178	NABILA SILAM BIN ABU MUSLIM	BE HONS (UTM) (ELECTRICAL, 2010)
73772	SUNTHARARAJU A/L SELVATHORAY	BE HONS (UNITEN) (ELECTRICAL POWER, 2013)
89639	YENNIE MELODY WONG	BE HONS (UMS) (ELECTRICAL & ELECTRONICS, 2012)
KEJURUTERAAN MEKANIKAL		
42282	AMAR BIN ABDUL RANI	BE HONS (UMS) (MECHANICAL, 2010)
88838	MUHAMMAD HAFIZ BIN AZMI	BE (VANDERBILT) (MECHANICAL, 2016)
88979	SIEW KOK KHION	BE HONS (UTAR) (MECHANICAL, 2010)

PERMOHONAN BARU / PERPINDAHAN MENJADI AHLI KORPORAT

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
25287	MOHD IRWAN BIN JUKI	BE HONS (UTM) (CIVIL, 1998) ME (UTM) (STRUCTURE, 2001) PhD (UiTM) (CIVIL, 2010)
KEJURUTERAAN ELEKTRIKAL		
37834	WONG JEE KEEN, RAYMOND	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2010) ME (UNITEN) (ELECTRICAL, 2013) PhD (MALAYA) (2016)

Pengumuman yang ke-158

SENARAI PENDERMA KEPADA WISMA DANA BANGUNAN IEM

Institusi mengucapkan terima kasih kepada semua yang telah memberikan sumbangan kepada tabung Bangunan Wisma IEM. Ahli-ahli IEM dan pembaca yang ingin memberikan sumbangan boleh berbuat demikian dengan memuat turun borang di laman web IEM http://www.iem.org.my atau menghubungi secretariat di +603-7968 4001 / 5518 untuk maklumat lanjut. Senarai penyumbang untuk bulan November 2021 adalah seperti jadual di bawah:

NO.	NO. AHLI	NAMA
1	09429	Ir. POOBALAN S/O MAHALINGAM
2	89527	MR. MOHD SAFARIZAM BIN ABDULLAH
3	07537	Ir. TIONG HONG HEE
4	19291	MR. WAN ALWI BIN WAN MUSTAPHA
5	04153	Ir. LOOI KOK WING
6	116463	DR ISHAK BIN JOHARI
7	10084	Ir. HJ. TAIB BIN ABU BAKAR
8	17186	Ir. KING IK CHIAN
9	36838	MR. TE CHOON CHIAM
10	75332	MR. ANG JEN KEN
11	22410	EN. AZALI BIN ARDY @ AZALI AH SIONG
12	14955	Ir. TENGKU HAZIAN BIN TENGKU AB. HAMID

Upcoming Activities

Half-Day Workshop on Google Analytics Crash Course

Date : 22 January 2022 (Saturday)
Time : 9.00 a.m. – 1.00 p.m.
Venue : Digital Platform
Approved CPD : 4
Speaker : Dr Yu Yong Poh

Virtual Training Series on API RP 577 Welding Inspection and Metallurgy Professional Course and Exam Preparation - Part 3

Date : 29 January 2022 (Saturday)
Time : 8.00 a.m. – 5.30 p.m.
Venue : Digital Platform
Approved CPD : 6.5
Speaker : Ir. Ts. Pragash Krishasamy

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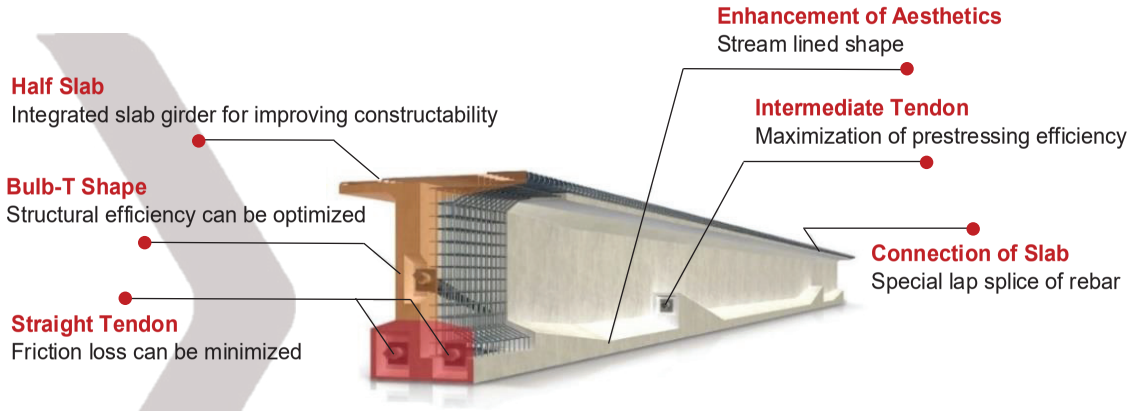

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