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# EDITORIAL

Hi Everyone,

**2**019 has been an eventful and colourful year. June 2019 saw a new line up of Council Members. The new council will be introduced in this issue. The new line up coupled with the new Editorial Team has brought us to the selection materials for this issue.

The main highlight as it has always been with the new line up of Councillors is the interview with the President, Sr Kwan Hock Hai. Our warm and easily approachable President showed leadership even as early as his childhood days. Sr Kwan is a former Kajang High School Head Prefect, and has held many executive positions in Royal Institution of Surveyors Malaysia (RISM) and also has served various committees in the Board of Quantity Surveyor Malaysia (BQSM). Read more about him inside.

Next we move on to the Peer Review Articles section. The first article is on "Mixed Use Development in Malaysia". Stratified development has become the popular choice amongst the urban population in Malaysia leading to the development of mixed use development in view of the limited supply of land and the maximisation of return to the developer. However, there seem to be a lack of awareness of the governing provisions with respect to the management of the units of the mixed use development amongst the parcel owners as well as the managers. This paper attempts to highlight the current structure of provisions for the management of stratified properties in Malaysia and establish the likely issues faced in the management of the mixed use development.

The second article is on the potential of the digital camera being used to improve the methods of data acquisition and processing techniques. This research assesses the accuracy of data based on standard deviation and RMSE of the 3D indoor model. The third article under this section is "Investigation of Ethical Decision Making Towards Ethical Issues in the Construction Industry".

Under the Professional Practice section, we feature : "Retrospective No More - The Construction Industry Payment and Adjudication Act 2012 Moves Forward".

As mentioned earlier, 2019 was an eventful and colourful year filled with lots of activities by the different divisions and branches in RISM. The second half of 2019 events covered in this issue includes the the main events held at Hotel Istana Kuala Lumpur between the 20th to 22nd of June, 2019. Starting with the 21ST INTERNATIONAL SURVEYORS' CONGRESS, the event continued with the RISM 58TH ANNUAL GENERAL MEETING and finally ended on a high note with the 58TH ANNUAL DINNER, held at the same venue on 22nd June 2019. The annual dinner has been graced by our Royal Patron His Royal Highness the Sultan of Selangor, Sultan Sharafuddin Idris Shah Alhaj Ibni Almarhum Sultan Salahuddin Abdul Aziz Shah Alhaj.

Another international congress was held in August 2019. The 23rd PAQS Congress was held from 26th to 27th August 2019 in at Pullman Hotel, Kuching, Sarawak. The Congress which was jointly organised by RISM and BQSM was successfully held with 550 delegates participating, which includes 250 international delegates.

December 2019 was another successful month for RISM. Beginning with the meeting with permanent mission of Malaysia to the United Nations at the United Nations Headquarters, New York on 4th December 2019. Apart from visiting the UN, delegates from RISM were also taken to a few other interesting sites in the United States.

Events for 2019 ended with a healthy activity, badminton! RISM Sports & Social Committee has organized the Badminton Tournament 2019 on 07th December 2019 at Sunsuria Avenue Sports Complex, Kota Damansara. 17 teams participated in this event and six medal events are contested in badminton including four individual events: Singles and Doubles for both men and women, Mixed Doubles and a Senior Doubles.

Enjoy your read! We at the Editorial Board wishes everyone a Happy New Year.  
May 2020 be a great year for all of us.

**Sr Ina Abu Bakar**  
*Member  
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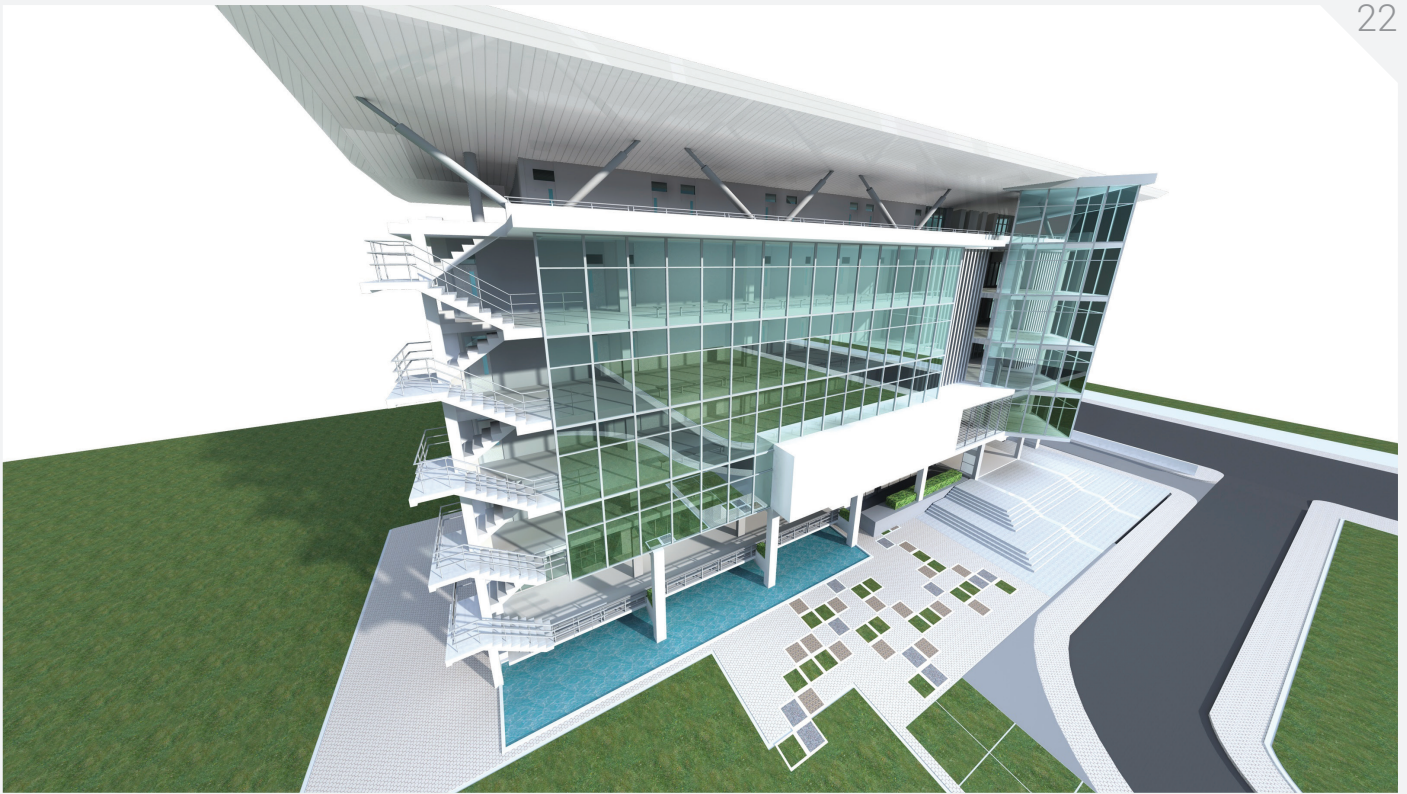
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'Sr' is the abbreviation for Surveyor which was first mooted by RISM in 2005 and used by all RISM members since 2006 as a badge of identity for Surveying professionals.

The Malaysian Surveyor is a quarterly publication that covers the development of the surveying profession, innovations in the surveying technology and surveyors' contribution towards the property market and building industry.

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# RISM President 2019/2020

## Interview with Sr Kwan Hock Hai, KMN, CQS,FRISM, FRICS

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### Background/History

Sr Kwan Hock Hai is the 58th President of our esteemed institution. Being born and raised in Kajang, Selangor, Sr Kwan really knows his satay! Like all locals, he has his favourite satay spot in Kajang which he has recommended to RISM members. Sr Kwan is married to his high school sweet heart Madam Koe Soo Hwa. They are blessed with 4 children, 3 girls a boy and 1 grandson.

This warm and easily approachable surveyor is a former Kajang High School Head Prefect. Sr Kwan pursued his degree in Quantity Surveying at the Heriot-Watt University, in Edinburgh, United Kingdom. Over the years, Sr Kwan has held many executive positions in Royal Institution of Surveyors Malaysia (RISM) and also has served various committees in the Board of Quantity Surveyor Malaysia (BQSM).

Not only is he the President of RISM, Sr Kwan is currently representing RISM as Chairman of the Pacific Association of Quantity Surveyors (PAQS). Sr Kwan is a Consultant Quantity Surveyor and he is a founding Director of the QS practice, Perunding PCT Sdn Bhd. Prior to that, Sr Kwan started his career at a quantity surveying practice, Mssrs. Hashim dan Lim Sdn and was based here in Kuala Lumpur. His experience in the industry is not only in Malaysia, apart from working on projects all over Malaysia, Sr Kwan has also worked on projects in other ASEAN countries and China.

In recognition of his contributions to the industry and the general public, Sr Kwan was awarded the KMN by His Royal Highness the Yang Di Pertuan Agong in 2014.



**Figure 1:** The President with his Generals

In this respect, we aim to be the centre for construction information and provide advisory services on construction economics.

## Q&A

### RISM and Its Future

**Q.** What are your visions and expectations for RISM and its members?

RISM now has about 11,000 members. It shows RISM is relevant to those practising as surveyors in the built environment. The public is becoming increasingly aware of our "Sr" title which is officially registered with under the Trade Marks Act. RISM members need to continue being relevant and proud of our "Sr" title. However, we must remember the professional responsibilities that come with it. We must ensure that we have high competency standards and a code of conduct that the public can respect.

RISM must also be relevant to the public and be the centre of excellence in surveying. We can offer services to the public and industry through our RISM Academy. We have a Centre for Knowledge Enhancement and a Center for Competency Enhancement. We can do more programs through these centres. Recently our Board of Building Management has done a lot of enhanced renovation works to enhance our Bangunan Juruukur. We have the capacity and resources to conduct courses at RISM.

We recently signed a memorandum of corporation with statutory bodies such as our Property Surveyors with Jabatan Penilaian dan Perkhidmatan Harta Malaysia (JPPH) and our Building Surveyors with NIOSH. All our previous cooperation and collaboration are now formalised into a structured working framework in areas of research, training, education and data information. We will build on our different strengths and resources for the benefit of the public, the profession and the country.

RISM must be in line with our vision, continue to provide quality, value-added and comprehensive service to the industry. In this respect, we aim to be the centre for construction information and provide advisory services on construction economics. We are achieving this with the setting up of Building Cost Information Services Malaysia Sdn Bhd (BCISM) in conjunction with CIDB where the public can download construction cost information such as construction cost benchmark, tender price index and construction material prices. BCISM will also provide training services, cost consultation and perhaps even extending to publishing construction economic reports.



We are also organising the annual national seminar on contemporary astronomy and sharing our knowledge of using celestial objects for the purpose of positioning, and determining latitudes and longitudes. This seminar is attracting great interest among government officials handling religious matters.

## Professional Services & the Construction Industry

### Q. What are your views on the quality of construction projects and professional services as delivered in the construction industry?

RISM has attended many international conferences which gave us the opportunity to benchmark ourselves against global counterparts. I must say that in terms of technical expertise and professional services, we are comparable and can be competitive in every aspect and we are delivering these services locally.

In terms of quality of construction, there are many developers and contractors who take pride in their product. You can see from recent advertisements of those projects winning local awards that the design concepts are well translated to actual good quality construction.

## Global Challenges and Misconceptions

### Q. What are the ways to improve the future of the surveying profession in facing local and global challenges?

The recent advancement in geospatial information, augmented reality and blockchain in real estate and 5-D BIM are among the rapid changes in the built environment industry that will affect all of us. Someone once said that we must change with time unless we are big enough to change time.

We must always try to be "one up" on these changes or perceived challenges. I do not mean to say we have to be market leaders all the time, but we must embrace and understand the changes in order to remain relevant so that the public have confidence in us and understand our scope of services. We can do this individually on a continuous personal development basis or in a bigger picture, through RISM on issues that will benefit the industry as a whole.

### Q. What are your views on the misconceptions about Surveyors?

I think the public still has a lot to learn about surveyors. Old mind sets still pigeon-hole us in a stereo-type way; that land surveyor is one who looks into the theodolite and building surveyor only works with local authorities. We need to educate the public of our complete range of services and how we can value add in the built environment.

In recent years and especially with multi-national companies, the services of a Quantity Surveyors are often term as "Cost and Commercial Consultancy services". Much as we are proud of the brand "QS" we must start to adapt to a more modern expression of our services where the value-added aspects are immediately recognised.

## Pacific Association of Quantity Surveyors (PAQS)

### Q. Congratulations on your appointment as the Chairman for PAQS 2019/2020. What are your plans for PAQS?

PAQS is a coalition of 15 quantity surveyors and cost engineering national associations from 14 countries. I am indeed honoured to be elected as their Chairman for this 2-year session. PAQS provides a regional platform for the Quantity Surveying profession to benchmark against each other and foster a community of leaders for the profession. We will continue to work together in areas of research, innovations with BIM, sustainability and accreditation of academic programmes, all for the betterment of the profession. My personal wish is to ultimately see the mobility of cost management professionals across the region.

## The Younger Generation

### Q. What are your advice to future professionals entering the construction industry?

Even with all the rapid technological and Artificial Intelligence driven changes to our industry, I want to tell all future professionals entering the construction industry, that we will never be a sunset industry. Construction is a major multiplier of economic growth. However, we must move with times and find new roles and services for ourselves in the industry in line with technological advances.

## Work Life Balance

**Q.** How do you maintain a work - life balance and especially as present President of RISM?

I have been serving in various committees in RISM and Board of Quantity Surveyors Malaysia for many years now. I have always been able to fit these roles into my professional work life because I have some very supportive partners in my company who like me, believe in giving back to the profession. I also have a very supportive and understanding wife who gives me

the freedom to attend to RISM activities that I commit to; often without informing her in advance. But being the President of RISM comes with a whole new set of responsibilities as I now have to look into the activities of all four divisions. Thankfully, I have a very dedicated group of councillors to assist me in so many frontiers. To unwind, I go away for a few days to fish in solitude!

As a family, we also make it a point to enjoy music together. Soo Hwa being a music teacher, is a music enthusiast and we always find time to attend musical concerts at the Petronas Philharmonic Hall every once in a while.



**Figure 2:** President with the rest of the contingent during the visit to the United Nations HQ in December 2019. Photo taken at The Capitol Building in Washington DC





# Mixed Use Development in Malaysia – Issues for Management

## ABSTRACT

Stratified development has become the popular choice amongst the urban population in Malaysia leading to the development of mixed use development in view of the limited supply of land and the maximisation of return to the developer. However, there seems to be a lack of awareness of the governing provisions with respect to the management of the units of the mixed use development amongst the parcel owners as well as the managers. This paper attempts to highlight the current structure of provisions for the management of stratified properties in Malaysia and establish the likely issues faced in the management of the mixed use development. From interviews with experts, it is revealed that although there are improvements in the existing strata laws, there are still issues in the equitable share apportionment, the formation of the Limited Common Property, the duties of the Commissioner of Building and the awareness of the property managers and parcel owners towards the management of the mixed use development.

**Keywords:** Mixed Use Development, Property Management, Stratified Units.

## 1. Introduction

In recent years, more Malaysians are moving into stratified units, especially in urban centres due to limited land availability (Azmin, 2006). Stratified development has become a major trend in Malaysia, especially in big cities which include Kuala Lumpur as developers often find stratified developments are more profitable. Higher amount of saleable units can be produced in a stratified development given the small area of land required for a stratified development.

Due to the scarcity of residential lots, developers have also induced an idea of having a new concept of stratified development on commercial lands which includes developments like

Small Office Home Office (SOHO), Small Office Virtual Office (SOVO) and even Small Office Flexible Office (SOFO). These developments are equipped with both residential usage and business usage on a commercial land. These developments are normally smaller and cheaper than most of the residential units offered in the market. In addition, developers have also induced the idea of having mixed development in the current property market whereby in one stratified property would comprise several uses which include retail/service apartment, retail/hotel/service apartment and even hotel/service apartment.

According to Brown & Bonifay (2001), New Urbanism, also commonly referred to as Neo Traditional Neighbourhood Design

(TND), is a movement which advocates a return to pre-World War II suburban development, now referred to by most as "sprawl". Essentially, New Urbanists envision compact neighbourhoods comprised of a mix of residential housing and commercial uses, pedestrian-friendly streets, large tracts of open space, and convenient access to mass transit. In a way, this concept is therefore applied to the current capability where strata buildings can be made for convenience of users. However, with the increasing development of strata titled property and legislations to govern the property management of such property, there has been an increasing demand for professional property management skills. The style of property management of a mixed use strata development may



not be the same, which would cause confusion between the user and the developers.

The unfamiliarity of the acts and laws regarding mixed use strata development is causing consumers to neglect their properties after the purchase. The designation of the property management structure in the mixed use strata development is also crucial. It plays a role in identifying how well the mixed use strata development would affect the sustainability of the financial and the physical environment. Good property management would make the development even more sustainable. The existing and adjacent land uses of properties that surround a planned area are accounted for in the model as a substantial part of planning goals. These include land uses, land use diversity, land use densities, and the ratios of land use densities. These considerations would lead to a socially acceptable and optimal mix in the mixed use strata development and have sustainable goals generalized and captured in the equity measure (Wuerzer, 2012). As mixed use strata developments are still new developments in the Malaysian property market, users and developers should be even more exposed and aware of the property management issues regarding these developments. Property management becomes even more complicated for stratified properties compared to those of a house with a single owner as it involves multi ownership and a multi storey building. Such stratified properties consist not only units where the owner themselves have exclusive rights, there are also common properties in which they are collectively liable together with the owner of the whole building (Daniel & Luisman, 2016). This paper attempts to provide an overview of the mixed use developments in

Essentially,  
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to mass transit.

Malaysia and uncover the governing provisions and issues in relation to the management of these developments. This is made through the examination of the governing provisions of the stratified properties as well as qualitative enquiry through the interviews with the experts were involved in drafting the Strata Management Act 2013 (Act 757).

## 2. Literature Review

### 2.1. Mixed Use Strata Developments

A rise in mixed use real estate development in Malaysia recently is caused by the shortages of urban renewal initiatives teamed with land and housing (Knight Frank Malaysia, n.d.). Therefore,

in premier cities such as Kuala Lumpur where demand of strata developments is relatively higher, City Hall of Kuala Lumpur (DBKL), the local authority of Kuala Lumpur already has plans on designating and implementing comprehensive development areas in their land use and having plans on development strategies to develop these lands as an integrated mixed development comprising of residential, commercial and industrial uses. These comprehensive development areas shall also be served by transit terminals that will be connected to key activities in the area to provide convenient accessibility and reliable transportation. (Dewan Bandaraya Kuala Lumpur, n.d.) According to Rabianski & Clements (2007) mixed-use development can take four general forms. First, a single high-rise structure on a single site that contains two or more uses integrated into the structure. Second, two or more high-rise structures on a single site with each structure holding a different use. Third, mixed-use development can also be a combination of different low rise structures on a single site with retail on the ground level with residential units above in one structure and office space above in another structure. Fourth, it can also be a single mid-rise structure on a single site typically in an urban setting with retail on the ground and residential or office above.

In addition, demographic changes, modern planning in the modern era and government policies has also encouraged mixed-use development which includes different types of land uses in the same project. Mixed-use development can be vertically built with, for example retail on the ground floor and offices, residences or hotel on the upper floor. It can also be built horizontally, which mostly found in a less dense area where diverse uses

are encouraged in close proximity to each other (Wardle, 2016). Such mixed-used development is often called Mixed Strata Development.

A few common examples of a mixed-use development in Malaysia include residential and commercial mixed-use development and the recent hotel and residential mixed-use development. Similar to normal strata type developments, a mixed-use strata development can also be built in phases accordingly to their type of uses.

## 2.2. Management of Mixed Use Strata Development

People living in strata properties are of diverse interests, different cultures, values, ages and background under one roof. With that, it is very usual to have such disputes and differences between one another, living in the same strata property. Therefore, the management of the strata property, the Joint Management Body (JMB) or Management Corporation (MC) is responsible for the management of the building. However, it is very difficult to rely only on the Committee to lead a property management body without any professional background or experience. (Mohamad & Sufian, 2013). It is no different for mixed use strata development as it also consists of people of diverse interest, different cultures, values, ages and background living under one roof. However, the mixed use strata development further consists people of different users, which makes management even more complicated.

Other than that, the physicality and structure of the mixed-use development also affects the usage of mixed strata development. The design, location and mix of

uses must be tailored to fit the local market. (Rabianski, et.al., 2009). For example, different user elements have to be contained in discrete buildings or in separate podium so that a part of the mixed-use development will not affect another. (Northedge, 2005). Mixed use developments like Hotel and Residences type development or Retail and Service Apartment type development has several crucial property management issues as it is built to cater different users in the building. As for the economical perspective, the mixed-use project must be compatible with its neighbours and be integrated into the community to maximise its economic effect. For example, considering the competition with existing single-use developments must be considered. (Rabianski, et.a. 2009). Furthermore, the mixed use developments create a higher cost and coordinated management approach as different tenures and users are managed in different ways. Problems arise from conflicts between these groups have to also be solved to prevent unsatisfactory conditions which can eventually lead

to declining tenants or decreasing rent rates. However, much of the conflict can be avoided at the initial planning and design stages (Dziomba, 2005).

Being an owner of a mixed use strata property in Malaysia also meant that the person will enter into a three-fold legal relationship. The owner will not only own his parcel of the property, but also co-own the common property and the land of the whole building development. Therefore, the owner is also responsible to be part of the maintenance and repair of not only his own parcel, but all the other parcels including any accessory parcels and common properties. However, issues arise when problems such as no direct control by property managers to the management fund, refusal of payment of management fund by the parcel owners, poor management and maintenance services and other social legal problems have led to a breakdown of the management of such development. (Mohamad et.al, 2015).

## 2.3. Governing Provisions for Strata Properties

### A. Strata Titles Act 1985, Strata Title Act 2013

The Strata Titles Act 1985, made pursuant under Article 76 (4) of the Federal Constitution 1957 which gives authority to the Parliament to legislate on land for the purpose of ensuring uniformity of law and policy was introduced to help in regulating and providing an administrative framework and legal framework to the strata scheme in Malaysia. The Strata Titles Act also stated the outlines of the management of the shared facilities within the building known as the common property (Mohamad et. al., 2015). Hereby, the MC will be formed under

People living in strata properties are of diverse interests, different cultures, values, ages and background under one roof.



the Strata Title Schemes where a combination of individual parcels and common property with a self-governance of Strata Corporation. The individual parcels will indicate that each of the strata building and each of the individual units will hold a different title. After the Strata Title is registered automatically by the opening of a Book of Strata Register, the Management Corporation is formed. The Strata Titles Act 2013 has made several amendments which include the provisions for the stipulated time frame for the issuance of the strata titles, issuance for provisional strata titles for provisional blocks as well as the designation of limited common property and creation of one or more subsidiary management corporations only for the purpose of representing the different interests of parcel proprietors.

2.4. Management Corporation

Management Corporation, in benefit of all the proprietors in the subdivided building is a body corporate to help to control and manage the common property of a subdivided building. As the common property is a shared responsibility of all the proprietors to maintain it, Management Corporation, consisting of a body of individual parcel proprietors is responsible to handle all matters affecting the common property and common interest of a subdivided building in general. The common property is controlled and administered by the developer before being transferred to the Management Corporation upon the issuance of the strata titles.

The Management Corporation exists automatically after the opening of

book of the strata register in respect of the subdivided building or land and need not be registered under the Companies Act 1965 or the Societies Act 1966 (Revised 1987). It is administered by the by-laws in the Third Schedule of the Strata Titles Act 1985. The Management Corporation has to abide strictly by the Strata Titles Act 1985 in maintaining and managing the common facilities (Shukri & Maidin, 2010).

2.5. Common Property

Common properties are owned communally after a strata subdivision (Everton-Moore et. al., 2006). According to the Laws of Malaysia Act 757 Strata Management Act 2013 Section 2, the definitions are as follows:

Table 1: Definition of common property and limited common property

Common Property and Limited Common Property	
Common Property	<div>(a) "in relation to a building or land intended for subdivision into parcels, means so much of the development area –"<div>i. "as is not comprised in any parcel or proposed parcel; and</div><div>ii. "used or capable of being used or enjoyed by occupiers of two or more parcels or proposed parcels; or"</div></div> <div>(b) "in relation to a subdivided building or land, means so much of the lot – "<div>i. "as is not comprised in any parcel, including any accessory parcel, or any provisional block as shown in a certified strata plan; and"</div><div>ii. "used or capable of being used or enjoyed by occupiers of two or more parcels;"</div></div>
Limited Common Property	<div>"Means such part of the common property in a lot – "<div>(a) "that is designated in a comprehensive resolution referred to in Section 17A of the Strata Titles Act 1985 for the exclusive benefit of the proprietors of two or more, but not all, parcels; and"</div><div>b) "for which a certificate has been issued by the Director certifying that the subsidiary management corporation has been constituted under the Strata Titles Act 1985;"</div></div>

## 2.6. Strata Management Act 2013 (Act 757)

The Strata Management Act 2013 (Act 757) which came into force in 2nd June 2015 has repealed the Building and Common Property (Maintenance and Management) Act 2007 (Act 663) [BCPA]. At the same time, amendments were also made to the Strata Titles Act 1985 (Act 318) to further facilitate and enhance the management of strata scheme in Malaysia. Before the introduction of Strata Management Act 2013, both strata development matters and strata management matters were dealt under the Strata Titles Act 1985. Whereas for now, the Strata Management Act 2013 is a standalone act in dealing with strata management matters while the Strata Titles Act 1985 deals with all strata development matters such as strata registration and issuance of titles (Teo, 2015).

The old law under the Building and Common Property Act 2007 and the Strata Title Act 1985 has seen setbacks in dealing with issues on stratified properties, especially in the management of mixed

developments. (Tan, et. al., 2016). Hence, the Strata Management Act 2013 have seen an introduction to a few new provisions which included amongst others, making it a comprehensive enacted statute which covers all aspects of strata management and maintenance, This includes the introduction of Schedule of Parcels, Formula for the computation of allocated share units, provision for limited common property and subsidiary management corporation, revised AGM and EGM provisions for the Joint Management Body (JMB) as well as Management Corporation (MC), the introduction of Strata Management Tribunal and the expanding of the department of the Commissioner of Building (COB) at local authority level (REHDA, 2016).

The regulatory roles of the Commissioner of Building and process to resolute dispute have been improved in the SMA whereby the Commissioner of Building will be in of higher powers in enforcing the statutory provisions pertaining to the management and maintenance of strata buildings after and before subdivision processes. The Tribunal was also established under the SMA to adjudicate disputes in strata schemes (Kamarudin, 2014).

## 2.7. Joint Management Body

A corporate body which has a common seal comprises of the purchasers together with the developer and/or their representative who undertakes the Joint Management of the building and common property. The first annual general meeting of the Joint Management Body (JMB) has to be conducted by the developer no later than 12 months from the commencement of the act for which the building is concerned was completed before

the commencement of the Act. For which building is completed on or after the commencement of the Act, the meeting must be held no later than 12 months from the delivery of vacant possession to the purchasers. It is the developer's duty to convene the first meeting of the Body which is effectively tied to the delivery of vacant possession to the purchasers and it is not how long it takes for the developer to apply for procure the opening of the strata register for the development or whether the developer has sold and transferred 25% of the development to purchasers.

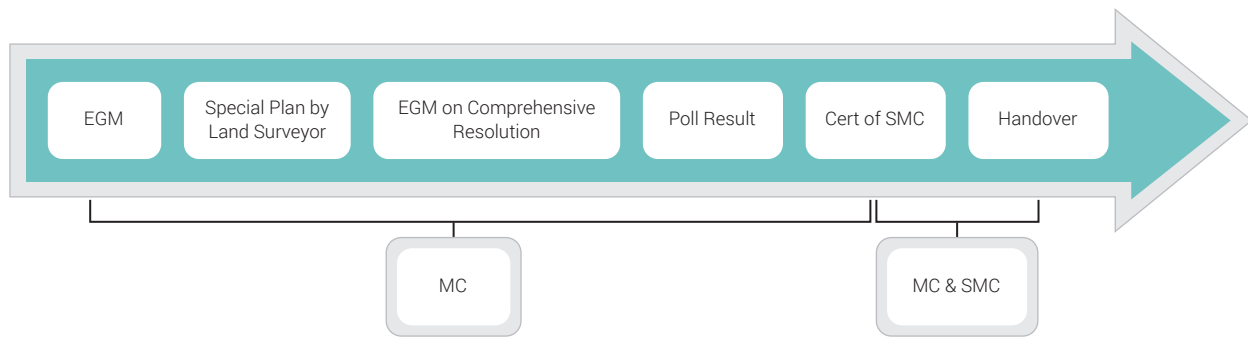
The developer will be in full responsibility to carry out maintenance works, ensuring that the building is free from all risks. The first meeting for the JMB is the duty of the developer to convene within a specified period with all the purchasers. The developer will be fined, imprisonment or both if the developer fails to do so.

## 2.8. Subsidiary Management Corporation

According to Tay et al., (2015) Strata management under the SMA 2013 consists of a two-tier corporation involving in the management of a mix development area. Therefore, the existing MC may designate limited common properties and the subsidiary Management Corporation (SMC) which will be a representative to represent a particular group to an exclusive use and enjoyment of the designated Limited Common Property. In other words, the formation of Sub MC will exist after the formation of MC and its committee will comprise of a subsidiary management committee. The formation of Sub MC is closely governed under the new Section 17A Strata Titles Act 1985. The MC will be needed to convene and facilitate

The developer will be in full responsibility to carry out maintenance works, ensuring that the building is free from all risks.





**Figure 1:** Formation of subsidiary management corporation

the Extraordinary General Meeting (EGM) to reach to a comprehensive resolution on a special strata plan which will then clearly define the boundaries of the limited common properties. The strata plan is then submitted by the MC and copy of the comprehensive resolution and poll result to the Director of Land & Mines who will duly issue a Certificate for the establishment of SMC.

An example of this scenario is a mixed development of residences and hotels, the residences will be using only certain lifts to access their residential units, and the central-air conditioning are exclusive use of the hotel proprietors. The Limited Common Property will be a suitable choice for developments with mixed uses with a mixture of residential and non-residential parcels, especially when different common properties will have different sets of requirements in relation to proper maintenance and service among these common properties (Tay et al., 2015).

### 2.8.1. Duties and Powers of the Subsidiary Management Corporation

Other than having the same powers and duties as the MC except that SMC only involved with matters in relation to the Limited Common Property designated, according to

the SMA 2013 (Act 757) Section 64 (3), the SMC without the prejudice to the subjects in subsection (1), the SMC shall:

- i. Establish a SMC maintenance and sinking fund account.
- ii. Inform proprietors of the SMC to pay charges and sinking fund.
- iii. Enforce the by-laws for the limited common property.
- iv. Manage, control and administrate the limited common property.

### 2.9. Commissioner of Building

The Commissioner of Building, who is appointed by the state authority, administers and carries out provisions from two statutes which are the Strata Management Act 2013 (Act 757) and Parts V1 and VII of the Strata Titles Act 198. The roles and responsibility of the COB is to make sure that the MC is doing their job by maintaining and managing the building and common property in a good and serviceable repair such that the building is in a good and clean condition at all times in compliance with the laws and regulations as stated in both of the statutes stated above (Shukri & Maidin, 2010).

In view of the Strata Titles Act 1985, the power of COB as stated in the STA generally relates to the role of monitoring the duties of the MC. After an application made by the MC, the COB will have to appoint a person to convene the first AGM of the MC and the COB are also in a position to make sure that the AGM will be carried out smoothly in addition to the handling of the accounts and sinking fund from the JMB period. Moreover, the COB is also given the power to instruct in subject to any application made by the parcel owners or the original proprietor into appointing a managing agent. However, the COB can replace the managing agent if there is any complaint in regards to the existing managing agent. Other duties of the COB also include in approving the allocation of share units in the multi-storey building intended for subdivision and advice on planning. Among the most important roles of a COB is however still to attend to complaints from various parties in a strata development and resolve the disputes through mediation. All in all, the roles of the COB cover a wide range of jobs as an increasing number of strata developments has been increasing which will obviously need a huge and competent number of staff to help in administer, regulate and mediate the laws and issues regarding the strata development. (Mohamad & Sufian, 2013).

In terms of the Strata Management Act 2013, the act has created an additional post of a Deputy Commissioner. The creation of this post is to hope that the Deputy Commissioner will help the COB to relieve the burden of some of their works. The creation of Strata Management Tribunal in conjunction to the Strata Management Act 2013 will also help in easing the works and burden of the COB in terms of handling all the disputes and complaints. Under the Strata Management Act 2013, COB will be in charge of enforcing and administering the management of the strata development right from the initial developer management period until the establishment of the MC. In general, COB is now given a clearer and bigger role under the new Strata Management Act 2013 to manage all types of strata development (Mohamad & Sufian, 2013).

### 3. Identification of Issues in Relation to the Management of Mixed Use Development

For the purpose of identifying the issues in relation to the management of mixed use development, semi-structured interviews were carried out with three key informants who were selected based on their knowledge and expertise in strata developments and they were involved in drafting the Strata Management Act 2013 (Act 757). From the feedback that were gathered during the interviews, the information was analyzed in a Fishbone analysis and is presented in Diagram 1. The Fishbone diagram present the findings, which are organized into 4 parts, namely the issues of a mixed use strata

development, regulations of strata laws, enforcement of strata laws and awareness.

In general, COB is now given a clearer and bigger role under the Strata Management Act 2013 to manage all types of strata development (Mohamad & Sufian, 2013).

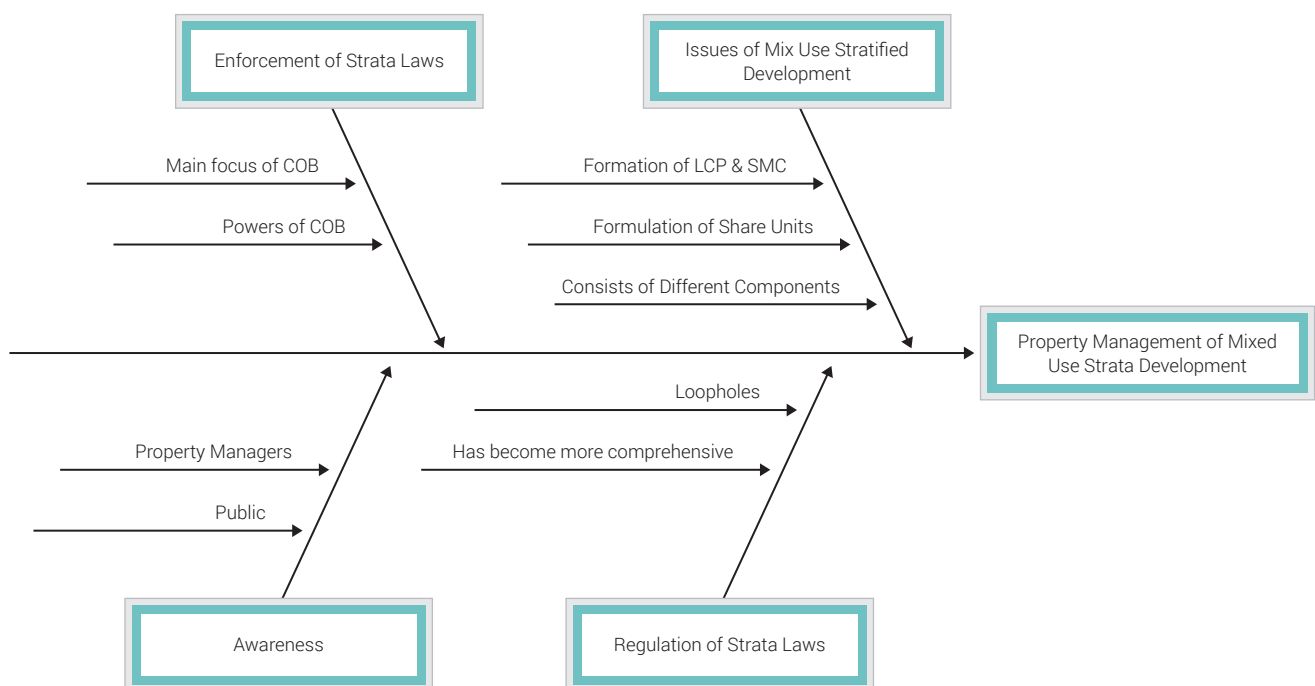


Diagram 1: Issues of Managing Mixed Use Strata Development



### 3.1. Issues of Mixed Use Strata Development

One of the issues in the mixed use strata development is the differences of components in a mixed use strata development. Each component in a mixed use strata development has its own specific uses which another component may not be in use of that particular service. Hence, the apportionment of charges in accordance to the share units of every parcel prove to be not equitable because of the differences of usage of the different components in a mixed use strata development. For instance, an apartment which has the same numbers of share units as the retail does not necessarily be using similar services.

*"In a mixed use development of retail and residences, retail is equipped with centralised air conditioning, whereas apartments are not equipped with centralised air conditioning..."*

- Interviewee 1

*"There are different responsibilities to be carried out in a mixed use development... in a hotel and residential mixed use development, the hotel requires a certain type of services 24 hours, but the residences do not require that much of services..."*

- Interviewee 3

Furthermore, the formulation of share units is carried out by parties who are less familiar to a mixed use strata development. The developers are less cared about crystallizing the whole development and putting every single component into details, hence they are just trying to get things done quickly by appointing a Licensed Land Surveyor without appointing another General Practice Surveyor or property manager to get the right and precise formulation of share units.

*"Developer must know the whole area of development in order for them to start assigning the share units to each and every parcel and provisional blocks... not many developers would have the forecast and the projections of what is going to happen in the future."*

- Interviewee 2

*"The appointed Licensed Land Surveyor are not equipped to work out the formulation of share units."*

- Interviewee 1

However, in the case of existing mixed use strata development or even upcoming mixed use strata developments, parcel owners can still choose to work out on a new formulation of share units which they think is equitable, and change the share unit formulation as fixed by the developer before handing in vacant possession. As stated by an interviewee:

*"If the development is already in existence, you can work out according to the weightage factor."*

- Interviewee 3

*"The authority is okay if you use the 4th schedule to work out on share units, but if you think it is not equitable, you can come out with your own proposed share unit formulation."*

- Interviewee 1

Nonetheless, coming out with a new share unit will not be a simple task. It involves many steps. All parcel owners have to come into an agreement to apportion all the expenditure in accordance with the adjusted surveyed area. There are no provisions in the Strata Titles Act 1985 to revise the share units at the moment. Therefore, the only way parcel owners can do to change and revise the share units is to apply to the court and get a court order.

*"Apply to court is the only way to appeal for a more equitable share unit."*

- Interviewee 1

*"There will be many people to be considered when making a decision in a strata development."*

- Interviewee 2

Another issue would be regarding the formation of the Limited Common Property and Subsidiary Management Corporation. In the current situation, the Limited Common Property can only be formed after the formation of the Management Corporation. The root to this part of the provision is to actually allow the Management Corporation which is comprised of the parcel owners to decide on the boundary of the Limited Common Property and subsequently forming the Subsidiary Management Corporation. However, strata experts have expressed the unreasonable fact to this provision whereby Limited Common Property should be formed even before the formation of Management Corporation.

*"Limited Common Property should be formed way before the formation of Management Corporation."*

- Interviewee 1

*"Developer is to decide the creation of Limited Common Property at the early stages of the development."*

- Interviewee 2

The formation of Limited Common Property only after the formation of Management Corporation can lead to several issues. This is one of the loopholes to the provision. The formation of Limited Common Property after the formation of Management Corporation is not only a matter of costing to re-consult a Licensed Land Surveyor, but it also leads to issues of re-designing the

boundaries of the Limited Common Property. Moreover, Management Corporation, which consists of mostly layman parcel owners are less exposed to the contents of the building which could lead to difficulties to be coming out with a plan for the Limited Common Property.

*"... Licensed Land Surveyor to reopen the subdivision to do special plan, then a fee will be charged again... how is it possible for a layman purchaser to know the contents of the building and come out with a plan for the Limited Common Property? Whereas the developers got their team of consultants like the M&E engineers, civil engineers, architects, Licensed Land Surveyor and property management consultants who can do the sub-division straight away."*

- Interviewee 1

### 3.2. Regulation of Strata Laws

Unlike the previous Building and Common Property (Management & Maintenance Act 2007, the Strata Management Act 2013 which came into force in 2015 has given a clear interpretation as compared to the previous act. Other than giving out heftier penalties to those who do not comply with the law, the Strata Management Act 2013 has answered to most of the problems in strata issues, for example like the introduction of Schedule of Parcels, Formula for the computation of allocated share units and the creation of provision for limited common property and subsidiary management corporation to name a few as stated in the literature review.

*"At this point of time, the Strata Management Act 2013 covers almost as much as we can."*

- Interviewee 3

*"The laws (Strata Management Act 2013) are comprehensive, it covers every angle of property management and maintenance."*

- Interviewee 2

*"The new laws are comprehensive..."*

- Interviewee 1

However, regardless of how well the new Strata Management Act 2013 is as compared to the previous Building and Common Property (Management & Maintenance Act 2007), there are still loopholes in the act.

*"... there are still grey areas. Professional bodies already put in a paper to propose and overcome these grey areas to make the law clearer."*

- Interviewee 1

*"... there is still room for improvement."*

- Interviewee 2

### 3.3. Enforcement of Strata Laws

As mentioned in the literature review, the Commissioner of Building (COB) will be in of higher powers in enforcing and administering the statutory provisions pertaining to the management and maintenance of strata buildings after and before subdivision processes. COB will also be in charge in mediating all the incoming disputes before parcel owners can proceed to the tribunal if the disputes cannot be resolved. This is mainly because COB does not have the power to settle any disputes but giving advices. Only the tribunal can settle the disputes.

*"Authorities want parcel owners with problems to go to the COB... if problems are attempted and cannot be resolved by COB, clearance letter will be given by COB, then with that clearance letter, they can go to the tribunal."*

- Interviewee 1

However, COB are not carrying on the mediating work efficiently. As the main focus of the COB would be on the enforcement and administering duties, the COB will not be carrying out their responsibilities properly when all the mediating job is lumped towards them. Needless to say, the inefficiency on mediating the disputes will only bring the dispute cases forward to the tribunal and wasting a lot of time while nothing is solved within the COB.

*"We don't see much effort and involvement of the COB in mediating the disputes... in the end, most of them (dispute cases) end up with the tribunal."*

- Interviewee 3

*"COB spends a lot of time delaying on mediating disputes for which they have no power to come into a proper conclusion... in the end disputes are handed over to the tribunal."*

- Interviewee 1

Therefore, COB should just be spending time on the administration and enforcement of the whole act and not mediating disputes before channelling the disputes to the tribunal after only when the COB is not able to solve the dispute. The mediating work is the main reason why the COB are taking up much of their time on disputes and leave aside the enforcement and administering work. Hence, making the enforcement very poor.

*"COB is not the right channel body to settle disputes."*

- Interviewee 2

*"COB should not be playing the mediator role."*

- Interviewee 1

In addition, COB have also problems of having the right people in their office. Mediation rights have been given to the COB. But they



COB will also be in charge in mediating all incoming disputes before parcel owners can proceed to the tribunal if the disputes cannot be resolved.

do not have the right people in the office to carry out these duties. Officers and legal officer are normally not exposed to the property management of a strata development. The lack of exposure of the officers and the legal officers will eventually lead to poor mediating duties in the office. Thus, resulting in undissolved issues, or sometimes even confusion between the parcel owners.

*"There are issues of communication with the COB, officers or legal officers working in the COB are not well versed with the laws."*

- Interviewee 2

*"COB do not have competent legal officers and officers to advise parcel owners. I think the training is incomplete."*

- Interviewee 1

Furthermore, there is a lacking of departmental staff in the COB. Officers in the COB tend to change departments very frequently.

Therefore, this causes an incoming of inexperienced new officers into the office. New officers will take time to learn about strata laws all the way from the beginning all over again. Thus, making enforcement, administering and mediation works even more inefficient.

*"... COB are lacking manpower, they do not have sufficient officers."*

- Interviewee 2

*"They (COB) do not have enough officers, they change the officers very frequent."*

- Interviewee 3

### 3.4. Awareness of Property Managers in Managing Mixed Use Strata Development

Unlike managing a homogenous stratified development, managing a mixed use strata development provides a different and more complex understanding of the building and the parcel owners. A mixed use strata development consists of different type of components of different users. In similar means, parcel owners of the different uses have also different expectations in the management of their components. Hence, property managers have to be competent enough to be able to manage a mixed use strata development.

*"Property Managers who lack in practicing experience will have problems managing a mixed use strata development."*

- Interviewee 2

*"Property Managers have to be experienced enough to manage a mixed use strata development."*

- Interviewee 1

Furthermore, the purpose of the law is to give property managers a guideline to adhere. Prior to

managing a mixed use strata development, property managers are required to fully understand the act to be able to carry their duties efficiently.

*"Property managers have to understand the law."*

- Interviewee 1

*"...most of the property managers should understand the Act and should be applying the provision in the Act."*

- Interviewee 3

However, property managers have to also be pragmatic in carrying out their duties as a property manager. When faced in a situation where property managers themselves think that the law is impractical, they should be adopting what is reasonable and wait for the law to be amended.

*"Law is made for the people, not people are made for the law."*

- Interviewee 1

### 3.5. Awareness of Parcel Owners Regarding Laws in Managing Mixed Use Strata Development

Most of the owners are not from the property background. Parcel owners are not expected to read the whole by-laws before buying the strata units. However, parcel owners have to know that they are bound to the strata laws once they step into the strata units. And education on these laws have to be provided to the parcel owners.

*"Parcel owners are not fully aware of the laws; they need more education on the laws implemented. Apart from the small ads in TV about strata schemes, I don't see any efforts or budgets from them (authorities) to educate the public about strata laws."*

- Interviewee 2

*"There is a need to educate the parcel owners about the laws."*

- Interviewee 1

Although there are few seminars held in cities like Kuala Lumpur and Penang, these seminar's tentative are not properly arranged to allow JMB committee members, MC committee members and parcel owners to get the most of these seminars. Topic sessions are relatively short and ineffective. Attendees of the seminars can only learn the gist of the property management of the strata development.

*"Every year, year in year out, I will be training people in Kuala Lumpur for short sessions under COB DBKL, and most of the time, I will be seeing the same faces for a couple of years."*

- Interviewee 3

*"Seminars are held in KL for JMB and MC committee members, but the sessions are very short for each topic and then followed by a Q&A session."*

- Interviewee 1

Developers also play a role after handing the vacant possession to the purchasers. Apart from the owner's kit, house rules and the by-laws, developers should also be given a handbook on the act to inform the owners that they are to comply to the Strata Management Act as they are entering into a strata property development.

*"Every purchaser must have a handbook on the act."*

- Interviewee 3

Despite the responsibilities that should be carried out by the developers prior to handing over the vacant possession to the owners, developers were not forthcoming. Developers were not truthful to owners and are not explaining to make things clear from the start

on what is to be expected. The main objective of the developers nowadays is mainly to dispose their properties as quickly as possible to gain profit quicker. Thus, making purchasers unhappy.

*"There are a lot of developers who are unscrupulous out there."*

- Interviewee 3

## 4. Conclusions and Recommendations

According to the interviews conducted with the strata management professionals, the laws implemented to manage the mixed use strata development has improved tremendously since the introduction and implementation of

The governing body should allocate more resources to organise training sessions and educational seminars for both the parcel owners and the property managers on living in mixed use strata developments.

the Strata Management Act 2013 (Act 757). However, there are still certain complex issues which need to be overcome in the near future to improve the management of the mixed use strata development. This not only applies to the governing body, but also the public, property managers and the professionals who are involved in a mixed use strata development.

The interviews revealed that there still some minor flaws in the property management of a mixed use strata development. Improvements can still be made to the laws. For instance, there should be more involvement between the developers and general practice surveyors to work out with a proper and precise formulation of share units so that parcel owners of different uses pay a considerable amount of charges in accordance to the ownership of their parcel. This can also prevent the complicated process of revising for a more equitable share unit through the application of the court order. Moreover, Limited Common Property should be formed in the Joint Management Body period instead of after the creation of the Management Corporation in a mixed use strata development. This can not only prevent the hassle to employ a Licensed Land Surveyor again, but also helps in preventing incurring additional cost to subdivide the building again.

In terms of regulation and enforcement of the laws towards a mixed use strata development, there is still some space for improvements that the government can work out to further enhance the strata laws. In the case of enforcement, the major problem that comes from the enforcing of the strata laws towards the mixed use strata development is the enforcing body which is the Commissioner of Building (COB). The COB is currently in charge



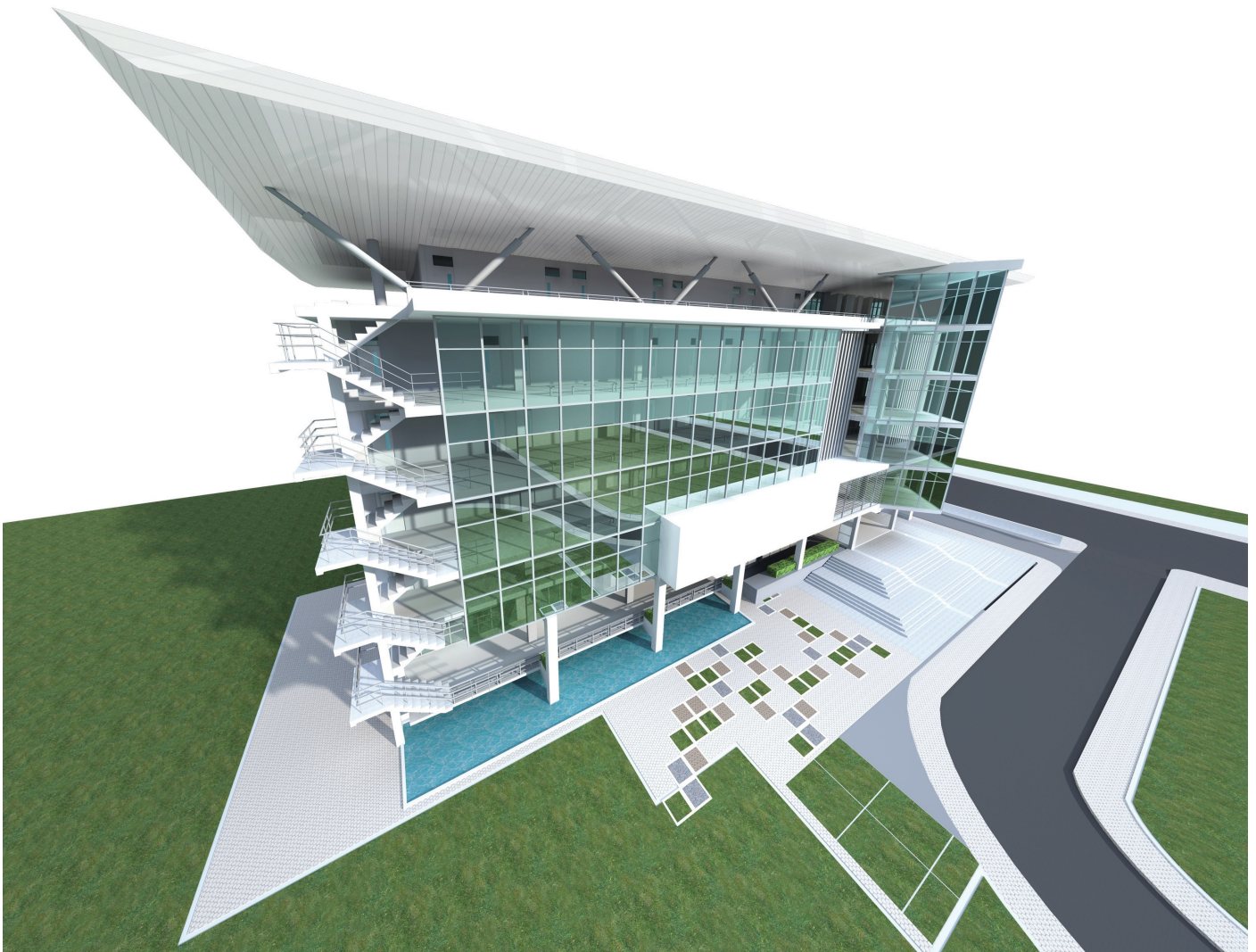
in mediation, administering and enforcing the strata laws. This scenario has taken up a lot of manpower. Mediating work should not be handed to the COB. Instead, the COB should be focusing only on enforcement and administration works so that the strata laws are implemented correctly and efficiently for every mixed use strata development or conventional strata development.

As for awareness, the governing body should be allocated more resources to organise training sessions and educational seminars for both the parcel owners and the property managers on living in mixed use strata developments. This can help in raising the awareness of living in mixed use strata developments and reduce unnecessary problems from occurring.

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# The Potential of Panoramic Images for 3D Indoor Model Reconstruction

## ABSTRACT

The potential of the digital camera is used to improve the methods of data acquisition and processing techniques. It automatically upgrades the manual methods to sophisticated ways to maintain the efficiency and accuracy of the data. The 3D indoor model can be developed using the photogrammetric technique, where the images capture in geometric and geographic ways. The implementation of 3D model is suitable for simple visualisation. 3D indoor modelling is a digital representation of the interior space in the specific building. The aim of this research is to assess 3D model indoor space using panorama images based on Close Range Photogrammetry method. Several methods such as laser scanning are used to generate the 3D indoor model in order to produce a good quality of 3D model. The validation between observe and actual measurement has been evaluated. The results indicate the accuracy of panoramic images able to produce 3D indoor modelling. This research assesses the accuracy of data based on standard deviation and RMSE of the 3D indoor model. In conclusion, the close-range method is useful for indoor space area due to the lighting factors and the condition of the research area.

**Keywords:** Terrestrial, indoor, sequential, 3D, accuracy.

## 1. Introduction

The term of close-range photogrammetry is generally used for terrestrial photographs having object distances up to about 300 meters. The rapid evolution of surveying techniques of close-range makes it is easy to use. Information of two-dimensional (2D) images can be extracted to generate three-dimensional (3D) data. In time, the demand of 3D modelling is increasing. The 3D modelling gives a good and high accuracies result in appearance (Wolf & Dewitt, 2000; Arias et al., 2006; Chandler et al., 2005).

Panorama photography refers to the area of the photography taken by a camera which the perspective point is changing to a wide field of view (FOV). The FOV of the standard camera is very small, which is one of the reasons that panoramic images are not useful for the monitoring of the environment. The 360° panorama scenes are used to understand the information and propose a model in 3D. Panoramic images can be obtained by using the basics of a digital camera. The advances in panoramic photography and photogrammetric software have enabled the photogrammetric methods to be used in a wider range of applications, at the same time reduce the equipment costs,

decreasing man-power and time making the whole process cost-effective. These advances evolved from the traditional photogrammetric methods (Luhmann, 2004; Deng & Zhang, 2003).

The developments and applications of close-range photogrammetry cover a wide field of different challenges in terms of accuracy, automation, process integration, cost-performance ratio and analysis (Suziedelyte-Visockiene, et al., 2015). Recent and future developments focus on higher dynamic applications, integration of systems into production, multi-sensor solutions and a higher accuracy and lower costs. Architecture,



documentation of cultural heritage and deck measurement in recreational ships are the examples of application in close-range

Panorama photography refers to the area of the photography taken by a camera where the perspective point is changing to a wide field of view (FOV).

photogrammetry (Desmond, 1994; d'Annibale et al., 2013; Hanke & Ebrahim, 1997; Jechev, 2001)

3D indoor modelling is a digital representation of the interior space in the specific building. To make sure the indoor space is in a good quality condition, several methods are used to monitor the maintenance of the indoor space. The manual methods used in monitoring the maintenance of the indoor building is old-fashioned since it takes a very long time to sketch, draw and record. Therefore, the potential of the digital camera is used to improve the methods of data acquisition and processing techniques. By doing this research, it automatically upgrades the manual methods to sophisticated ways to maintain the efficiency and accuracy of the data (Frastia, 2005; Guidi & Remondino 2012; Moe et al., 2010; Yilmaz et al., 2007).

The field-of-view (FOV) of the standard camera is very small, which is one of the reasons why

panoramic images are not useful as evidence for monitoring the environment. The 360° panorama scenes are used to understand the information of object detection and propose a model in 3D. The usage of panoramic images in Close Range Photogrammetry for 3D indoor modelling is one of the methods that gives a high-quality final output and which is time consuming. The comparison of measurement is applied to evaluate the accuracy of 3D models. The generation of 3D indoor modelling enables Close Range Photogrammetry as a technique to acquire the data and process the data until the final output. Researchers have found the potential of photogrammetric multi-station panorama processing for the 3D reconstruction and documentation of architectural objects (Figure 1).

The opportunity of using close range photogrammetry turns out to be one of the advantages in the documentation of archaeological artefacts and their possible



Figure 1: 3D modelling of Architectural Photogrammetry

reconstruction in the form of digital 3D models within the information system, as their development progresses "by leaps and bounds" (Luhmann, 2010).

According to Hanke & Grussenmeyer (2002), panorama images can be acquired quite easily by any type of modern digital camera. However, special notice must be given to geometric camera calibration if precise panoramas and/or photogrammetric products shall be achieved. In addition to standard calibration parameters, panorama adapters must be adjusted in order to ensure alignment of the rotation axis and the perspective centre of the camera. The mathematical model of panorama images is usually based on cylindrical coordinates. Since collinearity equations can be derived easily, all standard photogrammetric algorithms from space intersection to bundle adjustment can be applied (Belbachir et al., 2010).

Figure 2 shows an example for documentation purposes in architecture photogrammetry, panoramas are most useful inside rooms where an all-around image is desired. A very high image resolution and colour quality can be obtained from panorama images in order to get the valuable documents of the object. The advantage on 3D modelling for architectural photogrammetry is the measurement of tie points are a very limited number (Remondino et al., 2005). However, only several softwares are available to process panorama images for photogrammetric purposes.

Basically, the use of panorama photogrammetry became very popular in the early 19th century. First panorama images were taken using rotating frame cameras or by swing-lens techniques. From the



**Figure 2:** Examples of documentation in architecture photogrammetry

time of 19th century, panoramic cameras were put together with angular reading in order to determine the rotation angle of the camera. As a result, panoramic photographs and the use of photo-theodolite were well-connected (Luhmann, 2004; Ordonez et al., 2009).

Panorama photogrammetry presented some interesting panorama image acquisition and viewing facilities early in panorama photography. It has become more popular for 360° presentations of the natural environment (Schneider & Maas, 2003). For example, touristic purposes, weather forecast to mobile mapping and 3D reconstruction. Even low-cost digital cameras come with full or semi-automatic stitching software that combines some overlapping images into complete panoramic software (Parian & Gruen, 2010).

The development of new technology in sensor enables the acquisition of 360° panoramic images in high resolution and the format of the image up to almost one gigapixel. The advantages of display technology and computer graphics help to visualise images dynamically. Figure 3 shows the example of panoramic images. The use of panorama photogrammetry proves that the recording of indoor scenes is worthwhile (Luhmann, 2010). As a result, geometric modelling and camera calibration are helpful for 3D measurement and reconstruction purposes.

Panorama photogrammetry presented an approach in photogrammetric documentation could be used for 3-D measuring of structural remains of barrage systems and terrace walls as part of the archaeological survey.





Figure 3: Panoramic images



Figure 4: The research area

The documentation is based on panorama images and orientation of the images is using the natural control points (Vlahakis, et al., 2002; Browne & Lowe 2003; Klette, 2003).

According to Haggrén, et al. (2004), the procedures consist of the use of concentric panoramic images in a photogrammetric 3D reconstruction process, the use of close up photography for exact documentation and identification of the natural control points, and the use of photogrammetric documentation by archaeologists as their notebook during field invention. The result shows the accuracy of applying panoramic

imagery for the archaeological survey (Stojaković, 2008).

The research is intended to assess a 3D model of indoor space by using sequential images in Close Range Photogrammetry method (Figure 4). The recording of 3D indoor modelling is considered for photogrammetric documentation, where the images are controlled both in geometric and geographic ways. The control maintains the internal and external geometries of the images. After these two references are determined completely, the panoramic images can be transformed to a 3D modelling system. A purpose of recovery a 3D model is usable

for simple visualisation and fully automated procedures can be applied. The use of equipment and software is necessary to gain some of the knowledge. This research uses a total station which the accuracy is about  $\pm 2\text{mm} + 2 \text{ ppm}$  and a digital camera with a high-resolution image capturing.

## 2. Material and Methods

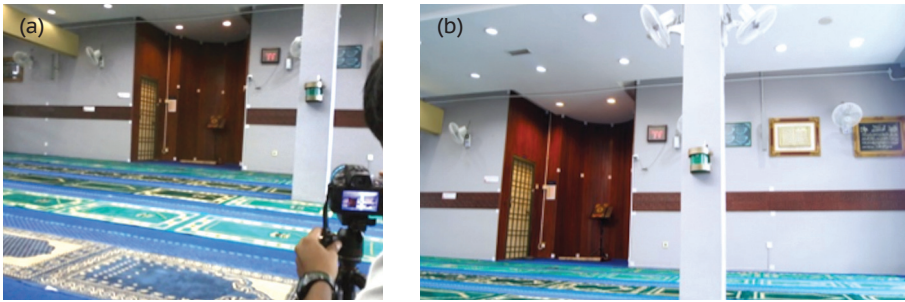
The research methodology is divided into several phases namely phase one, two, three, four, and five. Phase 1 explains the planning and design of work. Phases 2 discuss the instrument calibration. Phase 3 is about data acquisitions that consist of panoramic images and establishment of control points to set up camera stations. Phase 4 shows the process on how to generate 3D modelling. Lastly, phase 5 discusses the results and analysis of the research.

### 2.1. Planning and Design

Planning and design are conducted to gain some information for the research. It focused on the previous research that closely related to the current research. This phase is very important to make sure the research meets the requirements and specifications. The previous research discussed many types of data collection, methodology, calibration and processing using compatible software. Moreover, the research on data availability is very important to ensure the research can be done smoothly. After all, the aspects of previous research are applied and redesign for this research to achieve the aim and objectives.

Through this phase, the research on the 3D indoor modelling can be done from a different software that by processing the 3D model





**Figure 5:** Panoramic images (a) Digital camera on tripod captured an image (b) The example of images

based on sequential images, which is quite complicated. The scope of problems can be determined through the information obtained and the effectiveness of the software on sequential images. The previous research helps on selecting the suitable area to conduct the research. Fakulti Senibina Perancangan dan Ukur in UiTM Shah Alam has been selected as the research area for this research. The research area is in UiTM Shah Alam, Selangor Darul Ehsan. The building is small and rectangular. It is also as an initial process to identify the information of object detection and propose a model in 3D.

## 2.2. Data Acquisition

The images are captured in panoramic photography using digital camera Sony SLT-A35. Using a tripod the digital camera was set up at the camera station. From the camera station, images are captured horizontally with panoramic view. The process of capturing images is repeated on every five camera stations. The whole interior building has been captured to obtain a good result in the 3D model.

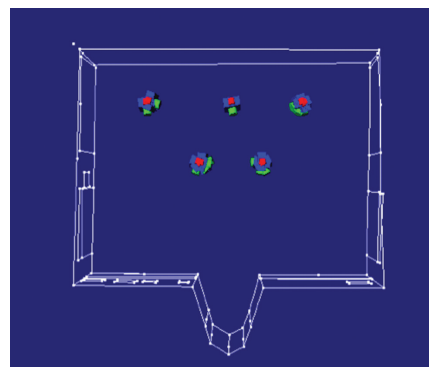
The camera captured all the interior features of the building as shown in Figure 5. The steps were repeated until all 360° view are captured. If the number of images is increased, then the higher of overlapping features on the images. It is important to have

enough target point to generate a perfect 3D model.

## 2.3. Data Processing

The processing method is based on 15 images that captured from every camera station. The images are captured in a 180° position and in panorama view. Figure 6 shows the position of camera station inside the building. The purpose of capturing an image in panorama view in this research is to identify the ability of the digital camera to capture panorama image for 3D indoor modelling. This panorama scene is captured in sequence and it is necessary to complete 360° model.

The purpose of camera stations is to capture and cover the panorama view inside the building. If the images do not completely capture the panorama view of the building, the orientation process will not successful to be processed. The

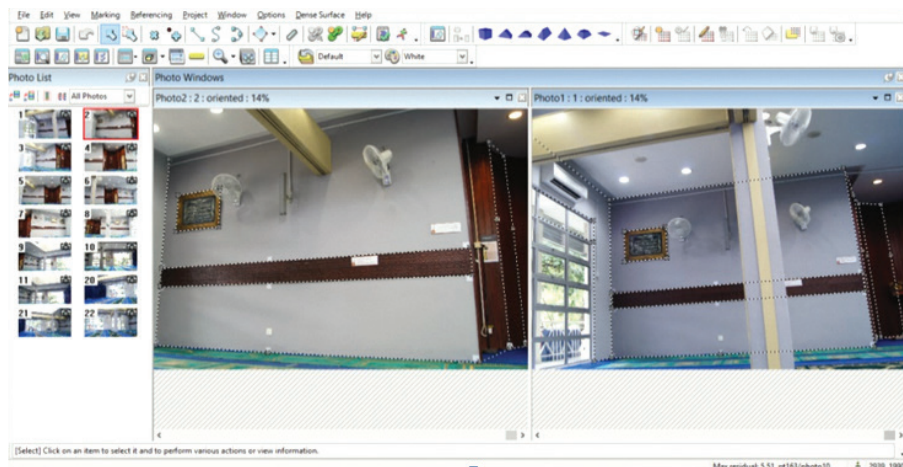


**Figure 6:** Position of camera stations

images must be at least 60% overlapped for each pair. The camera stations were 3-4 meters from the interior building, this is an ideal distance to capture the whole surface of the since the wall is relatively flat and it did not cause any problems with image matching.

The photogrammetric processing of image orientations consists of measurement of control and tie points and block adjustment. This can be done with Photomodeler software. At least, 10 - 15 tie points are used to orientate one panoramic stereo pair. The standard error of image observations has varied between 0.5 – 1 pixels. In PhotoModeler software, two modes of the project are introduced which are a point-based and shape-based project. For this research, point-based is selected. It is a process where points are marking in the image to create a 3D model. Every point that is marked on the images must be overlapping each other at the same position on the images. At least two images are needed to start marking a point in the software (Figure 7). The camera information has to be imported into the current research before starting any process in PhotoModeler.

The 3D modeling can be generated after the completion of data processing. The model is described and modelled as polylines. The corresponding points are identified and measured in both images and the 3D coordinates are determined by an intersection in space. However, the images can be viewed stereoscopically, which ease remarkably the interpretation of the structure. Since a panoramic image sequence is rectified to a plane, geometrically transformed and resampled, the resolution is reduced. The stretching of the pixels can reduce the interpretability as well. Therefore, it would be



**Figure 7: Referencing process**

better to use original images for all photogrammetric processing, or project them on cylinder instead of planes.

Once the images are oriented, the scale and rotation need to be inserted for the purpose of comparison between real world measurement and 3D measurement. The absolute value is assigned to the length of the feature but it is not an actual value. Correction needs to be made by entering a known distance between two points in the model. The unit must be in meters and to define the distance, two points or lines must be picked. A surface

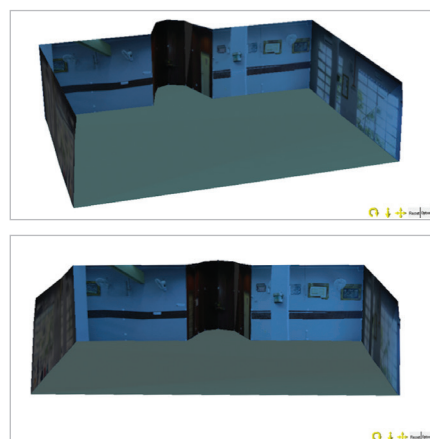
constructed by choosing points, lines, edges, and curves of the 3D objects. It gives the ability to create 3D model by marking in one image. It is useful to draw a detailed feature in one plane such as façade of the building. Drawing a surface does not require any referencing process so that the detailed in features are much easier to mark.

### 3. Results and Analysis

The interior orientation process recreates the geometry inside the camera. It requires camera calibration information to begin the measurement of image points. The principal point and lens distortion are used to refine the coordinate correctly. Referencing process is carried out in order to complete relative orientation. At least, 10 to 15 points are marked in one stereo pair. A successful referencing process is based on the residual of the images. The total residual of all images cannot exceed 5 pixels; this is due to maintaining the quality of the images. The residual can be corrected by re-do the camera calibration and use the best camera calibration information as possible. 3D positions were generated when

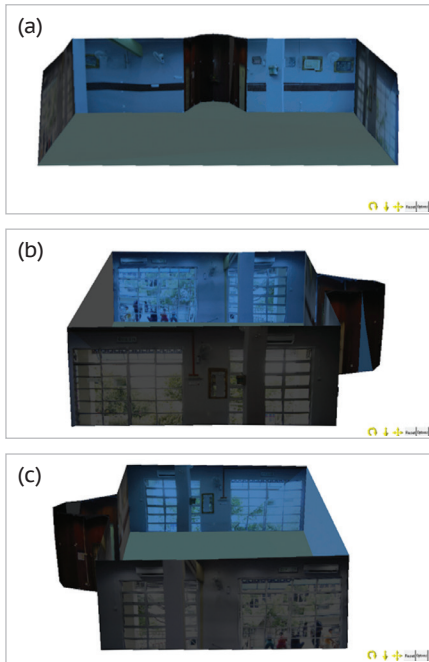
marked points projected in a straight line from the camera station, through the film. When the marked point is constructed on the images, it is possible to generate 3D model. One of the objectives of this research is to generate a 3D indoor modelling by using sequential images. Figure 8 shows the 3D indoor model of the research area. The 3D model is based on close range photogrammetry and it shows all the features inside the building.

The 3D model of the building is based on 15 images; the length was compared with the actual measurement in the real world using a measuring tape. The distance between the camera station and object during the capturing is about 3-4 meters. Images were taken with DSLR Sony SLT-A35. There are several factors that the 3D model deformed such as the incorrect way of marking points during referencing process, the lack of overlapping image will cause deformed the model since it needs to have enough point coverage and poor angle of camera defect the model because points will repeatedly mark the same location on the images. Good angle, well-distributed points marked, and quality of images give a good result of generating a 3D indoor model.



**Figure 8: 3D indoor model**

Good angle, well-distributed points marked, and quality of images give good results in generating a 3D indoor model.



**Figure 9:** 3D indoor model  
(a) Front view, (b) right view,  
(c) left view

There are 30 samples of distance have been compared based on actual measurement and 3D interior model results. The accuracy of the 3D interior model is 0.017m (Root Mean Square Error) and the standard deviation is +0.018m. This result explained the errors of the measurement in the oriented images that are affected by the marking point's process. From the results, analysis can be made by taking precautions that the errors of the model will be minimized, and measurement accuracy has a possibility to maximize.

All four models are captured in four different views: front, right, left and back view. The surfaces are not as perfect as the original images due to the overlapping of marking points during the orientation process. The 3D model in Figure 9 is produced using 15 images from digital camera DLSR SLT-A35. The procedure is applied, and the results indicate that the accuracy of panoramic

images able to produce 3D indoor modelling. As mentioned above, the surfaces of the interior building are distorted, most probably because of the residual error of marked point on each image are larger than it supposed to be.

#### 4. Conclusion and Future Work

The research has presented an approach in which photogrammetric method could be used for 3D indoor modelling. This research has achieved the aim and objectives for 3D indoor modelling. The consumer camera proved that DSLR SLT-A35 can generate a 3D indoor model to millimetres accuracy at the images. Resolution remains important and it is suggested that a 16 megapixels camera can provide a good resolution for surface measurement. The result shows that researchers could make use of the cheap camera for surface measurement using the photogrammetric software. The comparison of actual measurement with the measurement that the PhotoModeler used is interesting, which it is reliable to evaluate the results. The PhotoModeler Scanner software uses their ability in stitching more than 10 images to complete the orientation and manage to generate a 3D indoor modelling. The successful to complete the research in PhotoModeler proves that the generation of 3D model can be used in any applications related to indoor space. Performing the process in this research with a simple measurement such as tape distances, inexpensiveness of instrumentation like digital camera fits the procedure in orientation processes and easy to capture the sequential photos are several advantages that can be described.

For future developments on 3D modelling, reduction of processing

The result shows that researchers could make use of cheap camera for surface measurement using the photogrammetric software.

time can be considered. However, the 3D surface needs to be improved effectively to preserve the features on the surface of the buildings. There are several recommendations that would be useful in the future research such as ensure that the camera used for the research is well-calibrated. The information of camera calibration gives changes to minimize accuracy of the research, the number of images for each point is marked must be maximized to have a good overlapping coverage, ensure that all points appear on three or more images, the number of points that appear at two photographs have to maximize otherwise the research will not successful to carry out tie points measurement on next images, ensure that the angle between the camera positions close to 90 degrees as possible. For the research, the camera captured 360° view, at least, 25 points in the photographs have good coverage with 60% of overlapping coverage and the points need to be marked on each image precisely to minimize the residual errors in referencing process.



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# Investigation of Ethical Decision Making Towards Ethical Issues in the Construction Industry

## Abstract

Professionals such as Quantity Surveyors play crucial roles in ethical practices, particularly in the situation of ethical dilemmas and consequently affecting construction quality based on their decision-making. What is most important for a Quantity Surveyor in decision making is that they are perceived as consistent, persevering and well-judged. Hence, the aim of the research is to enhance ethics of the Quantity Surveyor towards ethical decision-making. To achieve this, the objectives are; to understand the theory of ethics and ethical dilemmas in decision making; and to investigate ethical decision making with regards to ethical issues in the construction industry. A questionnaire survey was conducted with Quantity Surveyors who work at the consultant's firms in Federal Territory of Kuala Lumpur. The data from survey was analysed using SPSS to determine the frequency, mean and standard deviation. The reliability data and the significance difference between mean are tested by using Cronbach's Coefficient Alpha ( $\alpha$ ). Results from data analysis identified the common ethical issues in the construction industry. The survey concludes that lack of quality of work, conflict of interest, cover pricing, improper Bills of Quantities practice, and also favouritism, discrimination and harassment are found to be the most influencing factors for ethical issues in the construction industry. This research is significant to Quantity Surveyors to enhance ethics at workplace.

Unethical practice is understood to be one of the most serious problems affecting the construction and construction industry (Shah and Alotaibi, 2017). Some of the most unethical issues in the construction industry are in the forms of unfair conduct, negligence, conflict of interest, collusive tendering, fraud and bribery (Rahman et al, 2009). Unethical practices can take place at every phase of a construction project during planning and design, pre-qualification and tender, project execution and operation and maintenance.

The consequences of these unethical behaviours in the construction industry can lead to a reduction in confidence in the profession, continuous insecure practices that risk lives and property, loss of income by customers and governments, unnecessary and basic expenditure that raises poverty levels and reduces quality of life (Shah and Alotaibi, 2017). The effects of unethical practices have lasting impact to construction and engineering companies such as wasted tender expenses, tendering uncertainty, increased project costs, economic damage, blackmail, criminal prosecutions, fines,

blacklisting and reputational risk (Adnan et al, 2012).

Making good ethical decisions requires a trained sensitivity to ethical issues and a practiced method for exploring the ethical aspects of a decision and weighing the considerations that should impact the choice of a course of action. The ethical decision-making process not only affects them personally, but can also have an impact on employees, communities and the overall ethical climate of the organisation (Starrat, 2004) and can even have an impact on communities and societies (Hatcher



and Aragon, 2000). Ethical decision-making is not simply to make a decision, it is the process by which human values are put into action.

Professionals in the Malaysian construction industry, namely architects, engineers and quantity surveyors, need to understand the ethical concepts that define the rules and practices of responsible behaviour between individuals, industries and the public. Chan et al. (2002) stressed that the inclusion of ethics clearly recognises that values and morality form part of a competence that increases professional credibility. Consequently, construction professionals should be solely responsible for carrying out their tasks with great care and diligence. Quantity surveyor as a construction professional has an important role in ethical practices, particularly in the situation of ethical dilemmas and consequently affect construction quality based on their decision-making. As a quantity surveyor, decision making must be perceived as consistent, persevering and well-judged.

This article aims to investigate ethical decision making with regards to ethical issues in the construction industry involving quantity surveyors. A questionnaire survey was conducted within consultant's firms in Federal Territory, Kuala Lumpur. A total of 144 quantity surveyors who work at the consultant's firms responded to the questionnaire. The data from the survey was analysed using SPSS and reliability of data and the significance difference between mean were tested by using Cronbach's coefficient alpha ( $\alpha$ ). The survey concludes that lack of quality of work, conflicts of interest, cover pricing, improper Bills of Quantities practice, and also favouritism, discrimination and harassment are

found to be the most influencing factors for ethical issues in the construction industry.

## Concepts of Ethics

Ethics is the philosophical branch that explores morality and the way of thinking that guides human behaviour. RICS (2000) define ethics as science of moral; moral principles or codes; and Guttman (2006) explains ethics as the science of duty. The drive of ethics is to acquire mental powers that enable one to overcome fleeting instincts and passions by favouring the good of the general over the bad; and to develop to a level at which the decision to be moral or ethical comes from the heart and the soul and must not be imposed by any external power Guttman (2006). Ethics is a set of moral values and principles that guide the code of conduct of individuals, organisations and professions (The Malaysian Institute of Integrity-IIM, 2004) and the concept of morality- one's ability to choose between right and wrong, good and bad, acceptable and unacceptable (Velasquez, 2009) and the code of morality that sets standards of good or bad, or right or wrong behaviour (Schemerhorn, 2008).

Ethical behaviour is accepted as good and right in the context of the governing moral code, rather than bad or wrong (Abuznaid, 2009). Ethical action must be taken to ensure that these practices and rules are consistently applied in all daily business situations (Orme and Ashton, 2003). Ethics is seen as the thinking and behaviour of "what is morally right or wrong" and "what people should do" and applied to daily personal and work practices. Ethics have an absolute impact both on the credibility and economic sustainability of

companies and also on personal safety. Pearl et al. (2005) stated that ethics is merely not about acknowledging an objective good, but also about thinking, language, reasoning, processes and judgment that informs the choices made by people in their daily lives that affect their own and others' well-being.

## Professional Ethics

The concept of ethics linked to the concept of professionalism which operated in a highly fragmented industry with many different skills and professions. Royal Institution of Chartered Surveyors (RICS) (2000) stated that behaving ethically is at the heart of what it means to be a professional; it distinguishes professionals from others in the marketplace. RICS professionals demonstrate their commitment to ethical behaviour by adhering to five global professional and ethical standards. The five global and ethical standard such as 1) able to demonstrate that they act with integrity, 2) always provide a high standard of service, 3) act in a way that promotes trust in the profession, 4) treat others with respect, and

Ethics is the philosophical branch that explores morality and the way of thinking that guides human behaviour.

5) take responsibility. Hong Kong Ethics Development Committee (HKEDC) (2003) explained that professionalism implies a high level of behaviour and social responsibility that a construction professional expects when exercising their expertise, judgment and supervisory responsibility for managing or implementing a construction project.

## Ethical Issues in the Construction Industry

The construction industry has a bad image in terms of ethics (Poon, 2004), unethical or illegal behaviour (Berawi, Abdul-Rahman, and Wei Siang, 2008) which is indicated when many parties claimed that construction professional such as architect, surveyor and engineer has been involved in some unethical cases. Unethical professional

Previous studies have shown that most unethical behaviour in the construction industry takes the form of unfair conduct, negligence, conflict of interest, collusive tendering, fraud and bribery.

practices in the construction industry such as bribery, fraud, collusive tendering, withdrawal of tender bid, bid shopping, payment games such as holding due payments, claims games i.e. exaggerated claims, false claims, extortion and threats, conflict of interest, professional negligence, negligence to environment are toxic to the construction environment (Vee and Skitmore, 2003; FMI and CMAA, 2004; Pearl et al., 2005; Shah and Alotaibi, 2017). Olatunji (2007) cited in Ferrell and Weaver (1978) identified negative tendencies like Quantity Surveyors' frequent temptation to provide trade secret in exchange for unscrupulous inducements, compromise to dispense professional service with very despicable low level of honesty, such as competency challenges traceable to negligence and stern denial of fault. Common practice in tendency to exaggerate services provided to deceive client into paying more than necessary.

Various literatures have shown that most unethical behaviour in the construction industry takes the form of unfair conduct, negligence, conflict of interest, collusive tendering, fraud and bribery (Vee and Skitmore, 2003; Pearl et al., 2005). There are obviously important areas of concern relating to the ethical conduct of construction professionals (Abdul-Rahman et al., 2010). The instances of ethical issues are explained as follows:

### Dishonesty

Poon (2004) explained dishonesty has a stronger linkage to illegal behaviour and is thus more appropriately linked to fraudulent activity and Vee and Skitmore (2003) stated unfairness can be combined with dishonesty. Rahman et al. (2009) stated that the most parts of dishonest conduct experienced

by experts are cordiality, blessings, actions, rewards, earth security, and well-being, as well as political and social behaviour.

### Negligence

Negligence is defined as "failure to exercise that degree of care which, in the situations, the law requires for the fortification of those interests of other persons which may be injuriously affected by the want of such care" (Delbridge et al, 2000). Poon (2004) clarified that negligence deals with the needs for proper care and the failure to carry out such a duty of care for others. There are several forms of negligence such as poor documentations, poor workmanship, poor material quality, inadequate safety standards and short payment and late payment (Poon, 2004; Berawi et al., 2008).

### Conflict of Interest

Conflict of interest happens between the personal interest and organisation interest which put the professional in conflict. Conflict of interest falls within "grey area" according to Abdul-Rahman et al. (2009), in as much as it often involves a personal interpretation of whether or not certain behaviour is commonly acceptable. Conflict of interest occurs when an individual or organisation such as engineer, architect and quantity surveyor has an interest that might compromise their reliability. Olatunji (2007) provided good example of conflict of interest such as "diverting from the organisation for personal interest, for business opportunity, use organisation's tool or assets for personal interest or benefit, accepting any valuable thing from organisation's customers or suppliers and having a financial interest in an organisation's competitor".

## Fraud

Major form of fraud is purposely covering up poor workmanship and material quality during inspections, constructing with materials not included in their quotations, over ordering material, tampering of signed documents, altering contract documents (Vee and Skitmore, 2003), misinformation, employing illegal workers, speeding up for payment (Berawi et al., 2008).

## Bribery

Poon (2004) defined bribery as the briber offering someone money or any others material as inducement to the receiver to get benefit from the action even though the briber is not entitled. Abdul-Rahman et al. (2009) stated if the gifts given by payer influence the decision or action to the receiver, such an act could be said as bribery but if the action does not fulfil the conditions above, the gift cannot transform to bribery.

## Collusive Tendering

Collusive tendering is defined as illegal agreements between tenderers that result in seemingly competitive bids, price fixing, or market distribution schemes that circumvent the spirit of free competition and defraud clients (Zarkada-Fraser, 2000). Methodology of tendering is one of the basic techniques in the construction industry that addresses moral issues from expenditure caused by inadequate tenderers, reasonable tendering practices and the right of disclosure to reveal irreconcilable situations.

## Cover Pricing

The term "cover pricing" refers to a practice in which a company wants or believes that it is necessary to tender for a particular project but does not want to win the tender or

has no time or resources to prepare a carefully priced tender for the project. The company therefore submits a high offer, which it does not expect to be successful (McHugh and Forster, 2012). An organisation may have decent reasons to ask at a spreading cost so that it can present a solid offer, including that: it could be dropped from a delicate downturn if it does not join or if it still needs employment capacity for the same important occupation in the future (Shah and Alotaibi, 2017).

## Lack of Quality Control of Work

Types of unethical conduct witnessed or experienced in the industry include "lack of quality" (Vee and Skitmore, 2003). Abdul- Rahman et al. (2010) added most of quality issues are perceived to be triggered by human factors. Unethical behaviour by the construction industry parties impacts the quality of projects (Rahman et al., 2009).

## Improper Practices on Bill of Quantities

The major problems identified during pre-contract stage are poor quality of drawings, poor specification,

low remuneration, difficulty in interpretation of standard method of measurement, difficulty in carrying out measurement on site and limited time to carry-out measurement. Vee and Skitmore (2003) divided breach of professional responsibility into three (3) categories such as conflict of interest, confidentiality and propriety information infringements and breaches of environmental ethics.

## Concept of Ethical Decision-Making

Ethical thinking involves the intricate process used to consider the impact of our actions on the individuals or institution served (Chmielewski, 2004). While most decisions are routine, we can unexpectedly face an ethical dilemma when unusual situations occur suddenly for which an immediate response is needed (Chmielewski, 2004). Ethical conflicts between these participants can therefore easily arise unless a certain degree of alignment of ethical standards and values is established throughout the project (Kang and Shahary, 2012). Thus, making good ethical decisions requires a trained sensitivity to ethical issues and a





practiced method for exploring the ethical aspects of a decision and weighing the considerations that should impact our choice of a course of action. The foundation of ethical decision making involves choice and balance; it is a guide to discard bad choices in favour of good ones (Hojnacki, 2004).

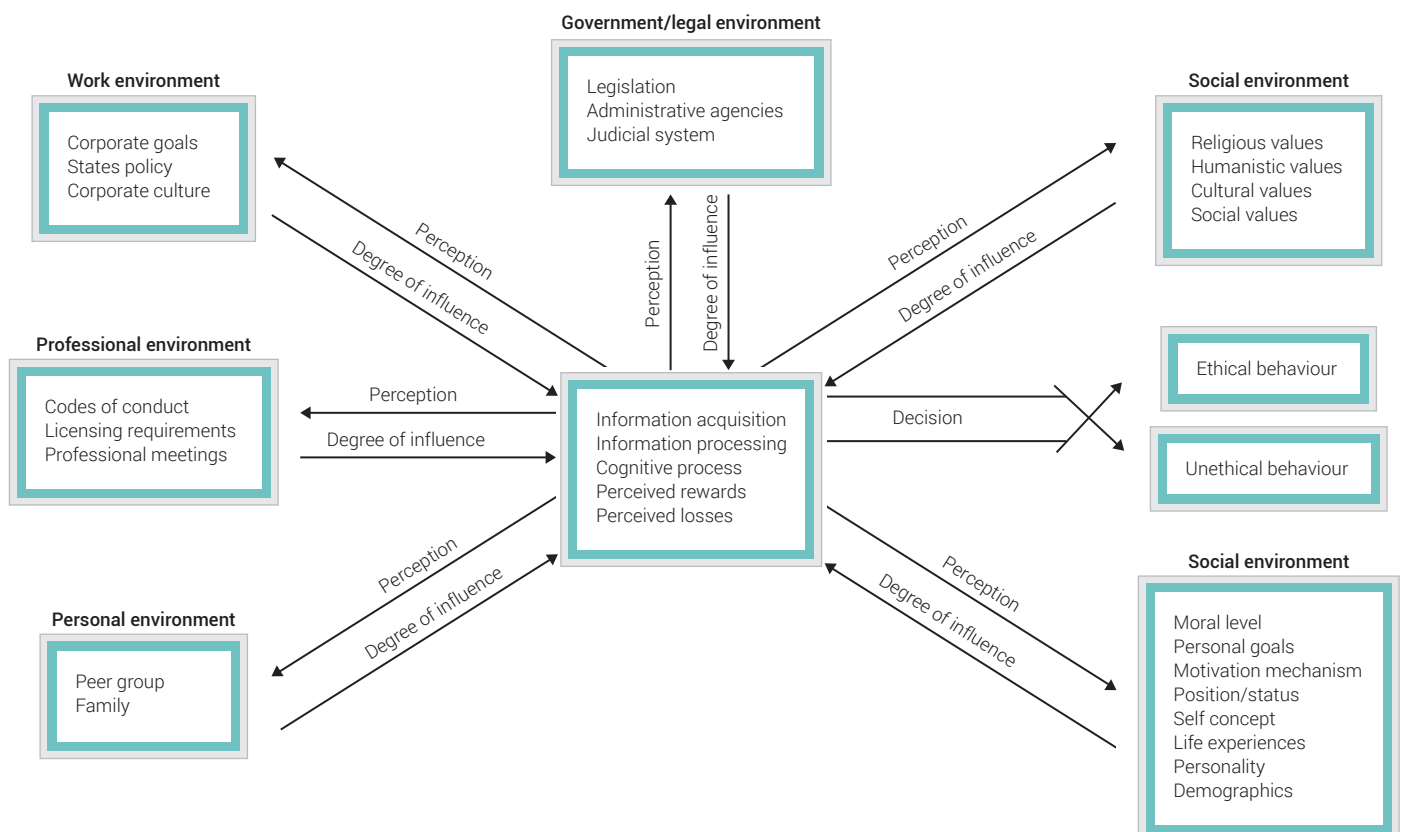
## Model of Ethical Decision-Making

As Bommer et al. (2013) cited, the prediction ethical decision making theoretical model include the general theory of ethics of Hunt and Vitell (1986), which includes personal, organizational, industrial and cultural factors; the contingency framework of Ferrell and Grisham (1985), which includes social, cultural, individual and opportunities factors; the behavioral model of Brommer, Gratto, Gravander and Tuttle (1987),

which includes work, personal, professional, governmental, legal and social factors And Trevino's (1986) situational-individual model, which includes individual, employment and organizational factors. Rest's (1986) of four-component analysis for individual ethical decision making and ethical behaviour is a famous framework for decision making. It comprises four main components: moral awareness, moral judgement, moral motivation, and moral behaviour. In addition Jones moral intensity model (1991) incorporates the factors based on the four - stage process of Rest's (1986): the recognition of moral issues, moral judgment, moral intent and moral behavior. Jones uses the stages of Rest to link the ethical decision - making models of Hunt and Vitell (1986), Ferrell and Grisham (1985), Brommer, Gratto, Gravander and Tuttle (1987) and Trevino (1986) and

argues that ethical decisions are not just individual decisions but are determined by the organisation's social learning. Finally, Brass, Butterfield and Skaggs (1998) in most recent social network model includes individual, organisational, problem-related factors and types and structures of the ethical decision maker social relationships. The collection and processing of information within the value structure and the cognitive limits of the decision- maker are associated with each of these steps as shown in Figure 1.

These categories include the social, government and legal environment of the decision - maker, the professional environment, the working environment, the personal environment and individual attributes. The model connects these influences on ethical and



**Figure 1:** A behavioural model of ethical and unethical decision making

(Source: Bommer et al., 2013, p. 99)

unethical behaviour through the mediating structure of the decision-making process of the individual. The decision-making process in the model functions as a central processing unit with its own internal characteristics, such as the cognitive style of the individual, the type of data acquisition and processing, and the perceived loss and reward levels, which influence the decision. The model also differentiates between the degree of influence that the decision-maker perceives and the influence that the various factors have.

## Research Methodology

The occurrence of ethical decision making through self-administered questionnaires was evaluated with quantitative data in this research categorising four (4) phases:

### Phase 1: Secondary Data Collection

The data for literature review collected from references such as reference books, journals, articles and some from electronic sources, websites.

### Phase 2: Primary Data Collection

The questionnaire for the survey was distributed to 200 numbers of quantity surveyors working in consultant's firm in Federal Territory of Kuala Lumpur through email and by walk-in to the organisations. However, only 144 respondents out of 200 samples have responded to the questionnaire survey, which indicate 72% responses.

### Phase 3: Data Analysis

The data collected was analysed using Social Science Statistical Packages (SPSS) version 22.0. Statistical SPSS software was used to test the reliability of the

data and testify the hypotheses. The variance must be reliable and valuable. The reliability of the data in the questionnaire survey was tested using Cronbach's coefficient alpha ( $\alpha$ ). The estimate of Cronbach's coefficient alpha ( $\alpha$ ) (often symbolised by the lower-case Greek letter  $\alpha$ ) should be interpreted just like other estimates of internal consistency.

### Phase 4: Conclusion and Recommendation

Conclusion was produced based on the data collected. The recommendation would be generated based on the conclusion to improve the current situation and overcome the problem encountered in this research.

## Data Analysis and Discussion

The questions included gender of the respondent, age of the respondent, education level of the respondent, designation of the respondent and working experience of the respondents either within company's organisation or within construction industry. The findings on the respondent's gender information shows that most of the respondents were female which concluded 75% (108) of the total respondents. Male respondents concluded 25% (36) from the total of 144 respondents. Respondents who were age 20-30 years old shows the uppermost percentage which was 126 numbers of respondents (88%). Then there were 12 numbers of respondents (8%) age 31 to 40 years old and the lowest was 6 numbers of respondents (4%) age 41 to 50 years old. The qualification of respondents was to identify the academic background of each respondent and the different perspective from them towards the subject of this research.

The foundation of ethical decision making involves choice and balance; it is a guide to discard bad choices in favour of good ones (Hojnacki, 2004).

A total number of 108 (75%) out of 144 respondents held degrees, 6 people (4%) were from a diploma background. 21% which made up of 30 people of the respondents held a masters. All in all, it can be seen majority of the total respondents are degree graduates who are practising in quantity surveying firms in Malaysia. None of them are from 'others' qualification. The designation of respondent was taken into consideration because the data has a significant impact on the result of the survey. It shows that the respondent's high-level position is commonly due to their increased experience in the construction industry, with experience leading to the viability of the collected data. The highest percentage was 13% (120) which was Quantity Surveyor, followed by Senior Quantity Surveyor with 13% (18) and Technical Assistant QS which determined as others with 3% (4). The lowest was Principle/Director with 1% (2). The results certainly have an important effect on the data collected. The data

collected was reliable and viable, as the majority of the respondents were relevant to their company's position.

The respondent's work experience has a significant impact on the research. If respondents have more experience in the construction industry, they may have more experience in ethical decision-making. The survey regarding working experience of the respondent was divided into two; within the company's organisation and within the construction industry. Most of the work experience by the respondent within company's organisation was in the range of 1-5 years with 79% (114), next the range of less than 1 year with 13% (18) and in the range of 5-10 years with 8% (12). The lowest percentage was from the range of more than 10 years which contributed to 4% (6). The work experience by the respondent was the most important data which will give significant impact on the reliability and validity of the findings for the research. Most of the work experience by the respondent within construction industry was in the range of 1-5 years with 80% (115). Next was the range of 5-10 years with 13% (18) and in the range of more than 10 years with 4% (6). The lowest percentage was less than one year contributed to 3% (5). In the construction industry, the majority of respondents have at least more than one year of experience.

### The Ethical Decision Making with Regards to Ethical Issues in the Construction Industry

This section describes the ethical decision making with regards to ethical issues in the construction industry. The reliability test of the questionnaire survey was assessed using the Cronbach's Coefficient

Alpha ( $\alpha$ ) test. The total number of questions as well as the number of respondents affect the result of Cronbach's Alpha ( $\alpha$ ) test. The mean index and standard deviation have been calculated and ranked in ascending order. The outcomes of the survey data were established using Cronbach's Coefficient Alpha ( $\alpha$ ) to determine the consistency and reliability of the question. The alpha's acceptable values ranged from 0.70 to 0.95 based on the rule of thumb for Cronbach's Coefficient Alpha ( $\alpha$ ) test. The outcome of the reliability test shows that the Cronbach's Coefficient Alpha ( $\alpha$ ) was 0.96 (excellent) to achieve the objective in investigating ethical decision making with regards to ethical issues in the construction industry. This outcome explained that the questionnaire survey used was consistent and reliable in this research.

There were 20 ethical issues in the construction industry that impacted the ethical decision making of quantity surveyors. The results for mean index and standard deviation are shown in Table 1.

Overall, the evidence from the results suggests that ethical issues that act on ethical decision making of the respondents and their organisations are relatively decent. The ethical issues with regards to the ethical decision making are summarised in Table 2. The issues were ranked and tabulated in accordance with the mean index on ethical issues.

The mean index was ranked according to the ascending order in which the Likert scale represented the mean ( $0.00 \leq a < 1.00$ ) was strongly disagreed, ( $1.01 \leq a < 2.00$ ) was disagreed, ( $2.01 \leq a < 3.00$ ) was neutral, ( $3.01 \leq a < 4.00$ ) was agreed and ( $4.01 \leq a < 5.00$ ) was strongly agreed. The discussion highlighted only the top five and lowest five of

the ethical issues with regards to ethical decision making.

As shown in Table 2, the highest top five ethical issues that impacted the ethical decision making was lack of quality control of work (Rank 1: mean = 3.96), followed by conflict of interest (Rank 2: mean = 3.79). Practice of cover pricing (Rank 3: mean = 3.75), improper Bill of Quantities practices by quantity surveyor (Rank 4: mean = 3.75) and lastly, favouritism, discrimination and harassment (Rank 5: mean = 3.75).

Initially, successful delivery of a construction project depends on the quality standards defined in the scope of work of a construction contract. However, there was often the issues of lack of quality control of work in the construction industry. The controlling of work consists of setting the target, monitoring and taking actions to ensure that the project to be carried out as planned. Though, the reason can be because of ineffective standard quality control of construction works such as failure to take control of the bidding exercise and also acquisition of information related to the volume or quantity of work and which was used to set the budget and monitored it out became the ethical issues.

The conflict of interest experienced by professional as quantity surveyor was usually diverting from personal interest and the organisation's interest for the business opportunity. The conflict can break the relationship between the parties of the project, affected the quality and productivity of work and lead to project failure if it is not well managed.

There were issues of practice of cover pricing in which quantity surveyors employed to protect the interests of clients interact



**Table 1:** The mean index and standard deviation of ethical decision making with regards to ethical issues in the construction industry

Item	Ethical Issues	Mean	Standard Deviation	Rank
B1.1	Unfair conduct	3.58	0.55	3
B1.2	Conflict of interest	3.79	0.69	2
B1.3	Collusive tendering	3.67	0.61	10
B1.4	Bribery and corruption	3.54	0.51	15
B1.5	High level of professional dishonesty	3.63	0.56	12
B1.6	Practice of cover pricing	3.75	0.62	3
B1.7	Poor in demonstrating good understanding of ethics	3.58	0.78	14
B1.8	Illegal collaboration with other firms to detest statutory and procedural standards	3.42	0.50	19
B1.9	Misrepresentation of financial status or records	3.71	0.63	8
B1.10	Favouritism, discrimination and harassment	3.75	0.72	5
B1.11	Improper bidding practices	3.71	0.63	7
B1.12	Improper Bill of Quantities practices	3.75	0.63	4
B1.13	Compromising personal principles to favour organisation's expectation	3.71	0.60	6
B1.14	Conspiring/collaborating to cover indecent practices of self, colleagues and superiors	3.67	0.58	9
B1.15	Lack of quality control of work	3.96	0.82	1
B1.16	Outright denial of fault	3.50	0.69	16
B1.17	Professional negligence	3.67	0.66	11
B1.18	Conspiratorial with external forces to defraud the client	3.46	0.57	18
B1.19	Failure to practice whistle-blowing	3.46	0.51	17
B1.20	Mishandle sensitive information	3.42	0.51	20

with greedy contractors to cheat others. It was maybe such an act of tendering an excessively high price for a contract, on the assumption that the tender will not be accepted. Thus, this could be considered as unethical conduct by a professional which cause consequence to the ethical issues.

One of the quantity surveyor's roles is to prepare bills of quantities and other contract documents relating to the project. However, the accurateness of the information in the Bill of Quantities has always been criticised with the improper preparation of Bill of Quantities by the quantity surveyor. It can be seen

that there were some common mistakes that can be made in the Bill of Quantities and sometimes may be considered as unethical behaviour of a quantity surveyor and thus become as ethical issues to the project.

Last but not least, favouritism, discrimination and harassment

**Table 2:** The overall ranking of ethical decision making with regards to ethical issues in the construction industry

Mean	Ethical Issues	Rank
3.96	Lack of quality control of work	1
3.79	Conflict of interest	2
3.75	Practice of cover pricing	3
3.75	Improper Bill of Quantities practices	4
3.75	Favouritism, discrimination and harassment	5
3.71	Practice of cover pricing	6
3.71	Compromising personal principles to favour organisation's expectation	7
3.71	Improper bidding practices	8
3.67	Misrepresentation of financial status or records	9
3.67	Conspiring/collaborating to cover indecent practices of self, colleagues and superiors	10
3.67	Collusive tendering	11
3.63	High level of professional dishonesty	12
3.58	Unfair conduct	13
3.58	Poor in demonstrating good understanding of ethics	14
3.54	Bribery and corruption	15
3.50	Outright denial of fault	16
3.46	Failure to practice whistle-blowing	17
3.46	Conspiratorial with external forces to defraud the client	18
3.42	Illegal collaboration with other firms to detest statutory and procedural standards	19
3.42	Mishandle sensitive information	20

also may be common ethical issues in the construction industry based on the respondent's answers. There was a time when quantity surveyor has falsified reports to favour selfish interest without considering professional implications and employer's requirements. That individual has potential to cover systemic errors for unprofessional reasons. The

discrimination may happen in the situation of compromise to pressure by expressed threat to other professional opinions and standards.

While the one of lowest five of ethical issues that impacted the ethical decision making was outright denial of fault (Rank 16: mean = 3.50). Followed by failure to practice whistle-blowing (Rank 17: mean

= 3.46) and conspiratorial with external forces to defraud the client correspondingly (Rank 18: mean = 3.46). Last but not least, illegal collaboration with other firms to detest statutory (Rank 19: mean = 3.42) which the second least agreeable statement and finally, procedural standards and mishandle sensitive information (Rank 20: mean = 3.42).

Adverse tendencies, such as the frequent temptation of quantity surveyors to provide trade secret in exchange for dishonest inductions, compromise the provision of professional service with a very despicable low degree of trustworthiness, especially when faced with challenges that can be traced to negligence and stern denial of fault.

Other than that, the failure to practice whistleblowing was considered in view of the personal conflict of whistleblowing, where it will act as unethically according to RICS core principles by not reporting other unethical behaviour. It can be said that it involved other people and against the principle's statute.

With regard to conflicts of interest with the client, the quantity surveyor must promptly disclose the relevant facts and refuse to continue the commission unless requested. If these were in conflict of mishandle information, then neither party will be comfortable with the other and profits will suffer as a result of the project.

It can be determined that most of the ethical issues as shown in the mean index were categorised as agreed, ranged  $3.01 \leq a < 4.00$ . This indicates that the respondents agreed that the ethical issues happened in the construction industry may impact the ethical decision making for the quantity surveyor.

The top five shows that the ethical issues became the main reason on ethical decision making to the quantity surveyor. While the lowest five shows that the ethical issues made less contribution to the ethical decision making. This is revealed from the results of the statements in the questionnaire which indicate that they were aware of the presence of ethical issues in the Malaysian construction industry.

## Conclusions

This research was to investigate ethical decision making with regards to ethical issues in the construction industry. Based on the data gathered, there were 20 ethical issues in the construction industry affecting the ethical decision making of quantity surveyor. The ethical issues have been ranked based on the respondent's agreement towards the ethical issues in the construction industry that commonly become the reason of ethical decision making. Ethical issues were those which related to the grey areas between what was accepted as right and wrong. Based on the data analysed, the top rank of ethical issues in the construction industry has been demonstrated to be the main issues of ethics. For instance, the issue of quality has undoubtedly taken on a new sense of urgency and importance within occurrence of activities happening in the industry in Malaysia. The quality of the products was adversely affected if the parties to the contract such as quantity surveyor do not carry out their duties properly especially in decision making. The lack of quality control also reflected the unethical conducts which have an adverse effect on the quality of the works.

Other than that, ethical issues of conflict of interest in the industry may occur to any profession in any type of organisation in the industry such as consultants using their position for financial gain or clients awarding contracts to companies. Conflict of interest becomes unavoidable issue in the construction industry. Practice of cover pricing takes place when bidders submit a price that was not intended to win the contract they are bidding for. This price was a price that would have been agreed upon between bidders who wishes to win the contract. Thus, it could

be a breeding ground for ethical breaches. Improper Bill of Quantities practices was considered as one of the ethical issues as it is obligated to the quantity surveyor to prepare and provide. The Bill of Quantities was a contractually one of the important documents that specify the quantity and quality aspects of every essential part of construction project. The inappropriateness of Bill of Quantities may lead to greater variability, increase risk and consequence more disputes in a project. Other than that, it can be frustrating to work for someone who plays favourites as favouritism and when the someone makes a job decision based on the protected characteristics of others will then become discrimination. Thus, there was a need to address the increasing concern of ethical issues in the industry. The ethical issues should be seen as something of interest and thus help to dismiss the impression that issues such as these are less important or disconnected from the construction sector.

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# RISM 58th Annual General Meeting



**Date** : 21st June 2019

**Venue** : Hotel Istana, Kuala Lumpur

The 58th Annual General Meeting of RISM was held on 21st June 2019 (Friday) at Mahkota 2 Ballroom, Istana Hotel, Jalan Raja Chulan, Kuala Lumpur. The AGM was chaired by the RISM President, Sr Hj Mohammad Azmi bin Mohd Zin. As part of the agenda during the AGM there was the appointment of internal auditors, announcing the Members of General Council for Session 2019/2020, introduction of Councillors for the Session 2019/2020, the presentation of Certificates of Appreciation to previous Councillors of Session and to present Diplomas to New Members and RISM Examination Certificates.





# 58th Annual Dinner

**Date** : 22nd June 2019

**Venue** : Istana Hotel, Kuala Lumpur

The annual dinner was graced by our Royal Patron His Royal Highness the Sultan of Selangor, Sultan Sharafuddin Idris Shah Alhaj Ibni Almarhum Sultan Salahuddin Abdul Aziz Shah Alhaj.







# 21st International Surveyors' Congress

**Date** : 20th - 21st June 2019

**Venue** : Istana Hotel, Kuala Lumpur



RISM has organised the International Surveyors' Congress (ISC) annually since 1999. The latest ISC is the 21st in the series. It was held at Istana Hotel, Kuala Lumpur on 20th - 21st June 2019. The Congress was officiated by the YB. Dr. Xavier Jayakumar, Minister of Water, Land and Natural Resources Malaysia. The theme for this event was "Surveying the Future" alongside an "International Seminar on United Nations Global Geospatial Information Management". This International Seminar was aimed to deliver considerable awareness and understanding of the significance of reliable, timely and quality information for evidence-based policies, decisions and programmes nationally and sub-nationally. Such information and knowledge are necessary for natural and built environment professionals to embrace the digital transformation and smarter infrastructures, value-add professional services in order to spark and shape meaningful changes in professional service industries and to better the world.



# 23rd PAQS Congress



**Date** : 26th - 27th August 2019

**Venue** : Pullman Hotel, Kuching, Sarawak

The 23rd PAQS Congress was held from 26th - 27th August 2019 in at Pullman Hotel, Kuching, Sarawak. The congress which was jointly organised by RISM and BQSM was successfully held with participation of 550 delegates including 250 international delegates. Other than the congress itself there were other activities such as Social Events, Young Quantity Surveyors Programme Ultimate Professional Centre, PAQS Committee Meetings, Siniawan Trip Siniawan Town, International QS Academic Forum (IQSAF) University Malaysia Sarawak (UNIMAS), BIM Workshop Room, PAQS Golf Tournament Samarahan Country Club, PAQS Welcome Dinner Sarawak Cultural Village, Presidents' Dinner Sarawak Club and PAQS Gala Dinner Colosseum Ballroom.

The Royal Institution of Surveyors Malaysia (RISM) and Board of Quantity Surveying

Malaysia have proudly organised and welcomed delegates to the 23rd PAQS Congress 2019 with the theme "Human Wisdom Amidst Emerging Technology".

The 23rd PAQS 2019 successfully gathered the best minds in Quantity Surveying and Cost Engineering. There were many symposia, case sharing and research presentations on how to brave the current and imminent challenges facing the QS profession in particular, and the construction industry as a whole. The congress addressed each important topic to integrate contemporary and future technologies as well as concepts to elevate the profession and industry to greater heights.

The congress started with the plenary session presented by Mr Gerry O'Sullivan on "The Construction Cost Profession- Global Impact in The Digital Age and Towards Harmonisation of Our Professional Standards". Followed by Prof Dr Rose Alinda Alias's presentation "In Search of The Soul in the Surveying Profession





Amidst Emerging Technologies” and Dr Yun Lang Sheng’s presentation on “Digital Transformation of AEC Industry”.

The congress was officiated by the Chief Minister of Sarawak YAB Datuk Patinggi (Dr) Abang Haji Abdul Rahman Zohari Bin Tun Abang Haji Openg and opening address by YBhg. Dato’ Adj. Prof. Aziz Abdullah, President, BQSM.

The keynote session was presented by the honourable Minister of Works Malaysia on “Human Wisdom Amidst Emerging Technologies”.



# Meeting with Permanent Mission of Malaysia to the United Nations

**Date** : 4th December 2019

**Venue** : United Nations Headquarters, New York

The team led by RISM President Sr Kwan Hock Hai and 31 delegates had a meeting with the Permanent Mission of Malaysia to United Nations with the presence of Mission staff - Mr. Mohd Hafiz Othman, Minister Counsellor, First Secretary, Ms. Azizah-Abd Aziz and Ms. Nurul Syaza Azlisha.







RISM delegates visited and had a meeting with UN-GGIM, hosted by Sr Teo Chee Hai from the Global Geospatial Information Management, United Nations Statistics Division, Department of Economics and Social Affairs.



RISM delegates had a meeting with United Habitat and were briefed by the Director of New York Office, Mr. Christopher W. Williams where knowledge and experiences were exchanged on urban development, affordable housing and other issues.





# RISM Badminton Tournament 2019



**Date** : 7th December 2019

**Venue** : Sunsuria Avenue  
Sports Complex,  
Kota Damansara

RISM Sports & Social Committee organised the Badminton Tournament 2019 on 7th December 2019 at Sunsuria Avenue Sports Complex, Kota Damansara. 17 teams participated in the event and 6 medal events were contested including four individual events: Singles and Doubles for both men and women, Mixed Doubles and a Senior Doubles Event.







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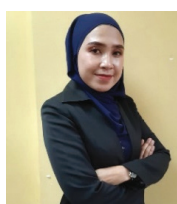
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# Retrospective No More: The Construction Industry Payment & Adjudication Act 2012 Moves Forward

by Janice Tay and Ooi Chih-wen

This paper discusses recent Federal Court decisions on the Construction Industry Payment and Adjudication Act 2012 and the effect on adjudications where the legislation is held to only apply prospectively.

**Keywords:** Construction, Adjudication, Construction Industry Payment and Adjudication Act 2012 (CIPAA).

The issue on the applicability of the Construction Industry Payment and Adjudication Act 2012 ("CIPAA") has finally come to an end with the ruling of the highest court of the land in the landmark cases of *Jack-In Pile (M) Sdn Bhd v Bauer (Malaysia) Sdn Bhd* and *Ireka Engineering & Construction Sdn Bhd v PWC Corporation Sdn Bhd* and two other appeals. On 16th October 2019, the Federal Court delivered its grounds of judgment holding that CIPAA only applies prospectively to contracts entered into after CIPAA came into force on 15th April 2014.

## Jack-In Pile (M) Sdn Bhd V Bauer (Malaysia) Sdn Bhd

### Background

Jack-In Pile was appointed by Bauer as a subcontractor through a letter of award dated 16th March 2011. The letter of award contains a pay-when-paid clause where all payments to Jack-In Pile shall only be made within seven days from the date Bauer received its related progress payments from the employer. In reliance of that clause, Bauer takes the position that it has no obligation to pay Jack-In Pile until and unless it receives payment from the employer. In return, Jack-in-Pile relied on Section 35 of CIPAA which renders pay-when-paid clauses void.

Jack-In Pile initiated adjudication proceedings against Bauer and obtained an adjudication decision where Bauer was required to pay the sum of RM 906,034.00. Jack-In Pile applied to enforce the adjudication decision. Bauer

applied to set aside the adjudication decision on the main ground that Section 35 of CIPAA does not apply retrospectively to the dispute as parties have exercised their contractual rights under the pay-when-paid clause before CIPAA was enacted.

### High Court

The High Court found for Jack-In Pile and held that CIPAA (and Section 35 which voids pay-when-paid clauses) applies retrospectively relying on the High Court decision of *UDA Holdings Bhd v Bistraya Construction Sdn Bhd & Anor* [2015] 11 MLJ 499 ("UDA Holdings"). Bauer appealed to the Court of Appeal.

### Court of Appeal

The Court of Appeal overturned the High Court's decision and found that CIPAA applies prospectively to contracts entered into after 15th April 2014 given that it affects substantive rights of parties, i.e. rights to payment pursuant to contract. Jack-In Pile appealed to the Federal Court.

### Federal Court

The Federal Court affirmed the Court of Appeal's decision that CIPAA applies prospectively and in making its decision, the Federal Court expressly disagreed with the High Court in *UDA Holdings*.

In the appeal to the Federal Court, the following questions were raised for determination:

1. Whether CIPAA applies retrospectively to construction contracts entered into before CIPAA, i.e. 15th April 2014?
2. If CIPAA applies retrospectively, does section 35 also apply retrospectively to all construction contracts entered into before CIPAA i.e. 15th April 2014?

It was held that CIPAA applies prospectively as it affects substantive rights of parties by providing an additional avenue for parties to commence legal actions to claim for monies due and not just a mere change of forum (from court or arbitration to adjudication). It creates a new avenue for access to justice and is not merely a procedural legislation as the procedural regime exists as a by-product of this substantive right.

Hence in so far as Section 35 of CIPAA is concerned, it prohibits parties to rely upon payment arrangements. Its applicability is prospective as well and cannot be relied on to void the pay-when-paid clause entered into before 15th April 2014.

The Federal Court also considered Sections 2, 3 and 41 of CIPAA which set out the applicability and non-applicability of CIPAA. The Federal Court concluded that Parliament would have included an express section in CIPAA if it was intended to apply retrospectively.

## Ireka Engineering & Construction Sdn Bhd v PWC Corporation Sdn Bhd and Two Other Appeal Cases

### Background

In the case of Ireka Engineering, Ireka appointed PWC Corporation under three contracts for construction projects in Mont Kiara, Sandakan and KL Sentral respectively, all of which were entered into before CIPAA came into force.

Disputes arose under the three projects and PWC Corporation initiated adjudication proceedings against Ireka. Ireka's primary defence and / or cross claim in the adjudication proceedings was that it had a right to set off any amount claimed by PWC Corporation against any amount due or liable to be paid by PWC across all three projects ("cross contractual set off").

The adjudicator in delivering a decision in favour of PWC Corporation, decided that he had no jurisdiction over disputes arising out of the other projects and contracts as they concerned other contracts and the disputes were before two other adjudicators.

PWC applied to enforce the adjudication decision. Ireka applied to set aside the adjudication decision on the

main ground that there was a breach of natural justice when the adjudicator refused to consider the cross contractual set off.

### High Court & Court of Appeal

The High Court found for PWC Corporation and held that the adjudicator was right in declining jurisdiction over and beyond the project/contract before him given that the other two contracts were before different adjudicators. This was also affirmed by the Court of Appeal. The arguments that CIPAA applies prospectively were raised by Ireka in the Court of Appeal.

Ireka appealed to the Federal Court.

### Federal Court

The same quorum who heard Jack-In Pile heard the current appeal and decided (on the same grounds) that CIPAA applies prospectively. The Federal Court did not address the cross contractual set off issue which remains alive today.

### Future Outlook

The Federal Court's decisions in Jack-In Pile and Ireka impacted the construction industry where all parties with construction contracts entered into before 15th April 2014 can no longer resort to statutory adjudication under CIPAA. It was also stressed that a retrospective application would prejudicially affect vested rights of the parties or the legality of the transaction under the contract.

However, the Federal Court's decisions have created practical difficulties and uncertainties, particularly in relation to the recovery of monies paid out under adjudication decisions which will now be rendered void. For example:

Adjudication Decisions based on contracts entered into before 15th April 2014 and enforced as judgments in the High Court are now void. The following predicaments may be encountered by affected parties:

- a. The avenues to recover the adjudicated sum paid out will likely be through the initiation of arbitration or court proceedings.
- b. The legal recourse for the principal / employer to recover monies paid pursuant to Section 30 of CIPAA where the winning party receives payment directly from the principal / employer is unclear.
- c. The legal recourse for companies wound up premised on a now void adjudication decision is unclear.



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Nurul Fathin Suhada Binti Zahar Uden  
Nurul Nazifa Binti Mazli  
Ong Yi Wen  
Phua Rouh Ying  
Ramani T.Krishnamoorthy  
*IUMW*

Rosalind Goh Mei Mei  
*IUMW*

Siew Chung How  
*UTM*

Siti Hanin Binti Zulkifli  
*Azmi & Co Sdn Bhd*

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Sophia Wong Jing Jie  
Symran Singh A/L Jagjit Singh  
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Tam Jin Huat  
*UTM*

Tan Shang Yin  
Tee Yi Wen  
Thah Lieng Hin  
*UTM*

Thong Zi En  
Victor Liaw Vui Lun  
Vik Shian A/L Ba Oh  
*IUMW*

Wan Nurul Atiqah Izyan Binti Wan Zuhamini  
Wong Hong Ling  
Yap Suk Yen  
Yeong Jia Li  
Zackry Anak Kuui  
*IUMW*

Zariri Rahimi Bin Zamharir  
*UTM*

## GEOMATICS AND LAND SURVEYING

### Fellow

Sr Muhamad Nadzir Bin Mat Isin  
*JUPEM*

Sr Tseu Chen Chee  
*Juruukur Terraforma*

Sr Wong Yeak Kuan  
*Jurukur Bakti*

### Member

Sr Abdul Hadi Bin Zakaria  
*Jurukur Serasi*

Sr Abdullah Al Shafiq Bin Abdul Satar  
*Juruukur Akrah*

Sr Ahmad Fatin Bin Mahmood  
*PETRONAS*

Sr Ahmad Izzaz B Mohd Rozi  
*Indah Geomatik Sdn Bhd*

Sr Ainu Basirah Binti Mohd Asri  
*Jurukur Perunding Sdn Bhd*

Sr Ang Wei Giap  
*Jurukur Generasi Sdn Bhd*

Sr Chan Peng Yue  
*Jurukur Berjasa*

Sr Cheah Kim Choong  
*Jurukur Generasi Sdn Bhd*

Sr Hanafi Bin Mohd Sabali  
*Jurukur Aufa*

Sr Khairunnisa Binti Tussin  
*United Survey Consultants Sdn Bhd*

Sr Kok Chee Yaw  
*Global-Track System Sdn Bhd*

Sr Lai Wooi Kent  
*JUPEM*

Sr Mohamad Ikhwan Bin Mohd Nasir  
*Jitu Konsult sdn Bhd*

Sr Mohamad Zakri Bin Tarmidi  
*UTM*

Sr Mohammad 'Akashah Bin Shaikh Ibrahim  
*Jurukur Dr Shaikh Ibrahim*

Sr Mohammad Asyraf Bin Mohd Nor  
*Jurukur Mohd Nor Udin*

Sr Mohammad Zulhilmi Bin Omar  
*Jurukur Perintis Sdn Bhd*

Sr Mohd Arrazi Bin Ahmad Tarmizi  
*Jurukur Metra*

Sr Mohd Farid B Fauzi  
*I Net Spatial Sdn Bhd*

Sr Mohd Hanafi Bin Abdul Rashid  
*JUPEM Selangor*

Sr Mohd Hanis Bin Rosli  
*Inspirasi Ukur Konsultan*

Sr Mohd Ikhwan Bin Abdul Razak  
*Ukur Tanah Jaz*

Sr Mohd Rashidi Bin Mohd Isa  
*HGIS Sdn Bhd*

Sr Mohd Rozi B Latib  
*Jurukur Indah*

Sr Mohd Rusdi Bin Hamid  
*I Net Spatial Sdn Bhd*

Sr Mohd Zakaria Bin Gzazali  
*JUPEM*

Sr Mohidin Bin Ahmad  
*Jurukur Profesional*

Sr Muhamad Shazni Bin Zainal Abidin  
*MK Survey Sdn Bhd*

Sr Muhammad Adzim Marwan  
*Jurukur Hasruzei Daud*

Sr Muhammad Afiq Bin Abdullah  
*Ukur Tanah Jaz*

Sr Muhammad Dzul Ahwal Muharram B. Zuki  
*Jurukur Hasruzei Daud*

Sr Muhammad Kamal Amir Bin Abu Husin  
*Jurukur Wahdah*

Sr Muhd Fadhi Bin Idris  
*Jurukur Idris Shawal*

Sr Nik Nurul Shuhada Binti Nik Mohamud  
*Jurukur Serasi*

Sr Noor Aziemah Bt Abu Bakar  
*Inspirasi Ukur Konsultan*

# LIST OF NEW MEMBERS

July – November 2019

**Sr Norazuan Bin Jamaluddin**

*HGIS Sdn Bhd*

**Sr Norhadija Binti Darwin**

*UTM*

**Sr Nur Roshima Bt Mat Rashid**

*UiTM*

**Sr Nurfadhilah Binti Ruslan**

*Jurukur Perunding Services*

**Sr Rizatulazri Bin Idris**

*Map2u Sdn Bhd*

**Sr Sharifah Diyana Binti Syed Ariffin**

*Jurukur Perunding Sdn Bhd*

**Sr Siti Norhazirah Bt Hamdan**

*Jurukur Perunding*

**Sr Tuan Hamdan Bin Tuan Ismail**

*Jurukur Indah*

**Sr Wan Nur Aisyah Binti Wan Mahadi**

*Jurukur Impian*

**Sr Zulkarnain Bin Abu Bakar**

*Jurukur Sharifudin*

## Graduates

**Azlina Binti Muhd Taib**

*Ukur Sepakat*

**Kong Wai Shun**

*Jurukur Perunding Sdn Bhd*

**Hamka Mubarak Bin Shamsul Kamal**

*Jurukur Menara*

**Mohd Saflan Bin Zainol Abidin**

*Ukur Dimensi*

**Mohd Salahuddin B Mohd Zali**

*Jurukur Tarmizi*

**Muhammad Yusri Bin Hamir**

*Ukur Sepakat*

**Muhammad Zainul Afiq B Bahar**

**Nur Liyana Binti Rosman**

*Lembaga Juruukur Tanah*

**Nurul Syafirah Binti Mohd Syafie**

*Jurukur Siu & Rakan-Rakan*

**Saifuldin Bin San**

*ABS Ukur*

## Probationer

**Mohd Zahiruddin Bin Zuhri @ Darmo**

*JUPEM*

## Students

**Afiq Hazim Aizat B Ariffin**

**Ainnur Syuhada Binti Mohd Khairi**

**Ainun Mardhiah Binti Radzali**

**Alia Dayini Binti Shalahuddin**

**Amin Aiman Bin Hisham**

**Elvis Ha Heng Siong**

**Hanim Fazira Binti Abd Hamid**

**Izzah Liyanamadihah Binti Ibrahim**

**Kang Xin Jie**

**Khairil Faiz Bin Mohammed**

**Khairul Nizam Bin Mohamad Kamal**

**Lau Bik Sing**

**Liew Vuk Khong**

**Lim Chang Xin**

**Mohamad Azrie Bin Mohd Azhar**

**Muhamad Shaharmi Bin Mohd Sharopi**

**Muhammad Amir Afiq Bin Mohamad Azman**

**Muhammad Fikri Bin Johari**

**Muhammad Imran B Arif**

**Muhammad Syafiq B Muhammad Zaly Shah**

**Nathaniel Gibbson Anak Gregory Anter**

**Nor Asmira Binti Azli**

**Norazrina Binti Md Ramlan**

**Nur Ain Fathiah Binti Mohd Rosli**

**Nur Ain Syuhada Ismail**

**Nur Aqilah Natashah Binti Zahairy**

**Nur Hazdryana Bt Abd Halim**

**Nur Syairah Binti Mohamad Raffi**

**Nur Syazwana Binti Agus**

**Nur'ain Binti Abdul Razak**

**Nurul Athirah Bt Mohd Emran**

**Nurzaitie Aflah Binti Abdullah**

**Ong Chong Rui**

**Shahrul Izwan Bin Sukri**

**Siti Nurhaliza Binti Azhar**

**Siti Syahela Binti Adam**

**Tan Jia Yi**

**Teo Chuan Yi**

**Tey Sui Zer**

**Yasmin Batrisyia Binti Z Yusserly Effendy**

## BUILDING SURVEYING

### Fellow

**Sr Hafisah Binti Yahaya**

*HYtechEMPIRE Consultant Sdn Bhd*

### Member

**Sr Mohd Jamruz Bin Mohd Jamil**

*Imanpuri Sdn Bhd*

### Graduates

**Ahmad Fauzan Bin Mohammad**

*K&P Cove Consultancy Sdn Bhd*

**Ahmad Izzat Nazmi Bin Muhammad**

*K&P Cove Consultancy Sdn Bhd*

**An Nisha Nur Welliana Binti Abd Rased**

*UiTM*

**Fatin Nabilah Binti Zawawi**

*K&P Cove Consultancy Sdn Bhd*

**Mohammad Hafizuddin B. Mohamed Hafiz**

*UMW Copration Sdn Bhd*

**Mohd Zaquan Bin Ahmad Zabidi**

*HYtechEMPIRE Consultant Sdn Bhd*

**Muhamad Azim Nor Shamsheer**

*HYtechEMPIRE Consultant Sdn Bhd*

**Muhammad Asyraf Bin Mansor**

*K&P Cove Consultancy Sdn Bhd*

**Muhammad Farhan Adlil Bin Yusri**

*UMW Copration Sdn Bhd*

**Muhammad Haziq Bin Harun**

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**Nurul Syamira Hashim**

*HYtechEMPIRE Consultant Sdn Bhd*

**Puteri Izzah Safiah Bt Zaki**

*HYtechEMPIRE Consultant Sdn Bhd*

**Ros Aini Binti Razali**

*K&P Cove Consultancy Sdn Bhd*

**Siti Nor Fatimah Binti Mohamad Azmi**

*K&P Cove Consultancy Sdn Bhd*

**Siti Nurul Asma' Bte Mohd Nashruddin**

*UKM*

## Probationer

**Liew Eu Hung**

*Belianemas Synergy Sdn Bhd*

**Loh Seng Yap**

*Konzepte + Cgna Sdn Bhd*

**Mohd Rizal Bin Che Mansor**

*Pesona Metro Sdn Bhd*

**Muhamad Faiz Bin Musa**

*CIDB*

**Muhammad Aimanul Hakim Bin Yusoff**

**Mohsin**

*Kampar Lakeside Sdn Bhd*

**Norsafiah Binti Norazman**

## Students

**Abdul Hayei B. Abdul Hadi**

**Abdul Muhaimin B. Husain**

**Abdul Razak Bin Mat Jusoh**

**Adila Husna Afendi**

**Afnan Shahrir Md. Juri**

**Ahmad Atiq Aiman Bin Junoh**



Ahmad Azri Bin Zakaria	Mohd. Fitri Mohd. Adzali	Nur Farzana Ahmad Romzi
Ahmad Fathi Azhan	Muhamad Ikmal Bin Rakhimi	Nur Fathiah Bt Mahmud
Ahmad Ismail Bin Rahim	Muhamad Luqman Darduri	Nur Fazreen Azeera M. Farid
Ahmad Syahmi B. Kamaruzaman	Muhamad Luqman Hakim Ishak	Nur Hanim Binti Mohd Tarmiji
Aiman Ahmad Zawawi	Muhamad Naquib Bin Halmi	Nur Hasyimah Binti Othman
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Airie Syazreen Saffri	Muhamad Syazwan A. Ghaffar	Nur Shazleen Zulkefli
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Chrisnida Anak Goyong	Muhammad Farid Fikri Bin Muhammad	Nurul Aida A. Ghani
Cynthia Anak Richard	Amin	Nurul Ain Shuhada Azil
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Debbie Sophia Binti Henry Bok	Muhammad harith A. Halim	Nurul Asyikin
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Maizatul Akma Mustapha	Norismanizam Mohd. Nor	Siti Nabihah Binti Rosli
Mirza Bin Kaha	Normahuza Binti Zul Hilmi	Siti Nur Hazati Rahamad
Mohamad Amirul Syafiq Bin Darwira	Norman Hakim Rashid	Siti Nur Hazlina Bt Nasri
Mohamad Hafizuddin Bin Mohamad Mansor	Normi Molisin	Siti Nurhawa Binti Abdul Aziz
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Mohamd Rizal B. Md Isa	Nur Aminah Binti Abdullah	Syrifah Syahira Binti Mohd Sandi
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Mohammad Izz Hirzi Bin Ismail	Nur Dania Natasha Mazlan	Zharif Diyana Binti Abdul Rahman
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