Valuation of Reclamation Land: Approach and Methodology

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ABSTRACT

This paper discussed on the concept of real estate development by using reclamation land approach on the seabed and ex-mining pond which were choose by the real estate developers especially in the strategic area and having the demands on such type of development. In this paper also, the writers explained the main components and basic characteristics on reclaimed land development especially along coastal areas in Malaysia such as in Langkawi Island, Penang, District of Manjung in Perak, Melaka, Southern Johor and Sabah. According to the National Land Code 1965, area covered by waters also a part of land interpretation as given the code. Therefore, in whatever condition, the area or land covered by waters also have the value that could be determined by the interested parties or the valuers can give their opinion about the market value of such land by using appropriate valuation approach and method.

Keywords: Real Estate Development, Reclamation Land and Real Estate Valuation.

INTRODUCTION

Land Reclamation activities is the process of creating new land from the ocean, lakes and riverbeds, with the aim of overcoming the scarcity of land required for development. Basically, the reclamation land would be an alternative to the government in order to provide a parcel of development land suitable for any types of development either residential, commercial or mixed development. Although reclamation will benefit to society, the process may have posed certain disadvantages to the residents in the area (Jumain *et al*., 2018). These advantages mostly effect the various issues that relating to the policy, economy and social specially to surrounding area that settling by the local community.

Land Reclamation activities is the process of creating new land from the ocean, lakes and riverbeds, with the aim of overcoming the scarcity of land required for development. This activity mainly practicing by the country that having less suitable land for land in the island states such as Singapore, Oceanic countries located within the Pacific and Atlantic Oceans. Land reclamation is restoring an abandoned and derelict landscape as close as possible to the original state to offer alternatives land use options.

The land reclamation is given many benefits in social, economy, and environmental aspects. In the context of environmental, the land reclamation is good for human beings and good for the rest of nature (Najiha, 2010).

LITERATURE REVIEW

Definition and concept of the reclamation land

i. Definition of reclamation land

Britannica (2020) defines, the land reclamation is the process of creating new land from the ocean or riverbed. The purpose of land reclamation is to increase the amount of land available and suitable for economic activity

in countries. Whilst, engain.com (2020) interprets the land reclamation means creating land either by removing water from muddy areas or raising the level of the land. With an increasing demand for land, it can be a good solution for creating areas for building, agriculture and other uses, but there are lots of things to think about before going ahead.

Stauber *et. al.* (2016) explains, the land reclamation is the process of creating new land from the sea. The simplest method of land reclamation involves simply filling the area with large amounts of heavy rock and/or cement, then filling with clay and soil until the desired height is reached. Draining of submerged wetlands is often used to reclaim land for agricultural use. And, the land reclamation refers to the process of creating new land from oceans, seas, riverbeds, or other water bodies. Historically, land reclamation has played a crucial role in expanding usable land for agriculture, urban development, and industrial use, particularly in regions where natural land is scarce based on the definition given by g3soilworks.com (2024).

Based on the definition as stated in above, the land reclamation refers to the process to create a new development parcel on the water either seabed, riverine or ex-mining pond in order to allow the interested parties to take the opportunity to develop that area with the suitable development projects especially to the area that having less of suitable development land or the area that having an attractive value for tourism would be able to boost the local and national economy activities.

ii. Types of reclamation land

According to g3soilworks.com (2024), Britannica (2020) and Abdul Rahim & Ziaudin (nd), there are four typical types of reclamation land practicing in the several countries namely coastal reclamation, riverine reclamation, wetland reclamation and mined land reclamation.

iii. Methods of reclamation Land

g3soilworks.com (2024), Britannica (2020) and Shahrizaila & Loi (1992) summary the methods that used in the reclamation land works into four common methods such as filling with soil and sand, construction of sea walls and dykes, dredging and modern technologies and sustainable methods.

iv. Purposes of reclamation land

Shahrizaila & Loi (1992), Abdul Rahim & Ziaudin (nd) and g3soilworks.com (2024) listed the purposes of reclamation land as follow:

a. **Expansion of Urban Areas and Infrastructure:** Reclaimed land provides much-needed space for expanding cities, enabling the development of new housing, commercial areas, and infrastructure. As urban populations grow, the demand for land increases, making reclamation an essential strategy for accommodating this growth and preventing urban sprawl.

b. **Environmental Restoration:** In some cases, land reclamation can restore environments, creating new habitats and improving ecological balance. For instance, reclaimed wetlands can serve as new habitats for wildlife, while restored mined lands can support vegetation and reduce soil erosion.

c. **Economic Benefits**: Reclaiming land boosts local economies by creating real estate opportunities, attracting tourism, and supporting commercial developments. Notable examples include the Marina Bay in Singapore, which has become a major financial and tourist hub, and the Kansai International Airport in Japan, built on reclaimed land to enhance connectivity and economic growth.

v. Effects from the reclamation land

Shahrizaila & Loi (1992), Abdul Rahim & Ziaudin (nd), Koh & Lin (2006), Azlinor & Maizatun (2010), de Giosa (2024) and Sahabat Alam Malaysia (2025) identified the effects from the reclamation land activities based on several areas in Malaysia. They were summarized the effects as follow:

a. **Environmental Impact:** One major concern is the disruption of marine ecosystems and loss of natural habitats, which can have far-reaching consequences for biodiversity. Land reclamation can lead to the destruction of coral reefs, mangroves, and other critical habitats, affecting marine life and water quality (de Giosa, 2024 and Sahabat Alam Malaysia, 2025).

b. **Social and Economic Concerns:** Reclaiming land can lead to community displacement, high costs, and sustainability issues. These challenges require careful planning and management to mitigate adverse effects. For example, relocating residents from reclaimed areas can be socially and economically disruptive, and the high cost of reclamation projects can strain public finances (de Giosa, 2024).

c. **Legal and International Disputes:** Reclaiming land can spark legal and international disputes over territorial waters. Countries may contest the ownership of newly reclaimed land, leading to diplomatic tensions and conflicts. It is essential to navigate these challenges through diplomacy and adherence to international laws, ensuring fair and peaceful resolution of disputes (Abdul Rahim & Ziaudin, nd and Koh & Lin, 2006).

d. **Balancing Development and Conservation:** Finding a balance between development and conservation is critical. Sustainable practices must be prioritized to ensure long-term benefits without compromising environmental health. This involves adopting methods that minimize ecological impact and integrating conservation efforts into reclamation projects (Shahrizaila & Loi, 1992; Abdul Rahim & Ziaudin, nd and de Giosa, 2024).

vi. Types of reclamation land

According to g3soilworks.com (2024), the reclamation land can be classified into the following types :

a. **Coastal Reclamation** : The coastal reclamation where the extending coastlines to create new land from the sea is a method often used in countries with limited land availability, such as the Netherlands and Japan. This method often involves constructing barriers such as sea walls and then filling the enclosed area with materials like sand or soil.

b. **Riverine Reclamation** : The riverine reclamation where the reclamation land is redirecting and managing river systems to prevent flooding and create new land. By controlling river flow and sediment deposition, new land can be formed along riverbanks, which can be used for agriculture, housing, or other purposes.

c. **Wetland Reclamation** : The wetland reclamation where the draining wetlands to make them suitable for agriculture or urban development. This involves removing water from wetlands through pumping or constructing drainage systems, converting the area into usable land. However, this type can have significant ecological impacts, as wetlands are crucial habitats for many species.

d. **Mined Reclamation** : The mined land reclamation where the works to restoring land that has been degraded by mining activities, making it suitable for new uses. This process includes reshaping the land, replacing topsoil, and replanting vegetation to stabilize the soil and restore the ecosystem.

vii. Methods of reclamation land

g3soilworks.com (2024) also stated the methods used in the reclamation land can be the following :

a. **Filling With Soil and Sand** : One of the oldest methods involves filling areas with vast quantities of soil, sand, or other materials. This approach, known as “land fill,” has been used extensively in places like Hong Kong and Singapore to expand urban areas. It involves transporting fill material to the reclamation site and layering it until the desired elevation is reached.

b. **Construction of Sea Walls and Dykes** : The works are carried out to building sea walls and dykes helps protect reclaimed areas from sea encroachment, maintaining the integrity of the new land. These structures act as barriers against waves and tides, allowing the enclosed area to be drained and filled. Sea walls and dykes are essential for coastal reclamation projects, providing long-term protection against erosion and flooding.

c. **Dredging** : The following method is dredging raising the seabed or riverbed, making it possible to reclaim underwater areas. This method removes sediment from the bottom of water bodies and deposits it in designated areas to create new land. Dredging is often used in conjunction with other techniques to ensure stability and sustainability, particularly in riverine and coastal reclamation projects.

d. **Modern Technologies and Sustainable Methods** : The recent innovations such as geotextiles and eco-friendly materials are making land reclamation more sustainable. Geo-textiles are permeable fabrics used to reinforce soil and prevent erosion, while eco-friendly materials reduce the environmental footprint of reclamation projects. These advancements minimize environmental impact and enhance the durability of reclaimed land, ensuring that it remains stable and productive over the long term.

2. Land reclamation in Malaysia

i. Background of Malaysia coastal area

According to Ku Kassim *et. al.* (2007), Stiftung (2019) and the Department of Irrigation and Drainage official website (2025), Malaysia has a total land area of 329,750 km2, comprising of Peninsular Malaysia (131,590 km2) and the states of Sarawak (124,449 km2) and Sabah (73,711 km2). The corresponding lengths of shoreline for the three regions are 2,031km, 1,035km and 1,743km respectively. The Malaysian coastline varies from scenic bays flanked by rocky headlands to shallow mud flats lined with mangrove forests. On the east coast of Peninsular Malaysia, the high sediment yield from river discharges and harsher wave environment creates the setting for a coastline of hook-shaped sandy bays. Whilst on the west coast, the mild wave climate of the Straits of Malacca makes for wide mud shores and coastal forests rich in biodiversity. Similar forms characterised the beaches of Sarawak and Sabah although certain sandy areas are very flat. Shore materials include a mix of sand, silts, and even shells with some patches of gravels and the occasional rock outcrops.

Malaysia has the following characteristics for coastal zone (Integrated Coastal Management 2005) which contains habitat and ecosystems (such as estuaries, coral reefs, sea grass beds) that provide goods (e.g., fish, oil, minerals) and services (e.g., natural protection from storms and tidal waves, recreation) to coastal communities. It also characterised by competition for land and sea resources and space by various stakeholders, often resulting in severe conflicts and destruction of the functional integrity of the resource system. Stakeholders are groups in the communities having a special interest or involvement in the usage of the resources as common property. The coastal area serves as the source or backbone of the national economy of coastal states where a substantial proportion of the gross national product depends on activities such as shipping, oil and gas development, coastal tourism; and is usually densely populated and is a preferred site for urbanization.

ii. Legal provisions relating to the Reclamation Land in Malaysia

There are several legal provisions that related to the reclamation land activities in Malaysia such as National Land Code 1965, Town and Country

Planning Act 1976, Environmental Quality Act 1974, Fisheries Act 1985, National Parks Act 1980, Territorial Sea Act 2012 and Continental Shelf Act 1966. All these acts relating to the power of the state authorities relating to the land administration, land alienation, development approval, Environmental Impact Analysis (EIA) and protections on the activities in order to avoid any works that effect to surrounding environment. The relevance authorities that specified in these law provisions had vesting the powers to carried out the role and functions that stated in these legal provisions.

METHODOLOGY

1. Asset based and income producing asset

Asset based refers to all the assets held by a company that gives value to the business. The value placed on the assets is not fixed and can fluctuate as the company buys and sells new assets. The income producing asset is referring to the any asset that generates an income. For example, dividends are paid on shares, investment properties generate rental income, bonds and bank accounts produce interest.

2. Basis of valuation

For the purpose of this valuation in determining the value of reclamation land is based on the Market Value. By referring to the Standard 4, Malaysian Valuation Standards 2025 (Seventh Edition), Market Value is the estimated amount for which an asset or liability should exchange on the valuation date between a willing buyer and a willing seller in an arm's length transaction, after proper marketing and where the parties had each acted knowledgeably, prudently and without compulsion.

3. Valuation approach and methodology

Malaysian Valuation Standards 2025 (Seventh Edition) stated three approaches can be adopted in valuing the real estate namely Market/Comparison, Cost and Income. Market/Comparison approach is an approach that provides an indication of value by comparing the subject asset with identical or similar assets for which price information is available. Cost approach refers to an approach that provides an indication of value using the economic principle that a buyer will pay no more for an asset than the cost to obtain an asset of equal utility, whether by purchase or construction. And, the income approach means an approach that provides an indication of value by converting future cash flows to a single current capital value.

From these approaches, there are five conventional valuation methods mainly adopted in valuing the market value of real estate. The five conventional valuation methods adopted from the valuation approaches are Comparison, Cost, Investment, Profit and Residual Methods. The comparison method refers to the recent transactions and asking prices of similar properties in the locality are analysed for comparison purposes with adjustments made for differences in location, size and shape of land, age and condition of building, tenure, title restrictions, if any and other relevant characteristics to arrive at the market value. The next valuation method is cost method comprises three main elements namely buildings, structures and improvements, depreciation/obsolescence allowance and land. First element is buildings, structures and improvements where the actual construction/tender cost and comparable cost data as are available to estimate the current replacement cost new of a similar simple modern substitute of the buildings, structures and improvements on the site must be compiled, verified, analysed and kept by the valuer. In adopting the actual construction cost as the basis of estimating the value, the Valuer is to make reference to the market to ensure that the said cost is realistic and reflective of the market. The second element is depreciation/obsolescence allowance where the valuer shall reflect the current condition of the buildings, structures and improvements by way of depreciation in terms of physical deterioration, functional obsolescence and economic obsolescence and the amount deducted for the depreciation should be stated. And the last element is land where the land value shall be determined by using the Market/Comparison Approach.

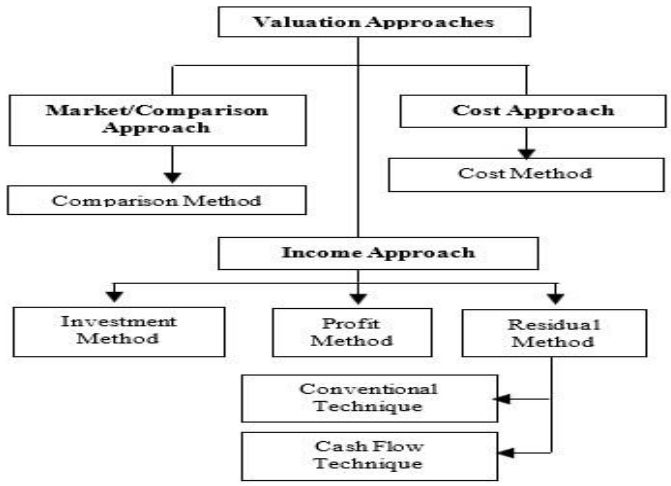


Fig 1 Valuation Approach and Methodology

Investment Method is one of the methods adopted from the income approach where the gross rent, outgoings and the capitalisation rates for the term and reversionary interests must be established by reference to current

rental passing or contractual rents for the term interest and the market rent based on similar properties for the reversionary interest. Where contractual rents are substantially out of line with the market and are not sustainable the Valuer must draw the attention of the reader of the report to this and must reflect a corresponding risk in the capitalisation or discount rate or by any other means. Annual outgoings or expenses incidental to the ownership of the property used in arriving at the net annual rental income for the property must be supported by evidences of such outgoings and expenses for the subject property and/or of comparable properties or by data compiled, verified, analysed and kept by the Valuer. Allowance for voids and the rate(s) of capitalisation used in valuing the property should be market derived and supported by such rates for comparable properties or by data compiled, verified, analysed and kept by the Valuer.

The second method adopted from income approach is profit method refers to the estimated gross earnings from the business for which the property is used must be established by reference to past records of such earnings obtained for the property, and/or comparable properties. The projected earnings must be reasonable and supportable. The operating costs of the property as a trading entity must be established by reference to current and projected rates as can reasonably be supported and crosschecked with past records of such costs for the subject property itself or similar properties. The tenant/operator's remunerative interest which includes the return on operator's capital, risk and entrepreneurship must be supported by adequate reasoning. The rate used to capitalise the annual rent (as a function of profit) to ascertain the value of the property should be market derived and supported by such rates for comparable properties or by data compiled, verified, analysed and kept by the Valuer.

And another method from income approach is the Residual Method where the gross development value of the saleable content for the property must be established by reference to prevailing sale values for similar properties. Such evidences including the adjustments made to the comparable data to arrive at the gross development value must be shown in the form of explanatory notes in the Valuation Report. The gross development cost used in arriving at the net development value of the property must be actual or estimated costs, fees, etc. which are likely to be incurred and they must be supported by evidences of such costs that are available for the property itself or comparable properties or by data compiled, verified, analysed and kept by the Valuer. When requested by the Board in case of disciplinary proceedings they must be forwarded, in writing and in a comprehensive separate report. The development period, including the phasing of the development, the absorption/take-up rates must be reasonable and supported by data compiled, verified, analysed and kept by the Valuer. When requested by the Board in case of disciplinary proceedings they must be forwarded, in writing and in a comprehensive separate report. Discount rates used in the valuation must be market derived and supported by adequate reasoning.

4. Valuation Sample

Location	:	Damar Laut, Seri Manjung – Pantai Remis Main Road
Mukim	:	Lumut
District	:	Manjung
State	:	Perak
Reclamation Area	:	86,631 sq feet
Parameter	:	1.21 km

i. Valuation by using the comparison method

Valuation exercise by using the comparison method involving two main elements which is determination of market value with assumption that the land is landed characteristics and the reclamation land cost to develop the seabed/ex-mining pond as development land. Comparable data used in determining the market value of reclaimed area based on the normal land that located on the above coastal line. The comparable data are of the vacant development lands based on data transactions recorded by the Valuation and Property Services

Department. In this analysis, there are two adjustments adopted in the valuation analysis namely time factors and other factors. The valuation analysis process as follow:

Consideration of Comparable Data……A
(+) Time Factors……B
Adjusted Consideration……..……..C
(÷) Land Area (sf/sm)……D
Value psf/psm……E
(+) Other Factors……F
Adjusted Value psf/psm……...G

Fig 2 Comparable Data Analysis

The best Market Value psf/psm…….A
(x) Land Area…….B
Market Value Landed…..……C

Fig 3 Valuation of Market Value with assumption that the area is landed characteristics

After the market value of normal land determined, the valuer needs to estimate the market value based on the *rebus sic stantibus* and highest best and use principles where the amount of reclamation land cost must determine by using appropriate approach and method. However, the valuer is advisedly to consult the professional experts to acquire the information and data required in the reclamation land cost works such as qualified civil engineer and registered quantity surveyor. Generally, there are two major costs that required such as sea wall construction cost, reclamation land cost and other costs i.e. professional fee, contingency cost and other.

Sea Wall Construction Cost (Length x Cost per metre……A
(+) Reclamation Land (Volume x Cost per cubic metre/feet) …….B
(+) Other Factors (% x Cost A & B)…….C
Estimated Total of Reclamation Land ……..……D

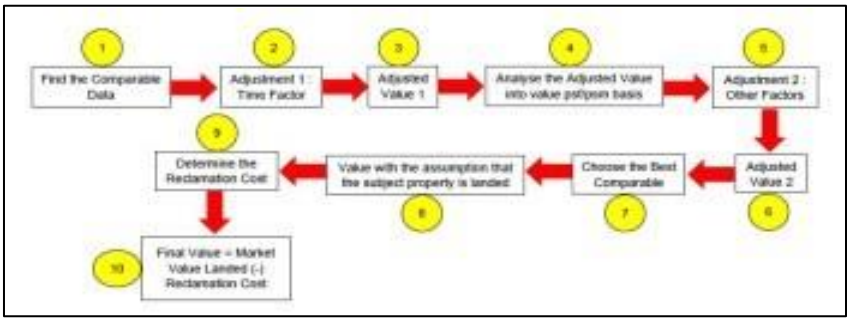
Fig 4 Determine the Estimated Total of Reclamation Land

Market Value Landed…….A
(-) Estimated Total of Reclamation Land ……..B
Market Value ……..……..……C

Fig 5 Value of the Subject Property

The following figures show details of valuation process, data analysis and valuation work:

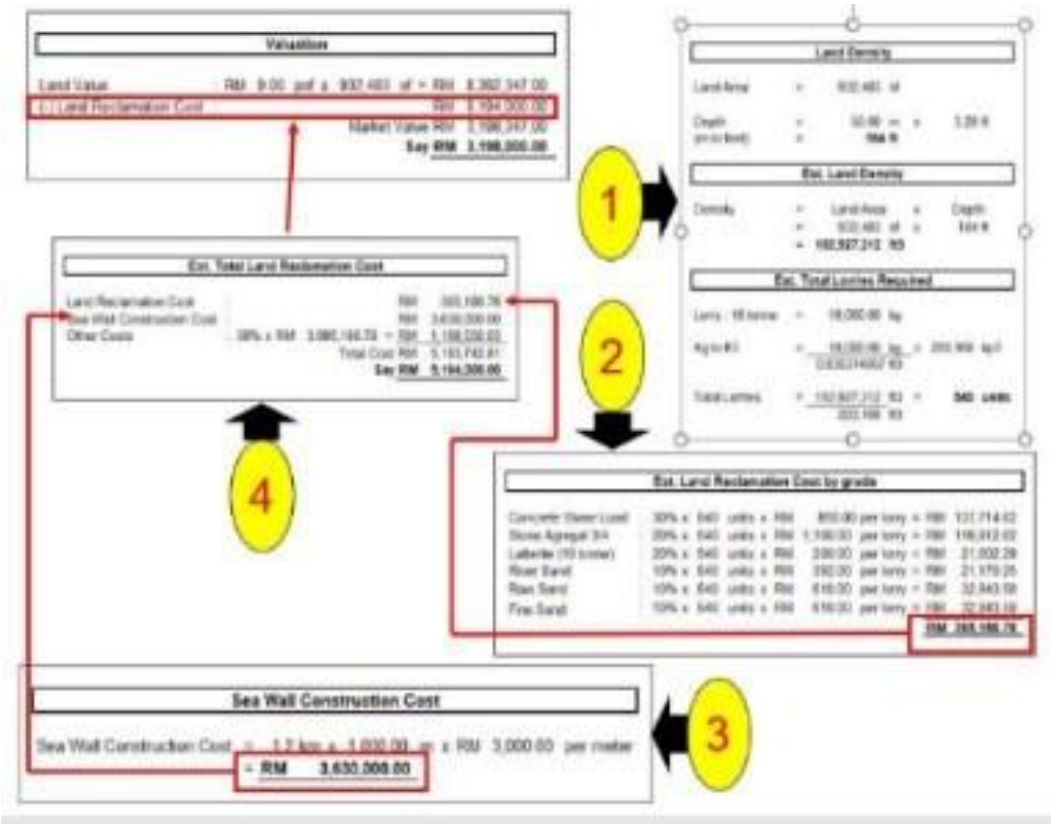
Step 1: Valuation Process



Step 2: Data Analysis

Date of Valuation : 2 September 2025				
Analysis				
Comparable	**1**	**2**	**3**	**4**
Lot	508	3366	10439	5265
Address	508, Bt 17 Matang Kerian	Off Jln Pantai Remis	Off Jln Ayer Tawar - Sitiawan	Lot 5265, Kg Pundut
Location	Pengkalan Bharu	Pengkalan Bharu	Ayer Tawar	Pundut
Mukim	Pengkalan Bharu	Pengkalan Bharu	Sitiawan	Lumut
District	Manjung	Manjung	Manjung	Manjung
RSS No.	1034	1034	747	796
Tenure	Grant in perpetuity	Grant in perpetuity	Grant in perpetuity	Grant in perpetuity
Remaining Lease Term (years)	-	-	-	-
Transaction Date	12 March, 2024	22 December, 2022	3 February, 2025	12 March, 2024
Area (sf)	153,009	385,994	261,347	126,573
Area (ac)	3.51	8.86	6.00	2.91
Land Use	Building	Building	Building	Building
Express Conditions	Residential	Mixed	Residential	Residential
Type	Vacant Land	Vacant Land	Vacant Land	Vacant Land
Consideration (RM)	**1,419,000.00**	**4,076,704.00**	**3,900,000.00**	**1,500,000.00**
(+) Time Factors				
2020	0%	0%	0%	0%
2021	0%	0%	0%	0%
2022	0%	5%	0%	0%
2023	0%	5%	0%	0%
2024	5%	5%	0%	5%
Total Adjustments	**5%**	**15%**	**0%**	**5%**
Adjusted Consideration (RM)	**1,489,950.00**	**4,688,209.60**	**3,900,000.00**	**1,575,000.00**
Value psf (RM)	**9.74**	**12.15**	**14.92**	**12.44**
(+) Other Factors				
Locality	-5%	-5%	-15%	-15%
Situation	-5%	-5%	-10%	-5%
Size	-5%	-5%	-5%	-5%
Tenure	-4%	-4%	-4%	-4%
Geology	-10%	-10%	-10%	-10%
Others	0%	0%	10%	0%
Total Adjustments	**-29%**	**-29%**	**-34%**	**-39%**
Adjusted Value psf (RM)	**7.00**	**9.00**	**10.00**	**8.00**

Step 3: Valuation



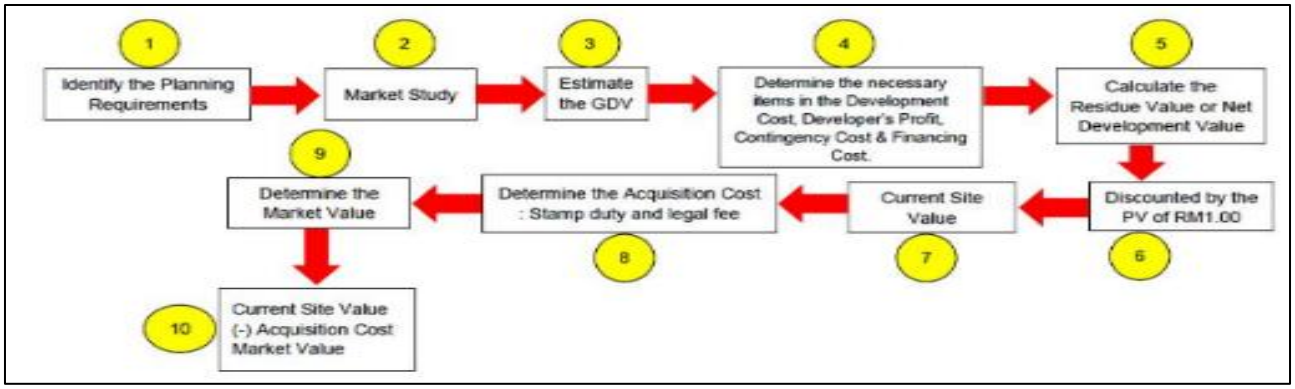
ii. Valuation by using the Residual Method

Another method to be adopted in this exercise is the residual method which involving four main elements namely, (1) Determine the Gross Development Value (or Project Value), (2) Development Cost, (3) Net Development Value (or Residue Value), (4) Discounting Factor, (5) Current Site Value, (6) Acquisition Cost and (7) Market Value. The valuation model by using this method as follow:

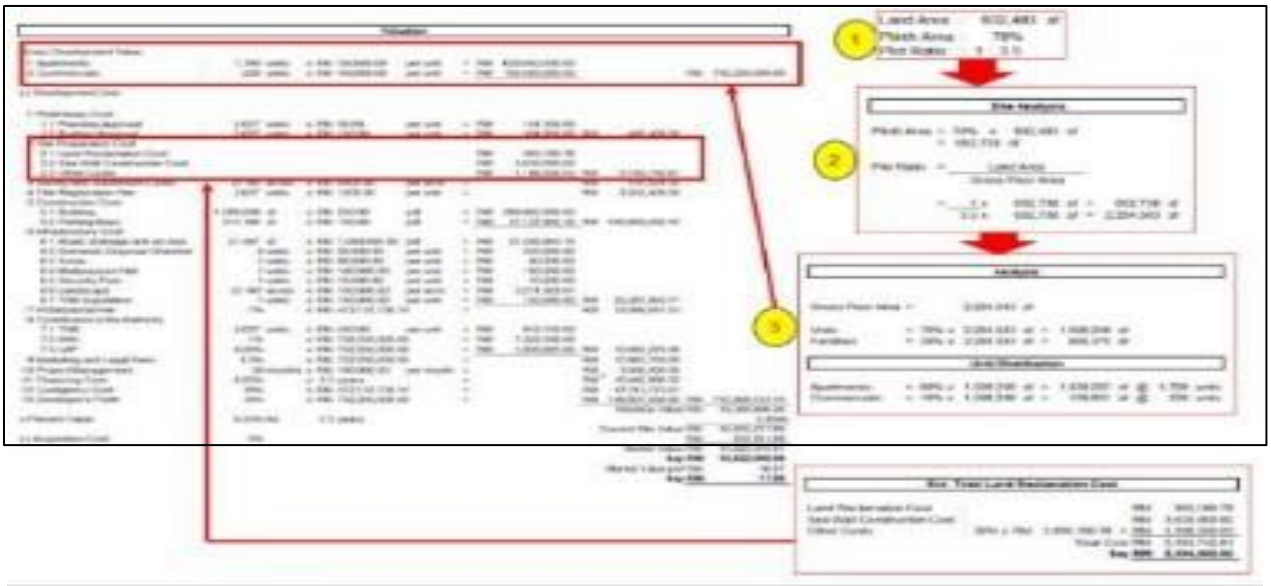
Gross Development Value.....A
(-) Development Cost.....B
(-) Financing Cost.....C
(-) Contingency Cost.....D
(-) Developer's Profit.....E
Residue Value/Future Site Value/Net Development Value.....F
x Present Value of RM1.00.....G
Current Site Value.....H
(-) Acquisition Cost.....I
MARKET VALUE OF LAND.....J

Despite the valuation works by using the comparison method, the reclamation cost is a part of development cost which is in the site preparation cost. The calculation of reclamation land cost is same as stated in the comparison method. The following figures show the valuation process, data analysis and valuation work:

Step 1: Valuation Process



Step 2: Valuation



CONCLUSION

Land reclamation is one of the development concepts used by the interested parties in the real estate development. This approach is less popular compared to other form of development concept and the developers make it as an alternative option to develop and provide development units especially in the strategic area and

along coastal area. There are two types of reclamation land to be develop such as the ex-mining ponds located within and nearby with the existing urban areas in the major towns and cities in Malaysia such as the Klang and the Kinta Valleys. The second option is the coastal areas with limited development land supply in Penang and Malacca. The projects also carried out in the strategic areas with tourism potential in other states in Malaysia such as Langkawi Island (Kedah), District of Manjung (Perak), Terengganu, Southern Johor and Sabah. Despite the development cost probably is higher than compared to the normal development land especially the sea wall construction and reclamation costs, the development in such project has the demand from potential buyers and investors. From the real estate valuation perspective, in whatever condition of the land, it has value from the various views and perspectives. In such situation, the property valuer able to determine the value of reclamation land from two perspectives which is from asset based and income producing asset based with appropriate valuation approach and methodology. The suitable method of valuation for reclamation land is comparison and residual methods where the *rebus sic stantibus* and highest best and use would be considered in determining of market value of reclamation land.

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