

INTANGIBLE FACTOR'S CONTRIBUTION TO VALUE OR BENEFIT CREATION IN INFRASTRUCTURE ASSET VALUATION

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ABSTRACT

Infrastructure asset valuation is a complex task and there are tangible and intangible factors need to be considered in valuation. As a government asset that serve to the society, there are intangible factors that need to be considered in valuation practice. The aim of this paper is to classify the details for intangible factors and its relationship to either value or benefit. This research is conducted through qualitative approach by using in-depth interview with the experts. The findings of this research have classified the items detailed for infrastructure asset valuation in the case study of Custom, Immigration and Quarantine Complex (CIQ Complex). As the main contribution of this research, the value and benefit creation from the intangible factors are analysed and the relationship are summarised. This research contributes to the body of knowledge and to the practitioner globally.

Keywords: special property valuation, infrastructure asset, tangible and intangible factors, cost-benefit analysis and Malaysia.

INTRODUCTION

Infrastructure assets as defined by Connellan (1997), refer to fixed assets which are inalienable assets, of which the expenditure is recoverable only by continued use of the asset created. The examples of infrastructure assets are highways and footpaths, among others. Infrastructure asset valuation is a critical component in asset management because it provides the value assessments of the infrastructure asset (Amekudzi-Kennedy et al., 2019). The prominence of asset valuation is required for supporting the financial reporting of an organisation. In another way, it will also describe the significance of asset investment in financial terms. According to Asset Management Manual in World Road Association (PIARC), infrastructure asset valuation has benefited from long term financial planning and budgeting that influence over senior decision makers' investment decisions. Besides, infrastructure asset valuation also benefited to performance assessment and benchmarking; prioritisation of resource allocation locally, regionally and nationally; production of transparent information for stakeholders on the organisations' management of its road assets; and production of financial information that is compliant with local or International Financial Reporting Standards (IFPS).

Weldemicael et al. (2017) added that asset valuation is the process of assigning monetary value to an asset. United States Federal Highway Administration highlighted that the value of an asset is a vital factor in the strategy planning for the assets long-term preservation, maintenance, rehabilitation and replacement. Having a comprehensive long-term strategy, asset valuation contributes to cost efficiency by identifying the current and future values of assets to support decision making.

Infrastructure asset encompasses all tangible assets of economic value that are not economically realisable which include roads, bridges, drains, and recreational facilities. Meanwhile, according to Malaysian Valuation Standards (MVS, 2019), there is no specific terms of definition for infrastructure asset. Nonetheless, in relation to MVS, the term for infrastructure asset is referred to special property definition. This is because, CIQ Complex with the unique building structures, designs and the operations are not easily to be compared with other asset. In another perspective, infrastructure asset is narrowed down to a specific term that is critical infrastructure asset. This term refers to infrastructure asset that needs a comprehensive safety and security protection because the functional and operational of the asset is highly critical.

As a public sector infrastructure asset, Custom, Immigration and Quarantine (CIQ) Complex offers comprehensive facilities that enhance effective transport management at the border of Malaysia and Singapore.

It also serves as a 'one stop centre' in which various government buildings are located. The most important role is serving and acting as a one stop centre since visitors are flocking on Bangunan Sultan Iskandar (BSI) building where the checkpoint is located. The comprehensive design also accommodates transportation networks for Keretapi Tanah Melayu (KTM) railway, road path for lorries, busses, light vehicles and motorcycles. All the infrastructure plans are well constructed and managed by several organisations in tandem with its capacity as the centre for customs, immigration and quarantine department that operate together in controlling the rules and regulations within the asset.

The essential nature of the asset needs a durable system especially in safety and security measures, apart from the building signage system, water feature system, drainage system, plumbing and sanitary system and rainwater downpipe system. The facilities available at CIQ Complex are unique and modern that consequently sustain the effective transport management at the borders of Malaysia and Singapore. As a public sector asset, the CIQ Complex development has contributed to copious benefits especially in traffic dispersal where it improves the traffic flow in Johor Bahru Central Business District. This project development has relieved heavy congestion at the Causeway as the current usage of vehicles are estimated at about 120,000 daily. It also relays economic benefits in creating a premier modern gateway and in providing multiplier effects on employment, income, and value enhancement at regional and national levels. CIQ Complex has also explicitly contributed to environmental benefits, tourism sector and maritime activities.

However, despite the benefits gained by the existence of the CIQ Complex, it has brought a question to the practitioners in evaluating this unique and modern property. Despite highlighting on the land value, cost involved, income generated and other factors that affecting the value, there are other elements that need to take into consideration. As a public sector asset, the main focus is contributing and providing adequate facilities to the society. It is undeniably for society development. Hence, the intangible factors in terms of social benefits and other benefits present as another element that needs to be considered in infrastructure asset valuation. The International Valuation Standards (IVS, 2020) in Item 210 has detailed on the intangible asset. Specific intangible assets are defined and described by characteristics such as their ownership, function, market position and image. These characteristics differentiate intangible assets from one another. Most importantly, in identifying and valuing an intangible factor that influence to the value of the infrastructure asset, valuers must understand specifically what needs to be valued and the purpose of the valuation. Thus, this research paper aims to classify the details for intangible factors and its relationship to either value or benefits.

LITERATURE REVIEW

Infrastructure Asset Valuation

Asset, as defined in Malaysian Valuation Standards (2019), refers to “item(s) that might be subject to a valuation engagement. Unless otherwise specified in the Standards, this term can be considered to mean “asset, group of assets, liability, group of liabilities, or group of assets and liabilities”. These terms are interchangeably used in these Standards with “property” or “real property”. Thus, as a summary, an asset is included in the valuation process by considering of either there is a single or many assets involved or a single or many liabilities counted. Besides, the assets or liabilities are subject to the other terms that is property or real property. The differences between these terms is on the basis of legal ownership encompassing all the interests, rights, and benefits related to the ownership. Property assets, as defined in Asset Valuation Guidelines (2017), means all rights, interests and benefits related to the ownership of real estate, plant, machinery and equipment. According to this definition, it includes the overall of real estate, plant, machinery and equipment as part of the property assets. Thus, in conducting an asset valuation for reporting finance to the Security Commission (SC), Malaysia, the term property assets will include all items on the property including the plant, machinery and equipment.

Understanding the asset and property assets is the basic knowledge in identifying subject case especially for asset valuation. The valuer needs to identify which assets are taken into consideration for valuation. Another term of asset management is defined as a systematic process of maintaining, upgrading and operating physical assets cost-effectively. This includes sound business practices and economic theory, and it provides tools to facilitate a more logical approach to decision making (McNeil, 2000). Thus, asset management provides a framework for handling both short- and long-term planning for asset maximisation functionality with optimum

cost. The planning for a quality asset management is difficult without a proper data provision. Hence, the asset managers should have a proper data regarding the asset details including size, use, condition, occupancy and running costs. This will help the asset managers to make a decision to sell, develop, maintain, extend or refurbish the asset (White, 2011).

The asset management concept, as mentioned by Jolicoeur and Barrett (2004) is associated to acquisition, remediation or disposal of property due to optimising the cost. This is to ensure that the property meets the service delivery objectives while the property portfolio is maximised. Asset managers must be proactive, not reactive in planning the organisation's future growth (Too and Too, 2010). They must be able to cope with risk management and forecast ahead of what is about to come before react on the consequences of event that already occurred (Peterson, 2006). According to the RICS Red Book (Connellan, 1997), the classification of public sector properties in the United Kingdom contains of:

- **Non-operational assets:** as “Fixed assets held by a local authority but not directly occupied, used or consumed in the delivery of services. Examples are investment properties and assets that surplus to requirements”.
- **Operational assets:** as “Fixed assets held and occupied, used or consumed by the local authority in the direct delivery of those services for which it has either a statutory or discretionary responsibility”
- **Community assets:** as “Assets that the local authority intends to hold in perpetuity that have no determinable useful life, and that may have restrictions on their disposal”
- **Infrastructure assets:** as “Fixed assets which are inalienable assets, expenditure on which is recoverable only by continued use of asset created. Examples are highways and footpaths”.

Once identify the asset criteria, then the details of functions and operations are investigated. Understanding the infrastructure asset functionality are essential in getting to know the tangible and intangible factors that enhance in valuation practice.

CIQ Complex as an Infrastructure Asset

The Custom, Immigration and Quarantine Complex (CIQ Complex), is a transportation terminal built to solve the problem of traffic congestion on the Johor Causeway in Johor Bahru. The building covers an area of 2,874,373 square feet. Meanwhile, the net floor area of the 3-storey office building at CIQ Complex, is 353,082.43 square feet and is located on the vehicle deck. Vehicle decks in the complex are placed at different levels to isolate the flow of traffic. Heavy vehicles will use the outermost part and the next level is for light vehicles such as cars and motorcycles, while the middle part which is the highest level is reserved for buses.

The common use area in CIQ Complex is 2,520,948.52 square feet. Meanwhile, there is a foyer for user that can accommodate 6,000 people and it is located above this highest level. CIQ Complex, aims to accommodate government agencies including the Customs Department, Immigration Department, Royal Malaysia Police Department and Department of Wildlife and National Parks Malaysia. Thus, the following are the functions and roles of the CIQ Complex:

- a) Monitor and implement a systematic security management in CIQ Complex and the building next to CIQ Complex which is Johor Bahru Central is being monitored with comprehensive security provided.
- b) Ensure that every government agency / department complies with the rules contained in the Security Instructions, especially involving Security Protection.
- c) Collect government revenue through the rental of Office Space, Commercial Space, Advertising Space and Parking Area. Other than that, is to impose a compound or fine on the negligence of lost Security Pass and Vehicle Stickers.
- d) Process and approve Vehicle Safety Pass and Sticker applications at CIQ Complex and JB Central.
- e) Make rules and compliance with security policies that must be complied with by each agency operated in CIQ Complex and JB Central.

The image of the CIQ Complex is as shown in Figure 1.



Figure 1. General view of the CIQ Complex

As a transportation terminal asset that links comprehensive infrastructure of highway and bridges, the CIQ Complex are the case study of this research. Further investigation on the facilities provided and the tangible and intangible factor that influence to value are identified.

The following are the facilities available at CIQ Complex:

- a) Process for light vehicles (cars)
- b) Process for heavy vehicles (lorries)
- c) Process for motorcycles
- d) Area for buses to drop off and pick up passengers
- e) Foyer for users who ride the bus
- f) Quarantine
- g) Other buildings
- h) Office of operations and administration
- i) Staff parking

Besides, systems provided within CIQ Complex includes Air Conditioning and Mechanical Ventilation (ACMV) System, fire system, lift and escalator system, machinery systems, pump set system, Liquid Petroleum Gas (LPG) system, high voltage systems, low voltage systems and other systems including audio visual system, water tank and sewage treatment plant. In order to carry out valuation for this asset, all facilities and components of the building must be identified and investigates in detail so that the assessment done is comprehensive and involves all facilities and components of the building in CIQ Complex. Thus, this research detailed on the intangible factors that influence to CIQ Complex valuation, where CIQ Complex represent the example of the infrastructure asset.

Intangible Factors for CIQ Complex

As to be applied in valuation practice, intangible factors are unseen factors that influence to the value. In the case of public asset, specifically the CIQ Complex, the identified intangible factors are listed and investigated in previous study. Nur Farah Hanna et. al. (2021) listed the intangible factors for infrastructure asset valuation. The factors are safety, mobility, economic advancement, sustainability, social value, environmental quality, intellectual property, image/goodwill and legal ownership. This research has contribute validating the intangible factors that enhance infrastructure asset valuation. As the research output, 5 factors are the findings

of the research. The validated intangible factors are safety, mobility, economic and social value and sustainability (environmental quality and image/ goodwill) and intellectual property.

This paper is an extended research work from Nur Farah Hanna et. al. (2021). Hence, this paper will classify the results of identified intangible factors and investigate the factor’s contributions with value or benefit. This research paper will strengthen the previous results and proceed with identifying how intangible factors will contribute to value or it is just beneficial to the society. The details are in Table 1.

Table 1. Details of Intangible Factors for CIQ Complex

	Early Hypothesis		Research Findings
	Intangible factors: 1. Safety 2. Mobility 3. Economic advancement 4. Sustainability 5. Social value 6. Environmental quality 7. Intellectual property 8. Image/ goodwill 9. Legal ownership		Intangible factors: 1. Safety 2. Mobility 3. Economic and Social value 4. Sustainability (Environmental quality & image/goodwill) 5. Intellectual property

Source: Nur Farah Hanna et. al. (2021)

Based on Table 1., the factors of safety, mobility, economic and social value and sustainability and intellectual property are identified as the findings for intangible factors that enhance in infrastructure asset valuation. Safety reflects from accidents reduction, education, training and publicity; and safety related defects (Turrell, 2015). Safety aspects is called intangible due to the application of the system to secure the surrounding area. Besides the feeling of secure is unseen, but the technology system that runs the security system is also intangible. As for mobility factors, it includes congestion levels that relates to how easy accessibility will gives huge relief to the users and society. Mobility is also related to the effectiveness of the traffic management system (TMS). As for economic and social value, these factors are merged due to interrelated of each factor. The development of the CIQ Complex impacts on economic advancement and social development because it encompasses the process of economic wellbeing and quality of life of a nation, region, local community or an individual (Foote and Hatt, 2017). In relating economic advancement and social development of the surrounding subject area, it is the intangible and unseen factors that has influence to the value of CIQ Complex. Sustainability includes environmental quality and image/ goodwill. Sustainability is the ability to be maintained at a certain level or rate. The concept of sustainability includes three pillars namely, economic, environment and social. In the context of infrastructure asset valuation and sustainability, it is much related on how sustainable is the infrastructure asset and how it will exert influence to the value. Sustainability includes energy efficiency, functionality, serviceability, durability, indoor air quality and health friendliness (Amekudzi, 2019).

Value and Benefit Creation in Intangible Factors

Thus, according to the listed intangible factors, this research paper is an extended version that will further investigate the value or benefit creation that enhance in infrastructure asset valuation. In terms of value, there are three main methods to value the intangible factors. The methods are cost approach, market approach and income approach (Souza, 2017; Reily, 2019; Visconti, 2020; Chartered Global Management Accountant (CGMA), 2012 and Parrington, 2016).

In the other case of benefit creation from the infrastructure asset, the concept of cost-benefit analysis (CBA) are included. CBA is a way to compare the costs and benefits of an intervention, where both are expressed in monetary units. Apart from that, the approach in translating the intangible factors to value can be divided to three elements, that are in terms of economic, social benefit and environmental quality. This concept is related to the CBA. CBA includes a systematic cataloguing of impacts as benefits (pros) and costs (cons), valuing in

dollars (assigning weights), and then determining the net benefits of the proposal relative to the status quo (net benefits equal benefits minus costs) (Boardman et al., 2006). A CBA is considered as a subjective assessment tool because cost and benefit calculations can be influenced by the choice of supporting data and estimation methodologies. Through this concept, the economic and environmental quality element can be monetarised. Meanwhile, the element of social is referring to the benefit of the social and cannot be translated to value.

The costs involved in CBA might include direct costs (labour involved in manufacturing, inventory, raw materials or manufacturing expenses); indirect costs (electricity, overhead costs from management, rent, utilities); intangible costs of a decision (impact on customers, employees or delivery times); opportunity costs (alternative investments or buying a plant or building); and cost of potential risks (regulatory risks, competition and environmental impacts). Besides, as for revenue, it might include revenue and sales increases from increased production or new product; intangible benefits (improved employee safety and morale, customer satisfaction or fast delivery); and competitive advantage (market share gained) (Kenton, 2020).

RESEARCH METHODOLOGY

Research methodology is very important for systematic research development. In order to achieve the objective of the research, it must align and strategized from the research methodology part. This research adopted qualitative analysis by conducting an in-depth interview with the experts. The experts consist of experienced registered valuer, cost-benefit analysis experts, green building experts, intangible asset valuation experts and person in charged in the operations of CIQ Complex. The list of the expert's profile is in Table 2.

Table 2 List of expert's profiles

Expert's Name	Expert's Profile and Specialisation	Working Experience
Expert 1	Registered valuer and CBA experts	15 years
Expert 2	Registered Valuer for special properties	8 years
Expert 3	Registered valuer and in charge of CIQ Complex	19 years
Expert 4	Property Manager in CIQ Complex	15 years
Expert 5	Facility Manager in CIQ Complex	23 years
Expert 6	Technician in CIQ Complex	8 years
Expert 7	Registered Valuer for special properties	20 years
Expert 8	Registered Valuer for special properties	14 years
Expert 9	Registered Valuer for special properties	15 years
Expert 10	CBA experts	25 years

Source: Researcher's Fieldwork (2020)

Ten experts are interviewed on face-to-face basis and two of them are interviewed through online platform. All of the experts successfully sharing their insights and thoughts regarding the intangible factors that enhance to infrastructure asset valuation. The questions to the experts are related to the expert's background as in Section A. The details of years of working experience and their expertise type were asked in the early part. On the next part of Section B, it is regarding the weaknesses of the valuation method for infrastructure asset valuation. The questions related to tangible factors in infrastructure asset valuation are located in Section C of the questionnaire, designed for the experts. It is in the Likert scale format and there are eight elements listed in the questions. The tangible elements listed are smart technology, land, buildings, plant and machinery, infrastructures, utilities, weight scales and traffic management systems. The intangible elements listed are safety, mobility, economic advancement, sustainability, social value, environmental quality, intellectual property, image/ goodwill and legal ownership. The first intangible element listed is safety that is related to resilience and risk management especially in risk mitigation it means that the feeling of secure is intangible but it will enhance the visitor to use the public transportation and facility when they are feeling secure. Thus, with higher number of visitors to CIQ Complex then it will influence the income and the good name of the infrastructure asset. The second intangible element is mobility. It is intangible where we cannot see but can

feel ease through congestion mitigation because of the closer distance and the traffic efficiency that enhance better travel experience.

Next, is economic advancement where the demand drivers are the key guide in determining positive economic enhancement within the infrastructure asset. It is something intangible but the positive growth is a result that can be analysed. Besides, sustainability is another intangible element listed for infrastructure asset valuation. Sustainability includes energy efficiency within the asset, functionality, serviceability, durability, indoor air quality, health friendliness and recyclability. Sustainability reflects to better environmental control. The concept of green building is also considered in sustainability elements by detailing on temperature of the building, the materials of window and other structure of the building. Other intangible elements is social value. This is because the government infrastructure asset provides services and contributed to the community. Environmental quality refers to positive externalities and environmental risk. Intellectual property is referring to software, guidelines, methods, procedures and data. Image/ goodwill reflect to brand identity, brand meaning, brand responses and brand relationships. Lastly, is legal ownership that refers to patent, trademarks, copyrights, trade secrets, registered designs and computer software. Table 3 shows the list of detail questions during the interview session.

Table 3 List of Detail Questions for Interview Session

No.	Intangible Elements	Details
1	Safety	Resilience and Risk mitigation
2	Mobility	Congestion mitigation, close distance to transit and traffic efficiency
3	Economic Advancement	Demand drivers
4	Sustainability	Energy efficiency, functionality, serviceability, durability, indoor air quality, health friendliness and recyclability
5	Social value	Service contributed to the community
6	Environmental Quality	Positive externalities, environmental risk
7	Intellectual property	Software, guidelines, methods, procedures and data.
8	Image/ Goodwill	Brand identity, brand meaning, brand responses and brand relationships
9	Legal ownership	Patent, trademarks, copyrights, trade secrets, registered designs, brands, computer software

Source: Researcher's (2020)

Based on Table 3., questions related to intangible factors in infrastructure asset valuation are located in Section C, specifically designed for the experts. It is in the form of open-ended questions, whereby the experts were required to fill in the blanks mentioning their justifications on each intangible element. There are nine elements listed in the questions. The intangible elements listed are safety, mobility, economic advancement, sustainability, social value, environmental quality, intellectual property, image/goodwill, and legal ownership. Analysing intangible factors that have influence on infrastructure asset valuation is a serious issue where the experts really take some time to well understand the real problems and try to relate such concerns on how the intangible elements could influence the infrastructure asset valuation.

FINDINGS AND DISCUSSIONS

After considering all intangible factors that enhance in infrastructure asset valuation, thus, according to the research findings, there are 4 identified intangible factors for CIQ Complex valuation as agreed by all experts. Each of the intangible factors is detailed in terms of the specific items referring to the factor and was derived by how to translate the items to value. This research result in intangible factors that are safety, mobility, economic and social value and sustainability (environmental quality). Compared to the previous research by Nur Farah Hanna et. al. (2021), the factors of intellectual property are dropped in the list as agreed by all experts. The remain four intangible factors and the described item are shown in Table 4. The summary of the findings is portrayed as in Table 4 with the classification of how to value the intangible factors.

Table 4 Summary of research findings related to item and value translation

No.	Research Findings	Item	Value
1.	Safety	Safety and security system	Economic (monetary)
2.	Mobility	Advanced technology and monitoring system from TMS	Economic (monetary)
3.	Economic and Social value	Rejuvenation of neighbouring area	Social (benefit)
4.	Sustainability (Environmental quality)	Energy efficiency, cost reduction and healthy environment. (monthly utility bills, price psf for built up area)	Environmental Quality (monetary)

Source: Researcher's Fieldwork (2020)

Based on Table 4., the findings of intangible factors that influence the CIQ Complex valuation are detailed in items and how to translate to value or it will benefit to the society. As for safety factors, it is referring to the safety and security system within the asset. In translating to value, it is referring to how much the investor is willing to pay (to invest) in the safety and security system to be embedded to the asset. The recommended methods in valuing safety factors are either cost approach or market approach. It means that in applying cost approach, the valuer needs to consider the depreciation and the cost of replacing the new safety and security system. If the valuer is applying the market approach, one needs to consider the market transactions for the system and also consider the adjustment to relate to the safety and security system within the asset. The element of safety is agreed as intangible factors by all experts. This is because CIQ Complex is a public infrastructure asset that provides transportation services to cross the boarder between two countries that are Malaysia and Singapore. Thus, the element of safety is very important and it is essential to provide comprehensive and efficient safety and security system within the infrastructure asset. Hence, by reflecting to the amount of the investor are willing to invest to provide better safety and security system, then safety element contribute to economic which it is intangible element that can be monetorised.

The same concept is applied to mobility intangible factors in CIQ Complex valuation, where advanced technology and monitoring system from Traffic Management System (TMS) ensures better traffic efficiency with congestion mitigation. As a solution compared to previous bridge linkages between Malaysia and Singapore, this CIQ Complex provides traffic solution and a peace of mind travel experience with better traffic management and roadway for different class of vehicle. There are four different roadways for light vehicle, heavy vehicle, busses and motorcycles within the asset. The experts agreed mobility as an intangible item but two out of ten experts believe that the system for traffic management itself is already included in the calculation of tangible elements that are Close Circuit Television (CCTV) monitoring system as a tangible item that are attached to the building. Thus, further caution should be highlighted when a valuer is conducting a valuation for infrastructure asset valuation. This is to ensure that the item is not redundantly count. In monetizing the mobility items, it reflects with the same concept of how much the investor is willing to pay (to invest) in providing the TMS.

As for economic and social value, it refers to rejuvenation of neighbouring area within the infrastructure asset. Based on the research findings, the economic and social of the surrounding area does not exert influence to the value in the case study of CIQ Complex. This is because, the situation is otherwise where in fact, CIQ Complex has influenced the development of economic and social of the neighbouring area. Thus, it cannot be monetarised and it only benefited to the social development. It is supported by the experts in cost-benefit analysis (CBA) who agree that social development brings benefit to the society but it cannot be monetorised. Thus, it only reflects to the social development in terms of more job creation, enhance active economic development within the neighbouring area and enhance improvement the society's quality of life.

The sustainability factors (environmental quality) can be monetarised and categorised under environmental quality. However not all environmental quality elements can be monetarised. Environmental quality reflects to enhance energy efficiency and cost reduction. As agreed by all experts, environmental quality is very essential in maintaining asset sustainability especially in the case of green building. Each of the element in building structure, materials for walls, ceiling and the layout concept of the building itself need to be in detail to ensure energy efficiency and at the same time to reduce the operational and maintenance cost of the building. The result of cost reduction can be seen in terms of lower cost for utility bills. With more concern in energy efficiency and leads to cost reduction, this will also result in healthy environment. Thus as mentioned by the CBA experts, in the case of green building, the price per square feet are different because of the building materials used and due to effective energy efficiency.

Specifically, the item of energy efficiency and cost reduction can be counted in terms of monthly utility bills and price per square feet for built up area (through cost or income approach). But the item of healthy environment cannot be monetarised. This is because, it reflects to the social benefit. The relationship of tangible and intangible factors in relation to the value is drawn in Figure 2 for clear illustration of the research findings.

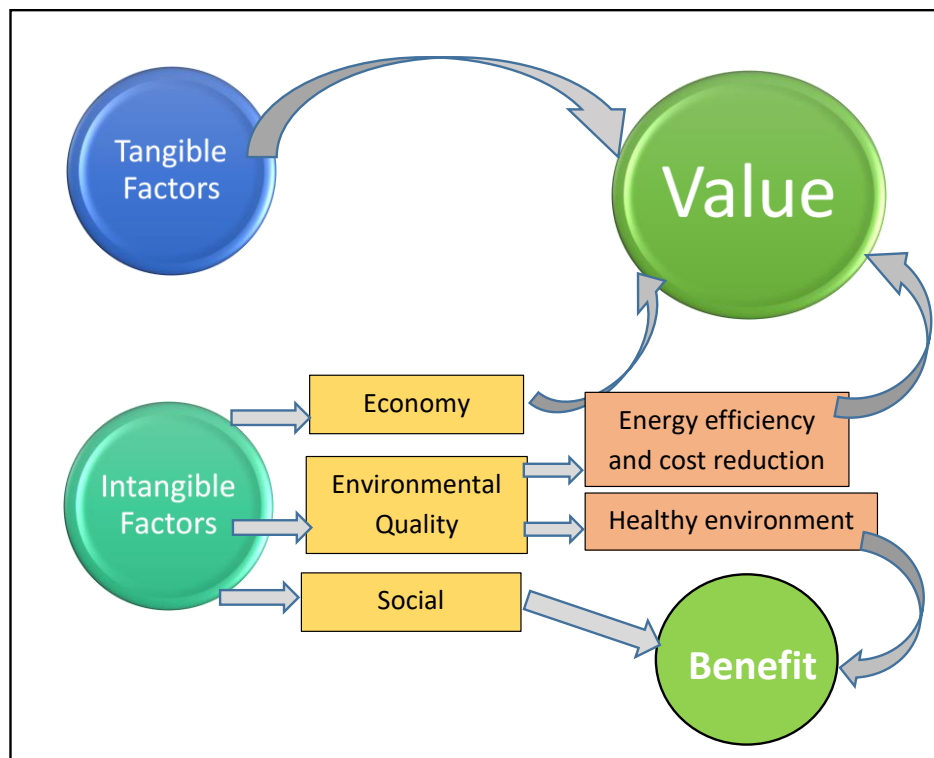


Figure 2 The Relationship of Tangible and Intangible Factors Related to The Value and Benefit

Based on Figure 2., the illustration of value and benefit creation for both tangible and intangible factors for infrastructure asset valuation are shown. As another concern in valuation that is considering the intangible factors where it is also influencing to the final value of the infrastructure asset. It is undeniable as in Figure 2, that the tangible factors are solely and directly influence to the value. It is based on the land value, building value, plant and machinery value and by considering the depreciation.

However, in the case of intangible factors as highlighted in this research paper, the results are categorized of either in value or benefit contribution. The research result in intangible factors that are divided to three aspects that are economy, environmental quality and social. In the aspect of economy, it is translated as directly will contribute to the value of the infrastructure asset. On the other hand, environmental quality denotes to energy efficiency and cost reduction that will contribute to the value. Healthy environment is another aspect of environmental quality but it reflects to the benefit creation. Same goes to social aspect that also contribute to benefits creation.

CONCLUSION

As a conclusion, this research has achieved its objectives. The listed intangible factors are validated through in-depth interview with the experts, results in four main intangible factors that enhance in infrastructure asset valuation. After classifying the intangible factors, this research has also contributed in analyzing the group details of either the intangible factors are monetarized and can be translated to the value addition of the infrastructure asset or it contribute to the benefit aspects in terms of social development or towards healthy environment. This research has also led to a drive in identifying and analyzing the intangible factors and adopting the cost-benefit analysis as a tool in measuring the cost to benefit related in valuation. It is very important for public assets especially and the stakeholders in getting to know the details of cost to benefit of an infrastructure asset because the valuation for public asset also influenced by benefit generated from the economy and social value.

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