Lecture Notes in Civil Engineering

Deva Fosterharoldas Swasto · Dwita Hadi Rahmi · Yani Rahmawati · Isti Hidayati · Jimly Al-Faraby · Alyas Widita *Editors*

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Beyond Sustainability Through Design, Planning and Innovation

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Preface

What Lies Beyond Sustainability

Sustainability, as a science and a development agenda, has always been contested, redefined, and reinterpreted. Brundtland Report in 1987 emphasised the intergenerational sustenance of resources to ensure the well-being of future generations for a sustainable development. Other prominent descriptors of sustainability used to compartmentalise the concept into several elements. The most widely used are the three pillars of economic, social, and environmental [1], although some also consider additional elements such as institutional [2], cultural [3], or even creativity [4] as the fourth aspect of sustainability. Discourses on sustainability have not only revolved around its definition, but also on operationalisation, underlying principles, implications, and dilemmas [5, 6].

As new challenges arise in a world characterised by volatility, uncertainty, complexity, and ambiguity (VUCA) due to climate crisis and complexities in the urban system, sustainability remains a key issue for allowing flexible interventions and management around architecture and planning. Nevertheless, the process of achieving sustainability has not been easy as COVID-19 highlighted critical deficiencies in our built environment and urban design [7]. Our current and conventional understanding of sustainability as development frameworks [8, 9] or moral arguments [10, 11] has been challenged and may no longer be enough to address contemporary issues that precede this era. These complexities necessitate innovative approaches, methodologies, and concepts beyond sustainability which can incorporate and utilise the inherent potentials of human and environmental transformation. This could support architects, urban designers, and urban and regional planners in implementing actions and commitments in achieving sustainability and managing transformation in a variety of ways.

Papers in this Lecture Notes in Civil Engineering discusses the theme of "**Beyond Sustainability Through Design, Planning, and Innovation".** They cover theoretical and empirical debates around the topics of:

1. Beyond Sustainable Architectural Design
   Papers in this section discuss the importance of cultural sustainability and vernacular architecture, resilient design, housing issues, green building, and energy efficiency.
2. Beyond Sustainable Urban and Regional Development
   This section starts by discussing the global issue of urbanisation and the emergence of super-urban regions, followed by a study on a sister city collaboration, the phenomenon of commoning and territoriality, street vendor, quality of life, sustainable highway infrastructure, sustainability assessment, heritage and conservation issues in urban areas, and transportation.
3. Challenges for Sustainability
   Papers in this section identifies challenges for sustainability, which include urban tourism, COVID-19 impacts on hospital layouts, office conversion to housing, disaster awareness, impacts of climate change on slope stability, landscape pattern changes, land cover changes, vulnerability of heritage buildings, smart regions, and the development of shopping malls in the digitalisation era.
4. Innovations for Sustainability
   Contributors of this section highlight innovations for sustainability in the form of disaster risk reduction, urban acupuncture, identification of neighbourhood changes, mapping strategies for heritage conservation, sustainable wetlands, and sustainable construction materials.
5. Responsive Environment
   Papers in this section contribute to the discussion of responsive environment by addressing the issue of natural resource depletion, utilisation of bamboo as a sustainable material, air leakage in residential buildings.

This collection of papers provides insights on what defines sustainability and how to proceed beyond achieving sustainable development. To limit ourselves with the predefined understanding of sustainability is counterproductive when facing critical transitions occurring at the local and global scales. Using this Lecture Notes as a starting point, future research can be directed to include more cases of sustainability and sustainable development across a wider geographical context and utilise wider arrays of theories and methods for understanding the ever evolving concept of sustainability.

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References

1. Purvis B, Yong M, Darren R (2019) Three pillars of sustainability: In search of conceptual origins. Sust Sci 14(3):681–695
2. Spangenberg JH, Pfahl S, Deller K (2002) Towards indicators for institutional sustainability: lessons from an analysis of agenda 21. Ecol Indic 2:61–77
3. Soini K, Birkeland I (2014) Exploring the scientific discourse on cultural sustainability. Geoforum 51:213–223
4. Hillier B (2016) The fourth sustainability, creativity: Statistical associations and credible mechanisms. In: Portugali J, Stolk E (eds) Complexity, cognition, urban planning and design, Springer, Cham, pp 75–92
5. Kuhlman T, John F (2010) What is sustainability? Sustainability 2(11):3436–3448
6. Mensah J (2019) Sustainable development: Meaning, history, principles, pillars, and implications for human action: Literature review. Cog Soc Sci 5(1):653531
7. Ranjbari M, Esfandabadi ZS, Zanetti MC, Scagnelli SD, Siebers P-O, Aghbashlo M, Peng W, Quatraro F, Tabatabaei M (2021) Three pillars of sustainability in the wake of COVID-19: A systematic review and future research agenda for sustainable development. J Clean Prod 297:126660
8. James P (2014) Urban sustainability in theory and practice: Circles of sustainability. Routledge, Oxon
9. Ameen RFM, Mourshed M (2019) Urban sustainability assessment framework development: The ranking and weighting of sustainability indicators using analytic hierarchy process. Sust Cit Soc 44:356–366
10. Wolch JR, Byrne J, Newell JP (2014) Urban green space, public health, and environmental justice: The challenge of making cities 'Just Green Enough'. Land Urb Plan 125:234–244
11. Martin A, Armijos MT, Coolsaet B, Dawson N, Edwards GAS, Few R, Gross-Camp N, Rodriguez I, Schroeder H, Tebboth MGL, White CS (2020) Environmental justice and transformations to sustainability. Env Sci Pol Sust Devt 62(6):19–30

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About the Editors

Deva Fosterharoldas Swasto works in the Department of Architecture and Planning, Faculty of Engineering, Universitas Gadjah Mada as a lecturer and researcher since 1999, while currently also serves as the Head of the Department. He graduated from Institute for Housing and Urban Development Studies (IHS)—Erasmus University, the Netherlands and Lund University, Sweden for master degree in Urban Housing Management (receiver of Stuned scholarship), and from University of Newcastle upon Tyne, United Kingdom for doctoral degree in Urban Housing Policy (receiver of Indonesia National Higher Education scholarship). His research interest focuses on urban housing policy and management, specifically related to low-cost vertical housing (walk-up flat) and the relation between public housing, management and health or well-being.

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The Best Alternative for Revitalising the Asset Area of PT. KAI in Kota Tua, Jakarta

Anindita Ramadhani, Anita Sitawati Wartaman, Endrawati Fatimah, Martina Cecilia Adriana, Aldi Mangapul Sitorus, and Audia Zikra

Abstract The revitalisation of Kota Tua (Jakarta old town area) is facing arduous land ownership problems. There, PT. Kereta Api Indonesia (KAI), a state-owned enterprise, has the ownership of land assets in the core zone of Kota Tua that needs to be revitalised. Therefore, the research aims to find the best alternative for managing PT. KAI land assets to increase the economic value of Kota Tua. The research method is descriptive, using the 'highest and best use' analysis technique to assess the feasibility of legal, physical, financial and productivity aspects of the asset. The finding identified that the best land use alternative is mixed land use, whereby 65% of the area is allocated for mixed activities (i.e. office, trade, services and tourism) and 35% for rental flat housing.

Keywords Old town · Highest and best use analysis · Land use · Land use assessment

1 Introduction

Kota Tua is an old town area in Jakarta that is rich with historical values. This area is an example of a colonial heritage city as indicated by the buildings and structures of urban space. However, along with the urban development, Kota Tua is increasingly

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threatened and abandoned. To prevent this neglect, the Jakarta government has been carrying out revitalisation efforts since 2006 in some areas in Kota Tua, such as the Kota Station, Fatahillah, Sunda Kelapa, and east and west of Kali Besar [1]. However, the revitalisation programme has not been completed yet.

In 2014, Jakarta government promoted the revitalisation of Kota Tua as one of priority programmes in the Jakarta Spatial Plan 2030 and the Jakarta Development Plan 2013–2017. Efforts to revitalise Kota Tua aim to create an area with high economic values from tourism, business, service and trade activities while maintaining its historical character and values [2]. However, in practice, this revitalisation aim cannot be fully realised. Although the revitalisation idea has been promoted several times, it has not been implemented due to the issue of building ownership, among others [3]. It was further explained that of the total buildings in Kota Tua, only about 2% are owned by Jakarta provincial government, while half are owned by state-owned enterprises and the private sector. This causes difficulties in the execution process. Currently, Kota Tua only has the image as a tourism attraction, while business, service and trade activities are rare because the utilisation of heritage buildings has not been optimal.

PT. KAI is one of the state-owned enterprises that own land assets in Kota Tua, in which the said asset is located in Pinangsia District, West Jakarta, in the north of Nelayan Timur Street up to the railway line. The asset area is ±0.7 Ha, located in the core zone of Kota Tua. In addition to the land, PT. KAI also has assets in the form of railroads which also function as a transportation infrastructure.

PT. KAI plans to develop its assets in Kota Tua to increase business. This plan is in line with the revitalisation programme of Kota Tua launched by the Jakarta government. If this development is carried out properly, not only it will have positive impacts on the business of PT. KAI, but can also accelerate the revitalisation programme, especially from the integration of land use and transport activities.

1.1 Revitalisation of Historic Areas

Revitalisation, according to the Ministry of Public Works Regulation 18/PRT/M/2010, is an effort to increase land value through rebuilding and improving the previous land function. The focus of revitalisation is to develop regional economic activities that can empower, maintain and strengthen the regional characters [3]. In addition to the economic benefits, revitalisation can increase environment vitality and quality while considering the socio-cultural aspects and regional characteristics.

Revitalisation activities consist of three main aspects, namely, physical intervention, economic rehabilitation and social engineering/institutional development [4]. Physical intervention includes improving the building and environmental conditions (e.g. green space, accessibility, signage, open space and environmental issues). This physical improvement can increase the economy through the opening of investment opportunities and the growth of local economic activities. It is necessary to develop

mixed-use functions to encourage economic and social activities. Meanwhile, social engineering includes creating a social environment that is self-identified and the development of accountable institutions (partnerships, cross-actor discussion and good urban governance). Furthermore, revitalisation needs to consider the following variables: structure/physical building, the function of the area, image of the area, legal and institutional aspects, distribution pattern, accessibility system and regional economy.

From the understanding and objectives mentioned above, Kota Tua revitalisation in the future is expected to emphasise and accelerate economic rehabilitation activities. This is done to empower and strengthen the character of Kota Tua. To maintain historic areas and buildings, changes to the PT. KAI's assets need to be reviewed comprehensively for their best use in the future.

1.2 Highest and Best Use (HBU) Analysis to Assess the Best Land Use Alternatives

Land has different economic and market values. Urban land used for industrial and commercial activities has the highest market value because those activities are efficient source for livelihood; thus, they provide the highest production value. Land owners tend to use their land for purposes that give the highest income. They will use their land according to the concept of the highest and best use [5].

Highest and Best Use (HBU) analysis identifies the best and highest use of a land that is (considered) vacant. HBU includes four analyses: (1) physical feasibility analysis, (2) regulatory or legal feasibility analysis, (3) financial feasibility analysis and (4) analysis of maximum productivity. A property is considered to have met the HBU criteria if it is physically possible, legally permitted, financially feasible and can provide the most maximum results [6]. HBU analysis use several predetermined criteria, including

1. Physically possible

   To be considered as physically possible, these criteria should be scrutinised: land size, landform, dimension (length and width), location, capacity and availability of public facilities [6, 7].
2. Legally permitted

   This analysis considers government regulations or statuses that have permanent legal force, such as zoning and building codes [6]. Applicable building regulations also need to be considered, including building boundaries, the allowed building coverage ratio, building height limits and other regulations that can affect building costs [7].
3. Financially viable

   Criterion for this analysis stems from economic engineering, particularly the concept of equivalence, namely, the effect of time on the value of money [7].

4. Have maximum productivity

   To generate maximum productivity, land use that yields the highest residual value consistent with the market-guaranteed rate of return for that use is the highest and best use. Hence, it can be concluded that to have maximum productivity, it should have the highest land value [6].

It can be said that the HBU analysis is a pre-feasibility study before the actual feasibility study is carried out. In the context of asset valuation, a simpler HBU analysis is often performed. In this case, the HBU analysis is more emphasised on the physical and regulatory feasibility analysis, while financial and maximum productivity analyses are rarely discussed in depth. Further, direct field observations can be used as the basis for making decisions whether the property being assessed has met the HBU criteria or not [8].

Asset development of PT. KAI has great potential to achieve the revitalization goal of Kota Tua Jakarta. Therefore, the purpose of this research is to find the best alternative for the asset development of PT. KAI to increase the economic value of assets and revitalise Kota Tua, Jakarta.

2 Methods

Previous research related to the revitalisation of Kota Tua, Jakarta, has focussed more on factors that need to be developed, as well as accessibility links to support the vitality of the area [1, 9–11]. Meanwhile, research on HBU is usually carried out to choose the best alternative land use for vacant land, which emphasises what types of land use are allowed by the spatial planning policy, building layout, accessibility and facilities around the land, as well as simulation of the maximum economic value that can be obtained from certain land use types. The best land alternative chosen is usually a vertical building with a maximum number of floors and commercial or mixed land use [12, 13]. In relation to the PT. KAI's assets located in the core zone of Kota Tua, Jakarta, this study discusses the HBU analysis in the context of area revitalisation (Table 1 and Fig. 1).

This study uses a quantitative descriptive method. To formulate recommendations for the best alternative land use, HBU analysis is used to assess the feasibility in four aspects: physical, legal, financial and maximum productivity based on the results of the identification of regional potentials and problems. These potentials and problems are then quantified with a scoring technique to get the best alternative. The process of determining the best alternative is carried out in the following stages:

1. Formulation of land use alternatives based on the legal feasibility.
2. Identification of physical feasibility for area development.
3. Financial feasibility analysis for each development alternatives.

Table 1 Research variable

Aspect	Variable	Indicator
Physically feasible	Structure/physical area	Land size and shape include the dimensions (i.e. length and width)
	Regional image	Image of the region as a historical area
	Location	Land location
	Distribution pattern of infrastructure and facilities	Capacity and availability of public facilities
	Accessibility system	Availability and conditions of public transportation
		Availability and condition of pedestrian paths
		Availability and condition of bike paths
	Area function	Existing land use
Legally permissible	Legal aspects	Compliance with policies related to land use plans and zoning regulations in the area
		Compliance with policies related to building code in the area (intensity of spatial use and building layout)
	Institution/institution	Institutions involved in the management of the area
Financially feasible	Regional Economy	Regional economic potential
Maximum productivity		Financial and operational feasibility

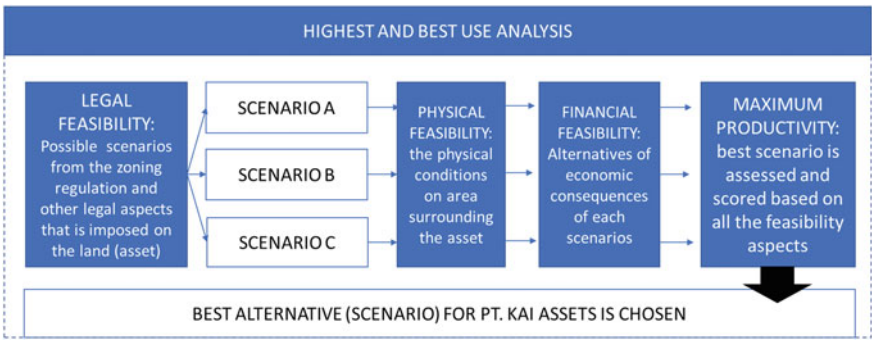

Fig. 1 Conceptual framework of analysis process

4. Formulation of the best alternative recommendations (highest and best use) based on the results of the analysis 1, 2 and 3 in terms of the maximum productivity that can be obtained.

3 Results and Discussion

The research was carried out in the asset area of PT. KAI in Kota Tua, Jakarta and its surroundings. The land area of the asset is approximately 0.7 Ha. This area is located within the core conservation zone of Kota Tua, Jakarta and to the northern part of Kota Tua tourism area.

3.1 Regional Legal Aspect Analysis

The analysis of the legal aspect is carried out based on Jakarta provincial government regulations, referring to the Regulation of the Special Capital Region of Jakarta 1/2014 concerning detailed spatial plan and zoning regulations [14]. Regulations that need to be considered are zoning (land allocation), building coverage ratio, floor area ratio, maximum building height, regulations relating to traffic and environmental factors that influence the development of the area as well as activities that can be carried out in the planning area.

Based on the explanation above, a scenario for the direction of the development of the planning area is then formulated based on six approaches: (1) consideration of legal aspects, land transportation development plans and the environment that influence regional development; (2) consideration of permitted activities in the planning area; (3) proportions of residential area at least 35%; (4) conditions of the surrounding environment; (5) the condition for environmental protection and integrated infrastructure with mass public transportation and (6) the condition to support the implementation of the development of strategic areas of socio-cultural interests in Kota Tua.

Based on Table 2 and the established zoning regulations [14], the permitted activities for each type of land use are detailed. Office activities are permitted in the form of office and other professional business. The type of office that can be developed includes leasing office spaces and virtual office. Trading activities are permitted in the form of shops. The permitted service activities vary, but it is recommended in the form of financial institutions, meeting rooms, co-working spaces and travel agencies. Tourism activities that are permitted also vary, but it is recommended to have recreation park and centre for sports and physical fitness (Table 3).

Table 2 Legal aspects in the study area [14]

No.	Regional development policies and regulations in planning areas	Area development plan
1	Land use	Mixed zone
2	Building coverage ratio	70%
3	Floor area ratio	3.00
4	Building height	4
5	Green area ratio	30%
6	Basement floor area ratio	55%
7	Land use details	The proportion of commercial buildings is at most 65% and residential buildings at least 35%
7	Land transportation development plan	• Secondary arterial road improvement • Secondary collector road development • Development and/or improvement of rail-based mass public transport

Table 3 Alternative land use scenarios for PT. KAI's assets based on the legal aspect

Type	Alternative land use
SCENARIO A	Residential use in the form of apartments is 35% of the land area Mixed activity functions in the form of office, trade, services and tourism (with the dominance of office and trade activities) are on the 65% of the land area
SCENARIO B	Apartment covers 35% of land area, while mixed activity functions in the form of office, trade, services and tourism (with the dominance of service activities) cover 65% of the land area
SCENARIO C	Apartment covers 35% of land area, while mixed activity functions in the form of offices, trade, services and tourism (with the dominance of tourism activities) cover 65% of the land area

3.2 Analysis of the Physical Aspects of the Area

PT. KAI's asset is located in the core area of Kota Tua, Jakarta, approximately 500 m from Fatahillah Park and close to the Kota Intan Bridge. The assets cover an area of ±0.7 Ha with 154.6 m length and 45.3 m width. The landforms tend to be regular and sloping contours. This asset is connected through the arterial, collector and neighbourhood roads. The land can be accessed via Jalan Kali Besar Timur, Jalan Nelayan Timur, Jalan Tongkol and Jalan Cengkeh. Jalan Kali Besar Timur and Jalan Nelayan Timur are the main routes from the south (Museum Fatahillah) to PT. KAI or to the Mercure Hotel. Meanwhile, Jalan Tongkol and Jalan Cengkeh accommodate circulation from the north to Kota Tua. There is a railroad track (Bogor—Jatinegara loopline crossing) in the north of PT. KAI. In addition, PT. KAI's asset can also be accessed by public transportation, namely, *angkot* and MiniTrans. *Angkot* passes through Jalan Kali Besar Timur, Jalan Nelayan Timur, Jalan Cengkeh, (M08, M12,

Fig. 2 Asset area orientation PT. KAI to Jakarta old town tourism area

M25) and Jalan Kunir (U10), while Minitrans only goes through Jalan Clove (GR4) (Fig. 2).

In terms of regional image, PT. KAI's asset is part of the core area of the old town. Kota Tua, Jakarta, is rich with historical values and has the typology of a colonial city. Kota Tua also serves as an icon of cultural heritage, which has many heritage buildings. Currently, Kota Tua is developed into a tourism area by promoting historical and cultural tourism through heritage buildings and activities such as museums, stations, bridges and shops.

Based on the analysis of physical aspects, problems and potentials of the study area are identified. The main problem is that the PT. KAI's land remains not optimally utilised because it only functions as semi-permanent houses and non-heritage buildings. This condition makes the area less attractive compared to area on the west side of the river. This current use reduces the economic value of the area. In addition, there are many abandoned buildings around PT. KAI's land that reduces the image and aesthetic value of the area. There are vacant lands along Kali Besar Timur Street, which indicate that the land use around PT. KAI's land is not optimal. Although PT. KAI's land is connected with adequate streets and parking facilities, pedestrian and cycling access is still not optimal and not up to standard. Nonetheless, the location of PT. KAI's land in the core area of Kota Tua holds the potential to be developed to accelerate the development and revitalisation of Kota Tua, Jakarta.

The optimal utilisation of PT. KAI's land will be able to increase the economic value and encourage the growth of the surrounding areas, so that the revitalisation programme can be accelerated. Accessibility to pedestrians and cyclists needs to be improved to increase connectivity between PT. KAI and Fatahillah Museum as the centre of Kota Tua, Jakarta. Access for pedestrians and cyclists can be an important supporting factor in tourism development in Kota Tua. Riding a bicycle or walking, visitors can better enjoy the historical buildings there. This, of course, needs to be followed by regional structure and conservation of historic buildings.

3.3 Regional Financial Potential Analysis

The financial aspect relates to economic activities that can be developed in the region. Based on the scenario developed from the regional zoning regulations and potential economic activities that can be developed at the study site, an analysis of the financial potential of the area is carried out by considering the positive and negative implications related to regional income.

Currently, economic activities in the study area, particularly around Jalan Nelayan Timur, Pinangsia, Taman Sari, West Jakarta, are generally dominated by tarpaulin shops, food stalls and parking lots. There are shop houses and a street vendor centre located in Taman Kota Intan. The scale of economic activities ranges from small to medium. There are also hotels and entertainment, such as karaoke and clubs. Some of the lands are vacant and some others are used as warehouses. It can be concluded from these activities that the economic value in the study area is still considered low. However, there is a chance to develop the land into higher value by referring to Regulation of the Capital City Region of Jakarta 1/2014 (Table 4).

Based on the Regulation of the Capital City Region of Jakarta 1/2014 [14], the planning area is located in the mixed zone, sub-zone C1, which is designated for vertical residential activities and/or trade and services with 35% of land should be used for residential and 65% for other activities. This provides flexibility for regional development. The study area is also part of Kota Tua, which is being revitalised by the Jakarta government. This can increase the economic potential as a supporting area for heritage tourism in the Kota Tua, Jakarta. Tourism support activities are adjusted to complement the needs of future vertical residential inhabitants. The existence of a TOD Development plan in Kota Station provides the potential for increasing the accessibility of the area. Increased accessible will help to revive economic activities in the area. Based on these considerations, the potential for economic activities that can be developed on PT. KAI's land is identified (Table 5).

3.4 Formulation of Alternative Land Use in Terms of Maximum Productivity

Previous studies have found that using the highest and best use technique [8, 11–13, 15–17], a hotel often appears as the most productive land use. This shows that the use of a land that is leased or does not change ownership tends to be more profitable for the land owner. Land use for offices also shows that it is more productive than apartments, shops and tourism/recreation. Based on this approach, the maximum productivity of the study area can be assessed for each strategy as shown in Table 6.

On the other hand, the concept of land value is also influenced by utility, scarcity, demand and effective purchasing power [18]. The interaction of these factors influences land value, which can be explained using economic principles of supply and demand. From the demand side, the value of land increases because the demand for

Table 4 Potential economic activities that can be developed on asset land based on the regulation of the capital city region of Jakarta 1/2014 [14]

Land use	Type of activity	Economic activity
Housing area	Flat occupancy	– Residential rental – Buy housing – Condotel – Parking lot – Rent space for shops – Rent space for restaurants and cafes
Trading	Shops	– Sale of goods – Location rental – Parking lot
Office	Virtual office	– Rent address – Rent room – Parking lot
Service	Co-working space	– Rent location/meeting room – Sales of food and beverages – Print and scan services – Parking lot
	Bank	– Banking activities – Parking lot
Tourism support	Fitness centre	– Membership – Sales of food and beverages – Sales of fitness equipment – Entrance ticket
	Restaurants and cafes	– Sales of food and beverages – Parking lot

a commodity increases as the commodity has utility and scarcity in the market. In addition, demand is also influenced by the desire to satisfy needs (demand) but sometimes demand cannot be fulfilled because it is limited by purchasing power. From the supply side, the supply of a commodity is also influenced by these four factors. In other words, factors that determine the economic value of a land property are (1) demand which indicates a person's desire and ability to buy or rent a property; (2) usefulness shows the benefits of the subject property that can provide satisfaction to consumers [19, 20]. Therefore, although some previous studies have shown that the use of land for offices will have a higher production value than other uses, maximum productivity needs to consider the demand factor and the usability factor or benefits.

Table 5 Analysis of the study area's financial potential

Development scenario	Financial implications	
	Potency	Problem
SCENARIO A • The function of residential activities in the form of apartments (35% of the land area) • Mixed activity functions in the form of office, trade, services and tourism (with the dominance of office and trade activities), 65% of the land area	– Profits from the sale and/or rental of flats – The cost of building an independent flat/Cooperation with the private sector – The ground floor of the flat can be used directly for various other activities, such as offices, restaurants and cafes, fitness centres – Around the flat, a shopping area can be built in the form of shophouses and/or take advantage of the existing shop houses – Can build and earn income from basement parking	– Less strategic location, difficult to find investors for flat construction – The types of goods that can be sold in the shopping area are limited because in the area there are already shophouses and shops/kiosks – Turnover of income from trading activities (shops) fluctuates
SCENARIO B • Apartment 35% of land area • Mixed activity functions in the form of office, trade, services and tourism (with the dominance of service activities), 65% of the land area	– Profits from the sale and/or rental of flats – The cost of building an independent flat/cooperation with the private sector – The ground floor of the flat can be used directly for other activities, such as offices, restaurants and cafes, fitness centres – In the vicinity of flat buildings, service activities can be built that facilitate the activities of flat residents, such as banks, co-working spaces – Service activities support the MICE concept for meetings and workshops for employees of PT. KAI – Sources of income are more stable because service activities such as banks are a basic need – Can build and earn income from basement parking	– Less strategic location, difficult to find investors for flat construction – Focus economic activities on offline meetings, which is difficult during a pandemic

(continued)

Table 5 (continued)

Development scenario	Financial implications	
	Potency	Problem
SCENARIO C • Apartment 35% of land area • Mixed activity functions in the form of offices, trade, services and tourism (with the dominance of tourism activities), 65% of the land area	– Profits from the sale and/or rental of flats – The cost of building an independent flat/cooperation with the private sector – The ground floor of the flat can be used directly for other activities, such as offices, restaurants and cafes, fitness centres – It is part of the core area of the Kota Tua Jakarta so that restaurants and cafes can be linked to support tourism activities in the Kota Tua Jakarta – Can build and earn income from basement parking	– Less strategic location, difficult to find investors for flat construction – Access connectivity with the main tourist area of the Kota Tua Jakarta is weak – The image of the surrounding area is not good so it is less attractive to tourists – Target market depends on tourists coming to Kota Tua

Table 6 Estimated study area productivity

Directional scenario for planning area development	Productivity forecast
SCENARIO A • The function of residential activities in the form of apartments (35% of the land area) • Mixed activity function, with the dominance of office and trade activities (65% of the land area)	• It is estimated that scenario A has the highest productivity, the dominant function is offices • It is estimated that scenario B has the second highest productivity, especially if the service activity is in the form of leasing spaces without any transfer of land ownership • It is estimated that scenario C has the lowest productivity. This is based on the results of research which conclude that tourism activities have less leverage on land values
SCENARIO B • Apartment (35% of the land area) • Mixed activity function, with the dominance of service activities (65% of the land area)	
SCENARIO C • Apartment (35% of the land area) • Mixed activity function, with the dominance of tourism activities (65% of the land area)	

Considering that the owner of the asset is PT KAI, which is a state-owned enterprise, land ownership in the area can only be transferred in accordance with the Ministry of State-Owned Enterprises Regulation 03/Mbu/03/2021 concerning procedures for write-offs and transfers of fixed assets of state-owned enterprises, Article 5 paragraph (1) [21].

Based on these aspects, the assets owned by PT KAI will have the maximum productivity if (1) they have the economic potential to have optimal productivity

values; (2) has optimal benefits or uses for PT KAI when carrying out its activities; (3) having optimal benefits or uses for the general public; (4) there is still a scarcity or high market demand. These four criteria are used to assess three alternative scenarios of land use to obtain maximum productivity for the asset area.

Based on the value of the benefits and market demand, it is recommended that the development of PT KAI's land to opt for scenario 2, whereby (1) 35% of the land is for rented apartments/flats to support MICE activities , especially for training, education or exhibitions held by PT KAI that requires participants to stay overnight; (2) 65% of the land is for mixed use (offices, trade, services and tourism) with dominance for service activities, especially MICE and financial functions that can be rented out to the community and/or used for internal PT KAI activities (Table 7).

3.5 Discussion of the Best Land Use Alternatives for Kota Tua Revitalisation Efforts

Kota Tua revitalisation is one of Jakarta's priority programmes in the 2030 Spatial Plan and Kota Tua Masterplan. The purpose of this revitalisation is to make Kota Tua, Jakarta, as an area that has high economic value as a tourist area, business, services and trade while maintaining the historical values of the area [2].

PT. KAI is located in the core area of Kota Tua, Jakarta, hence this area should have a high potential for economic value. However, currently, PT. KAI's land is dominated by settlements and semi-permanent buildings. A small part of the area functions as small-scale trade such as kiosks that sell foods and drinks. There are no heritage buildings found in this area. Land has different economic values based on the use, accessibility and quality of resources and the environment [5]. Settlements do not have the highest economic value for urban areas [21]. The highest economic value is in the form of trade and industrial activities because these activities can utilise the land efficiently for livelihoods, and hence produce the highest productivity.

Based on the explanation above, PT. KAI's land currently cannot optimally function, indicated by the use of land as settlements that cannot generate significant economic activities. The current condition of the building is not feasible which reduces the aesthetic and historical value of the area. Therefore, to optimise the function of Kota Tua, efforts to rebuild the land of PT. KAI are needed to achieve the highest economic land value through revitalisation. The focus of revitalisation is to change the current land function into economic activities to empower, maintain and strengthen the area's character [4].

Table 7 Area maximum productivity assessment

Scenario	Evaluation				Total score
	Economy	Benefits for PT KAI	Benefits for society	Market demand	
A	Highest score (3)	Offices and shops are not used directly. PT KAI only as a rental recipient (1)	The community can only act as tenants and/or beneficiaries. Tenants will have more business actors (2)	The surrounding community lacks purchasing power, while people who have purchasing power need special interests to come to the location (not yet have a strong attraction to require them to come) except for apartment residents (2)	8
B	Medium score (2)	Service activities (meeting halls) can be used by PT KAI, for example, for training activities, exhibitions or other internal activities that have the power of forcing the community to come and use the facilities (3)	The public can rent the meeting hall for social activities (2)	In Pinangsia and Taman Sari sub-districts, there is no representative meeting building. Even in Jakarta, the need for meeting halls is still quite large (3)	10
C	Lowest score (1)	The Sports and Physical Health Centre can be utilised by PT KAI employees (2)	Communities, schools in the vicinity can rent and use the sports centre (3)	What the local community needs are accessible tourism. Meanwhile, there are quite a lot of tourist attractions/objects in Kota Tua (2)	8

4 Conclusions

From the findings, it can be concluded that the best alternative for the development of PT. KAI' asset based on HBU analysis is mixed land use. The scenario is that 65% of the land area for mixed activities (office, trade, services and tourism) with dominance for service activities, especially meeting halls, financial institutions that

can be rented out to the community and/or used for PT. KAI activities. Meanwhile, 35% of the land area is developed as rented residential flats to support the function of the meeting halls, especially when training, education or exhibitions is held by PT. KAI that requires participants to stay overnight.

References

1. Prakosa W (2011) Kotatua Jakarta: Revitalisasi menyeluruh atau menghilang? (Kotatua Jakarta: complete revitalization or disappearing?). In: PESAT proceedings (Psychology, economics, literature, architecture & civil)
2. DKI Jakarta Provincial Government (2014) Rencana Induk Kawasan Kotatua (Kotatua Area Masterplan)
3. CNN Indonesia (2018) Revitalisasi Kota Tua Jakarta Diharap Dilakukan Terpadu (Revitalization of Kota Tua Jakarta is expected to be carried out in an integrated manner). https://www.cnnindonesia.com/nasional/20180425180658-20-293548/revitalization-kota-tua-jakarta-diharap-dilaku-terpadu
4. Martokusumo W (2011) Revitalisasi Dan Rancang Kota Beberapa Catatan Dan Konsep Penataan Kawasan Kota Berkelanjutan (Revitalization and urban design some notes and concepts of structuring sustainable city areas). J Urban Reg Plan 17(3):31–46
5. Pambudi A (2008) Analisis nilai ekonomi lahan (Land Rent) pada lahan pertanian dan permukiman di kecamatan Ciampea, kabupaten Bogor (Analysis of the economic value of land (land rent) on agricultural land and settlements in Ciampea sub-district, Bogor district). Thesis, Faculty of Agriculture IPB, Bogor
6. Listyohadi M (2018) Analisis Highest and Best Use pada Lahan Milik PT PLN (Persero) di Paya Pasir Medan Sebagai Solusi Alternatif Pemanfaatan Aset (Analysis of highest and best use on land owned by PT PLN (Persero) in Paya Pasir Medan as an alternative solution for asset utilization). Thesis, Universitas Sumatera Utara, Medan
7. Utami NPK, Utomo C (2015) Analisa Highest and Best Use Pada Lahan Kosong di Kawasan Wisata Ubud (Analysis of highest and best use on vacant land in Ubud tourism area). J ITS Eng 4(1):C41–C44
8. Suprapno (2010) Pemahaman Sederhana Konsep highest and best uses analysis (Simple understanding of highest and best uses analysis concepts). https://www.djkn.kemenkeu.go.id/article/baca/2305/Pemahaman-Sederhana-Konsep-Highest-And-Best-Uses-Analysis.html
9. Fajar DN, Fahrur R, Edwin H, Lakshmita D (2016) Penyusunan Rencana Strategis Revitalisasi Kota Tua Jakarta (Draftjng of the strategic plan for the revitalization of Kota Tua Jakarta). City management course report. Institut Teknologi Sepuluh Nopember, Surabaya
10. Firdaus F, Purwantiasning AW, Prayogi L (2018) Revitalisasi kawasan Kota Tua Jakarta dengan alternatif konsep TOD (Revitalization of the Kota Tua Jakarta area of Jakarta with an alternative TOD concept). PROTECTION J Arch 2(1):35–44
11. Spandou M, Garcia C, Macário R (2012) Urban revitalization and transport: local factors and driving forces from a stakeholder view. In: Conference: 3rd annual conference on planning research CITTA, pp 1–22. Lisbon, Portugal
12. Akmaluddin A, Utomo C (2013) Analisis Highest and Best Use (HBU) pada Lahan Jl. Gubeng Raya No. 54 Surabaya (Analysis of highest and best use (HBU) on Jl. Gubeng Raya No. 54 Surabaya). J ITS Eng 2(1):C6–C10
13. Faradiany FV, Utomo C (2014) Analisa Highest and Best Use Pada Lahan Kosong Di Jemur Gayungan II Surabaya (Analysis of highest and best use on vacant land in Jemur Gayungan II Surabaya). J Eng POMITS 3(2)
14. Peraturan Daerah No 1 tahun 2014 tentang Rencana Detail Tata Ruang dan Peraturan Zonasi DKI Jakarta 2010–2030 (Regional regulation of the special capital region of Jakarta regarding detailed spatial planning and zoning regulations 2010–2030)

15. Budi FP, dan Putra INDP (2021) Analisis Highest and Best Use Pada Lahan Kosong di Kawasan Perumahan Samudra Residence Brondong Lamongan (Highest and best use analysis on vacant land in the Samudra residence residential area, Brondong Lamongan). Putra Reka Buana: Jurnal Ilmiah Teknik Sipil dan Teknik Kimia 6(1). https://doi.org/10.33366/rekabuana.v6i1.2165
16. Mulyana EW (2019) Penentuan Penggunaan Lahan Kosong dengan Analisis Highest and Best Use (HBU) (Determination of vacant land use with highest and best use (HBU) analysis). J Glob Bus Manag Rev 1(1). http://dx.doi.org/https://doi.org/10.37253/jgbmr.v1i1.444
17. Priambudi BN, Haryanto R (2015) Optimalisasi Lahan Untuk Pengembangan Rekreasi dan Budaya dengan Metode Highest and Best Use (HBU) (Land optimization for recreational and cultural development with the highest and best use (HBU) method). Jurnal Pembangunan Wilayah dan Kota 11(4):403–412
18. Wolcott RC (1987) The appraisal of real estate American Institute of Real Estate Appraiser. North Michigan, Chicago Illinois, pp 22–63
19. Eldred G (1987) Real estate analysis and strategy, p 4. Harper & Row, Publisher New York
20. Suparmoko (1989) Ekonomi Sumberdaya Alam dan Lingkungan: Suatu Pendekatan Teoritis (Economics of natural resources and the environment: a theoretical approach). PAU-UGM, Yogyakarta
21. Minister of SOE Regulation No. Per-03/Mbu/03/2021 regarding the third amendment to the regulation of the Minister of State-Owned Enterprises Number Per-02/Mbu/2010 concerning procedures for write-offs and transfers of fixed assets of State-Owned Enterprises

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