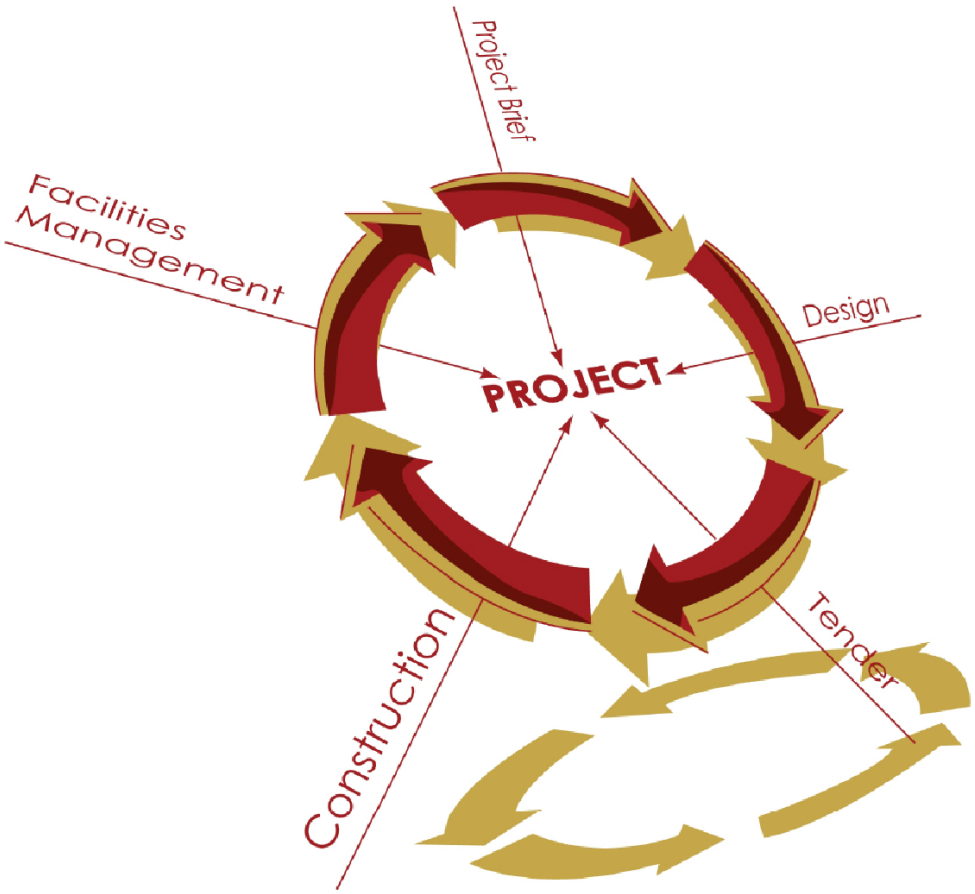
MCRJ SPECIAL ISSUE Volume 20 | No. 3 | 2023 eISSN 2590 - 4140

Malaysian Construction Research Journal

6TH INTERNATIONAL CONFERENCE ON RESEARCH METHODOLOGY FOR BUILT ENVIRONMENT AND ENGINEERING 2023 (ICRMBEE 2023)



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APPLICATION OF THE NODE-PLACE MODEL TO EXPLORE THE SPATIAL DEVELOPMENT OF KL SENTRAL IN MALAYSIA

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Abstract
The basic principle of railway development is that a railway station is not merely a node where people change modes of transport but also a place where spatial concentrations of high-value activity in and around station areas are recognised. This paper aims to assess the spatial development of KL Sentral using the node-place model introduced by Luca Bertolini. KL Sentral was chosen as the case study of transit-oriented development in Malaysia to evaluate the station's spatial performance by balancing the node and place value of the station, besides using the TOD index. Direct observation was also conducted in KL Sentral to observe passengers' movement patterns and activities, including in the station building and surrounding areas within an 800-metre radius. The result of this study provides theoretical support for node-place value and TOD performance indicators for KL Sentral. It facilitates comparability among other stations and assists decision-making and actions in developing Malaysia's railway stations.

Keywords: *Railway Development; TOD; Node Place; Spatial Development*

INTRODUCTION

Conventionally, urban infrastructure has demonstrated railway stations as transportation functions, movement, or development. However, interest has evolved recently in developing railway stations to integrate with their surroundings - more than just interchanges where passengers transit from one mode to another. This shift in perspective acknowledges the potential of railway stations to serve as vibrant and multifunctional spaces, going beyond their basic transportation functions. Instead, they are seen as key nodes that can stimulate economic activity, social interactions, and the overall spatial development of their surroundings. That is, rail station areas are increasingly perceived as where there is interchange, stops, activity, and destination (Hale, 2013). It is also perceived as an urban fabric beyond as a transportation infrastructure (Banerjee & Saha, 2022; Zacharias et al., 2011). This entails that the stations are perceived as nodes of connectors - connect people to transportation and infrastructure, people to surroundings, and people to people (Cao, 2022).

Rail stations are not only defined as places where trains arrive and depart, but they are also reinforcing their interconnective function. In urban development, railway infrastructure has been promoted as a catalyst for broad development agendas such as urban regeneration and revitalization, as well as a focus for cities aiming to boost their status and image as liveable, and sustainable cities (Alexander & Hamilton, 2015). Through conceptualization of space as socially constructed, station development can be understood as part of placemaking strategies that help to rejuvenate the streets, (re) produce urban spaces, and, in turn, shape discourses about the city image (Muriby, 2007; Viet Anh, n.d.). Here, urban design in the transportation context is imperative in maintaining the visual, functional, and physical links between station concourses, streets, malls, squares, and landmarks (Abdul Latip et al., 2023).

Technically, it can be observed that urban design shapes the public realm at the intersection of architecture and urban planning, from macro to micro scale, which demonstrates that urban design should move beyond land use and spatial planning into movement analysis and cross-sectional design.

The success of a dynamic urban space is determined by how well it connects with the surrounding. The Next American Metropolis by Peter Calthorpe (1993) addresses the transit-oriented development (TOD) concept, an architect, urban planner, and the founder of American TOD. In his book, a mixed-use neighbourhood that is "within an average 600m walking distance of a transit stop and core business centre" is what Calthorpe called a TOD. TOD make it convenient for people and employees to travel by transit, foot, bicycle, or car by integrating residential, retail, office, and open space in a walkable environment (Calthorpe, 1993). TOD has the greatest opportunity to incorporate urban design in infrastructure projects to create an appealing public space with a diverse potential for economic and social activities (Abdul Latip et al., 2023). This phenomenon will then be related to wider contextual factors to focus on planning and designing a station as a node and place. However, the elements of TOD involve the tension between the role of a railway station as a node in a regional transportation network and, at the same time, the station's role as a place in a neighbourhood context (Yang et al., 2022). A key node-place tension exists between the station's role as an access point for people arriving by public transport, cars or foot and its station area to create a pleasant place.

Many design issues abound here, including the station's footprint in the community, the integration of the customer services counter into the station itself, and the location of parking and drop-off bays (Caset, 2019). Beyond urban design issues, the node's function in the transportation network and the type of place it is in the region are important factors to be concerned about (Singh et al., 2017). The discussion in this paper picks up this subject and deals with KL Sentral. KL Sentral, the largest transit hub in Malaysia and a TOD reference, as a case study for this paper, will be judged on its contribution to place and transport infrastructure using the node-place theory by Luca Bertolini. This paper aims to define the terms "node of networks" and "place in the city" with two (2) objectives. Firstly, the paper reviews the theory of TOD and the node-place model. Secondly, the theory has examined its spatial functions, which affect the station's attraction and movement. The spatial functions explain how KL Sentral serves primarily in the transportation network in Klang Valley, and the neighbourhood explicitly links the node-place model.

LITERATURE REVIEW

TOD and The Node-Place Model

It remains necessary to examine the integrations between land use and transportation in TOD areas under a systematic framework (Bertolini, 2008). Both integrations can describe station areas through the node-place model as an analytical tool. The node-place model introduced by Bertolini in 1991 is an analytical framework to systematically assess transit stations in a transport network (Caset, 2019). The qualities of the station area can be quantified in the way of indicators within the index of node, place, and design (Chorus & Bertolini, 2011; Monajem & Ekram Nosratian, 2015; Olaru et al., 2019). According to Chorus & Bertolini (2011), a railway station has two basic functions: node and place. Node is a train

access point and will increase to other transportation networks (see Figure 1a). While the place is a specific section of the city with a concentration of infrastructure but also diversified buildings and open spaces (see Figure 1b).

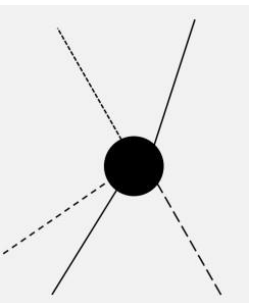


Figure 1a. Diagram of Station as a Node

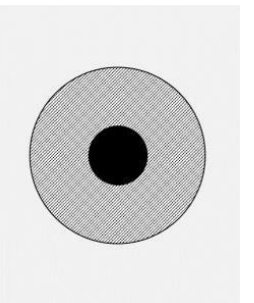


Figure 1b. Diagram of Station as a Place

Bertolini (1996) illustrates five (5) associations between node and place dimensions: dependency, accessibility, stress, unsustained node, and unsustained place. As shown in Figure 2, the station's network accessibility is shown by the y- axis (node), while the x- axis represents the station's land uses (place) (Bertolini, 1996). The x- value indicators also include the number of residents and employers in several economic sectors at station areas and create diverse activities (Bertolini, 1996, 2008). It thus contributes to the potential of actual human interaction as there are more activities present. Considering that the higher the number of people who can get to the station, the greater the potential for interaction (Bertolini, 1999).

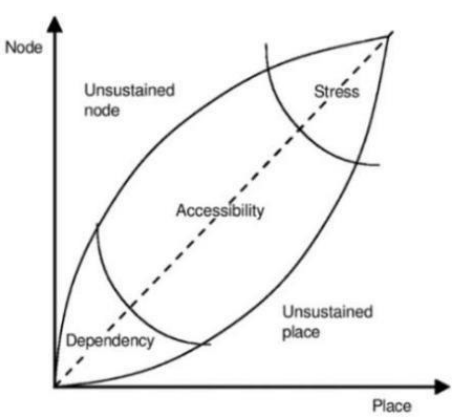


Figure 2. The Node-Place Model by Bertolini (1999) to Balance Accessibility and Station Area

The model suggests that a balance must be present or will develop between node and place functions for railway stations. Balance refers to a dynamic search for equilibrium rather than a state of static equilibrium (Caset et al., 2017). A station above the diagonal is where the potential for passenger interaction has not been fully realized despite high connectivity in the rail network. This situation is called an unsustained node (above the middle line). A station is an unbalanced place or node if its node and place values are unmatched. The unsustained node, in turn, demonstrates the opposite situation, the unbalanced place and node. The unbalanced nodes refer to where the transport systems are relatively more developed than the urban activities around the station areas. An unbalanced station area thus has a significantly strong relative position in the node or the place value. The station is a balance station where

the node and place value are matched, but over configuration or under the configuration of node and place value, or where both the node and the place have been used to the fullest would result in stress or dependence. Stressed station areas have a relatively strong position on node and place value. Further development in these areas may become problematic as multiple claims on the limited space can easily cause conflicts.

REVIEW THE CASE OF KL SENTRAL

Kuala Lumpur Sentral (also known as KL Sentral) is the leading transit hub in Malaysia (9.3 acres of land in total, and 10.5 acres are dedicated to the depot) and a largest integrated railway terminal in Southeast Asia. It opened in April 2001 at the heart of KL Sentral CBD to replace the old Kuala Lumpur Railway Station. KL Sentral is integrated with major roads (such as Jalan Damansara and Jalan Syed Putra) in Kuala Lumpur and with other modes of transportation, including Light Rail Transit (LRT), Mass Rapid Transit (MRT), Keretapi Tanah Melayu Komuter (KTM Komuter), monorail, intercity trains (electric train system - ETS), interstate buses and taxis. KL Sentral also connects the hub to Subang Airport by KTMB, Kuala Lumpur International Airport (KLIA), and Kuala Lumpur International Airport 2 (KLIA2) by KLIA Express and KLIA Transit, operated by the express rail link (ERL). The point that connects almost all major lines manifests what KL Sentral truly is. In 2022, the annual average daily number of passengers at KL Sentral entry and exit recorded 220,354 passengers, a spike during the post-pandemic period (www.mot.gov.my).

To understand the physical characteristics of KL Sentral from a broad perspective, Table 1 illustrates five (5) different typologies: terminal building, station, space, function, and settlement hierarchy. Furthermore, Singh et al. (2017) and Kim and Shin (2021) suggest these typologies. As an interchange transfer station, KL Sentral produces a complex space typology connecting many modes of transportation with many lines and routes. As a multiple-function station space for economic and commercial activities, service areas, and social and cultural activities as in-transfer areas, KL Sentral strives to optimise its functions in the city centre of Kuala Lumpur and affect the urban fabric.

Table 1. Different Typologies for KL Sentral

Typology	Terminal Building	Station	Space	Function	Settlement Hierarchy
	On-Ground	Transfer/Interchange	Complex	Multi-Function	City Centre

ANALYSIS AND DISCUSSION

Measuring TOD Performance

Ewing and Cervero (2010) have recommended the land use proportion of urban TOD. To fit in the Malaysian context, this study also reviews the recommendations by (Niu et al., 2019), who studied Singapore TOD stations' land use characteristics. In this study, the area within 800 metres of the KL Sentral is analysed, and spatial statistics are used using a Geographic Information System (GIS) technique (see Figure 3).

Table 2 below shows the land use distribution according to housing, commercial, public facilities, parks and green space, and roads. The total buffer area of KL Sentral is approximately 2.011 km2. Giving to the TOD performance for KL Sentral based on land use

characteristics, KL Sentral received an 'A' grade for housing, commercial, parks, green space, and roads, which is feasible for the land use proportion recommended by Calthorpe (1993). The public facilities received an 'H' grade as they calculated 19.70%, exceeding 11%. As for the hierarchy of KL Sentral as an urban TOD station, the study found that development years, urban economic growth, and urban regeneration programs result in higher land use mix degrees. This is undoubtedly true in that the functions of a transit station are elusive because they can be constrained by various other factors such as planning policies, the political environment, passenger socio-demographics, train operating characteristics, financial mechanisms, development plans, and others.

Table 2. The Distribution of Land Uses of KL Sentral Within an 800-Metre Radius and Its TOD Performance Score

Land Uses Category	Area (Hectare)	Percentage (%)	TOD Performance
Housing	40.34	20.00	A
Commercial	31.81	15.76	A
Public Facilities	39.73	19.70	H
Parks and Green Space	21.43	10.62	A
Road	59.76	29.61	A

L	Lower than The Standard TOD	A	Applicable Within Standard TOD	H	Higher than The Standard TOD

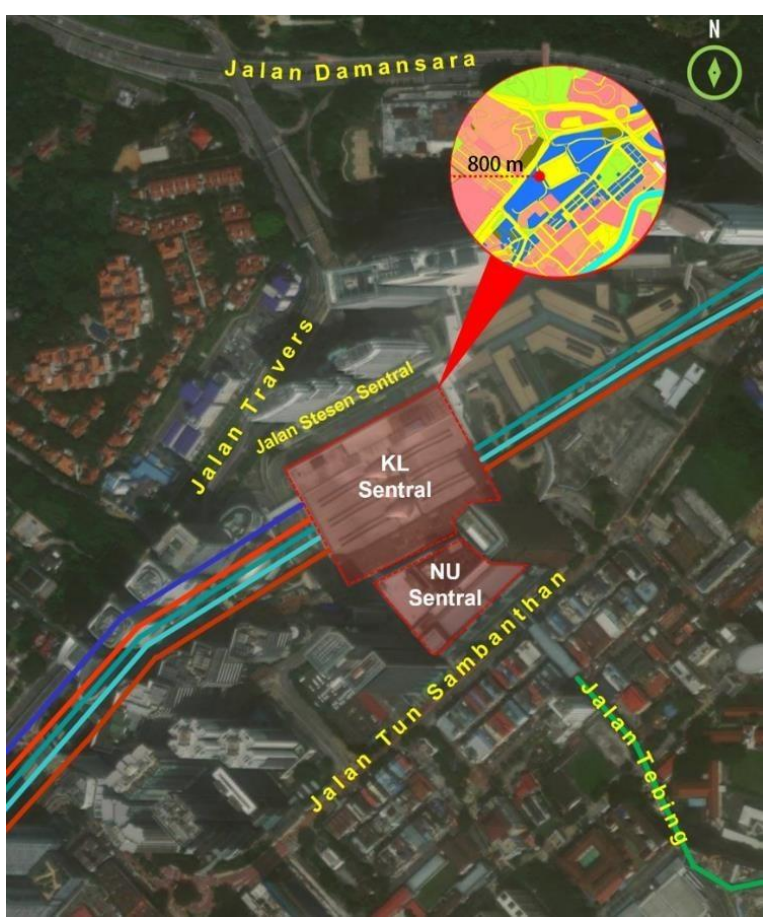


Figure 3. The Sation's Buffer of KL Sentral Within 800 Metres

This paper also comprehensively analysed the TOD level for KL Sentral based on five (5) sets of indicators: diversity, design, distance to transit, and destination accessibility, as suggested by Cervero & Kockelman (1997); Ewing & Cervero (2010). The indicators were calculated and aggregated using ArcGIS, as presented in Table 3. All indicators have been standardised using the maximum standardisation technique, which applied a 0–1 gradient to all values and aggregated them into the TOD index with an equal-weighted technique. The indicators help to determine how effective and successful the TOD concept is regarding supporting the function of the rail station and its network and accommodating a liveable environment. Overall, KL Sentral received a score of 1.24, with the design elements of open space (1.00) and parking (0.82) scoring higher than the diversity of land use (0.92) and distance to transit (pedestrian density) (0.90). The result of the land use score is proven by the earlier analysis on land use distribution within the 800-metre buffer of KL Sentral and scores as applicable within the standard of TOD with the diversity of land uses. For pedestrian density, the semi-grid iron street pattern with minimal conflicts over the street and the interconnectedness around KL Sentral areas offer many available alternatives for pedestrian routes that are accessible and convenient to walk, especially with the high degree of land use mixedness.

Table 3. Calculation of TOD Index Indicators

Indicators	Measurement	Formula
Density	Population Density (People Per km^2)	*PD* = *NP/A* Where *PD* = Population Density, *NP* = District Population, *A* = District Area *PA* = *PD/SA* Where *PA* = Buffer Area Population, *SA* = Buffer Area Coverage (2.01km^2) *PD* = *PR/SA* Where *Pd* = Population Density of The Buffer Area, *PR* = Population Residence Area
	Commercial Density (Number of Commercial Activities Per km^2)	*CD* = *NC/SA* Where *CD* = Commercial Density, *NC* = Number of Commercial Activities, *SA* = Buffer Area Coverage
Diversity	Land Use Diversity (Mix Percentage)	1 - $\sum$ (a/A)^2 Where *a* is the total area of specific land use (e.g. residential, commercial, industry, facilities) within the buffer area, *A* = total area of all land use categories within the buffer.
Design	Open Spaces	Total Area in Acre
	Parking Space	Total Area in Acre
Distance to Transit	Pedestrian Path	Total Length of Pedestrian Within The Buffer Area Using ArcGIS
	Intersection Density	Number of Road Crossings Per km^2 Within The Buffer Area
Destination Accessibility	Land Use Mixedness (Mixedness of Residential Land Use with Other Land Use Categories)	MI (i) = $\frac{\sum_j L_o}{\sum_j L_r + L_o}$ L_o = Non-Residential Land Uses for Each L_r = Residential Land Uses

To view each of the TOD indicators' results for KL Sentral, Figure 4 visualises the TOD performance based on five main TOD indicators. The diagram shows almost proportionality within each hexagon, whereas the strongest concentration is on land use, open space, parking, population, and pedestrian density indicators. While the smallest proportion of the hexagon axis shows a land use mixedness indicator.

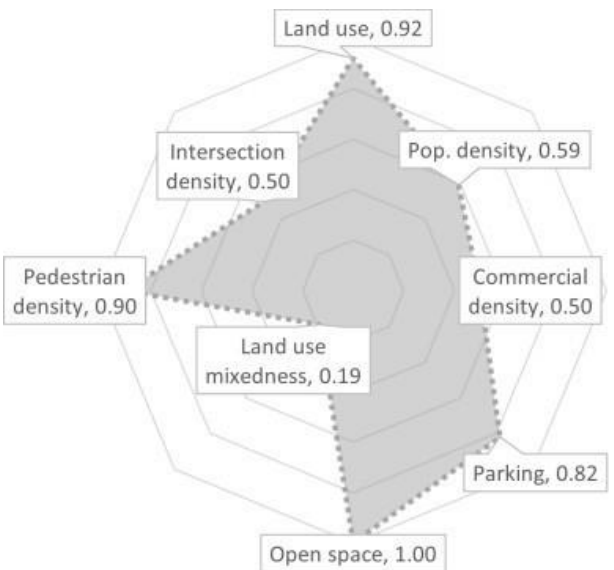


Figure 4. Hexagonal Diagram for TOD Index Level for KL Sentral Based on Five Indicators

Overview of Node-Place of KL Sentral

KL Sentral is progressively understood as an urban district with more than a transportation and infrastructure project, especially after it is integrated with the mixed development of NU Sentral. The brief assessment of node-place characteristics for KL Sentral is shown in Table 4 to examine the characteristics of the node and place of KL Sentral.

The 2-days observation was conducted in KL Sentral building, including Jalan Stesen Sentral, Jalan Stesen Sentral 3, Jalan Tun Sambanthan, Jalan Tun Sambanthan 4, Little India Brickfields, and Jalan Tebing. The observation started from 8.30 am until 8.00 pm on 3 January 2023, Tuesday. The purpose of observing on weekdays is to observe and analyse the daily movement, activities, and type of passengers (especially the workers who contribute more to the movement).

From the direct observation that has been carried out, two (2) types of passengers can be classified in KL Sentral: (i) transit passengers and (ii) office workers. The passengers only transit in the KL Sentral to transfer or to their destination, without stopping at any shops or stores in KL Sentral or NU Sentral. At the same time, the office workers working in KL Sentral, NU Sentral, or around the station areas are either departing (employment moving to the node area from the outside node) or leaving places (employment from KL Sentral building to outside the node area). These types of employment are related to the offices and residential functions provided close to KL Sentral.

The KL Sentral building, connected to the NU Sentral Mall, is relatively small to accommodate the current and future passenger capacity. Both buildings produce an excellent transition between the interchange and non-transport activities, evident in the efficient use of space. As the observation has been conducted at specific hours, the people's movement will be classified as heavy, moderate, or low based on the number of people passing the gate. The first observation in the morning found that the concourse creates heavy and fast movement and crowdedness during the peak hour between 8.00-9.00 am. The crowdedness is significant when the passenger density increases. A lower movement level is observed at 10.00 am and during office hours after the peak hour. The passengers are mainly in transit, either as retail workers or for leisure purposes, to the NU Sentral. The central concourse level observed less passenger movement, and the same was accurate at the commuter entrance hall and train gates. The movement level gradually increases between 12.00 noon to 2.00 pm as the period is reflected in the flux of space use patterns, whereby office workers mainly occupy the area during peak and lunchtime periods. The shops, restaurants, stores, and services in the KL Sentral become the movement attractors that attract passengers to stop by. This area becomes congested during peak hours, which are 12.00 noon to 2.00 pm and 4.00 to 8.00 pm. The movement rate at the LRT, KTM, and MRT gates and platforms increases from 4.00 to 7.00 pm. The movement rate increases at the NU Sentral entrance and rear entrance (southeast side) through the bridge and a series of escalators where passersby walk towards the LRT, KTM, and MRT platforms and gates. As Yuh Yao et al. (2018) claimed, the movement and circulation of the KL Sentral are based on the architectural design idea of the "Coral", which represents the city were urban life flows efficiently without boundaries. The other issue with internal layout is the unclear sense of orientation, instantly providing a sense of place and direction (Yuh Yao et al., 2018). Poor orientation may leave visitors wondering if they are walking in the right direction.

The main entrance of the KL Sentral in Jalan Travers is associated with clusters of urban mixed office towers, hotels (such as Hilton KL, St Regis, and Le Meridien), and commercial uses with a high level of pedestrian and vehicle movement. The building blocks linear arrangement gave visual consistency and reduced distance. In the planning concept of KL Sentral, the furthest buildings from each other are at most 400m to and from the station to encourage more movement by foot and create a convenient environment. In addition, KL Sentral has designed a horizontal façade facing the adjacent buildings with the lowest height to avoid the direct sunlight that the adjacent building has blocked from the station building. Most buildings and towers paint a picture of aggressive modernisation, only leaving behind only the KTMB Building and National Museum in Jalan Damansara. The front area (departure hall of KL City Air Terminal) is filled with mixed types of people and typical activities shared by office workers, commuters, and travellers, as well as local people.

KL Sentral has two completely different urban patterns between its front and rear, reflecting two distinct urban environments (Khalid et al., 2019). Both areas have a bustling front side contrasting with decrepit surroundings to their rear. Their urban patterns unmistakably imply that a significant amount of movement by vehicles and pedestrians are generated in the mixed-use front area, which is cohesive and densely built but needs to be better utilised with its surrounding block patterns (Khalid et al., 2019). For the rear area in Jalan Tun Sambanthan, Jalan Thambipillay, and Jalan Sultan Abdul Samad, the cluster of three-story old shophouses, located to the southeast of the KL Sentral and NU Sentral, is well defined by the urban grid. The rear entrance (southeast part) from the NU Sentral at ground

floor level needs passengers to pass by the shops and crowdedness to go to the monorail station and to get out of the building. The area also includes churches, a mosque, government offices, schools, retailers, hotels, and a morning market in Jalan Tebing, a section fronting the Klang River.

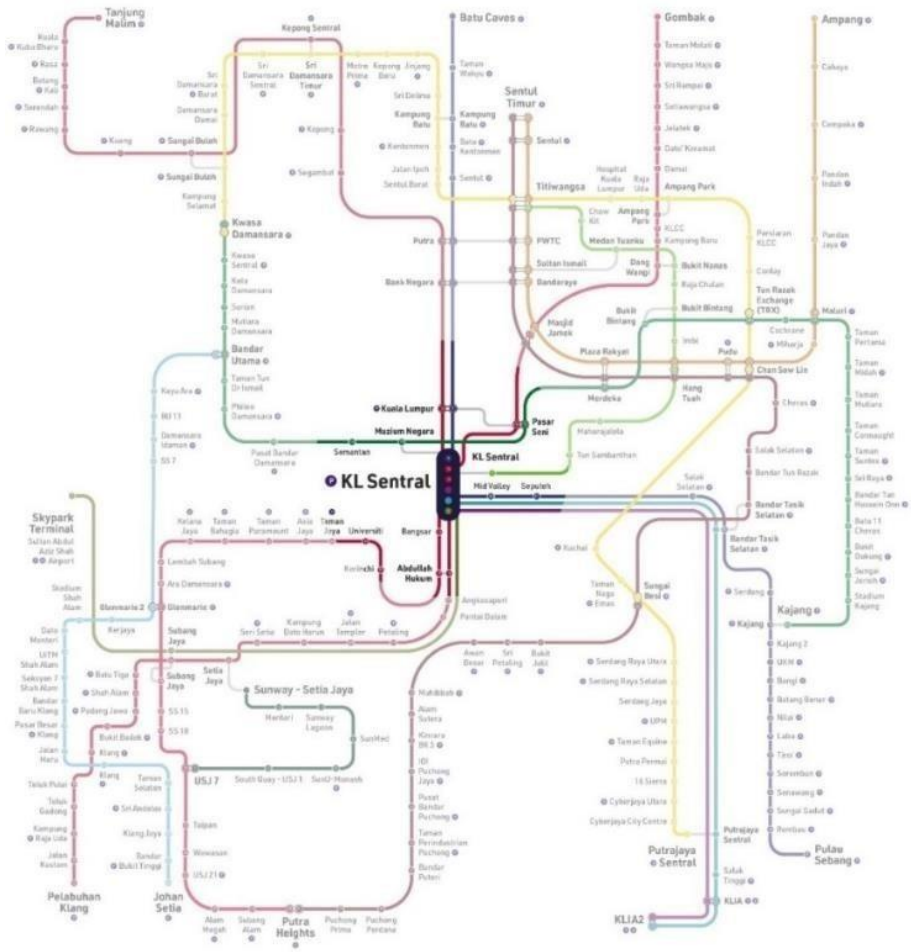
Table 4. Assessment of Node-Place Characteristics of KL Sentral

Elements	Characteristics
Node	
Spatial reach from node	Local – (inter) national
Transport pattern	Monocentric
Accent on	Domestic passengers
Transport unit cost	Lower middle
Management of node	No separation between infrastructure and services Monopolistic, subsidized
Target market	Commuters (for work, school/college), city users (shopping), long-distance business, local traveller, tourist
Spatial constraint on transport development at node	High
Place	
Typology location	Urban
Land consumption per unit transported	Moderate
Land use density	High
Variety of uses	Moderate
Dominant of uses	Transport related
Dominant place-connected activities	Commercial (shop lots), condominiums, shopping malls, hotels, corporate offices tower, institutions
Variety of place users	High
Access	Public
Type of property development	Regeneration of existing fabric
Node-place	
Node-place relationship	Local interaction, and intra-regional dependence
Economic impact of node	High
Environmental impact of node	Moderate and spatially limited
Density of actors	High and fragmented
Policy context: thematic focus	Environment (positive indirect effects)
Specific issue	Development of public transport, privatization of railway companies

The Node Value

Nodes are the points at which goods and passengers are transported from one node to the following (Bertolini, 2008). Reusser et al. (2008) argued that a transportation node like a rail station had more than just accessibility (how many destinations, how quickly, and how accessible it could be from the origin). Nevertheless, the station also serves as an activity hub (how many diverse activities can be performed in a station area) (Reusser et al., 2008). Node values measure the intensity and connectivity in the transit network and the vicinity of the transit stop, and based on this model, when transportation and land use-driven demand in the station area are balanced, the ideal state of a node has been attained Bertolini & Spit, 1998). In this case, KL Sentral has a significant function as a railway station that provides transportation facilities to people, as the interchange is the central concept. Because of its central position in the national railway network, KL Sentral is the largest railway station in the country and the biggest connecting station where passengers can transfer between

monorail, LRT, and intra-city trains like commuter by KTM and Express Rail Link (ERL a high-speed rail service in Malaysia that operates between KL Sentral - Kuala Lumpur International Airport, KLIA and KLIA2) and including intercity buses (see Figure 5). It connects transit networks, offers transport services to the catchment areas, and comprises a transportation demand.



(Source: www.mymrt.com.my)

Figure 5. KL Sentral in the Networks of Urban and Regional Public Transportation

From a node perspective, KL Sentral is accompanied by other public transport and services. These modes of transportation services as multi-modal transport hubs where various types of passengers can switch between them. KL Sentral was integrated with four lines as an interchange station. There are the LRT Kelana Jaya Line, monorail line, KTM Komuter Batu Cave - Pulau Sebang Line, and Tanjung Malim - Pelabuhan Klang Line.

The Klang Valley's rail-based transit system generally consists of three (3) LRT lines: the LRT Ampang Line, the LRT Sri Petaling Line, and the LRT Kelana Jaya Line. The Klang Valley Mass Rapid Transit (KVMRT) was designed to support continuous connectivity and integrate with the existing LRT, KL Monorail, KTM Komuter, KLIA Express, and KLIA Transit systems in the Greater Kuala Lumpur/Klang Valley. Two MRT Lines have been

implemented: the MRT1 Sungai Buloh-Kajang (SBK) Line, which has been fully operating since August 2017, and the MRT2 Sungai Buloh-Serdang-Putrajaya (SSP) Phase 1, which began early construction in 2016 and was fully operational in March 2023. Two (2) commuter lines operate: KTM Komuter, a monorail line known as KL Monorail, and an airport rail link to Kuala Lumpur International Airport (KLIA Terminal 1 and Terminal 2).

Drawing on the integrated rail networks of Klang Valley, it can be analysed that the spatial pattern is monocentric. However, despite its continued expansion, the conventional central business district (CBD) remained the predominant area as cities typically have a core business district, like KL Sentral, where the main operations are concentrated because of economies of scale (employment, property, and services).

In addition to being a monocentric city, the spatial system of Klang Valley is a radial structure which connects the central attractant area directly with transfers with the rest of the city. The new lines, such as MRT Putrajaya Line Phase 2 and LRT3, are created to serve new attractant spaces along the lines resulting from the CBDs scattering. Due to the slow progress of new CBDs growth along these lines and station location, the aim appears challenging, given the slow expansion of new CBDs along the lines and the station's location.

It can be summarised that the transportation networks of KL Sentral consist of three (3) phases. The first is a highly centralised one where the major activities occur in a CBD such as KL Sentral. The second is an intermediary phase, when some of these activities start scattering over adjacent CBD areas, such as Bangsar, Cheras, Bandar Sri Permaisuri, and Sentul. The final phase is a scattered urban form, where many activities are relocated to the new peripheral areas far away from the KL CBD, such as Putrajaya Central, Subang Jaya, and Kwasa Damansara. The decentralisation of the cities in Klang Valley, especially a few decades ago, was brought on by changes in land use, transportation, and the sprawling of the CBDs. Even with this, the public transport system in Klang Valley is still mainly oriented toward the core cities. At the same time, suburban communities such as Puncak Alam, Kuala Selangor, and Bangi are less connected by public transport, especially rails and buses. Therefore, the somewhat high level of car use in cross-commuting Klang Valley makes intuitive sense because many commuters from the suburban areas also live in the suburban.

The Place Value

As marked by Tuan (1979), space and place define geography's nature. Space may have been created out of nothing, but how it is organised, used, and understood results from social translation, transformation, and experience. Also, as functional nodes in space, place is much more than just location and extends beyond the spatial dimension of socio-economic phenomena (Banerjee & Saha, 2022). The terms individuals employ to give any area a sensation having a stronger emotional charge than location or practical space hold the key to place meaning. The place value of railway stations may vary depending on where they are located within the city (Alexander & Hamilton, 2015). If the station is in the urban core, it urges a different plan for developing the space in and around it than a peripheral area. Rail stations in urban core locations have more comprehensive of being well-connected intra- and inter-urban network linkages. In contrast to the stations of peripheral locations, which have the discomfort of comparatively poor linkages with public transportation or active mobility such as walking and cycling (Cao, 2022).

KL Sentral was initially designed to provide transport services to inter and intra-passengers. However, as time goes on, it transforms into a multifunctional urban fabric, providing a wide variety of public transport services to people with different social needs. Besides, it has been designed as a place with multifarious roles and has been foreseen as an urban place that performs various social and economic functions to serve locals, tourists, and travellers. The rear areas of the KL Sentral, in Jalan Tun Sambanthan, connected to the Little India Brickfields (approximately 400m from KL Sentral by foot), can be seen as public spaces that created and encouraged a sense of community. The station renders visitors and tourists a unique experience without even going far from the station- become a social and cultural hub with diversified services and facilities. Besides Little India Brickfields, it can be recognised that pedestrians enjoy walking along Jalan Tun Sambanthan because of the built environment elements such as the small blocks of shophouses, the colourful street furniture, shading, historical façade, pop-up booths, informal stalls, and the connected pathways, among others, which make walking along Jalan Tun Sambanthan enjoyable for pedestrians and significantly contribute to the vibrant public life. On the one hand, neighbourhood walkability is stimulated by mixed land use and high density, and public transport for travelling outside the neighbourhood is promoted by efficient transit infrastructure such as bus stops, pedestrian pathways, and crossings. High densities correspond to comfortable and walkable environments and easily reach the destination. However, KL Sentral is only walkable within it. It is an island compared to the surrounding neighbourhood and parcels connected only by private bridges. It may reflect the concept of "City within a City", where the linkages are only designed within the building purposely. It is only walkable from the next door of KL Sentral, such as CIMB Tower, Q Sentral, or St Regis. Another example is the poor connection from Botanical Garden to KL Sentral unless access via MRT Muzium Negara for air conditioner and covered bridge. KL Sentral should be a perfectly walkable city within a city where nobody should be driving to KL Sentral with so many public transport options converging there.

DISCUSSION AND CONCLUSION

Quantifying a balance between the KL Sentral's node and place functions is challenging in terms of its network, accessibility, and activity as well. This system's node and place functions must be strongly balanced to achieve a high impact on the station. It becomes clear that in planning, designing, and developing activities (social and economic growth) around the railway station areas, the spatial configuration is a crucial procedure.

The study highlights the significance of the node-place model in evaluating transit-oriented development (TOD) stations, emphasizing the relationship between transportation infrastructure and the potential for surrounding area development. The motivation for the study came from the demand for more attention to the spatial configuration in the TOD research topic using the node-place model. In considering any typology of railway stations, planners are challenged with node and place tasks that may be similar or different. Planners must consider two crucial needs: first, a node and a place function must be distinguished, and second, node-place interactions must be dealt with together. the challenge of the development of node-place is the need to deal at the same time with both transport infrastructure and urban development issues. This implies, among other things, two distinct and often conflicting sorts of policies, demands, management, operational, and technical realms.

The study confirms that entire movement networks connect space and society, and that movement significantly impacts urban form and function in the station area. This suggests that a more detailed study of the spatial configurations of KL Sentral and their impact on movement patterns is required. To objectively transform railway station areas into a place in the city, it is necessary to clarify the station's spatial impact on their urban settings and people. The relationship between the internal and external spaces of the station buildings and between the station area and the city is vital in planning and designing programmes for the most apposite spatial intervention.

Figure 6. The 'Place' of KL Sentral Evolved into Thriving Social and Economic Spaces, Designated Within the Existing Urban Fabric in Which It Offers as Places of Great Experience Value for Passengers, Urban Dwellers, and Tourists

ACKNOWLEDGEMENT

This work is supported by the Malaysian Ministry of Higher Education (MOHE) and Universiti Teknologi MARA under the Skim Latihan Akademik Bumiputera (SLAB) as part of a PhD study.

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