Connectivity index of infrastructural accessibility for disabilities in Palembang

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Abstract: Accessibility is a major component in the physical planning of an area. Planning must include important components including facilities for persons with disabilities to be used by all people. The downtown area of Palembang is a strategic area of Palembang city that needs to be assessed on the connectivity index. The research object used is public facilities that are used as connectivity between buildings. This assessment was to determine the completeness of existing facilities and the feasibility of accessibility between buildings. The assessment were used to identify existing facilities and to determine the level of completeness of the facilities through the scoring method. The connectivity index was analysed based on these results to determine the feasibility of the facility and the feasibility of accessibility in the region. The results obtained from the connectivity index analysis are the level of accessibility between buildings. The level of accessibility is classified based on the connectivity index to determine the feasibility of accessibility between buildings. Based on these results, there are four feasibility classifications in the central area of Palembang.
Keywords: accesibility, identification, feasibility, facility, disability

Abstrak (Indonesian): Aksesibilitas merupakan komponen utama dalam perencanaan fisik suatu kawasan. Perencanaan fisik yang baik harus mengikutsertakan komponen-komponen penting termasuk didalamnya fasilitas-fasilitas penyandang disabilitas agar dapat digunakan bagi semua kalangan masyarakat. Kawasan pusat kota Palembang merupakan kawasan strategis kota Palembang yang perlu dilakukan penilaian indeks konektifitas. Obyek penelitian yang digunakan adalah fasilitas-fasilitas umum yang digunakan sebagai konektifitas antar bangunan. Penilaian ini dilakukan bertujuan untuk mengetahui kelengkapan fasilitas eksisting dan kinerja aksesibilitas antar bangunan. Penilaian tersebut dilakukan dengan identifikasi fasilitas eksisting dan untuk mengetahui tingkat kelengkapan fasilitasnya melalui metode scoring. Analisis indeks konektifitas dilakukan berdasarkan hasil tersebut untuk mengetahui kelayakan fasilitas dan kelayakan aksesibilitas di kawasan tersebut. Hasil yang diperoleh dari analisis indeks konektifitas adalah tingkat kelayakan aksesibilitas antar bangunan. Tingkat kelayakan aksesibilitas ini dilakukan klasifikasi berdasarkan indeks konektifitas untuk mengetahui kelayakan aksesibilitas antar bangunan. Berdasarkan hasil tersebut terdapat empat klasifikasi kelayakan yang ada pada kawasan pusat kota Palembang adalah dua ruas jalan masuk dalam kategori sangat layak, lima ruas jalan berada pada kategori cukup layak, lima ruas jalan berada pada kategori kurang layak dan satu ruas jalan berada pada kategori tidak layak.
Kata Kunci: aksesibilitas, identifikasi, kelaikan, fasilitas, disabilitas

1. Introduction

The rapid population growth in urban areas has implications for city development including socio-economy activities in it. The city center is the center of the concentration of city services which is seen as the heart of a city. This is characterized by the presence of various functions and activities such as governance, offices, trade and commercial buildings and services, recreation, and social and cultural activities [1]. These activites are held by people in the area therefore required to have easy access for moving from one place to another. Decent and easy access are done with the support of public facilities. Cities in general have highest population growth. Population growth must be equilised with the need of supporting public facilities do to various function of the city itself. The public facilities must meet the requirement of standarized regulations to support the activities in the area. The completeness components of a facility may effect the user to have more activities in the area. The need of decent facilities in urban areas is increasingly demanded and not to be separated as the result of the rapid growth of a city. Activites which exist in the city must be facilitated and should be a major issue in city development [2].

Palembang as developing city is facing the lack of adequate facilities is a major issue in accordance to its rapid population growth. Facilities and accessibility are the two most important aspects of city planning. Public facilities in terms of accesibility of an area are should be a concern for the government to fulfill the need of public facilities to minimize the use of vehicle for moving from one place to another. Public facilities such as sidewalks and other road facilities for pedestrian should be met the minimum criteria of walkable city. A walkable city is determined by the completeness of its walkable facilities and the urges of its people to walk and to support people with special needs to be able to use the facilities for daily activites [3].

The relationship between environment and accessibility in an area is something that is inseparable. Sidewalk for persons with disabilities need decent accessibility for daily activities [4]. In general, the lack of pedestrian facilities can cause difficulties for mobility of pedestrians. If there is no available major infrastructure such as sidewalks it can increase the risk of injury or even fatal due to the absence of a barrier between pedestrian and the movement of operating vehicle. Inadequate facility for accessibility can cause people with disabilities to experience difficulties or even not being able to carry out their activities properly. Therefore the main problem in this study is how the performance index of the inter-building connecting facilities in the central area of Palembang city?

1.1. Central Business District (CBD)

The structure of city space was first put forward by Ernest Burgess in 1923 which emphasized the existence of zones of territories within the city that had their respective characters but were still concentrated in one of the zones within the city which was the center of activity for other zones [2]. The CBD is a center of activity that must be able to serve and be the center of social, economic, cultural and political activity of a city so that it influences the access routes of the city movement which are all focused on the center of the activity.

The service center is based on the City Spatial Plan (Permen PU No. 17 / PRT / M / 2009) divided into 3 (three) service centers, namely the city service center, city service sub-center and regional center. The service center is based on its functions, namely:

1. A city service center (PPK) is an economic, social and / or administrative service center that serves all city and / or regional areas.
2. City service sub-centers (Sub PPK) are economic, social and / or administrative service centers that serve sub-cities.
3. The environmental service center (PPL) is the center of the economic, social and / or administrative services of the city.

The CBD area is a crowded area as a city center with various types of activities and has strategic functions. This area has activities such as government, social, economy and culture. Rijal [6] stated that the central city area has several forming elements including city service centers, networks for movement access (such as roads, railroads, river and sea lanes) and as a functional area which acts as a service node (terminal, airport, etc.).

1.2. Public Space

The term public is derived from English which means society or state. The public word on this matter is more focused on public space. According to Scruton [7], public space is a space whose functions and benefits are used fully for the benefit of the public. Public space has meaning, namely a location that is designed to a minimum but has great access to the surrounding environment, where people / users meet, there are behaviors of the user community and there are several activities in it according to applicable norms [1]. Hakim [8] in his journal stated that public space is basically a container that can accommodate certain activities of the community, both individually and in groups where the shape of public space depends on the pattern and density of the surrounding buildings.

Public space is always related to development in an area or city. Urban area is an area that has various activities and types of space inside. Economic, social and other activities form an integrated area that has inter-space linkages in the region [9]. Planning and integrating urban space must be based on potential, physical and non-physical constraints and constraints possessed.

Trancik [10] stated that in a good urban space, between space and its contents must have a good relationship so that it forms between solid space and void space that meets ideal planning standards.

1.3. Public Facilities

Public space and public facilities are connected with community service centers, both related to government needs, the economy, security or other needs in public spaces. Planning and building public buildings in an area is fully aimed at achieving community welfare [11].

Population growth causes a city to be required to provide public spaces including the requirements of fulfillment of accessibility of each land use [12]. The types of infrastructure or facilities in public buildings include several types, namely accessibility, facilities and other facilities of public buildings. The types and functions of road and its components, are as follows:

1. Roads

Road is one of the land transportation infrastructures that has an important role in regional development by connecting various places to achieve equilibrium and equitable development. Indonesian Road Law of 38 2004 states that roads are land transportation infrastructure covering all parts of the road, including complementary buildings and equipment intended for traffic, which are at ground level, above ground level, below ground level and / or water, and above the water level, except railroads, lorries, and cable roads. Roads are used as a distribution infrastructure for goods and services. The road also functions as a barrier between locations, such as administrative areas and land use.

2. Road Components

Road has several component parts that make up a road. Good road forming components are fully regulated based on the needs of road users. The road components studied are as follows: (1) sidewalks, (2) street decorations, (3) parking lot, (4) road signs, (5) crossing bridges, (6) road marks, (7) road divider, (8) traffic lights, (9) guiding blocks, (10) ramps and (11) boundary poles. Each of these road components have their own standarised usage and purposes.

2. Methods

This study used quantitative descriptive approach. This method is expected to explain the goals and objectives related to the identification of feasibility in central business district (CBD) of the city of Palembang based on the existence and quantity of supporting facilities for the public area and people with disability. This method was preferred above all others as quantification of the findings on site was more easier approach and accurate. The approach were based on reference and observations to determine the existence and needs of facilities. The method used to assess facility performance by using scoring method.

Two types of data used in this study namely primary data and secondary data. Primary data used in this were based on observation and questionnaires. Observation were used to identify geometry of the object while questionaire were used to identify the effect of security, convenience, easiness, aesthetics. Secondary data used in this study were theoritical related study. Questionnaires were given out which based on Lemeshow calculation the sample needed for the study were no less than 96 respondents.

These data were used to analyse the performance of public facility in the CBD area in Palembang. Analysis of performance on pedestrian paths is carried out by identifying the existence of facilities on the road. The results of this identification were then carried out by scalogram analysis of each road section. The results from this analysis were in form of rankings of each road sections. The results of this identification are then analysed by influential factors to determine the performance of the road through categorization based on the value interval.

a. Identification of Existing Road Facilities.

Identification of existing facilities used to determine the completeness of the facilities on the road that were the object of research. This identification were used to determine the accessibility performance of the road towards its users. The identification used a scalogram analysis, namely that the existence of a facility gets a value of 1 (one) and if there are no such facilities, then the

given value is 0 (zero). The initial assumption of this analysis was that the road with the highest number of components facilities has the best rank. While the road with the least facilities has the lowest value. The analysis carried out resulted in classification of roads with details of existing facilities and ranking of completeness of road sections. The results of this analysis are then ranked against each road section.

b.   Influential factors analysis towards Road Facilities.

The influence factors used in this study are safety, comfort, convenience and aesthetics. Security in accessibility within observed area is seen from the ideal dimentions of pedestrian sidewalk, the existence of lighting lamps, the absence of obstacles, the presence of barriers, and there are different heights [5]. The convenience of pedestrian sidewalk seen from circulation mobility, accessibility, natural and climate styles. Ease of accessibility is analysed from how the facilities affect the accessibility of roads. Whereas aesthetic factors are analysed from the effects of facilities in terms of aesthetics of the road. Assessment of safety, comfort, convenience and aesthetics of facility is assessed based on user preferences. This assessment uses a Likert scale for each influence factor, namely security, comfort, convenience and aesthetics.

3.   Results and Discussion

3.1.   *Performance Analysis Towards Accessibility for Disability*

Public facilities related to accessibility for the public and disability were analised according to the completeness of the facilities used as the object of research. The components that have previously been identified are then analyzed by scoring on the level of completeness of the facilities. These results then carried out by descriptive analysis to provide information about the data obtained. The facilities used as the research object are roads which are located in the central area of Palembang city. The roads which were identified in this study are as follows: (1) Jalan Jenderal Sudirman, (2) Jalan Letkol Iskandar, (3) Jalan Pangeran Subekti, (4) Jalan K.H. Ahmad Dahlan, (5) Jalan POM IX, (6) Jalan Balap Sepeda, (7) Jalan Sumpah Pemuda, (8)

Jalan Angkatan 45, (9) Jalan Kapten Anwar Sastro, (10) Jalan Kapten F. Tandean, (11) Jalan Kapten A. Rivai and (12) Jalan Radial.

Analysis of the existance of observed public facility towards road sections in CBD area of Palembang are as indicated on table 1 below:

Table 1 Ranks of road rections by the number of facility

	Road Name	Num. of Facility	Ranks
1	Jalan Jendral Sudirman	14	1 (Most Complete)
2	Jalan Kapten A. Rivai (Ruas B)	11	2
3	Jalan Radial	10	3
4	Jalan Angkatan 45	9	4
5	Jalan POM IX	9	5
6	Jalan Kapten A. Rivai (Ruas A)	8	6
7	Jalan Letkol Iskandar	8	7
8	Jalan K.H. Ahmad Dahlan	7	8
9	Jalan Sumpah Pemuda	7	9
10	Jalan Balap Sepeda	6	10
11	Jalan Pangeran Subekti	6	11
12	Jalan Kapt. F. Tandean	6	12
13	Jalan Kapten Anwar Sastro	4	13 (Least Complete)

The results on Table 1 were obtained from observing the existing components on the research objects which then accumulated from the most complete which has the biggest number to least complete which has the lowest number of components.

Analysis of the effect of influential factors were conducted to measure the effect of each facility on the road sections. These influential factors are identified as follows: (1) safety, (2) comfort, (3) convenience and (4) aesthetics. These factors are derived from user preferences by using questionaires and used to measure each factor towards each facility. These values are then combined with the number of facilities of each road sections. As a results, the values from these results are formed connectivity index of each road section in CBD area of Palembang The results of this analysis are shown on table 2 below.

Table 2 Connectivity performance index

Road Name	Total	Ranking
Jalan Jendral Sudirman	280,6	1
Jalan Kapten A. Rivai (Ruas B)	246,6	2
Jalan Radial	217,6	3
Jalan POM IX	203,1	4
Jalan Angkatan 45	204,1	5
Jalan Kapten A. Rivai (Ruas A)	189,6	6
Jalan K.H. Ahmad Dahlan	180,4	7
Jalan Letkol Iskandar	177,2	8
Jalan Sumpah Pemuda	167,6	9
Jalan Kapten F. Tandean	131,6	10
Jalan Pengeran Subekti	152,0	11
Jalan Balap Sepeda	136,0	12
Jalan Kapten Anwar Sastro	80,3	13

An assessment of the completeness of road facilities can be carried out to determine the quality of the road and has a correlation with the assessment of the quality of road facilities towards the influence factors. This can be observed from the relationship between the completeness of road facilities and the assessment of road facilities towards influence factors. Roads with complete facilities are theoretically feasible for persons with disabilities. The following assessment is a classification of performance on road segments that are calculated using interval values obtained from minimum values and maximum values in previous calculations. The value interval can be seen from table 3 below:

Table 3 Classification categories based on performance index.

Value	Classification
$i < 26$	Not feasible
$26 \leq i > 36$	Less feasible
$36 \leq i > 46$	Decent
$46 \leq i$	Very feasible

Based on table 3, road sections can be divided into four category based on their performance index. These category are shown on table 4 as follows:

Table 4 Road classification based on Performance

No	Road Name	Average	Category
1	Jalan Jendral Sudirman	56,1	Very feasible
2	Jalan Kapten A. Rivai (Ruas B)	49,3	Very feasible
3	Jalan Radial	43,5	Decent
4	Jalan Angkatan 45	40,8	Decent
5	Jalan POM IX	40,6	Decent
6	Jalan Kapten A. Rivai (Ruas A)	37,9	Decent
7	Jalan K.H. Ahmad Dahlan	36,1	Decent
8	Jalan Letkol Iskandar	35,4	Less feasible
9	Jalan Sumpah Pemuda	33,5	Less feasible
10	Jalan Pengeran Subekti	30,4	Less feasible
11	Jalan Balap Sepeda	27,2	Less feasible
12	Jalan Kapten F. Tandean	26,3	Less feasible
13	Jalan Kapten Anwar Sastro	16,1	Not feasible

index

4. Conclusions

Based on performance index is as a result of the assessment stated in table 4 there were 2 (two) roads Jalan Jendral Sudirman and Jalan Kapten A. Rivai (Section B) which are very feasible with each the average value of 56,1 and 49,3 respectively. There are five road segments in decent categories, they are Jalan Radial with an average value of 43,5, Jalan POM IX with an average value of 40,6, Jalan Angkatan 45 has an average value of 40,8, Jalan Kapt. A. Rivai (Section A) has an average value of 37,9 and K.H. Ahmad Dahlan with an average score of 36,1. Roads that are in less feasible road categories are Jalan Letkol Iskandar, Jalan Sumpah Pemuda, Jalan Kapten F. Tandean, Jalan Pangeran Subekti and Jalan Balap Sepeda. The road regarded as not feasible is Jalan Kapten Anwar Sastro.

The assessment carried out on the completeness of facilities and infrastructure, roads that have the best, most complete facilities and are categorized as suitable for persons with disabilities is Jalan Jendral Sudirman. This road has supporting facilities for persons with disabilities such as guiding blocks, ramps and boundary poles on the sidewalk. Then, the roads that have disability facilities that can

help people with disability are Jalan A. Rivai which has ramps and boundary poles, Jalan Letkol Iskandar which has boundary poles on its sidewalk, Jalan K.H. Ahmad Dahlan as well as Jalan Sumpah Pemuda road which have ramps for ease of going on and off from and to the sidewalk.

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