Urban quality measurement and it’s influence to sense of place

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Abstract. A city is a place to live, which should have quality. The urban quality is effective to be applied to provide a better place for people and form a sense of place. This study aims to measure urban quality and analyze the influence of urban quality to the sense of place. Urban quality consists of functional, visual, and urban space experiences factors. While a sense of place consists of identity, structure, and meaning aspects. The method used is a quantitative method with a survey by questionnaire techniques. The research conducted at Merdeka Square in centre of Medan city, North Sumatera Province, Indonesia which has historical buildings around it. Medan Merdeka Square is a public open space in the center of Medan city. The study population was the people of Medan City who came to Merdeka Square with sample as many as 100 respondents. The analysis technique used is Partial Least Square Structural Equation Modelling (PLS-SEM). The results of the study show that functional, visual, and urban space experiences influence the sense of place. The quality of urban is relevant to consider in forming a sense of place.

1. Introduction

Quality is the notion of a benchmark that reflects excellence and the characteristics or features of something [1]. Inclusivity can promote in measuring the quality of the built environment [2]. There are four urban livability indicators, namely environmental quality, place quality in physical aspects, place quality in functional aspects, and safer places [3]. Environmental quality can measure by noisier-quieter, dirtier-cleaner, more or less congested and better or worse by building quality. Place quality measured by artificial environmental products, levels of abandoned land, quality of parks, and quality of the public realm. While functional aspects of place quality measured by pedestrian quality, public transport quality and vitality and survival of services. Safe places measured by the rime level and anti-social habit that happens in social life Quality of an area will increase if the cleanliness of the air, street, and open space have improved [3]. Sense of place relates to the physical environment and built environment and affected by the quality of place [4]. The purpose of this research is to analyze measurements of urban quality, and that affected the sense of place at Merdeka Square, Medan city, Indonesia.

1.1. Urban Quality and Sense of Place

Quality can measure by the perception of people about the object [5]. Built environmental quality contributes to a higher quality of life in cities [6]. Urban has two characteristics, namely physical and social [7].

Urban quality can make a city become an attractive place. Urban quality can be measured based on proportion and scale, form and a sense of the direction, quality of the object that border or fill and the
nature of the connection between spaces [8]. Diversity is the main element of urban quality [9]. Urban design quality and the sense of place have the equation elements, namely form and activity, and the different elements are between imagination and meaning [10]. Physical disregard of urban heritage may decrease urban quality, while urban life cycle that has stable economically and socially may increase urban quality [11].

Urban public space used as the area for social and cultural interaction activities and economic activities can be evaluated to determine its quality. The outstanding place should have assessed and communication; user and activity; relief and imaginability; and sociability of public space [12]. Quality in urban public spaces is crucial in design with consideration characteristics of the environment and urban welfare [12].

Urban design quality factors are imageability, enclosure, human scale, transparency, and complexity. Then the physical elements in urban design quality are sidewalk width, street width, traffic volumes, building height, and others [13]. Urban design quality characteristics divided into four considerations, namely functional and social use, natural environment and sustainability, visual and urban experience [14].

Sense depends on space, form and quality, culture, temperament, status, experience, and direct purpose of the observer [15]. A simple model of sense is identity; in general terms, a sense of place that can be identified by color, form, the smell of air and light. It has formal components that consist of identity and structure; and particular components are a sense of congruence, transparency, and legibility [15].

Identity is related to other things in urban, structure related to the relationship between object and observer and meaning is a cause of practical and emotional issues from the object to an observer [16]. The definition may change depending on the object quality [17]. Meaning as a part of sense can be measured and influenced by urban quality.

Transparency is the degree where people can see the edge of a street, public space, and human activity [13]. Transparency means people can observe the object in real condition and human activity without obstacle. Street transparency can measure by the proportion between space used and not used, the wall of buildings along the street, and the width of building facade and window [8]. The sense of place components related to form is physical and visual features and ecosystems. Meaning is consists of a sense of identity and legibility. The activity consists of social interaction, a variety of activities, security, and satisfaction of the neighborhood [10].

A sense of place can produce by the identity related to the form and history of the place [18]. It consists of three models, namely place attachment, place dependence, and place identity [19]. Sense of place formed by two factors, namely the cognitive and perceptual factors; and the physical characteristics of a physical setting factor [20]. Sense of place has some elements that consist of scale, diversity, size, proportion, color, texture, ornaments, the smell, sound, history safety, and others [20]. Urban designers and architects argued that the visual quality of a place improvement should change a terrible sense of place. Architecture and streetscape may be forming the perceptual place quality [21]. People can be experiencing and feel urban space by walking; then people can develop a sense of place [22] and [23].

From previous research, urban quality measurement based on several aspects. This research focuses on physical characteristic, namely functional use, visual, and urban experience. The sense of place consists of identity, structure, and meaning. The relationship between urban quality and sense of place explained in Figure 1.
2. Method
This research uses quantitative and surveys with a questionnaire as a data collection technique. Independent variables are the urban quality that divided into three sub-variables, namely functional use, visual and urban experience. The dependent variable is a sense of place that consists of identity, structure, and meaning. The research conducted at Medan Merdeka Square in Medan city Centre, Indonesia. Medan Merdeka Square is a public open space built in the colonial period. The population is Medan Merdeka Square visitors with the sample as many as 100 respondents. The analysis technique is Partial Least Square Structural Equation Modelling (PLS-SEM). The variables and indicators described in Table 1.

Table 1. Research Variable.

| Variable            | Indicator                                                                 |
|---------------------|---------------------------------------------------------------------------|
| Functional (Building) | FB1-building arrangement   |
|                     | FB2-public facilities          |
|                     | FB3-friendly design space     |
|                     | FB4-signage in building       |
| Functional (Access)  | FA1-pedestrian comfortability  |
|                     | FA2-regulation for disabilities |
|                     | FA3-accessibility to public facilities |
|                     | FA4-separated vehicle and pedestrian paths   |
|                     | FA5-ease of accessibility for public transport |
|                     | FA6-freedom of movement in the city |
| Visual              | V1-building facade             |
|                     | V2-building variation          |
|                     | V3-landscape design            |
|                     | V4-human scale                 |
|                     | V5-street furniture            |
| Urban Experience     | UE1-variety activities        |
|                     | UE2-good pedestrian walkway    |
|                     | UE3-activities can be carried out until night |
|                     | UE4-variety of entertainment activities |
| Sense of Place       | SoP1-building identity        |
|                     | SoP2-Merdeka Square identity  |
|                     | SoP3-sense of history          |
|                     | SoP4-legibility with the surrounding area |
|                     | SoP5-legibility of Merdeka Square |

3. Results and Discussions
The analysis with Partial Least Square analyzes an outer model for reliability and validity; and the inner model for effectiveness and assessment of prediction quality.

3.1. Outer model
The outer model shows the influence of factor loading, Average Variance Extracted (AVE), discriminant validity and composite reliability. Factor loading from all indicators must more than 0.6 to fulfill validity. Based on the outer model, there is one indicator that has value less than 0.6 namely SoP4 (the relationship between Merdeka Square and the surrounding area). After SoP4 deleted, there is one indicator that has a value less than 0.6, namely SoP5 (legibility of Merdeka Square). Then, the analysis runs once again and produce the outer model shown in Figure 2. All of the indicators have a value more than 0.6 so that they all stated valid.

![Figure 2. Outer model.](image)

The discriminant validity can be tested by looking at the cross-loading (Table 2). All of the indicators have a value more than 0.5, and the difference between the main loading and cross-loading is above 0.1. The analysis result is appropriate because the correlation between the indicator and the latent construct is higher than the other. If the difference between the major loadings and cross-loadings is above 0.100, and it means the indicators are good.

|       | FunctionalB | FunctionalA | Visual | UrbanExp | SoP |
|-------|-------------|-------------|--------|----------|-----|
| FB1   | **0.736**   | 0.704       | 0.508  | 0.318    | 0.403|
| FB2   | **0.792**   | 0.730       | 0.511  | 0.425    | 0.364|
| FB3   | **0.797**   | 0.665       | 0.547  | 0.416    | 0.450|
| FB4   | **0.763**   | 0.573       | 0.610  | 0.446    | 0.530|
| FA1   | 0.667       | **0.768**   | 0.562  | 0.434    | 0.418|
| FA2   | 0.660       | **0.715**   | 0.494  | 0.260    | 0.271|
| FA3   | 0.724       | **0.805**   | 0.614  | 0.449    | 0.416|
| FA4   | 0.706       | **0.858**   | 0.710  | 0.408    | 0.450|
| FA5   | 0.526       | **0.664**   | 0.456  | 0.238    | 0.290|
| FA6   | 0.535       | **0.647**   | 0.570  | 0.422    | 0.413|
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The composite reliability test is a test for the unidimensionality of the model. The composite reliability value and Cronbach Alpha should be greater than 0.7 (Table 3). Based on the composite reliability value of construct functional building, functional access, visual, urban experience, and sense of place, there are not found any problems because all the value is higher than 0.7.

The expected Average Variance Extracted (AVE) in this research is higher than 0.5. The value of the Functional Building construct is 0.597; Functional Access is 0.557; Visual is 0.606; Urban Experience in 0.502 and Sense of Place is 0.601. It means all of the variables are acceptable.

R square value for a sense of place construct shows that 45.70% of the variance in the sense of place that can be explained by functional building, functional access, visual and urban experience.

Table 3. Composite reliability.

| Construct          | Composite Reliability | AVE  | R²   | Cronbach’s Alpha |
|--------------------|-----------------------|------|------|------------------|
| Functional Building| 0.855                 | 0.597| 0.000| 0.777            |
| Functional Access  | 0.882                 | 0.557| 0.000| 0.839            |
| Visual             | 0.884                 | 0.606| 0.000| 0.837            |
| Urban Experience   | 0.800                 | 0.502| 0.000| 0.671            |
| Sense of Place     | 0.817                 | 0.601| 0.457| 0.659            |

The commonplace Goodness of Fit or GoF is between 0 and 1. The GoF in this research obtained from the square root of the average AVE value multiplied by R². The GoF value obtained at 0.511, which is higher than 0.3600. This value shows that both independent and dependent variables have strong support. The sense of Place variable is strongly influenced by functional building, functional access, visual and urban experience.

3.2. Inner model

The t-value for each item of constructs shown in Figure 3. The functional building construct has four indicators, and the highest t-value is FB3, which means the friendly design space has more influence on the useful building construct. The access construct has six indicators, and FA4 has the highest t-value, it means separated vehicle and pedestrian paths are more effective on functional access. Visual construct has five indicators, and V1 has the highest t-value, it means building facade is more control the visual construct. Urban experience has four indicators where UE2 has the highest t-value. It means acceptable pedestrian walkways more influence urban experience.
The hypothesis testing in this research show in Table 4, based on the path coefficient ($\beta$) and significance for this model. The $t$-values present the hypothesis for the independent and the dependent variable is supported or not based on the significance value. The functional building construct has a $t$-value 2.349 that more than 2.33 as the significance value for $p<0.001$. The visual construct has a $t$-value 2.174 that more than 1.645 as the significance value for $p<0.005$. Then, the urban experience construct has a $t$-value 2.461 that more than 2.33 as the significance value for $p<0.001$. Functional access does not influence the sense of place. The useful building, visual, and urban experience influence sense of place. The analysis results in this research are consistent with the research conducted by [14], [22], [8], [10] and [23].

| Hypothesis | Relationship                  | Beta  | Mean  | Standard Error | T-value | Decision     |
|------------|-------------------------------|-------|-------|----------------|---------|--------------|
| H1         | Functional Building $\rightarrow$ SoP | 0.351 | 0.349 | 0.149          | 2.349** | supported    |
| H2         | Functional Access $\rightarrow$ SoP | -0.155 | -0.145 | 0.178          | 0.871*  | Not supported|
| H3         | Visual $\rightarrow$ SoP       | 0.291 | 0.285 | 0.134          | 2.174*  | Supported    |
| H4         | Urban Experience $\rightarrow$ SoP | 0.290 | 0.302 | 0.118          | 2.461** | Supported    |

Note: **$P$<0.01, t-value = 2.33
* $P$<0.05, t-value = 1.645

4. Conclusions
The urban quality is shown by an excellent physical condition of the city such as buildings, accessibility, attractive visual of the city, and urban experience. Good urban quality can influence the formation of a sense of place. Based on hypothesis testing results, functional building, visual, and urban experience are affecting a sense of place for Merdeka Square. This is in accordance with the research that has been done previously by [8], [22] and [23]. The measurement of urban quality shows that functional building,
functional access, visual and urban experience has several indicators that can affect the sense of place. On the building variable, the affected indicators are friendly design space, signage in the building, public facilities, and building arrangement. All of them should have well organized to influence a sense of place. On the functional access, the most affected indicators are separated vehicle and pedestrian paths; accessibility to public facilities; and pedestrian comfortability. The most affected in the visual construct are building facade; landscape design and street furniture. On the urban experience construct, the most affected are acceptable pedestrian walkways and various activities in public space. Then, for a sense of place construct, the most affected are the legibility of Merdeka Square and the identity of Merdeka Square that easy to recognize.

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