Understanding Social Sustainability Criteria for Public School Building

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Abstract. The school building has an important role in the education process of the young generation. Surabaya as the second biggest city in Indonesia has a quite large number of school buildings. As a building is a construction project, it has a long project life cycle, it is very important to adopt a sustainable development concept to provide maximum benefit to the community. Social sustainability is one of the sustainable development aspects and has a close relationship with the community needs and interests. This aspect is essential to promote project benefit streams to the community not only in the short-term but also in the long-term. This research is an initial research step to investigate social sustainability criteria in public school buildings in Surabaya. Data was collected through a series of research steps consisting of a preliminary survey, pilot test, and questionnaire distribution. Mean analysis was used to rank the attributes criteria according to the three stakeholders’ perceptions. Finally, seventeen attributes were considered relevant to this research. This study provides a reference for the designer as well as the decision-maker such as the government on how to achieve social sustainable public buildings.

1. Introduction
Public school buildings are important facilities for the community, especially for the next young generation. As the second biggest city in Indonesia, Surabaya has a very large number of public buildings. According to [1], 168,578 public school buildings are available ranging from kindergarten to high school / vocational level in 2016/2017. However, in addition to the positive impact, the existence of a public building can also have a negative impact to the community if they are not managed properly during the construction phase or operation phase. It happens in the form of environmental pollution, flooding, traffic congestion, damage to surrounding buildings and others. Therefore, it is very important to ensure the school building project is successful by presenting maximum positive benefits and reducing negative impacts on the community.

From the community perspective, as the building has a long project life cycle, the concept of sustainable development (SD) is quite relevant to be applied in this type of projects [2]. This SD concept stressed that the development must be able to meet current needs without sacrificing the interests of future generations by balancing economic, environment, and social aspects or known as the “triple bottom line” [3]. Unfortunately, while the economic and environmental aspects have received a lot of attention, social sustainability (social aspects) has not been widely explored [4]. Indeed, social sustainability concept is very important to be realized in a project so that it can provide long-term project benefits to all communities at large [5]. Several types of research have been
conducted to investigate social sustainability application in the built environment [4, 5, 6, 7]. As limited research has been conducted to investigate social sustainability in public school buildings, this research aims to bridge the gap in the literature by investigating social sustainability criteria in this field.

2. Literature Review

2.1. Sustainability Concept

Literally, Sustainable Development (SD) can be articulated from two words, namely sustainable and development. While “Sustainable” means “can be continued”, “Development” can have the meaning the way to increase the community’s well-being over time”. Therefore, sustainable development can be defined as meeting the community well-being in very long terms. Meanwhile, [3] defines sustainable development as “a development which meets the present’s needs and aspirations without comprising the future generations ability to meet their needs”. The concept of sustainability stressed to balance the implementation of the three sustainability components, namely economic, environmental, and social aspects.

With regards to the construction sector, [8] argued that sustainable construction should be applied in the overall construction stages since material extraction, planning, design, and building until the demolition which is seen as a holistic process to maintain the harmony between the natural and built environments to present human dignity and promoting economic equity. The implementation of the sustainability concept in a construction project should also balance its three dimensions. However, while the economic and environmental aspects have obtained a lot of attention, social sustainability still has not been widely explored in the construction field. Indeed, this social aspect is also important as the other two components to ensure that projects can deliver their benefits to all stakeholders, including the community in the long term [5].

2.2. Social Sustainability

The concept of social sustainability is actually still in the development process [7]. Even though the social sustainability term has been acknowledged, the definition of this concept is still fuzzy and has not been agreed upon by researchers [4]. According to [9], social is defined as “something relating to society or its organization”. Several issues related to social are equity, health, education, housing, security (combating crime), population/demographics, poverty, and governance [10]. By referring to the definition above, literally social sustainability means “the ability to maintain the society and something related to it at a certain rate or level”.

In this paper, social sustainability is defined as “a life-enhancing condition within communities, and a process within communities that can achieve that condition” [11]. It consists of several principles such as equity, diversity, interconnectedness, quality of life, and democracy, and governance. Several social sustainability criteria from previous literature were identified as in Table 1.

Several studies have also been conducted in the area of the built environment [5, 6, 7, 12]. Yet, how this social sustainability can be applied in the public school building has not been widely explored.

3. Research Method

This research adopts a quantitative approach using a statistical approach based on respondents’ perceptions. The data was acquired through a series of data collection steps, namely preliminary survey, pilot test, and main survey. A preliminary survey was conducted to verify research variables with the study context. Four experts were interviewed regarding the research attributes. Following the main survey, the analysis was conducted to obtain attributes which were considered relevant according to the expert opinions. According to the experts, it was found that all 17 variables were considered relevant for this research.

A pilot test was then conducted before the main survey through questionnaire distribution to ensure that the prepared questionnaire can be well understood by the respondents. Respondents involved in
this study can be categorized into three sectors, namely user, neighborhood and construction sector. This classification adopts [6] stakeholder’s classification. User consists of the student, teacher and school employ while the surrounding community is people who live in the school surrounding area. Meanwhile, the construction sector includes a consultant, contractor, and supplier. There is no specific rule according to the samples required for the statistical analysis. However, this research sought to get a large number of samples, as according to the statistic test, the larger data can be obtained, the better it can represent the population. Data was analysis using a mean as an appropriate statistical technique [13] to obtain attributes which are considered important for the school building.

4. Result and Discussion

4.1. Respondent Background

From the main survey, finally, 100 samples were received from three stakeholders, namely user, construction provider, and the community. Table 1 presents the respondent’s background and characteristic. According to Table 1, 30% of respondents in this study had senior high school backgrounds, while 70% held status as a bachelor. Meanwhile, respondents with age between 31-40 years are the largest component of the respondents. Finally, most of the respondents are holding minimal bachelor degree with 70% composition.

| No. | Criteria                                                                 | Source                     |
|-----|--------------------------------------------------------------------------|----------------------------|
| 1   | Building can provide security for all people.                           | [4, 6, 12]                 |
| 2   | Location of the building is close to public transportation facilities.   | [12]                       |
| 3   | Building provides an open space area.                                   | [6, 12]                    |
| 4   | Building can be accessed by all people without any gender or social status restrictions. | [12, 14] |
| 5   | The building can promote the local community’s needs.                   | [4, 12, 14]                |
| 6   | Building can adopt to changes in the surrounding community.             | [12]                       |
| 7   | The level of pollution (water, air, waste) from the building existence can be tolerated. | [12, 14] |
| 8   | The surrounding community is involved in the decision-making process during the construction and operation phases. | [4, 12] |
| 9   | Building becomes facility for training and education.                   | [4, 11, 15]                |
| 10  | Building existence contributes to maintain the local community value and culture. | [11]                      |
| 11  | Building existence can be identity and historical value for the surrounding community. | [11]                      |
| 12  | The building can create a sense of belonging and pride for users and the surrounding community | [4, 7, 14] |
| 13  | Building existence is supported by users and the surrounding community.  | [7, 14]                    |
| 14  | Building existence can improve the economy of surrounding community     | [4, 6, 7]                  |
| 15  | The existence of buildings can create new jobs for the surrounding community | [4, 6, 16] |
| 16  | Building existence does not damage the community social order.           | [4, 15]                    |
| 17  | The expected outcomes of the building construction have been communicated to the community | [16]                      |

4.2. Reliability Test

Reliability test is a series of instrument measurement tests to ensure that the measurement has consistency if it is used repeatedly [13] which is usually calculated using the Cronbach Alpha coefficient. To be reliable, this coefficient value has to be greater than 0.60 [12]. According to the analysis the reliability of the questionnaire was 0.671, which means this survey instrument’s reliability can be considered sufficient.

4.3. Attribute Ranking Based on Stakeholder Perceptions

Attribute mean analysis aims at understanding the importance of the attributes according to the respondents’ perception, which is shown in Table 2. The ranking is presented according to overall
stakeholder, user, neighborhood, and construction sectors. The first ranking attribute from the overall stakeholder is that The building is secure for all people with the mean 4.64. Indeed, security is a basic need that should be fulfilled in every facility provided for the community [4]. This means that every building should become a place, which can prevent a criminal action for the user and surrounding community. However, while neighborhood sector also ranked these attributes as the first ranking attribute, the user and construction sectors placed these attributes in the second and third positions, respectively.

Table 2. Respondents background

| Group Category       | Group Type                  | Percent (%) | Percent (Cumulative) |
|----------------------|-----------------------------|-------------|----------------------|
| Stakeholder Type     | Construction Type           | 33          | 33                   |
|                      | User                        | 35          | 68                   |
|                      | Neighborhood Community      | 32          | 100                  |
| Age                  | 10-20 years                 | 13          | 13                   |
|                      | 21-30 years                 | 25          | 38                   |
|                      | 31-40 years                 | 36          | 74                   |
|                      | 41-50 years                 | 22          | 96                   |
|                      | 51-60 years                 | 4           | 100                  |
| Education Category   | Junior High School          | 0           | 0                    |
|                      | Senior High School          | 30          | 30                   |
|                      | Bachelor Degree and Above   | 70          | 100                  |

The second important attribute from the overall perspective is The building location is close to transportation facility (mean 4.55). Almost similar to that, the user, neighborhood, and construction sectors also placed this attribute in the second and third rankings. This result shows that transportation is very important to the community as this facility can provide accessibility to the building as an important indicator of social sustainability [12]. Meanwhile, the attribute of Building becomes a facility for knowledge and skill development (mean 4.52) which is ranked as the third position according to the overall sector. The building is a strategic facility, which provides an opportunity for the students or community to develop their knowledge and skills [5] either during its construction or operation phases. However, the three stakeholders had different perceptions of this attribute. While the user put this attribute as the main priority or the first ranking, the neighborhood and construction sectors placed this attribute as the tenth and fifth positions, respectively.

The fourth attribute is The building is able to improve the economy of the surrounding community (4.37). This attribute is perceived as important because a public school usually attracts many people to come and meet that place. As the people gather in one place, it is possible to stimulate business activities in its surrounding area [7]. Yet, similar to the previous attribute, the three stakeholders also had a different perspective for this attribute. If the construction sector positioned this attribute as the first ranking, the user and neighborhood ranked this attribute in the fourteenth and fifth positions, respectively. Finally, the fifth position attribute from the overall sector is The building which provides an open space area with mean value 4.36. In order for the people to be able to do their activities productively, a sufficient open space is needed. Human needs sufficient open space as a facility for relaxing and putting the stress away [12]. Even, for a public school building, open space is really needed to allow students explore their creativity as well as developing their skills through the surrounding environment. An open space is needed to make the user easy to use the facility according to their approach and use [17]. This is also important for the surrounding community where there should be sufficient open space between the school building and their settlement area. This is important to avoid some negative effects from the building, such as noise, traffic congestion and some other similar effects. Unfortunately, the three stakeholders also had a different point of view regarding the attribute ranking. While the construction sector ranked this attribute as the fourth position, the user and the community placed this attribute in eighth and ninth positions, respectively.
The results show that three stakeholders had different perceptions to rank the five highest attributes’ positions. The agreement is important in order for it to be used as the guidance for the designer or the decision-maker such as the government to plan and design the building appropriately and to ensure that social sustainability can stream to the community to maximize the project benefit as well as minimizing its negative impact.

5. Conclusion
This study found 17 attributes to measure social sustainability in public school building in Surabaya. This social sustainability attribute is very important to promote a holistic concept of sustainable development by balancing three sustainability components, namely economic, environmental and social aspect. Accommodating social aspect in the success criteria which is close to the community needs and interest can be expected to improve the stakeholder’s support to the project and to minimize the stakeholders’ opposition to achieve a more successful public school building project. It was also found that the stakeholders still had a disagreement regarding the attributes’ priority. This means there

| No. | Criteria                                                                 | All Stakeholders | User | Neighborhood | Construction Sector |
|-----|--------------------------------------------------------------------------|------------------|------|--------------|---------------------|
|     |                                                                          | Mean Rank        | Mean Rank | Mean Rank   | Mean Rank          |
| 1   | Building can provide security for all people.                            | 4.64             | 1      | 4.73         | 2                   |
| 2   | Location of the building is close to public transportation facilities.   | 4.55             | 2      | 4.57         | 3                   |
| 3   | Building becomes facility for training and education.                    | 4.52             | 3      | 4.74         | 1                   |
| 4   | Building existence can improve the economy of surrounding community      | 4.37             | 4      | 3.97         | 14                  |
| 5   | Building provides an open space area.                                    | 4.36             | 5      | 4.20         | 8                   |
| 6   | Building can be accessed by all people without any gender or social status restrictions. | 4.36             | 6      | 4.31         | 6                   |
| 7   | Building existence contributes to maintain the local community value and culture. | 4.30             | 7      | 4.20         | 9                   |
| 8   | Building existence is supported by users and the surrounding community.  | 4.25             | 8      | 4.31         | 7                   |
| 9   | The existence of buildings can create new jobs for the surrounding community. | 4.25             | 9      | 4.40         | 4                   |
| 10  | Building existence can be identity and historical value for the surrounding community. | 4.19             | 10     | 3.97         | 14                  |
| 11  | The expected outcomes of the building construction have been communicated to the community. | 4.17             | 11     | 3.86         | 17                  |
| 12  | Building existence does not damage the community social order.           | 4.16             | 12     | 3.89         | 16                  |
| 13  | The level of pollution (water, air, waste) from the building existence can be tolerated. | 4.10             | 13     | 4.37         | 5                   |
| 14  | The building can create a sense of belonging and pride for users and the surrounding community. | 4.06             | 14     | 4.09         | 10                  |
| 15  | Building can adopt to changes in the surrounding community.             | 4.01             | 15     | 4.06         | 12                  |
| 16  | The building can promote the local community’s needs.                    | 3.95             | 16     | 4.06         | 11                  |
| 17  | The surrounding community is involved in the decision-making process during the construction and operation phases. | 3.93             | 17     | 3.91         | 15                  |

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is a need to develop communication between the stakeholders through a gathering moment, such as public participation, to better develop stakeholders’ understanding regarding the important social sustainability criteria for this type of project.

Acknowledgement
The authors would like to thank the Ministry of Research, Technology and Higher Education who provided a grant for this research in 2019 as well as several experts and respondents who have been involved in the data collection processes, both the preliminary survey as well as the main survey.

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