

Implication of the National Standard Indonesia (SNI) on Lighting Conservation as a Basis of Architectural Design

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Abstract

Rate of building construction in Indonesia has been rising, thus monitoring is to retain any building in compliance with government regulations. Nevertheless, building development in Indonesia is not passed by regulations, one of the regulation is lighting requirements. Lighting regulation in Indonesia referred to document of SNI no. 03-6197-2000 of the Energy Conservation in Lighting System. While designing, SNI cannot achieve since architect does not refer to the SNI regulations. This survey study of National Standard Indonesia (SNI) which concern to lighting issue. It is for obtain a fact and reason related to awareness level of architect to the lighting regulation. This study used data from questionnaire that has taken from 80 design practitioners in Surabaya, Indonesia. From this study, it shown that 72.5% practitioners are not aware to the SNI of the Energy Conservation in Lighting System. Besides, mostly stated that they were unknown with the SNI document. From the result data, it can be based data for the further study to increase awareness level of architects and design practitioners toward the SNI regulations.

Keywords: lighting, regulation

1. Introduction

In the last decade, rate of building construction in Indonesia has been rising[1]. Therefore, government, designers and practitioners pioneered to organize the buildings operation through strengthen building policy and regulation. Besides of the regulations, architect is also the main factor on the building development since every concept before any building built was hold by architect. Between government as the regulation's maker and architect as the lead of development should be cooperative to notice what regulations going to be. In the architecture design, all aspects of design will be a consideration in building design, including lighting aspects. Lighting becomes important when

efficiency and appropriate of it can affect the user's psyche. More than that, lighting consumption on the building comes to be the second largest of energy consumption after cooling[2]. It because many buildings still use artificial lighting during daytime. Therefore, passed of the lighting regulation being must to get highest efficiency of energy consumption.



Figure1: (a)Retail shop in Indonesia; (b) Interior retail shop using artificial lighting during daytime
Source: google.com

Indonesia has used the National Standard of Indonesia for lighting requirement. National Standard of Indonesia obtains the guideline for lighting design which released in SNI no. 03-6197-2000 of the Energy Conservation in Lighting System[3]. However, if the government has released the rules but it will be useless since none practitioner has applied it. In this study, a survey for architect, lecturer in school of architecture, architecture student, and building owner is conducted to obtain real data that occurs within the condition of design in Indonesia, particularly related on lighting and SNI aspects. Thus, the purpose of this paper is to create awareness of the SNI lighting regulations to users, and for researcher is to propose a way for further study related with assessing the SNI lighting regulation.

2. Indonesian lighting Issue

In order to support the energy-saving movement through lighting conservation, Indonesia has several institutions and regulations to control it. However, all institutions and regulations refer to the National Standard of Indonesia (SNI). This regulation is the standard reference used by Indonesia as a benchmark of eligibility. SNI was made by BSN (Ministry of National Standardization) in cooperation with various expertise in managing data to become a regulation. In the process of launch SNI Energy Conservation in Lighting, "Ministry of Energy Development and Mining" and "Ministry of Energy Department" were being a representative of government to arrange all of the data which is collaborated with expertise in university, contractor, building management, supplier, and consultant firm. This collaboration obtains the technical book of energy conservation "lighting system" and it had extracted to be SNI No. 03-6197-2000 of the Energy Conservation in Lighting System.

In the case of lighting energy in buildings, Energy Conservation in Lighting System which contains in detail related to the recommended illuminance for room and limitation of lighting energy consumption for each room. As an Instance from SNI document, office room generally has 350 lux with CRI 60 – 80 % or 80 – 100%. Besides, the SNI recommend that color temperature can be use cool white (3300 K – 5300 K) or daylight(>5300 K) and has power energy limitation should not more than 15 W/m². From these requirement, it concluded that should choose a lamp with efficacy no more than 22.3 lm/W. every lamps has detail of specification and number of efficacy on its box package.

Besides SNI, Indonesia has a green building rating tool body called Green Building Council Indonesia (GBCI), a private institution established since 2009 by professionals who have concern for green buildings. GBCI is an institution to certify green buildings in Indonesia [4]. GBCI contains six categories; Appropriate Site Development, Energy Efficiency & Conservation, Water Conservation, Material & Resources Cycle, Air Quality & Leisure Time, Building & Environment Management. In detail, lighting requirement is a part of Energy Efficiency & Conservation category. The assessment mentioned that lighting assessment is achieved when it has passed the lighting conservation requirements in SNI no. 03-6197-2000 of the Energy Conservation in Lighting System.

Government has been in charge on the development system in order to keep on the procedures, national regulation (Government Regulation of the Republic of Indonesia number 36/2005) and local regulation. Those documents had used as a basis to apply for the building permission [5]. However, these documents are not detail as like SNI document since these only for organizing policy in general. National regulation and local regulation still keep on referring to SNI documents.

2. Research Methodology

In order to determine the awareness level of designer, a survey was developed throughout e-questionnaire to take responses from architectural practitioners at Surabaya, Indonesia. The survey questionnaire was created by Google Form [6] and contained 11 numbers and several open question number to sharpen the correlated multiple answer. The survey dealt with question about occupation, age and work experiences as personal information. The survey also confirmed knowledge of lighting standard, daylight consideration, design strategy to save energy and knowledge of SNI document. The survey asked further on their reason while respondents choose “NO” in confirmation of using SNI or not using SNI. To get more data, the survey also gave several choices of documents that might use architectural practitioners besides SNI. From those question, it will be known fact and reason related with SNI document consideration. The survey was conducted on November - December 2017 and can be access from link that has created by authors. Architectural practitioners are grouped into 4: architecture students, lecturers, architect / design practitioners, and building owners. There are 80 respondents as target to fulfill the questionnaire since this survey study has 4 groups and every group must have 20-30 responses [7].

3. Research Results

The literature reviewed above, all government regulations and the body of green building tools Indonesia refer to SNI Energy Conservation on Lighting System. Indeed, some studies also refer to the SNI as a baseline. As an instance, a study of daylighting on office space in Makassar Indonesia[8]. There was an analysis of rooms adapted to SNI standards. It was found that of the entire office room, only offices that close to the window has appropriate illuminance. While offices that far from the window require artificial lighting but need to use dimming to adjust with minimum illuminance. If architectural practitioners refer to the SNI regulations, any space that does not require artificial light will designed with lower quantity and quality lumen specification. The success of energy consumption in lighting depends on the conformity of designers in complying with SNI. However, regarding at the survey results, the concern for regulation in Indonesia is minor.

Result data showed that responses who were in university level got the highest score of 47.5%. It consists of the whole level of architecture students, started from 1st year students until graduate student level. Secondly, architects /practitioners design generated 32%. These result is interesting because the results of studies that can represent the architects in the present, and the architect of the future.

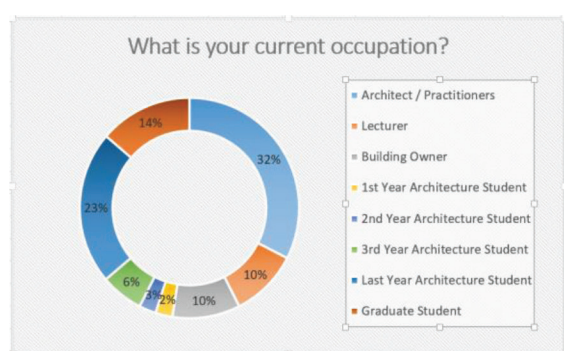


Figure2: Occupation survey

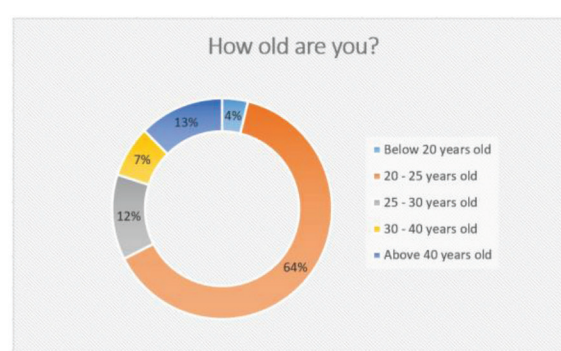


Figure3: Age survey

Less predictably, while expected that work experience might be a reason for practitioners would assess the lighting standard, but from the responses who had experienced above 5 years (21.3%), only 4% of them had proclaim that assess SNI properly. The experienced responses mentioned on the feedback that SNI is not applicable for common architect. It could be understood for expertise only.

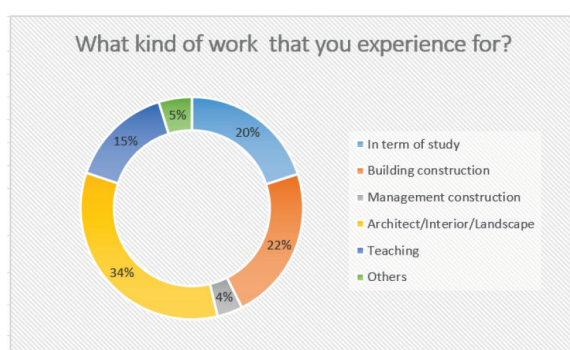


Figure3: Work experiences survey

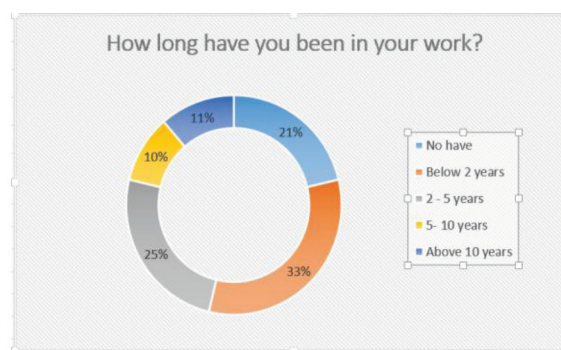


Figure4: Work experience years survey

Another interesting result comes while mostly responses consider on lighting saving design, but they tended to adjust it through found some references on website or book and thought by their own estimation. These reason showed that the practitioners used untrusted references which cannot be sure is that valid or non-valid method for designing. It was predictable that 72.5% responses did not use SNI as the proper regulation on their basis consideration. Those kind of facts could be a main issue where not many responses use appropriate sources to assess lighting design. While the lighting standard has not passed, it might be having several negative effects such as over limit energy, could be risk on eyes, and not consider on green building issue. On the open question 10b, it showed more detail reason that mostly they did not know about the SNI Energy Conservation in Lighting System.

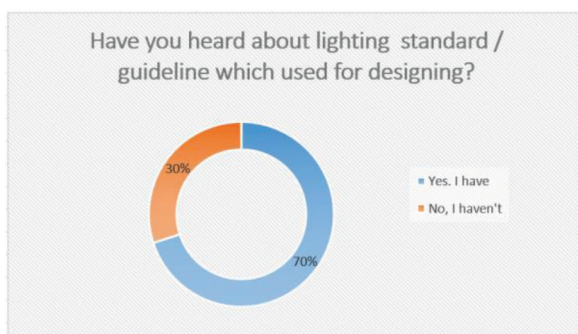


Figure5: Standard or guideline knowledge survey

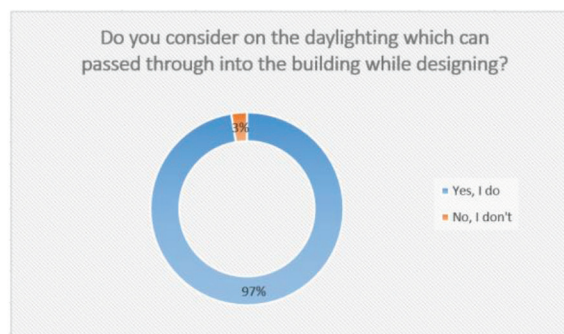


Figure6: Daylight consideration survey

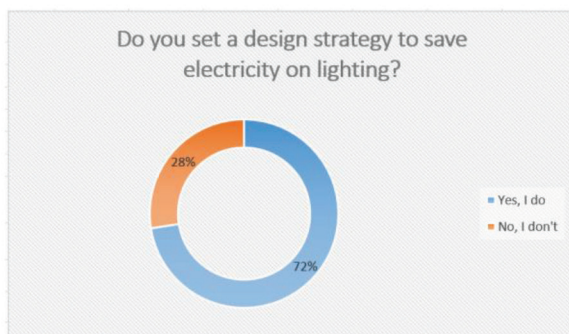


Figure7: Saving energy survey

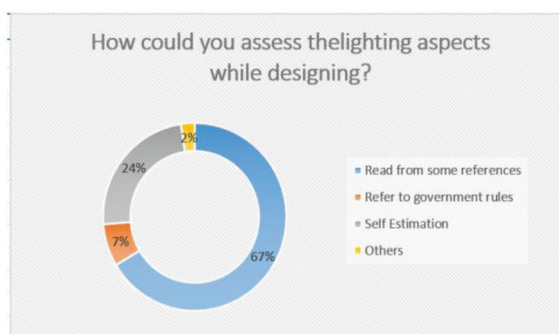


Figure8: Document referred survey

In the last question, it confirmed that very terrible condition of lighting design in Indonesia was happening since got unpredictable answers. Responses also did not know about other trusted references such as CIE, CIBSE, IESNA. It showed from 73% chose unknown with other references.

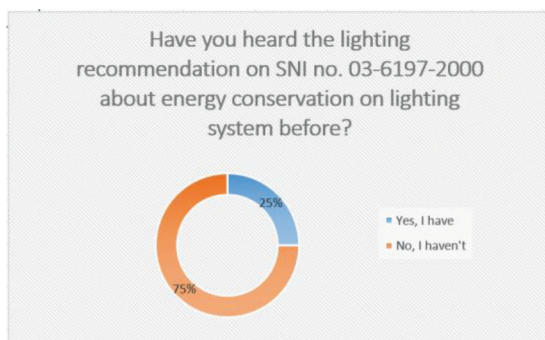


Figure9: SNI document knowledge survey

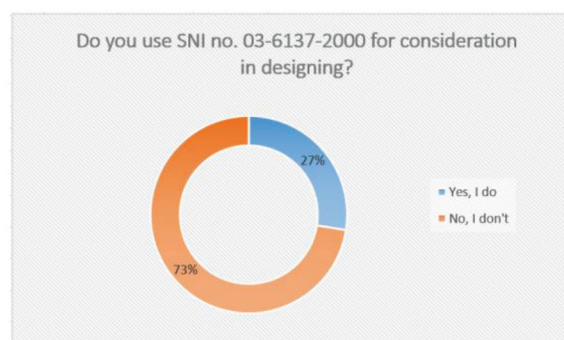


Figure10: SNI document consideration survey

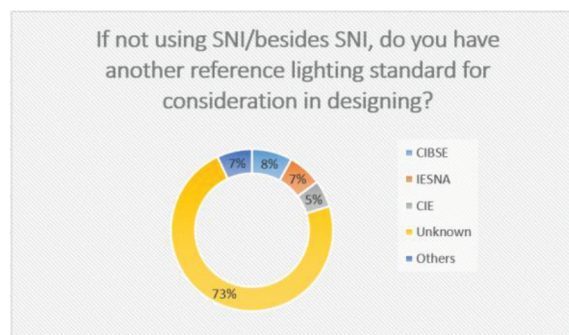


Figure10: another document knowledge survey

4. Conclusion and Discussion

Based on the result, it is necessary for further research to solve the problem of lack users who passed the requirements. Topic opportunity for doing further research such as:

1. SNI no. 03-6197-2000 of the Energy Conservation in Lighting System has been launched 18 years ago, but this document still used as the latest regulation. Since that the regulation was too long time ago, it necessary for stakeholders doing further information to upgrade this document which can adapt with newly technologies example LED light, light pipe, side lighting strategies, etc.
2. Based on the result that expertise architect mentioned that this SNI is not understandable for common architect. Therefore, Rule of thumb to assess SNI is needed to access SNI easily. It could be used instant equation, graphic, table, or simple method.
3. Further study on way to encourage architecture students or architect candidates for knowing kind of regulations. This might be a quantitative survey which conducted in several school of architect and doing survey for taking a data roughly regulation knowledge. This way is to cut off the lacks of unknown regulation that happened nowadays which hopes in the future, those architects candidates always consider on regulation while designing.
4. Since there is no much data about daylight in Indonesia on SNI, research on daylight potentiality scopes can be another opportunity to complete SNI documents.

5. Acknowledgement

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