Factors that affect the low quality of school buildings

G J Johari*, I Farida, S Permana and D Yogaswara
Department of Civil Engineering, Sekolah Tinggi Teknologi Garut, Jalan Mayor Syamsu1, Garut 44151, Indonesia

*ganjar.johari@sttgarut.ac.id

Abstract. School buildings have an important role in education. The problem that occurs is the low quality in rehabilitation. A quality control system is needed that can guarantee the quality of the building in accordance with the expected results. The purpose of this study was to identify what factors caused low quality in the rehabilitation of school buildings in Garut district. This study uses a quantitative approach to survey methods. The population and sample were 4,134 secondary schools that experienced rehabilitation in 2018 with a sample of 94 schools. The statistical analysis used was a confirmatory factor analysis. The results of this study are 13 variables that affect the low quality in the rehabilitation of school buildings in Garut Regency which are incorporated into 2 factors, namely project planning and implementation/project implementation. One dominant factor was obtained, namely the organizing factor for the implementation of activities. The indicators are division of tasks, time, capacity, and manner of implementation, estimated number of resources needed, Allocation of available resources, Ease of communication between the elements involved, Allocation of responsibilities for project implementation, Coordination of all activities and labor involved, Allocation of responsibilities for project implementation, Coordination of all activities and labor involved.

1. Introduction
These Building a school building as one of the educational infrastructures has an important role in the effort to develop the life of the nation and state. Within this framework, educational infrastructure has a role to play in developing development goals such as equitable development and results. At present, the budget for education infrastructure is very large. But at the time of implementation in the field, often found buildings or infrastructure sourced from the country turned out to be inappropriate, between the initial specifications and realization. There are several causal factors, including the quality of materials, professionalism of workers or human resources, methods of implementation, environment and so forth.

The results of the study stated, currently nationally of 1.8 million school classrooms, only 466 thousand are in good condition. That is, only 25.8% of classrooms can be used properly, while 74.2% of school classrooms are in damaged condition. (source: presidential statement, online media detik.com). Based on data from the Education and Culture Office of Garut Regency, the condition of school buildings in Garut Regency has a very low level of building quality. This can be seen from the condition of the classroom from the level of damage to the building. Even though the budget allocation for rehabilitation and construction of new classrooms (RKB), both from the aspirations of the board, DAK, BANPROV, and DAU, is very large. Based on the data, it can be seen from the many classrooms of school buildings for the middle level, only 19.2% of the classroom conditions are in good condition. While the remaining 80.8% of the conditions are mildly and severely damaged. This is not in accordance
with the allocation of aid funds disbursed by the government specifically for improving education facilities and infrastructure, especially in Garut district.

From the data from the Garut District Education Office, the 2016 budget allocation for the Education Office is only Rp. 74,877,335,000. While for infrastructure allocated Rp. 33,205,575,000. This means that 44.3% is allocated for infrastructure, both new buildings, and rehabilitation of old buildings. The reality is that there are still many conditions in the school that has received assistance, the conditions are very appealing.

The problem statement in this study is the low quality in the rehabilitation of school buildings in Garut Regency. In this regard, a form of study is needed that is able to produce a quality control system that can guarantee the quality of buildings in Garut Regency in accordance with the expected results.

2. Literature review

The quality of the building can be seen from the aspect of construction strength, material durability, the beauty of appearance, and price mercy. The strength of construction is determined by the accuracy of the selection of structural systems and the selection of materials, the correctness of the implementation, and the level of smoothness of the solution. In other words, the quality of the building is determined from the time of planning, implementation, and the stages of use/maintenance. No matter how good planning is if it is not implemented properly it will not produce a quality building [1].

Understanding and concern for development actors as well as anticipating building damage are still low [2] (Construction, 1992 March 20-26). More than 95% of builders have never received formal education at Vocational High Schools, even most of them are only elementary school graduates. This low quality can occur at the stage of the planning (pre-construction), implementation (construction), and usage (post-construction) stages [3], building damage is a defect or malfunction, performance, management or requirements of a building so that it reduces service for its users.

Declining quality of buildings can also occur due to the failure of building users to carry out maintenance and maintenance [4], stated the results of the study that there were still schools that did not pay attention to supporting facilities and did not periodically carry out maintenance of buildings [5], mentions seven factors that cause material damage, namely: solar radiation, local climate, biological factors, gases that damage materials, salt content in soil and water, production factors, and material storage [6], said that building damage was caused by human factors, namely: lack of knowledge of planners, executors, and supervisors; economic factors including development costs and maintenance costs; carelessness of development actors since planning, implementation and supervision; and natural disaster factors such as earthquakes, floods, storms, fires, and so on. From the description above, it can be said that the low quality of buildings occurs due to five things, namely the first human factor, which is a less professional development actor; second, the low quality material / material that is not in accordance with the specifications specified, the three methods of implementation methods, namely not in accordance with the SOP / operational guidelines and technical guidelines that have been set, fourth, environmental factors include climate, weather, biology, chemistry; and the five factors of natural disasters. Indonesia in the ring of fire has a high vulnerability to the earthquake disaster especially if the earthquake exceeds the planned building capacity. On the other hand, arbitrary exploitation of nature can lead to landslides, floods, and climate change disasters that also have the potential to reduce building quality.

Understanding of quality control in general that control is a process of comparing what happens with what should happen (plan) with implementation when an activity is carried out so that control will not be carried out if the activity/work has not begun [7]. Furthermore, according to RJ Mockler control is a systematic effort to determine standards that are in accordance with the objectives of planning, designing information systems, comparing implementation with standards analyzing the possibility of deviations between implementation and standards, then taking necessary corrective actions so that resources are used effectively and efficiently in order to achieve goal [8].
3. Method
The author uses survey and explanatory research methods. Determination of survey methods is done because survey research is a study conducted on large or small populations, but the data studied is data from the population sample so that relative events and relationships between variables, sociological and psychological are found \cite{9,10}. Furthermore, this research is exploratory research which explains the involvement of a combination of factors between theory and the addition of other factors that are considered to affect the object of study under study. In the final stage, the factor is concluded by using Factor Analysis.

The population used amounted to 4,134 junior high, high school and vocational schools that experienced mild rehabilitation and severe rehabilitation. Based on the results of the number of samples using the Slovin method then it was found that the number of samples was 98 people, then the determination of the number of samples was done using the proportionate stratified random sampling method.

Factor analysis is principally used to reduce data, namely the process of summarizing a number of variables into fewer and naming them as factors. The type of factor analysis used in this study is confirmatory factor analysis. The stages are:

- Arrange data matrix
- Feasibility test for factor analysis
- Factor extraction
- Factor rotation

4. Results and discussion
Building damage is a process of weakening the strength and durability of construction and building materials accepting loads from the outside or heavy loads themselves so that they exceed their capacity. If the condition is left unchecked, over time there will be a decline in quality and eventually, the destruction of buildings will occur.

Based on data from the Garut District Education Office, observations of various buildings in the field, especially school buildings in the Garut Regency area indicate that many school buildings that are still newly built or that are still being rehabilitated have been damaged, for example cracks in the walls (stucco), leaking gutters, leaking on fussy walls, leaking on bathroom floor plates, detachment of ceramic bonds, growth of moss, or damage to other building parts. As a result of severe damage to school buildings can cause disruption to the implementation of learning, and threaten their safety.

Validity test is used to measure the level of validity or validity of an instrument. The results of the validity test show that all items have a correlation value >0.3 and are said to be valid. Reliability testing is needed to measure reliability that involves consistency of answers if tested repeatedly on different samples. The reliability test results show Cronbach Alpha values greater than 0.6, this means that the reliability of the questionnaire has been fulfilled.

The results of factor analysis obtained 13 indicators incorporated in 2 factors, namely project planning, and project implementation/implementation were determined as factors that influence the low quality in the rehabilitation of school buildings in Garut Regency. The factors that influence the low quality in the rehabilitation of school buildings in Garut Regency are as follows:

- Project Planning: identification and preparation of early activities, determination of time, costing, determination of labor, procurement of equipment, tender preparation, organizing the implementation of activities, project implementation / implementation, cooperation, work team, trust, effective communication, monitoring scheduling and feedback.
- In carrying out construction work, planning is made to achieve high effectiveness and efficiency of the resources that will be used during the implementation of the project in order to obtain minimum implementation costs so as to meet the planned resource elements, including Time, Costs, Labor, and Equipment.
Planning can be described in detail, as follows:

- Organizing activities involved in the project.
- Determine the distribution of tasks, time, capacity, and manner of implementation.
- Estimating the number of resources needed.
- Allocate available resources.
- Allocate project implementing responsibilities.
- Facilitate communication between the elements involved.
- Coordinate all activities and labor involved.
- Facilitate control of project progress.
- Estimating project implementation time.
- Anticipate unexpected conditions and changes to plans that may occur during the project.

Furthermore, the control process can be carried out as long as the project work activities are carried out. Risk identification can be carried out through two approaches, namely based on the source that is general in nature and based on the impact it causes must be clear with certain risks [11]. Risk identification based on the source in general:

- Regulations, natural disasters, and their side effects.
- Markets, Operations, Environmental Impacts, Inflation and exchange rates.
- Management, Schedule, Cost, Cash flow.
- Technology, Image, Design, Method, and Complexity.
- Licenses, Patents, Rights, Force Majeure.
- While special risks for construction projects.
- Availability of skilled workers, regulations and certifications, equipment delivery.
- Design maturity, equipment availability.
- Project organization, contract administration.
- Environment, geotechnics, geology.

5. Conclusion
Based on the calculation of the factor analysis, the poor quality of the rehabilitation of the school building in Garut influenced by 13 factors which consist of project planning and execution / implementation of the project. The dominant factors that influence the low quality in the rehabilitation of school buildings in Garut Regency are the organizing factors for the implementation of activities.

Acknowledgment
Authors wishing to acknowledge Sekolah Tinggi Teknologi Garut that supports and funds this research publication.

References
[1] Pheng L S 2018 Managing Productivity in Construction Routledge
[2] Hanun Y, Alisjahbana S W, Ma’Soom D M, Ikhsan Setiawan M and Ahmar A S 2018 Designing Cost Production of Concrete J. Phys. Conf. Ser. 1028 012063
[3] Akrivopoulos O, Zhu N, Amaxilatis D, Tselios C, Anagnostopoulos A and Chatzigiannakis I 2018 A fog computing-oriented, highly scalable iot framework for monitoring public educational buildings IEEE International Conference on Communications vol 2018-May (IEEE) pp 1–6
[4] Zomorodian Z S, Tahsildoost M and Hafezi M 2016 Thermal comfort in educational buildings: A review article Renew. Sustain. Energy Rev. 59 895–906
[5] Ransom W H 2002 Building failures: Diagnosis and avoidance Routledge 1–184
[6] Ayedun C A, Durodola O D and Akinjare O A 2012 An Empirical Ascertainment of the Causes of Building Failure and Collapse in Nigeria ISSN 2039-2117 Mediterr. J. Soc. Sci. 3 313–22
[7] Fadun O S and Saka S T 2018 Risk Management in the Construction Industry: Analysis of Critical Success Factors (CSFs) of Construction Projects in Nigeria *Int. J. Dev. Manag. Rev.* **13** 108–39

[8] Talman J 2018 Enhancing teamwork in group projects by applying principles from Project Management *Innov. Teach. Learn. Conf. Proc.* **10**

[9] Krishnamoorthi S and Mathew S K 2018 Business analytics and business value: A comparative case study *Inf. Manag.* **55** 643–66

[10] Liguori M, Steccolini I and Rota S 2018 Studying administrative reforms through textual analysis: the case of Italian central government accounting *Int. Rev. Adm. Sci.* **84** 308–33

[11] Ye R, Zhao J, Wickemeyer B B, Toste F D and Somorjai G A 2018 Foundations and strategies of the construction of hybrid catalysts for optimized performances *Nat. Catal.* **1** 318–25