Exploratory study: Conservation practices and the role of architect

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Abstract. Conservation practices are comprehensive and multidisciplinary, both in substance and process. Based on a review of 30 randomly selected conservation writings, the papers review revealed that 3% of the articles discussed the development of heritage buildings conservation, 23% of them described the roles of stakeholders related to conservation practices, 13% discussed scientific or multidisciplinary issues concerning conservation practices, 54% explained several techniques in conservation practice, and 7% identified several challenges and obstacles in conservation. The previous research result indicated that specific research on architects' role in conservation practices was still lacking, while this is partly useful for formulating conservation education programs. This paper aims to present the results of exploratory research on the role of architects in preparing, planning, and implementing conservation. The research used a qualitative-exploratory approach through precedent studies and in-depth interviews with conservation practitioners. The information units were inductively classified into themes and formulated into conceptual models. The research found that architects' roles in conservation practices were flexible, either as the main actor (leader) or as a technical assistant involved in parts or all stages of activities: recording and documenting, analysis, decision making, and drawing work.

1. Introduction
Heritage buildings are the identity and historical witnesses of the city and significantly contribute to the study of human and cultural development [1]. Burra Charter underlines that conservation practices are the process for maintaining the significance values of the past civilizations artefacts representation [2]. At present, those who are interested in preserving cultural heritage buildings view that the conservation of historical buildings is not only useful for preserving cultural products but also has economic investment value. This is evidenced by the increasing number of scientific writings that discussed in-depth on the preservation of cultural heritage buildings.

The author randomly selected thirty articles on the preservation of cultural heritage buildings published during the last 10 years. Based on the thirty writings, there were several topics regarding the preservation of cultural heritage buildings as follows: 3% of the articles discussed the development of heritage buildings conservation [3], whether they were getting more attention or being forgotten. 23% of them described the roles of stakeholders (owners and government) on implementing conservation practices [4-10]. 13% of the articles discussed scientific or multidisciplinary issues concerning the conservation of cultural heritage buildings [11-14]. While 54% described some heritage building techniques, e.g. identification and analysis, building categorization, re-function, heritage science [15-
The last 7% of the articles identified some of the challenges and barriers of conservation professional practice [31,32]. From this 54%, it was assumed that architects played a role in this conservation practice. The role of architects in conservation practice academically has not been widely discussed. Meanwhile, recently the work on conservation projects increases along with the development of the conservation study program.

The availability of multidiscipline human resources determines the implementation of a conservation program, and it depends on their ability to collaborate. The Burra Charter notes that experts involved in conservation practice include architects, urban planners, demographers, archaeologists, geographers, historians, conservators, anthropologists, scientists, engineers, and heritage administrators [2]. Knowledge of what fields are worked on by architects and the nature of their collaboration with other experts are things that need to be revealed to contribute to scientific development for architectural professionalism and curriculum development in architectural study programs. In this regard, the research question being carried out was the roles of architects, and how do architects collaborate with other multidisciplinary experts in building preservation?

Based on the above questions, this research aimed to determine the role of an architect and how architects collaborated with other multidisciplinary experts to preserve heritage buildings. Hopefully, this research will be useful for architects when dealing with heritage building conservation work, so that the architect can see the scope of work, whether by the architect himself or work carried out in other multidisciplinary experts. This study used the results of interviews with several practitioner architects who were experienced in planning and implementing building conservation projects, especially in Indonesia. At the end of the paper, the author will show what kind of conceptual model formulation of the architects' scope of work and their role in the creation of preserving cultural heritage buildings.

2. Literature

The heritage building conservation process is different from the typical construction of buildings. However, like any other building construction, heritage building conservation projects are managed through construction management. Construction management in the development process has stages starting from planning, implementation until the building is operationalized [33]. The first stage is formulating a design concept. At this stage, an investigation is carried out regarding the project's strengths and weaknesses to obtain facts and analysis as early as possible so that the architect can create a construction implementation strategy. The second is the planning stage that consists of understanding TOR (Term of Reference); investigating the existing conditions; sketching plans in architectural concepts drawing; doing final planning. The third is the procurement stage, which at this stage, the architect makes a list of participants, prepare auction procedures, and estimate costs. The fourth is the construction stage, and the last is the building operation stage, where the architect needs to ensure that the installation is functioning correctly, and the user agrees to the quality of the finishing of the building components.

The heritage building's conservation process involves several experts from various multidiscipline. Based on UNESCO's explanation in the guidelines entitled “Caring For Your Heritage Building” [34], some of the multidisciplinary experts and their activities involved in the implementation of conservation are architect, historian, structural expert, material conservators / material science, building service engineer, contractor, archaeologist. Based on Anthony's [35] explanation, the architects are responsible for planning and building design based on the terms of space quality, building shape, building aesthetics, basic structural system, material use, and environmental control system. Historian concerns on social, cultural, and political history. The structural expert assesses the strength of building structure and gives recommendations for structural improvements. Material conservators/material science recommends the implementation of the building's materials. A service engineer is responsible for analysing building functions, such as utilities and others. The contractor is liable for the traditional techniques of building construction and archaeologists' tasks to predict the building artefact’s location.
3. Methods
The research objective was to obtain an explanation of what the roles of architects were and how architects carried out activities in implementing heritage building conservation practices. The final result of this research was the formulation of the initial theoretical model of architects' roles in heritage building conservation practices. The researcher considered that a qualitative exploratory approach was appropriate to answer the research question because only those deemed resource persons have significant experience, and information from these sources was difficult to find in secondary reference sources.

This research used a qualitative paradigm, which was the researcher revealed the realities naturally, and theory, in this case, was used as background knowledge. The researcher collected pieces of information directly from architects involved in conserving heritage buildings and considering all aspects of the research object. In-depth interviews with building conservation practitioners were the primary data used to develop the final conceptual model. Conceptual models were initial theoretical concepts before building general ideas. The initial theoretical concept was formulated by interconnecting the units of information through the coding process that which then classified it into themes. These themes referred to empirical evidence obtained through verbal explanations presented by resource architects. The results of literature studies and interviews were written in report scripts. Then they were analysed and interpreted inductively to build the conceptual model of the roles of architects and the way architects collaborate with experts from other multidisciplinary in the stages of the conservation process [36].

4. Results and discussion
Through the research, researchers found: 1) building preservation procedures; 2) the role of each actor from different disciplines/expertise based on the principles of construction management, and 3) Conceptual model of implementation of heritage building conservation. The point of three is a model of finding abstraction. The following are the procedures and the actors for the implementation stages of the conservation of heritage buildings, which include the stages: conceptual design, planning, procurement, and construction.

4.1. Stage-1: Conceptual design
In the conceptual design formulation stage, the experts who play a role in implementing building conservation are historians, architects, archeologists, structural experts, and material conservators. The tasks of each in the building conservation project are as follows Table 1:

| No | Actors                                      | Rules                                                                                             |
|----|---------------------------------------------|---------------------------------------------------------------------------------------------------|
| 1  | Historian                                   | Studying and analyzing: the building's history, building's owner, building planner, construction's year of building, building's function, and architectural style. |
| 2  | Architect supported by archeologist and structural expert | Observing and documenting the existing condition of the heritage building                           |
| 3  | Architect supported by archeologist         | Drawing and coding conserved building elements                                                     |
| 4  | Structural expert supported by architect    | Assessing and analyzing the damage of building structure components                               |
| 5  | Architect, structural expert, and material conservator | Deciding the initial conservation measures to save building                                       |
| 6  | Architect                                   | Deciding the alternative of new function of the conserved building                                 |
Table 1. Cont.

| No. | Role |
|-----|------|
| 7.  | Architect, material conservators, structural expert, and archeologist |
|    | Determining the preservation steps that will be carried |
| 8.  | Architect, material conservators, structural expert, and archeologist |
|    | Deciding which treatments will be used for the preserved building |
| 9.  | Multidisciplinary experts |
|    | Discussing all problems |

The findings above identified that the architects in implementing the heritage building conservation project worked after conducting a historical study. The result of discussions between historians, archeologists, structural experts, and material conservators determine what components need to be maintained or modified. Architect, as a designer in the conceptual design stage, is involved in getting a dominant portion and requires input from the disciplines of history, archeology, structural engineering, and material experts.

4.2. Stage-2: Planning

In the planning stage, architects work more after getting input from the disciplines, as mentioned earlier. Comprehensive data input from these parties determines the planning decisions and the accuracy of the conservation work. Lack of data and information has resulted in the failure of work implementation and the conservation mission's success. At the planning stage, the type of work of an architect includes: making DED drawings, including master plans, building plans, facades, sections, and details, and cost estimation. The initial activities are recording, documenting, analysing, and decision-making for that job's needs. The details of each activity are as follows:

4.2.1. Recording and documenting. The recording is an activity of collecting data through observation of existing conditions to get an overview of the building's conditions to compile a master plan, site plans, facades, sections, and details. Architects do documentation assisted by archaeologists and structural experts. Architects need to study the history of the building (old photos), discussions with experts from other fields, and related institutions such as the Architectural Data Centre institute. The required data is a floor plan, facades, sections under the original condition, measured as accurately as possible, including all furniture found. Data on the building's existing condition is recorded in the form of descriptions, drawings, and photographs. The architect makes codes each floor plan drawing with a specific elevation (through re-measurements) and a detailed description of the material specification. At the data collection stage, architects need to avoid predictions or conjectures. Like archaeologists, architects need to provide grid-based codes on drawings to make it easier for architects to describe damage to specific areas. The documentation not only details of building components but also items found in the building.

It is also possible to document data connected with the construction process, which is known as excavation. Excavation is carried out manually to avoid damage to existing buildings other than to mark which parts are old and new. For that, architects need structural experts. All findings are recorded through photographs accompanied by a date, time, size, and details.

4.2.2. Analysis. The architect makes an analysis by comparing the condition of the building historically to determine whether there are changes in the building. Building history analysis is useful for identifying traces of technical history and examining damage to each element as a whole or sample. With the help of structural experts, architects analyse building conditions that cannot be recognized visually such as testing the strength of the structure.

4.2.3. Decision making. Architects need to consider conservation measures for building preservation purposes and assign new functions to survive in the future. It is different when the architect plans a
building to be preserved as a monument; then, its condition can be returned to its original condition. Architects need to consider anticipatory steps so that the building is safe and sturdy to accommodate new functions. The decision to save the building was made based on the level of damage. The level of damage affects different treatments, for example, 1) the level of minor damage, the building is still functioning; only needs improvement in the structure of the building; 2) moderate level of damage, the building must be vacated, and can be used after the building is repaired and strengthened; and 3) the level of severe damage, buildings were emptied or destroyed.

4.2.4. Drawing work and cost estimation. Based on the level of damage analysis and soft drawing, the architect makes a cost estimate. The soft drawing consists of a master plan, site plan, facades, parts and details. The cost estimate is based on the standard price issued by the Ministry of Public Works.

4.3. Stage-3: construction
The construction phase is the development stage through renovation, rehabilitation, or adaptive reuse based on the planning stage's criteria. At this stage, the actors and the types of work are as follows Table 2:

| No | Actors         | Rules                                                        |
|----|----------------|--------------------------------------------------------------|
| 1  | Architect      | Supervising during construction process                      |
| 2  | Contractors    | Doing first construction to save cultural heritage buildings from further damage |
| 3  | Architects     | Monitor the implementation of conservation by monitoring the project construction and provide solutions to problems that arise in the field related to |

In the construction stage, the architect, as the designer, acts as the construction process supervisor. Meanwhile, the contractor acts as executor of development. At the beginning of the construction, the contractor carried out cleaning the building from components that caused damage. Some examples of building rescue, namely cleaning the building from dirt or plants that can damage the building, temporarily using scaffolding on a collapsed structure, increasing security from theft, making immediate construction planning decisions and budgeting decisions, re-plastering peeling walls because if left too long can cause the wall to collapse. In some instances that require solutions, the architect acts to provide directions according to the conservation planning criteria. Based on the research findings, the conceptual model can be abstracted as Figure 1.

**Figure 1.** Conceptual model of heritage building conservation.
5. Conclusion
The role of architects in carrying out the construction of cultural heritage building conservation projects is strongly supported by historians and archaeologists who technically have expertise in collecting, documenting, and coding historical physical artefact data. Conservation action is multidisciplinary (architects, archaeologists, historians, material science conservators, contractors, construction service engineers, and structural experts), comprehensive, and collaborative. Procedurally, each expert works sequentially or simultaneously in stages: conceptual design, planning, and construction. The considerations that accompany the determination of steps to increase the building structure's strength, repairing, and emptying/demolition require the documentation of the actual and accurate condition of existing preserved buildings.

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