

## Risks in Conservation Heritage Project

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**Abstract:** Risks in conservation projects are believed to be different from risks in new building projects. There are different methods and processes that need to be adopted in order to handle a conservation heritage endeavour, particularly in heritage projects. Heritage projects form a valuable inheritance with sentimental values that tell a certain history, culture or tradition which needs to be preserved. Nevertheless, due to limited knowledge on conservation heritage projects, project teams tend to treat a conservation project the same as a new building project. Many have reported that conservation projects frequently suffer failures in meeting the delivery goals of time, quality and budget, which lead to contractual disputes during the post-contract stages of a conservation project. Conservation work is riskier due to the inclusion of many activities such as preservation, restoration, and refurbishment. Thus, this research aims to identify the risks in carrying out conservation projects through conducting semi-structured in-depth interviews and using the survey research method. The objectives are to make comparisons between the characteristics of new construction projects and conservation heritage projects, and identification of risks in conservation of heritage buildings. The outcome of this research is considered to be significant and relevant as it contributes towards the conservation sector by minimising the risks taken on conservation projects by the project team involved.

**Key words –** *Conservation, heritage project, risk*

### INTRODUCTION

Construction project is not simply restricted to the new buildings only but it also includes restoration and maintenance of existing building. There are many reasons why the building is restored and maintained. Heritage can be one of the whys and wherefores. The National Heritage Department [1] defined heritage as a valuable inheritance that can be categorized under culture, tradition, area, building, archives material, paper or books. Conservation practise begins as the act of appreciation of heritage. The factors of age, high maintenance cost, neglect, lack of comprehensive guidelines, and low understanding on heritage buildings' maintenance management practices are the reasons these heritage buildings are decaying [2].

Time, cost and quality have always been the factors that play a significant role in determining whether a project can be considered successful or not.

Unfortunately, for the conservation project, the performance in terms of time, cost and quality is far from satisfactory [3]. Currently, the industry is facing several issues that have caused cost and time overruns and also contractual disputes during post-contract stage [4][5]. Surprisingly there are actually many countries facing the same difficulties when dealing with heritage building. Canada, Italy, Australia and India are some of the countries that have reported frequent failures in meeting the delivery goals of time, quality, scope and budget [3]. This is because compared to a new building work, different methods and processes need to be approached in order to handle a conservation project. But due to limited knowledge on conservation, project team tends to treat the conservation project the same as new building project. They are not aware of the full extent of heritage conservation works.

Research on refurbishment works done by Lee [4] discovered that contractors commented on the bad

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format and low tender documents variability. This is supported by Lee and Lim [4] as they suggested that there should be proposal on new BQ formats, forms of contract and preliminaries bills that are specifically to be used in building conservation work. Wee and Lim [6] also come out with a proposal on a new Elemental Cost Analysis (ECA) format for conservation works. The new ECA format is proposed due to various issues which cause wrong estimate and these issues are even more obvious when estimating work for historic buildings and structures [7].

Roy and Kalidindi [3] mentioned the issues occur in estimation are because of lack of documentation regarding the original structure, difficulties in estimating quantity of work without opening the structure and also delays because of large variations in quantity and nature of work. Due to unavailability of proper drawings or other technical documents regarding the structures of heritage building, the consultants will need to depend solely on assumptions when estimating the quantities during tendering. Consultants are taking a high risk when they are making assumptions on the original structure of the building since it leads to high variation in scope of work [3]. In new building project, the unforeseen physical condition only apply to underground condition however, in conservation project, it applies to building condition which can only be found once construction start.

Many researchers agree that research on post-contract stage in conservation work is actually lacking. Research on Bills of Quantities, Elemental Cost Analysis and Tender which are commonly found fall under pre-contract stage. This issue is highlighted by some researchers where they said that literatures on

post-contract stage of conservation works are limited since most publications only focusing on precontract stage [8][5].

Professionals involved in conservation project is one of the aspects that may affect the nature of the conservation project since the risks are higher. Although professions of Building Conservator and Architect Conservator have been introduced in conservation projects in 2000's but in article journal in 2015 written by [5], they claimed that Malaysian construction industry is still facing an issue of limited number of technical experts and skilled labour, and lack of technical knowledge in current conservation scenario.

## **CONSERVATION IN CONSTRUCTION INDUSTRY**

### **Characteristics of conservation project**

Conservation is defined as all the processes involved such as maintenance, preservation, restoration, reconstruction, refurbishment, rehabilitation and adaptation or a combination of more than one of these categories in order to retain heritage building cultural significance [9][10][4][5][3][2].

Mustapa et al. [4] mentions that even though the definition of conservation carried the general meaning of conserving and preserving heritage building, he said that it is also “can be specifically categorised and each category carries a different meaning, outlining and defining the difference on the scope of works that are associated with it, such as restoration, rehabilitation, preservation, reconstruction, repair and maintenance”.

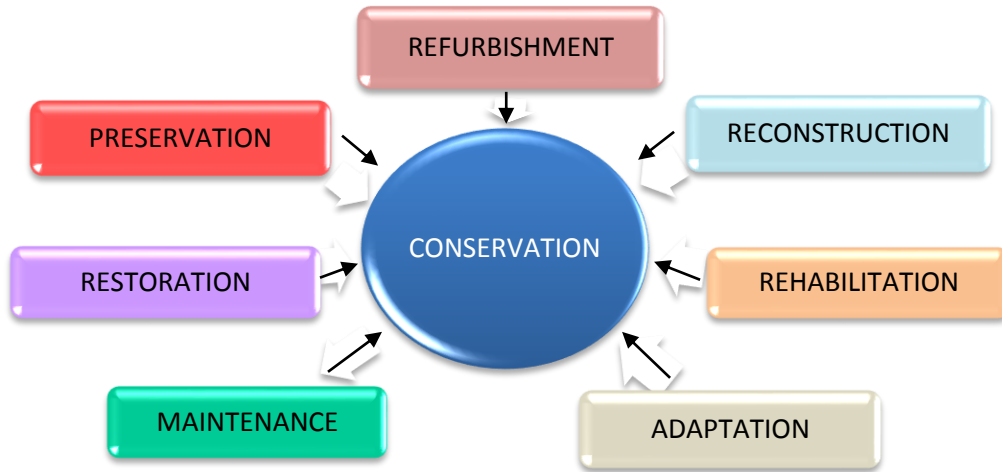


Figure 1: Processes involved in conservation works  
[9][10][4][5][3][2]

Jabatan Warisan Negara (n.d) stated that there are at least five important stages in conservation project which are;

Stages	Description
1) Preliminary investigation	Information on the heritage building to be conserved is obtained and a full report on preliminary study contains all the information will then be presented. Decision whether the building should be preserved or not will be determined based on the report.
2) Dilapidation survey and building investigation	It is done by walking through existing building to observe the finished surface and any exposed structure (Siti Norlizaiha, 2011). The information was gathered to further investigate the state of building defects.
3) Preparation of tender documents	The submitted dilapidation survey report will be reviewed by consultant quantity surveyor in order to suggest appropriate methods and techniques of conservation, assess and estimate total cost of conservation project and finally, prepared Bills of Quantities for tender document.
4) Building conservation works	This phase requires a systematic documentation of the activities by recording the building's condition in three phases ; before, during and after the building's conservation using the Historical, Architectural and Building Survey (HABS) method.

Stages	Description
5) Management and maintenance of heritage sites	Efforts to care, maintain and repair heritage buildings from time to time should be carried out periodically. An action plan on conservation management of heritage buildings should be established effectively in order to continue preserving and maintaining the heritage buildings so that it can be appreciated by future generations.

Material of the building is one of the main components that portrays the originality of the building. During a particular period of time, the materials are combined or deposited to form a historic property in a particular pattern or configuration [11]. Types of material chosen and its combination will unveil the preferences or the taste of the building creator. Thus, in order to keep its originality, the material used in the conservation work must also be the same as what have been used when the building first constructed.

Heritage buildings are valued for the physical evidence of crafts of a particular people or culture during any given period in history or prehistory [11]. It portrays the skill and talent of the artisan at that particular time and place. In India, a highly skilled artisan called Sthapatis who built temples used to pass on their knowledge within apprentices and families. Nowadays, it is hard to find Sthapatis who still practise the skill in detailing the monolithic rock cut temples [3]. Since the principle of conservation is to maintain the originality of building as much as possible, it might be a problem if there is no available craftsman or skilled manpower needed for construction work.

### **Categories of risks in conservation project**

Conservation work also involved risks where Umi Kalsum et al. [2] believe that risks in conservation project are actually much higher than new building project. Game, Fitzsimons, Lipsett-Moore & McDonald-Madden [12] mention that “understanding risks to project success should influence a range of strategic and tactical decisions in conservation, and yet, formal risk assessment rarely features in the guidance or practice of conservation planning”. This is supported by Umi Kalsum et al. [2] when they also found that risk management in conservation projects had been poorly practiced and applied nowadays. This is an important issue to be addressed since risk cannot be ignored but should be accepted, transferred, shared, managed, or minimized [13].

Risk is defined as uncertain event or condition which has negative effect on the successfulness of project objective if it occurs [14][13][16][2].

#### ***Project Risk***

In conservation project, uncertainties is common as project team cannot find out the detail of certain part of historical building without opening it. Therefore, consultants will need to deal with the

uncertainties by making accurate assumptions before contractor starts construction work. Besides, hidden work or unforeseen items such as old basement may be found in the middle of construction. There will be variation order issued for those hidden works whether to demolish or reconstruct it. This then leads to increasing the project cost and duration and maybe decline in quality which will affect project performance. Low quality outcome will definitely results in decrease in authenticity and value of the historical asset.

#### ***Design risk***

There is possibility of design error or discrepancies in documents such as drawing but it might not become apparent until contractor starts his work. In conservation, design can be changed during construction if there is a discovery of new information or hidden works in the existing building. The design process can affect the performance of conservation project [5]. There is also risk involved whenever designers have to make assumptions on his design due to limited and inaccurate information regarding the original design. The past documents might have been missing or not updated throughout the time. Designer’s assumption can lead to a large number of variation orders which then can increase cost and time of the conservation project.

#### ***Material risk***

Availability of material for construction is one of the risks that is important to be highlighted. Since conservation involved old heritage building that need to be repair and preserve, the original material used might not be available nowadays or have gone extinct. Characteristic of the original material can also be not known due to absence of technical literature [3]. Nur Auji Athirah and Hasnanywati [5] pointed that new materials can be used to replace the old materials but it must be the same species and type.

#### ***Labour risk***

The principle of conservation is to maintain the originality of the heritage building. Some of the buildings might use services of talented artists when it was first built. In order to re-produce the crafts, similar skilled artists need to be hired. Same goes to labour

resources, the knowledge and practise might be extinct like the material resources.

#### ***Cost/ Financial risk***

Conservation projects are riskier than new building projects due to unavailability of identical material in the local [2]. This is because contractor will need to import material from foreign country which increase the project cost. Besides, there are many other factors for financial lost such as cash flow problem, unavailability of funds, inadequate payment, changes to funding structure, invalid estimate, reliabilities of cost data, dispute or slow payment problem, or loss due to the default of suppliers, contractor or others [16][2].

Physical deterioration of the heritage building can cause risks in capital investment meanwhile, risks from various accounting regimes can affect the extent and timing of conservation work [2].

#### ***Time risk***

It is said that risk of extension of time in the conservation projects is higher than new-built projects [2]. Roy and Kalidindi [3] stated reason of delay in the case of Ripon Building project in Chennai is frequent stoppage of work due to the building in use during construction. Conservation work cannot be performed on the whole building at once. Offices will have to be temporarily moved in order to do work on that location. This will take time to reach completion. Delay will undeniably happen if the work had to be stopped when there are high-profile meetings and any important official events.

All types and categories of risk are associated with time [16]. Any kind of risk like project risk or financial risk as discussed before can cause conservation project to suffer delay. Whenever there is delay, cost might be increased.

#### ***Safety Risk***

Safety is important in conservation especially when the construction is ongoing while the building is occupied by user [2]. Then, safety risk will also include public user other than construction workers.

Fire is one of greater risk to be control in safety management. Processes that use naked flame and appliances that produce sparks around the historic material can cause fire to start. It is important to make sure that there is an adequate policy in place to mitigate

fire risk. A proper planning must be implemented to minimize safety risk in conservation projects.

#### ***Human risk***

Successful of conservation project largely depend on the professionals involved due to the problems from the original structure [5]. Barnes [17] observed that human risk factors must be taken seriously. According to Xiang, Jia and Li [17], contractor's poor technical capability or poor management capability can be factors of human risks.

#### ***Contractual Risk***

Contractual risks arise from the probability of loss due to failure in contract performance. According to the Risk Management Division in State Of North Dakota (2018), contract amount is not a good index to measure the level of risk. Analysing risks is not just about the loss of contract expenditure itself, but it is about overall potential for damage to property or personal injury.

Consequently, the effort to identify and prioritize risk management in conservation is inconsistent and likely inadequate. Methods shared by Umi Kalsum et al. [2] that can be applied to reduce the risk in conservation projects are Government trains particular contractor or consultants in conservation refurbishment works and subsidy special tools for future construction in order to reduce overall cost. Besides, dilapidation report must be done before commencing of works. Problem arise due to communication problem can also be reduced by having frequent meeting among the parties.

## **RESEARCH METHODOLOGY**

This study focussing on comparison between new building project and conservation heritage project by ranking risks involved in conservation project. In conducting this study, the author collected data through semi-structured in depth interview and questionnaire survey. In research done by Umi Kalsum, Khairi, Kamarul and Ismail [19], they found out that there are only 46 firms that have experience in building conservation out of 297 quantity surveying firms registered under Board of Surveyors Malaysia. At first, questionnaire method is out of question as there may be less than 46 numbers of questionnaires distributed that

might be returned back. However, after further research and study, there are actually various seminars and conferences regarding heritage conservation that are being organized. Since it is a great opportunity to distribute questionnaire to the participants in the seminar, the author decides to choose questionnaire as primary data collection.

The author selected construction professionals whom understand and knowledgeable in a conservation project whom consist of Architect, Quantity Surveyor, Building Surveyor, Town Planner, Engineer, Technical Expert and Academician. The questionnaires are given to 110 participants. Only 36 respondents returned with proper answer while others are unanswered. Another 10 questionnaires are distributed by hand in hardcopy to academicians in International Islamic University Malaysia (IIUM) and Universiti Teknologi Mara (UiTM). Only 6 academicians returned the questionnaire to researcher. From total of 120 questionnaires, only 42 respondents returned the

questionnaire with proper answer which represents 35% of response rate.

There are 46 risks expressed in the questionnaire which are identified and collected from literature review. The likert scale used enable the author to assess the most dominant risks found in conservation project by using mean. The result is then validated through semi-structured interview with a quantity surveyor, a conservator and a building surveyor who have more than 10 years experiences in conservation of heritage buildings.

**ANALYSES AND DISCUSSION**

Risks can never be fully eliminated but it can be managed effectively to minimize and mitigate the impacts on expected outcomes of the project [14]. “The aim of conservation planning is not to reduce risk per se but to maximize performance of the chosen strategies” [12]. Risk assessment will prioritize which risks need to be managed in conservation project.

<b>Risks In Conservation Project</b>	<b>Mean</b>	<b>Rank</b>
Hidden works.	4.6429	1
Uncertainties.	4.4762	2
Delay because of hidden works.	4.3571	3
High cost for using original and authentically materials and components.	4.3095	4
Large amount of money spend on variation.	4.3095	4
Unavailability of material and workmanship needed.	4.2857	5
Limited knowledge of consultant, expertise and specialist in conservation project.	4.2857	5
Contractor’s poor capability.	4.2619	6
Inadequate or insufficient funding.	4.2381	7
High payment on skilled artist.	4.2381	7
Hidden work found during construction causes design to be changed or modified.	4.1905	8
Missing and lack of related documents.	4.1905	8
Limited availability of original type of materials.	4.1905	8
Alternative material used caused heritage building to lose its value.	4.1667	9

<b>Risks In Conservation Project</b>	<b>Mean</b>	<b>Rank</b>
Certain clauses in standard (new building construction) form of contract does not take into account the nature and characteristic of conservation work.	4.1190	10
Loss of building value due to use of different material from the original.	4.1190	10
Improper conservation practices because of the absence of standard specifications for repairing historical buildings.	4.1190	10
Difficulties in providing detailed, concise and inclusive definition of the processes which may lead to decline in value.	4.0952	11
Miscommunication between parties.	4.0952	11
Uncooperative parties during collecting data and information.	4.0952	11
Loss of architectural or historical significance of the original fabric resulting from negligence.	4.0952	11
Changes of original design because of funding constraint.	4.0714	12
Unavailability of reliable historic cost information.	4.0714	12
Contractor price items without performing site survey or only based on assumption.	4.0714	12
Design information are vague and inaccurate.	4.0238	13
Tender document is confusing due to lack of critical information.	4.0238	13
Fire incident due to flammable fabric or material of building.	4.0238	13
Heritage building collapsed due to incomplete or wrong design information.	4.0000	14

Table 1: Top risks concerned by respondents

### **Hidden works**

All respondents are bothered with the risk of hidden work in conservation project. This is because it might affect the design process which then affect the performance of conservation project [5]. The design is changed during construction if there is a discovery of new information or hidden works in the existing building. Usually in conservation project, variation order is caused by hidden works. One of the respondent adds that hidden works will cause cost of the project to burst. In practise, quantity surveyor does not allocate certain amount of money for hidden works. The project team will directly have meeting to discuss on the solution for the hidden works. Although there is no money allocated for hidden works, there might be extra money in the project for it.

Delay is another consequences of hidden work. When there is hidden work found in project, obviously project duration will increase. This is

because the new information will need to be added into the design which will take time.

### **Uncertainties**

When there is uncertainty, project will be exposed to risk. Example of uncertainties in conservation project is the structure of the building as it can only be viewed once the construction work start. Uncertainties can also relate to hidden work. Hidden work is one of uncertain items that might or might not appear in conservation project.

Respondent commented that consultants are required to do precise assumption during design stage until completion of work to minimize risk of uncertainties in a project. Umi Kalsum et al. [2] already remind to properly assess and manage risks in conservation project. It is said that conservation project with high uncertainties needs more advance project management models with flexible contracts [3]. But current practise in industry still use contracts for new building work for conservation project.

### ***Unavailability of materials and skilled labours***

There is always risk of unavailability of original material and skilled labour since historical buildings are hundreds years old. They might not be available due to the sources of the material and skill are extinct. Cost and project duration will increase when contractor needs to import material from foreign country.

Project team is allowed to replace the old materials with the new one but its species and type must be similar (Nur Auji Athirah & Hasnanywati, 2015). In practise, the project team even changes the original material from China with the local material, due to time and budget constraint throughout the project. They cannot simply change it without any valid reason as they must bear in mind to maintain the authenticity of the building. However, there is a tendency to loss building value if project team use different material from the original since the authenticity of the building lay in the material itself. Interviewee provides solution in which she says that the client and project team can have a meeting together to change the era for the historical building to the time where all materials are available.

One of the respondents said that 'even renovation is challenging enough, let alone conservation work'. Similar to new building project, chosen of material for renovation work can be decided by building owner. However, just to know materials to be used for conservation project, there must be test and research conducted.

### ***Poor performance by parties involved***

Respondent argues that besides contractor, consultants are also inexperienced in conservation construction. This can be seen when quantity surveyor prepares a very thick tender document when actually more than half of it are not relevant such as mechanical and electrical work scope. The irrelevant part is actually meant for new construction projects. There is a lot of 'copy and paste' job and even dilapidation study which is the report for basis in preparing BQ document, is also unnecessarily included in tender document. This is related to tender risk where the tender document is confusing due to lack of critical information.

Architect is advised to create a minimum intervention when designing for heritage building. It is good for an architect to have high spirit in designing,

but he must respect principle of conservation which is to maintain the originality. Similar goes to engineer who tends to damage part of the historical building. He must be creative when deciding design of fitting and determining best location for services equipment so that building is not affected.

There is problem arise in some of the conservation projects because of the contractor who prefer not to follow specification provided. Interviewee shares that contractor bids document without properly understand the conservation work.

### ***No standard documentation***

Conservation construction practise is currently using form of contract prepared for new building work. However, respondents agree that certain clauses in the standard form of contract does not take into account

the nature and characteristic of conservation work. Both Public Works Department (PWD) and Pertubuhan Arkitek Malaysia (PAM) form of contract do not address the criteria of uncertainties, use of original material and design, HABS, or even employment of conservator.

According to Lee and Lim [4], improper conservation practice is because of the absence of standard specifications for repairing historical buildings. It is not possible to create a new form of contract for conservation work as CIDB already released a construction contract for renovation and small projects.

### ***Inadequate and insufficient funding***

Conservation project is also exposed to risk of insufficient funding. Due to funding constraint, client and project team might have to change their decision. Choice of material used in conservation project might be affected due to the inadequate funding. If they insist on holding onto principle of conservation, instead of using alternative materials, they need to change era chosen for the conservation project to the era that the funding is adequate to spend at. This causes changes in design.

In Malaysia, amount of money allocated for conservation project is not as many as in other developing country. It is one of the reasons building in Malaysia is missing their originality Compared to some other countries, they are willing to spend a large sum of



money just to protect their heritage assets. Malaysia still needs more awareness on the importance of heritage assets to the country and society.

#### ***No real value and return from historical building***

One of the respondent explains he believes conservation project is riskier to client. It is because the owner may suffer great loss and damages with no real value and return from the building. This is a new finding as it can be true since heritage building will not be rental out or sold because it is too precious to someone. A lot of money is spent for conservation project but the return might be slow if the building is only open for visitors as exhibition. Umi Kalsum et al. [2] and Safayet, Hamidul Islam and Shakil Ahmed [16] already define risk as exposure to economic loss arising from involvement in the construction project.

#### **CONCLUSION**

One can see that conservation project is different compared to new building project in terms of principles, processes, and procedures. But similar to new building project, conservation project also confronts and deals with risk. The risks consists of project risk, design risk, cost risk, and etc. Respondents from questionnaire survey agreed that project risk is most crucial to be addressed in conservation project. This is also agreed in validation with conservation professionals. Under category of project risk, there are risk of uncertainties and hidden work. Literatures by other authors also claimed that conservation project has a lot of uncertainties compared to new building project. A newly found risk in this research is the risk of no real value and return from historical building.

Conservation is a process of protecting the authenticity and originality of a heritage building. Thus, risk of losing building value is expected to be mostly concerned by key players compared to other risks in conservation project. However, result shows otherwise. Therefore, a study on the significance of historical building value to parties in conservation project can be performed by future researcher.

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