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# Technology measuring buildings' quality for cultural heritage palaces in Cirebon, Indonesia

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**Abstract.** Kanoman Palace and Kacirebonan Palace located in Cirebon, Indonesia still show their existence until today. The form of the existence is shown through the appearance of the palace building, the king, and all the activities. Although both palaces are similarly a palace space, but there are some differences on the quality of the buildings. The differences are considered as the initial stage of cultural heritage building conservation. Palace or *keraton* is an initial formation of a city space. The structure of the palace space shows the development of civilization and culture that is served as a knowledge. The aim of this study is to describe the quality of the material and the building of Kanoman Palace and Kacirebonan Palace. The approach method used is a comparative technique for the two palace buildings by collecting reference of conservation technology on materials in the building of cultural heritage that can be applied to the buildings of the palace. Furthermore, the quality of buildings is obtained from the results of fieldwork and research reports conducted previously. The results of this study can be found to take technological steps in the conservation of cultural heritage buildings in the Kanoman Palace and Kacirebonan Palace. The implication for the local government of the city of Cirebon is to help making strategic policies in the procurement of conservation technology for the palace buildings.

## 1. Introduction

Palace or *Keraton* is a residential area for king and his family [1]. In the past, Indonesia had several kingdoms that had the authority as government as well. Both Kanoman Palace and Keraton Palace are the space that is similarly called as *keraton* also located in Cirebon city. Although they both are the place where all palace activities are held, but refer to the statement from Perdikogiani [2], which states that a place is a reservoir of memories, thus they are not the same because they have different history. Furthermore, a place is a social transformation that contains art [3], like the two palaces. Other than that, Franco Farinelli [4] states that two meanings of place and space can be distinguished clearly, a place cannot be exchanged with others and without making a change, whereas space can change without reducing the balance. An anthropological theory of space and place needs to be process-oriented, person-based, and allow for agency and new possibilities [5]. The statements show that every place has process, and so did the two palaces. A process that had link to the function and historical radius that created the palaces. The social space is revealed in its specificity to the extent that it ceases to be distinguishable and the mental space (space of philosophers/artists) and the real space (physical and social space in



which we live) Lefebvre [3]. The two palaces have contributed in the forming of Cirebon city, both for central activities also for community residence.

Understanding of keraton local space as form of local wisdom contained in its space. Concept of spatial knowledge that is formed within keraton space is a concept of proximity between human and nature, then it leads human in responding a space, this opinion is similar to the statement: Eko Noer Kristiyanto *“The proximity between human and its natural resources both physically and mentally also the interaction happened in a system that generates process and process result that is interconnected, give each other, and take advantage within a long period of time has created a knowledge which eventually will create local wisdom, particularly related to how humans act to the nature. Existence and role of people regarding policy decision in the field of agrarian affairs including spatial arrangement [6].*

According to the reference, thus keraton spatial become a material to dig more about its spatial knowledge. Besides, keraton is historical building that formed visual space of Cirebon City. Visual quality is an attribute of a visual system that can be determined by physical elements and cultural values [7,8]. In order to maintain the existence of palace space, local government in Indonesia has an obligation to support the palace party, this is controlled by the regulation of the rule of central government and regional government. However, funding from the government is very limited, thus it is needed to create a budget priority [9]. This study is needed to be done to help the effort of making priorities, so the function, quality of buildings. And conservation technology to maintain the existence of obsolete palace building due to its lifetime.

## 2. Methods

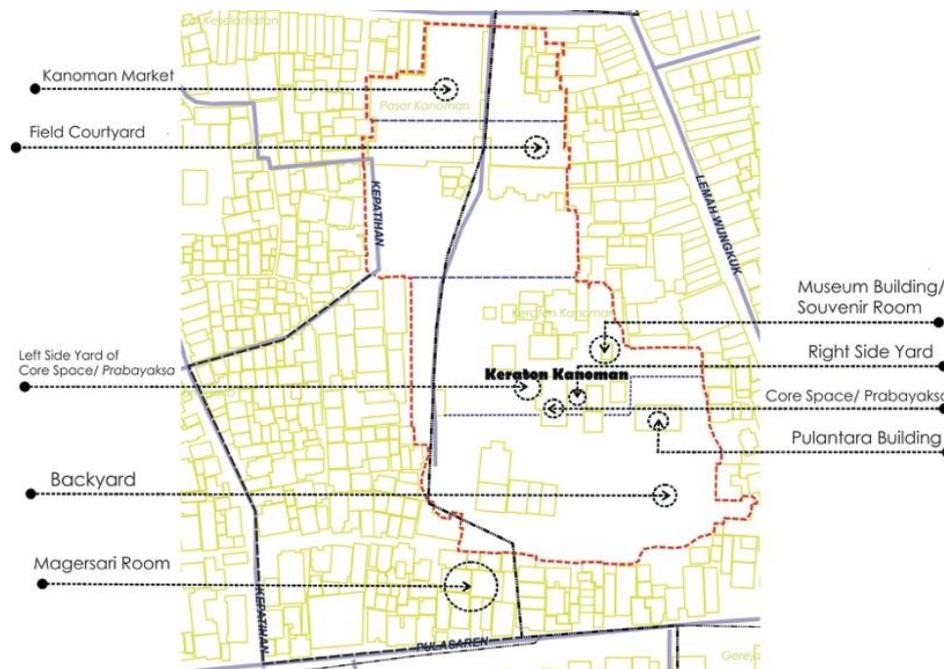
This study was conducted by collecting the data of the building through primary survey in each palace. The data was collected using photo visualization and interviewing people from both palaces to find out the building's function and building quality. Besides observing the quality of the material used for the building. The basis for selecting the palace is in accordance with the 2016-2019 study, the background of the study showed that there were differences in the function of the palace space and the quality of the building even though they were both palace space.

The research method used is comparing the space of Keraton Kanoman and Keraton Kacirebonan through its building quality, it is also supported by the data from previous study. The data is then verified to field informants related to the information collected, to check the details on the space, location, building quality and building history, such as the Palace Square, Prabayaksa Room, Witana Room, Paseban Room, space in the court yard, the king housing area, the king's activities and tradition.

## 3. Results and discussion

### 3.1. Keraton kanoman space

Keraton Kanoman space has composition of space that limited with layers of keraton's yard, however the first layer of Keraton Kanoman's yard is being covered by the buildings of Kanoman Market, so keraton building is barely seen. So does other yard namely alun-alun keraton that has function as parking lot for vehicles owned by the Kanoman market visitors [10,11]. On the west side of alun-alun there is Keraton Kanoman Mosque, in macro, space and building position of Keraton Kanoman can be seen in the following figure 1. Keraton Kanoman has art display room called Siti Hinggil, there are also pancaratna and pancaniti buildings as guide room in the past. Keraton Kanoman building is the symbol of king's power at the moment.



**Figure 1.** Space and building arrangement of Keraton Kanoman.

At the back of Keraton Kanoman there is *witana* building which is the first building when the Kingdom in Cirebon started. *Witana Building* was built using coral reef from the sea or locally called *wadasan*. *Witana* building was also the beginning of urban civilization of Cirebon like today, the building is shown in the figure 2. The maps caught by drone can be seen in the following figure 3.



**Figure 2.** Witana Building as the origins of keraton building in Cirebon and the beginning of Cirebon urban civilization.



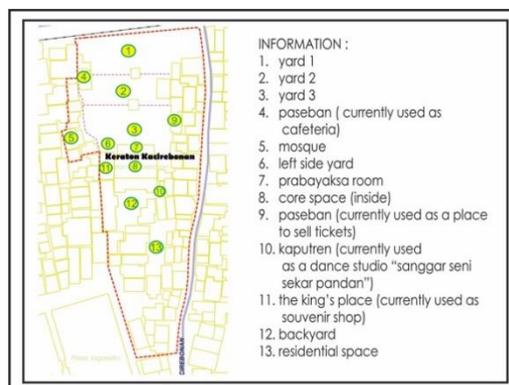
**Figure 3.** Maps of Keraton Kanoman Today caught by drone.

Keraton Kanoman is still the residence of the king and his family. Raja Muhammad Emirudin's activity is *tirakat* and being the leader of traditions while his family members do common activities such going to school, shopping. Traditional activity is still carried out in keraton, even the traditions are following the *Java* and *Hijriyah* calendar. Primordial tradition is rich in Islamic spiritual message; even sacred dancing art is a form of Islamic *Syar*. At present, Keraton Kanoman is no longer the place of governance of an authority area but rather as a spiritual center. There is a social transformation from authority area to a spiritual center.

*Buildings such as witana, siti hinggil, prabayaksa, keputren, musium singabrata still manifest but the quality of building material is humid and crumbly. Even more, kaputren building is very dirty and not well-maintained. Some well is weathered on its walls. The lack of sunlight that goes into the buildings causes the walls become full of mold and very humid.*

### 3.2. Keraton Kacirebonan space

Keraton Kacirebonan can be seen in the following figure. Keraton's yard has three layers, there is also a cafeteria on the left side of keraton, mosque is located on the east side. Prabayaksa building as a place to receive guests, the inner room of the keraton there are rooms for storing heirlooms, and in the back of the keraton there is a space for dance practice called Sekar Pandan Art Studio [11]. Keraton Kacirebonan does not have art display room such as Siti Hinggil, and guard room such as Pancaratna and Pancaniti. The shape of arrangement of Keraton Kacirebonan space does not form the structure of king's governmental authority but only forms the composition of the king's residence.



**Figure 4.** Space and Building in Keraton Kacirebonan.



**Figure 5.** Keraton Kacirebonan Maps caught by drone.

Keraton Kacirebonan is not a place for the king's residence, Keraton Kacirebonan is an activity space and community that are coached by the king, including dance communities, automotive enthusiastic communities. Similarly, Keraton Kanoman which no longer has government authority but rather the cultural and artistic center in Cirebon city. As well as Keraton Kanoman, there is social transformation in this keraton, that is the transformation of authority into social and cultural art. However, Keraton Kacirebonan still held some primordial traditions, such Panjang jimat/pelal traditions that conducted by both Keraton Kasepuhan and Keraton Kanoman. Moreover, traditional subjects like topeng (mask) dance traditions has its human moral value taught in this Keraton Kacirebonan.

Keraton Kacirebonan has better building quality than Keraton Kanoman. *Pringgodani* building is well-maintained. The age of Keraton Kacirebonan building is younger than Keraton Kanoman. However, the inside part of palace building is very moist, and even in the *kaputren* room there is a damage in some part of the wall due to its age. The lack of sunlight, causes the walls become moist and moldy.

### 3.3. Discussion

Kanoman Palace and Kacirebonan Palace have different spatial arrangement, the significant difference is: Kacirebonan Palace doesn't have *alun-alun* space and *siti inggil* space. Back then, *alun-alun* was a place for the kingdom soldier practicing to maintain its authority [1]. Whereas *siti inggil* space is a place for the king entertaining the people [1]. It can be said that Kacirebonan Palace was not a central of government authority due to the absence of these spaces, but only a place for residence. Kanoman Palace has *witana* (first building), it is a sign of a palace construction in Cirebon also the initial formation of settlements.

**Table 1.** The Arrangement of Conservation Technology to Defense Quality of Buildings in Kanoman Palace and Kacirebonan Palace.

Palace	Space and Building	Quality of Buildings	Conservation Technology
Kanoman Palace	<ul style="list-style-type: none"> <li>• Yard 1,2,3</li> <li>• <i>Alun-alun</i></li> <li>• <i>Pancaniti</i></li> <li>• <i>Pancaratna</i></li> <li>• <i>Siti inggil</i></li> <li>• <i>Paseban</i></li> <li>• <i>Langgar Agung</i></li> <li>• <i>Lonceng Building</i></li> <li>• <i>Semirang</i></li> <li>• <i>Singabrata</i></li> <li>• <i>Bandongan</i></li> <li>• <i>Jinem</i></li> <li>• <i>Prabayaksa</i></li> <li>• <i>Keputren</i></li> <li>• <i>Witana</i></li> <li>• <i>Jimat Building</i></li> </ul>	The building is still manifest but the quality is dirty, walls are dirty and moldy. Some parts have begun to be weathered and collapse. The floor is still original using gray tiles but has begun to erode. The roof uses tiles made of clay.	Requires conservation technology to maintain old buildings. Because it has historical values and values that are different from the quality of buildings today. The historical complexity that accompanies the building needs to be taken into consideration.
Kacirebonan Palace	<ul style="list-style-type: none"> <li>• Yard 1,2,3</li> <li>• <i>Paseban</i></li> <li>• <i>Prabayaksa</i></li> <li>• <i>Kaputren</i></li> <li>• <i>Pringgodani</i></li> </ul>	The building is still manifest but the quality of walls are moist and moldy. Some parts have begun to be weathered and collapse. The floor in <i>Pringgodani</i> building is still well-maintained but some floors inside is very humid. <i>Kaputren</i> walls are obsolete.	Requires conservation technology to maintain old buildings. Because it has historical values and values that are different from the quality of buildings today.

From table 1 above, it is shown that the two palaces have the same building quality which is weathered, moldy, and moist on the walls, the floor, and the roof of the building so that it requires a building conservation technology that maintains the authenticity of the building. The building quality of the two palaces is not only judged by the existence of their forms, but also the quality of the roofs, walls, floors which is a form of historical past that must be preserved. The form of the building is time complexity, therefore to be maintained, it requires a technological engineering. For this reason, aerogel material technology has been found to help maintaining heritage buildings [12]. It is the time for historical buildings such as the palaces in Cirebon to use aerogel material. Aerogels are open-porous, high-performance thermal insulation materials that can be used for very thin building insulation [12]. Aerogel technology is a technology that can protect the palace buildings.

#### 4. Conclusion

The conclusion is that Keraton Kanoman and Keraton Kacirebonan each have different building characteristics but have the same building quality and the historical value they contain. The complexity of heritage buildings is not only a form but also the complexity contained in that form must persist. The age of the building and the treatment of the building must be able to preserve the historical values of the

building. Both palaces require technological support to maintain the integrity of the building. Aerogel is a material technology that can be used as a building envelope for both palaces. For this reason, the Cirebon city government can help carry out conservation by considering the use of aerogel materials.

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