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Digerati of Nusantara Architectonic; Case Study of Baghi House, South Sumatra

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ABSTRACT : Indonesia has an architectural heritage that has great potential to be explored, in the midst of continuous modernization along with the development of IT in the design process. Nature (biophilic) teaches many things in shaping the design behavior of 'Nusantara Architecture'. Can this potential synergize with IT that are skillfully used by the younger generation/millennials? In an effort to answer this question, the research explores Nusantara architecture as a study case and is knitted together to make it "Digerati" optimalize the use of Big Data. Embedded case study method is used within the research, starting from collecting data – based on bigdata resources and similar research which riched by graphic simulations to obtain a database, followed by three dimensional architectural tectonics figures. Exploration of the 3D figures database using several design-computational programs, then this figure will be elaborated to be digested so that it will complement the existing literature – such as the "Wikipedia" search engine covering the tectonics of the archipelago architecture combine with a "rotation view" feature. Tectonics digerati will attract the millennial's and in the future they will have a new perspective of Nusantara architecture, thereby increasing their enthusiasm for design experiments.

KEYWORDS :architectonic, big data, digerati.

I. INTRODUCTION

In its implementation, the Industrial Revolution 4.0 has penetrated into all fields including architecture related to the design process (design). Design in the context of architecture has a wide and broad spectrum, in which the broad distinction contributes in the form of literature as a reference for architects to explore designs according to their respective aims and objectives. The Industrial Revolution 4.0 also contributed to the existence of today's literature, previously known literacy through tangible/real documentation (such as: drawing paper, photos, manuscripts, etc.) turned into intangible/virtual documentation (such as digitally data).Referring to the thought that globalization is an opportunity to 'globalize' Nusantara architecture and to make the contribution of Nusantara architecture wider in the architectural field, an innovation in the architectural design process is needed that is able to become a legacy for the next generation. This innovative effort can be carried out through collaboration with many parties, such as several architectural practitioners, especially those related to tectonic studies of Nusantara architecture (the sharpening of architectural tectonics – architectonic).

II. REVIEW OF LITERATURE

Digital architecture has become a discussion topic for decades, at least since the launch of the first generation of Computer-Aided Design (CAD) in the 1970s. The presence of computers in both hardware and software has changed the face of design (idea-process-result), digitization based on the binary number system (base two number system, using two symbols, namely 0 and 1), the result of Gottfried Wilhelm Leibniz's in the seventeenth century.The transformation that occurs in the context of digital architecture always includes computers (hardware and software) as the main component of the design process, a popular term is design computing. Computational design in architecture is a change in the medium of expressing designs from geometry to logic through the application of computational strategies. Design problems that were previously solved by intuition and experience can now be done more quickly with computer codes, making it easier for architects to produce designs. Most of the programs used for this design computation are visual programs capable of combining many syntheses at once.

Fig. 1. The differences in architectural drawing techniques; conventional way by Albercht Durer in XV Century (left) and digital way with CAD in XX Century (right)
https://illustrationconcentration.com/2013/05/09/traces-of-lucidity/albrecht-durer-draftsman-drawing-a-recumbent-woman-woodcut-1525-graphische-sammlung-albertina-1024x352/ (left)
https://simpledesignworks.co.uk/product-design-services/computer-aided-design/ (right)

On the other side, 'big data' is generally understood as a term in the Industrial Revolution 4.0 era which is closely related to IoT (Internet of Things) where through the internet network data can be obtained which is a source of information stored digitally on a set of computing media and most of the data can be free accessed (except those that are confidential).Both of them (digital architecture and big data) open up the opportunities to be elaborated in working on an architectural content that will become digital literacy – known as digerati. One of the interesting issue in architecture is local content which explore Nusantara architecture and tectonic.

Nusantara in architectural studies is contextualized from a political area with the connotation of Indonesia, into a cultural space, spread widely from West to East starting from mainland Southeast Asian countries, Aceh to the islands in East Papua, from North to South starting from the Japanese Archipelago to Rote Island. It is much broader than the "traditional" understanding of Indonesia's political boundaries (Pangarsa, 2006).Modernism cannot be rejected because we are currently living it. We should accept modernism with caution, while the treasures of Nusantaraarchitecture can be continued, in other words, we should modernize Nusantara architecture (Prijotomo, 1988).Another interesting discussion is about architectural tectonic (architectonic), which is one of the principles in the Nusantara architecture. Indonesia is located in an area that is frequently hit by earthquakes. In the Nusantara architecture, the construction technology system used is earthquake-resistant construction, that uses ties and holes as a lock between one another. This construction is strong but still allows it to sway and compensate for earthquakes. Literature study on architectural tectonics refers to the classical theory of Karl Botticher, emphasizing the relationship between substance (Ontology) which is a material entity, and the direct image of appearance (Representation).

The literature review then raised the tectonics of the Baghi House in South Sumatra as one of the sample for the implementation of earthquake response construction. The various connection systems that exist in the Baghi House are located joints, notches, pegs and fasteners. The study of the structural system and connection system of Baghi House shows that the structure of Baghi House is a loading and unloading structure and a rocking structure that has a high degree of adaptation to earthquakes.

Objectives of the Study:
1. To understand the digitalization in the field of architectural tectonics
2. To study the implementation of digitalization as architecture literacy (archdigerati)

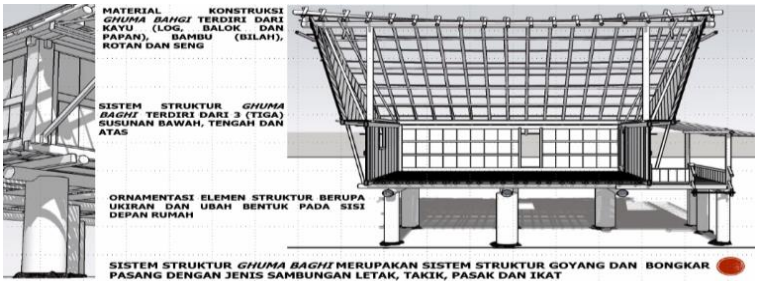

Fig. 2. Impression of Baghi House's architectonic
Source: Interview with Iwan Muraman, researcher of Baghi House

Scope of the Study: This research study provides the direction about, how public (especially millenial generation) understand impact of digitalization on Nusantara architectural tectonic. The study also open the collaboration opportunities from many parties who concern in Nusantara architectonic to fit up archdigerati as a result, throws the ultimately on future prospectus of architecture design.

III. METHODOLOGY

The research method used in this research is Embedded Case Study (related), in which the approach is a research technique using several predetermined units of analysis, the unit of analysis itself is needed to focus research on the intent and purpose. The research raised object as study case, Baghi House. Literature reviews are used as a guide to focus research and provide an overview of the background of the research and as material for discussion. In addition to the embedded case study approach, the researcher also takes a measurable approach to the parameters of the tectonic data of Nusantara architecture that will be presented.Documentation collection technique is a data collection technique by collecting and analyzing documents, whether written, pictures or electronically. The documents collected are documents related to the tectonic of Nusantara architecture with the big data mechanism (search through the Google platform, YouTube, etc.). The research method also includes interview, which is a data collection technique conducted by two parties (interviewer and interviewe) to collect information. The interview technique is a structured interview, that has previously been prepared with a list of questions. This interview technique was used to dig up information about the details of the tectonic architecture of the Baghi House.Data analysis is the development of the case study method, when the researcher tried to approach internal validity by making an explanatory analysis. This technique is as a way to analyze research data. The analysis technique is carried out simultaneously with the modeling process as material to be displayed on the web, so that case studies are analyzed based on literature reviews and implementation of exploratory steps in 3D by SketchUp 2019.The analysis focuses on studying the tectonic architecture of the modified architectural form without compromising the essence of the original material, but composing it in a three-dimensional form that is interactively charged so that it supports explanation. Further analysis is carried out during the preparation of material for publication on the web (archdigerati.id) as a means of information based on big data, through a series of mechanisms, both software and hardware.

IV. DISCUSSION

Architectonic of Baghi House –Architectural Modeling Study by SketchUp 2019

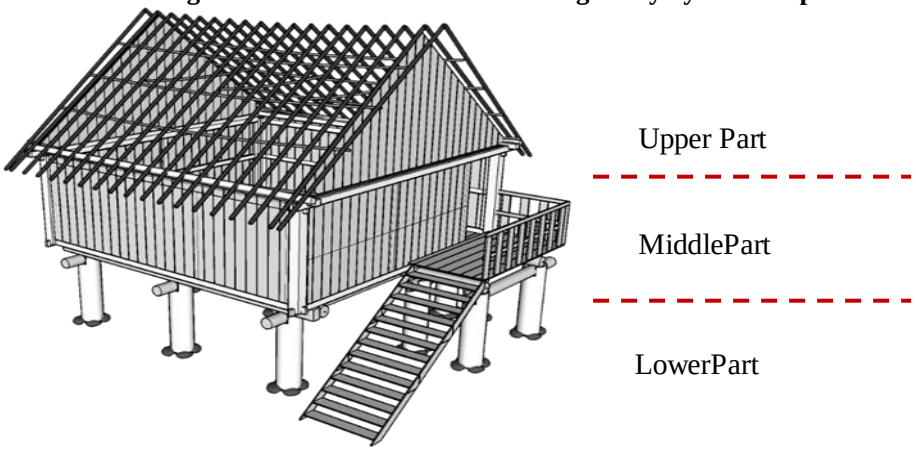

Fig. 3. Three dimensional modeling of Baghi House's architectonic
Source: Computizing research team

Structurally, the Baghi House is separated into 3 parts, the lower part, the residential part (middle) and the upper part as roof structure: **1)**In the lower structure of Baghi's House, the lower columns stand on mountain rocks that are placed on the ground. In addition, the function of the mountain stone is as a separator between the wooden columns from the ground, so as to maintain the quality of the wood and extend the life of the wooden columns. The support girder consists of 2 (two) layers of logs. The first layer uses wooden log beams resting on top of the bottom columns and connecting one way between the bottom columns. The connection between the bottom column and the girder is notch. The notched bottom column and bearing girder are within the column pile notches; **2)**The structure in the middle part consists of wood logs and beams. The residential area also consists of floor and wall components that form a box that is placed on the bottom/under structure, which rests on support girders 1 & 2.

The middle structure consists of a vertical structure and a horizontal structure, for a vertical structure in the form of a main column with a size of 10" x 10" (inch) which is located at the ends of the room from BaghiHouse. As for the horizontal structure, in the form of upper and lower girders that function as a binder between the middle column and act as a stiffener in the middle structure.Furthermore, the wall components consist of a wall frame in the form of a horizontal frame in the middle between the top girder and the bottom girder, with the addition of a vertical frame. As for the wall covering using wooden boards; **3)**The upper part/structure on the roof of Baghi House consists of wooden components and thatched roof coverings. The roof is a structure that is based on the middle/residential structure which consists of the main pillar structure of the roof, the roof truss structure and the structure of the roof covering and layering. The triangular part of the gable roof is above the hanging girder with sloping layers that follow the slope of the gable roof of the Baghi House, while the roof slope is at least 40 degrees. The roof covering of BaghiHouse uses thatch.

Implementation of Digitalization on the Web as Digital Literacy (Digerati) : The stages of the website creation process start from the website layout framework, this framework is used as a basic draft for the creation and definition of the content of the website design itself. The contents of the layout framework are; Logo, Navigation Menu (a map display of the Indonesia archipelago), Header Image, Content, and Footer. These features will be further developed at the layout design stage.The next stage is the purchase of a domain name and hosting, the purchase process is carried out on Indonesian web hosting, namely Niagahoster, before making a purchase the researcher checks the domain name that will be used. After the availability of the domain name is declared, the next process is to register the domain name that will be used by uploading a registration document in the form of a copy of the researcher's ID card, as the person in charge of using the website itself. The domain name used is www.archdigerati.id.

The layout design process is a continuation of the layout framework process that has been adapted to the wishes of the researcher in displaying the collected content, the content of Nusantara Architecture (house) in 3D modeling with a 360° view rotation, along with contextual explanations.The most important process after all stages of website design and content collection are completed is the coding and HTML stages. In this process, coding is done using the PHP (Hypertext Preprocessor) programming language based on the layout design that has been made. After the coding process is done, then a local trial is carried out on the offline device, this is done to check whether there is an erroron the PHP code. If an error is found, it will be re-checked and repaired to PHP code that has been written before. Trials are carried out on the display of website content and features.If the trial process is declared without any problems / errors, the next step is to download it on the hosting that has been prepared. This download process is the last process in creating archdigerati website with Nusantara house content that can be accessed online widely by public.

Fig. 4. Display of 3D tectonic modeling of the Nusantara architecture (Baghi House) on the archdigerati.id
Source: Computizing research team

Findings

1. Through the digitalization process of the architectonic's sample (Baghi House) can be found more detailed information as part of the learning material, supported by "learning by doing" principle.
2. Big data is not only a component of the Industrial Revolution 4.0 as a source of data (input), but can also be a medium (method) and publication of results (output).

V. CONCLUSION

Nusantara architecture with sharpening in the context of architectural tectonics has a content in the form of local wisdom that exist to follow the information technology disruption (in a big data-based format). The existence of updating Nusantara architecture is considered important for the sustainability of local architecture and as a literacy that plays a role in educating the millennial generation, with packaging that has its own charm with interactive and interesting platform instruments. Sustainability is a literacy that has a role in enriching the architectural treasures.Through this research process, it can be seen that the architectonic of Nusantara and the potential for digitization can be elaborated on the packaging of digital architecture, through a series of exploration processes assisted by the Sketch Up computing program. The existence of a series of computational steps is an interrelated part of analysis through modeling and simulation that features rotation at 360 degrees, so that the object's tectonic of Nusantara architecture become interesting and have more content in their explanations (in the form of illustrations that are driven interactively directly by the user).The common platform as digital literature is applied in a simple and general way with the website (archdigerati.id), as a pioneer website in introducing the tectonic elaboration of Nusantara architecture through case studies of Nusantara houses. The existence website also opens wider collaboration opportunities to document the architectural tectonics of the Nusantara, as an open source access platform that can interact with fellow researchers, both architecture and other interested parties such as local government.Thus, the Nusantara architecture will always be updated through a digital platform that attracts the interest of many parties, so that it becomes a good reference in future design exploration that maintains local identity in the midst of globalization.

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