Architecture design of the nusantara traditional Wastra digital repository

M Purbasari1,2*, Sasmoko2,3, O S Caroline4, S R. Manalu2,5

1 Visual Communication Design Department, Graphic Design and New Media Program, BINUS Northumbria School of Design, Bina Nusantara University, Jakarta, Indonesia 11480
2 Research Interest Group in Educational Technology, Bina Nusantara University, Jakarta, Indonesia 11480
3 Primary Teacher Education Department Faculty of Humanities, Bina Nusantara University, Jakarta, Indonesia 11480
4 Interior Design Department, School of Design, Bina Nusantara University, Jakarta, Indonesia 11480
5 Computer Science Department, School of Computer Science, Bina Nusantara University, Jakarta, Indonesia 11480

E-mail: mitawahid@binus.edu

Abstract. The Nusantara traditional wasstra (NTW) is the Indonesian biodiversity product that has not been formally identified as the national referral and has yet been commercially oriented. The research objectives were to formulate the understanding of NTW dan to construct a valid architecture design of the Nusantara Traditional Wastra Digital Repository (NTWDR). It was described as implementing the digital inventory business in the form of a smart portal template that acted as an infinite window of the complete Indonesian traditional wasstra and as a marketplace for the Indonesian traditional wasstra value chain. The research used the Neuroresearch approach of exploratory research through literature studies and FGD with the Delphi Technique for the validity of the design. The NTW's boundaries and the NTWDR's design in the form of a portal-based website are set as the results.

Keywords: architecture design, Nusantara traditional wastra, digital repository

1. Introduction
Indonesia is the largest archipelago country in the world, consisting of 17,508 Islands [1]. The diversity of the islands presents a variety of biodiversity as a potential aspect of Indonesia. Indonesia is the world's second largest in the world after Brazil in terms of biodiversity, as much as 15.3% of the world's 5.131 million biodiversities are in Indonesia [2]. Less than 5 out of the 15.3% [2] has been proceeding for the nation's prosperity. The biodiversity benefits life and becomes an essential part of human life's chain [3] and will increase the nation's wealth, which eventually creates a cultural diversity [4]. One of Indonesia's cultural diversity is wastra. The Nusantara traditional wasstra (NTW) consists of all traditionally made fabrics [5], from local materials and developed by individuals or groups and spread throughout the territory of Indonesia. Further in this study was called the Nusantara traditional wastra (NTW).
Nusantara Traditional Wastra (NTW) has not been formally identified as a national referral and has yet been commercially oriented. Its potential is still fragmentary among the community, and even some are not listed yet; thus, it is possible that some traditional Indonesian wastra still neglected as a cultural asset of Indonesia, and causing the original Indonesian wastra is challenging to be learned and used as an asset of the Indonesian creative industry.

The causes of difficulties are geomorphological problems and the disparity of understanding the potential of the traditional wastra as a global economic asset. The development of Information Technology offers easy access globally. It allows data or information is displayed through web, mobile, or other desktop-based applications so users can enjoy the knowledge of the content provided, without necessarily coming to visit the location of the production of wastra. NTWDR uses as the back-end data management and user management system. Scattered data will be merged into a single application integrated with the data of each region using Information Technology support. That is why it is crucial to building a digital inventory business framework in the form of portals that act as an infinite window of the complete NTW and also as a complete NTW value chain market. It is a place where Indonesian local wisdom will be an added value to support Indonesia's creative industries that will ultimately support its economy and leads the architecture design of the Nusantara Traditional Wastra Digital Repository (NTWDR) becomes something important to be studied.

Hence, the research’s objectives are to formulate the understanding of Nusantara Traditional Wastra (NTW) and construct a valid architecture design of the Nusantara Traditional Wastra Digital Repository (NTWDR). NTWDR acts as an infinite window of the complete Indonesian traditional wastra and as an Indonesian traditional wastra value chain market. The NTWDR is also designed as a place where Indonesian local wisdom will be an added value to support the Indonesian creative industry. Repository plays a role as a back-end data management and user management system to access it. By using the application, we can explore Indonesian wastra.

2. Literature review

2.1. Wastra in general

In general, wastra which etymology means cloth [6] is derived from the Sanskrit word vastra in Marathi-English dictionary means (वस्त्र). — n (S) Cloth: Also, a Cloth. 2 An article of apparel or raiment: also apparel, dress, clothes [7].

Wastra is one of the highest cultural achievements of a human civilization that is almost as old as human civilization itself. In the museum collection, wastra/textile is the most attractive object, whereas, in the culture and history of economics, the textile is undoubtedly one of the essential objects [8].

Throughout civilization, we will find the works of wastra in a variety of forms, ranging from the wastra made from tree bark as found in the culture of Kalimantan, Uganda, and Ethiopia to the wastra made of gold as it is used by the Pharaoh of Egypt as seen in the mural "Relief of Thutmose I" found around 1500 BC [9].

In the historical excavations in Swiss around the sixth and seventh centuries BC, the discovery of hemp and woolen fabrics was noted. In India, the silk fabric culture was introduced in 400AD, while spinning cotton was found in the year 3000BC. In China, the discovery and development of the sericulture and silk spin methods began in 2640 BCE, and in Egypt, the art of spinning linen and weaving spinning was already developed in 3400 BCE [10]. In Egypt as one of the centers of civilization, the history of textiles is very long because it is supported by the country's condition, which is very fertile with advanced technology at that time [9]. Wastra, which part of handcrafting, is a primary human enterprise [11]. In Uganda, textiles made of wood fibers are made from the inner bark of the Mutuba tree (Ficus natalensis) and still processed until now and become UNESCO-recognized cultural products [12]. In Kalimantan, a textile made of talun bark that is made thin or woven of temar leaf [13] becomes a commodity that is valuable until now.

At the beginning of the 15th century, wastra was also one of the most crucial trade commodities between Malacca and Gujerat, the trade made from India to the island of Java and from China to Java,
Arabia, and Europe [14]. In Indonesia, the history of wastra is also very long and varied. Wastra became a valuable commodity since the early days of civilization in Indonesia. During the reign of Sultan Agung from Mataram, which was the beginning of the development of Javanese and Batik culture, Batik wastra with particular color already applied and then expanded to Pekalongan, which later became known as 'Batik City' [14].

2.2. Nusantara traditional Wastra

According to Irma Hadisurya, et al., a senior fashion journalist and also a fashion lecturer, in Indonesian fashion dictionary which is referenced by many fashions magazines in Indonesia, wastra which is a word taken from Sanskrit means fabric and refers to fabrics made in any way, including knitted and tree bark, and not necessarily developed traditionally [5].

Batik as one of the Nusantara traditional wastra is a fabric that has a root in its regional culture and rich in the content of local warmth so that talking about the traditional batik is the same as talking about the traditional values which involve the process of acculturation Javanese Hinduism and Islamic cultures as well as the incoming culture [15].

Local wisdom is a tradition that has been traditionally in an area [16] and can be understood as a notion of a local which is the notion of wisdom, full of wisdom, good value, embedded and implemented by the community. Local wisdom can be understood as a human endeavor by using his intellectual (cognitive) to act and behave against something, an object, or an event that occurs in a particular space [17]. The practice of local wisdom in society can be values, norms, ethics, beliefs, customs, customary law, and special rules [18].

In the great dictionary of the Indonesian language, the word traditional means the way of thinking and acting that always refer to the norm and customs existing/transport/attitude and hereditary and the word Nusantara which means/nusantara/n designation for all Indonesian archipelago territory [19].

Each wastra has a peculiarity and uniqueness in the cultural philosophy and craftsmanship process [20]. According to Wieke Dwiharti, traditional fabrics are essential parts of the culture of many tribes in Indonesia, covering the materials used, craftsmanship techniques, and the various motives and philosophies behind it. Wastra in Indonesia is not only a body cover but gets into the deep inside of the people's lives from birth to death. From two opinions above, it is clearly said that the traditional Indonesian textile called the wastra has much-hidden uniqueness from the historical side, the process of making, the motive, the material, and the meaning behind its use [21].

2.3. Potential digital capacity for human life

Information technology gives good impact and improves daily human life, for example, this technology helps to monitor and track things we send with expedition [22], to measure Indonesia teacher engagement [23]–[25], to analyze sentiment about public officers [26], [27], to analyze the publication review [28], [29], as a psychiatric companion application in diagnosing mental disorders [30], [31]. These involve the number of components that are integrated to meet the needs of its users.

Information Technology could be accessed by persons who have a database to save data and manage users' requests. Datastore as rows into table according to specific template role[32]. Each table should be connecting each other using the primary key; this connection called relational database[33]. An interface is used to view the data. An excellent interface must be designed carefully by considering the user's level of expertise in information technology. Moreover, an excellent interface must fulfill eight golden rules of Shneiderman [34] and measurable human factors.

2.4. Digital repository

The repository has the meaning of "a place where things are stored." [35] "a receptacle or place where things are deposited, stored or offered for sale. An abundant source or supply; Storehouse "[36].

The research of an information application about traditional Indonesian fabric based on web and Android has been done by other researchers [37], this research was about the dissemination of historical
information, usability, and its. Meanwhile, the Nusantara Traditional Wastra Digital Repository (NTWDR) in this research was planned to be a one-stop portal that provides detailed educational information about the Nusantara Traditional Wastra (NTW) that including the uses of photographs, video making of wastra and as a meeting place of the craftsmen and buyers which could help to make it easier for the business transactions.

3. Methodology
The research uses an exploratory methodology of qualitative research as part of the Neuroresearch method [38] [39]. The qualitative research consists of a theoretical study of NTW and a theory of architecture design for NTW by doing content validity (expert judgment) through FGD with the Delphi Technique approach [40] [41]. This Delphi Technique is applied because NTW is a cultural product that spread throughout Indonesia, where each region has its expertise. The research involves three people of wastra experts and three people from Information Technology experts. The target of content validity from the wastra expert is to find the contextual construct of NTW that capture the unique character of each region across Indonesia and to find the valid indicators of NTW while the target of content validity from the IT expert is to validate the web-based architecture design of NTWDR. The research framework is presented in Figure 1.

4. Result and discussion
4.1. Nusantara Traditional Wastra (NTW)
The research gives clear boundaries on the specification of the wastra that part of it by adding the words traditional and Nusantara as the content of the proposed digital repository. Overall, Nusantara Traditional Wastra (NTW) means fabrics made in any ways, including knitted and tree bark developed (created and designed) using Indonesian local wisdom, including values, norms, ethics, beliefs, customs, customary law, and special rules where the fabric is made. Furthermore, considering the materials used, the technique of craftsmanship, history, and philosophy for all traditional fabrics scattered throughout the Indonesian archipelago.

4.2. Nusantara Traditional Wastra Digital Repository (NTWDR)
The results of exploratory research on NTW architecture design are done by Delphi Technique through Focus Group Discussion (FGD) by expert judgment as many as three people in Information System. Based on the FGD, it is agreed that the repository meaning in the NTW system is a digital storage space. The place in question is in the form of the NTW server to store the collection of Wastra as an
Indonesian asset called Nusantara. So, the digital repository of Nusantara is an attempt to move the Nusantara Wastra into digital, which is placed on the portal based website. Through NTW digital Repository portal, all potential Wastra areas in Indonesia can be explored historically, explored in a philosophical, characteristic, classification/type of Wastra, quality Wastra based on local wisdom, implementation of Wastra in fashion, and the capacity of Wastra Indonesia economically.

The FGD result also agree that the NTW digital repository is built for four things: as conservation of cultural heritage, protection of cultural expression, cultural diversification, and cultural implementation as a global economic asset.

Based on the explanation, NTW architecture design is a potential information system of Indonesia about traditional fabric-based website. Many researchers have done this kind of system. However, NTW architecture design is different from its novelty aspect because the system is designed as an asset inventory effort while building economic capacity based on local wisdom. For that reason, the architecture performs the quality assurance explicitly over the external system through User Interface (UI) and User Experience (UX) Measurement as per the context of the Indonesian community and the context of the global community of local wisdom lovers.

The results of the research also have a purpose as a tool to disseminate historical information, usability, and location that are expected to drive a local wisdom-based economy. In the meantime, the NTW digital repository is planned to be a website based portal that provides educational information Wastra Nusantara in detail and also gives the experience of the domestic and foreign community and the learning process in order to develop Wastra Nusantara as a cultural product and the economic capacity of the nation.

The result of FGD results using the Delphi Technique is agreed that in the design of NTW architecture, it is essential to develop a specialized database, it takes an interface that is easy to understand by users and their experience with a new one. This Interface is a website-based mobile application. As for the information technology, architecture agrees that the result could be seen in Figure 2.

**Figure 2.** The NTW Architecture of Information Technology

Figure 2 shows that the system begins with the data inventory of wastra across Indonesia which is used as big data with five NTW indicators: local wisdom, history, philosophy, material, and craftsmanship. Before becoming an NTW database, local wisdom experts will perform content validity judgments, which are indigenous leaders, community leaders, and local governments. The result is a content validity that is stored on the NTW server as a database. This database will serve as a storage
place for all things about manuscripts, images, and videos of *wastra*. *Wastra* users can access the WASTRA web-based application via a smartphone (smartphone), laptop, or regular computer terminal. The successful data saved to the database or digital repository will then be validated by the relevant experts and after that in the administration into the WASTRA system by the WASTRA Admin, which simultaneously acts as a curator. Once the data is received, the curator’s truth and validity are ensured, then the data is declared worthy of being displayed. However, before being performed on the website, quality assurance will be done first in the form of UI/UX measurement that then, after the new passes, the user can access it. Through the architecture, it has been agreed that the NTWDR will become an infinite window of the complete Indonesian traditional Wastra where all design patterns, techniques, and all documentation related *wastra* are kept as well as the market chain of traditional *wastra* values. The digital repository that implements relational databases enhances the data management system that helps to take useful data. An excellent user interface needs to display data and to attract users’ attention.

4.3. Particular specifications related to schemes

The implementation of the Nusantara traditional *wastra* digital repository (NTWDR) individually as a digital inventory business in the form of a smart portal template will become the business-based of the whole value chain of the NTW from the inventory level, validation of *wastra*, marketing and to position Nusantara traditional *wastra* (NTW) to be part of Indonesian creative industry.

5. Conclusion and suggestion

NTWDR is an unlimited window of the complete Indonesian traditional *wastra* where all the design patterns, techniques, and all *wastra*-related documentation are stored and as a marketplace of Indonesian traditional *wastra* value chain. The digital repository that implements relational databases enhances the data management system that helps to retrieve useful data. An excellent user interface needs to display data and to attract the user's attention.

The theoretical construct of NTW refers to the fabrics made in any way, including knitted and tree bark developed (created and designed) using Indonesian local wisdom that concludes values, norms, ethics, beliefs, customs, customary law, and special rules where the fabric is made. Furthermore, by considering the materials used, the technique of craftsmanship, history, and philosophy for all traditional fabrics scattered throughout the Indonesian archipelago. The results show a broad view of NTW as conservation of cultural heritage, protection of cultural expression, cultural diversification, and cultural implementation as a global economic asset that can be explored through five capacities, local wisdom, history, philosophy, material, and craftsmanship.

The theoretical construct for the architecture design of the NTWDR is a portal-based website with the benchmark success of the portal through User Interface (UI) and User Experience (UX) Measurement as per the context of the Indonesian community and the context of a global community of local wisdom lovers.

For future research, the digital repository needs to be implemented as an optimization database management system to improve data retrieval.

References
[1] The Embassy of Indonesia - Prague *The Embassy of Indonesia - Prague*. Retrieved from http://www.indonesia.cz/ on August 8th, 2020.
[2] Bahtera, E. 2019. *Terbesar Kedua di Dunia, Keanekaragaman Hayati Indonesia Baru Tergarap 5%* http://news.unpad.ac.id.
[3] Rahman A. 2019. *Keanekaragaman Hayati Indonesia Menjadi Sumber Pangan dan Kesehatan Dunia*. Indopos.
[4] The National Development Planning Agency (BAPPENAS). 2003. *Indonesian Biodiversity Strategy and Action Plan NATIONAL DOCUMENT*.
[5] Hadisurya I, Pambudy NM, Jusuf H. 2011. *KAMUS MODE INDONESIA* (Jakarta: Gramedia Pustaka Utama).
Fanani A K. Retrieved from www.antaranews.com on April 9th 2020

Wisdom Library. Wisdomlib Retrieved from Wisdomlib Web Site: www.wisdomlib.org on August 1st 2019.

Kang J. 2009. A History of Textiles in Egypt International Program Korean Minjok Leadership Academy

Textile School. Retrieved from www.textileschool.com on April 27th 2020.

Ave J. 1988. SENI KRIYA THE CRAFTS OF INDONESIA (Singapore: Times Editions)

Fornal J. 2020. The Ancient Craft of Bark Cloth Finds New Uses. Retrieved from www.nationalgeographic.com on April 27th

Roojen PV. 2001. BATIK DESIGN (The Netherlands: The Pepin Press BV)

Paranom Y. 2011. Permatas Tersembunyi Kalingan Timur Jakarta: DEKRANAS

Parmono K. 2013. Nilai Kearifan Lokal Dalam Batik Tradisional Kawung. Jurnal Filsafat Universitas Gajah Mada, 23 2

Sartini.2004. Menggali Kearifan Lokal Nusantara sebuah Kajian Filsafat. Filsafat Universitas Gajah Mada, 14 2

Sumada IM. 2017. Peranan Kearifan Lokal Bali Dalam Perspektif Kebijakan Publik. Jurnal Ilmu Politik dan Komunikasi, VII 1

Balipos. August 2019. Menggali Kearifan Lokal Untuk Ajeg Bali. Retrieved from www.balipos.co.id on 1st.

Kamus Besar Bahasa Indonesia. 2019. KBBI. Retrieved from KBBI Web site: www.kbbi.web.id on August 1st

Djoemena NS. 2000. LURIK-GARIS-GARIS BERTUAH (Jakarta: Djambatan)

Ariani IS. June 26th 2019. Dewi Magazine. Retrieved from Dewi Mazine Web site: https://www.dewimazine.com/news/berkenalan-dengan-kain-tradisional-atau-wastra-nusantara.

Rapinta S and Saputra A. Android-Based Framework for Business Expedition Third Party with Google API : Case Study no. Fig 2

Sasmoko, Manalu SR, Widhyoyoko SA, Indrianti Y, Suparto. 2018. Develop applications based on Android: Teacher Engagement Control of Health (TECH) Journal of Physics: Conference Series 978 1

Sasmoko, Noerlina, Indrianti Y, Permai SD, and Manalu SR. 2018. Applying Indonesian teacher engagement index (ITEI) apps: Self-diagnostic apps for teachers in Indonesia ICIC Express Lett Part B Appl, 9 4

Manalu SR, Sasmoko, Permai SD, Widhyoyoko SA, and Indrianti Y. 2018. Designing Indonesian teacher engagement index (ITEI) applications based on android Journal of Physics: Conference Series 9781

Widhyoyoko SA, Sasmoko, Nasir LA, Manalu SR, and Indrianti Y. 2018. W.a.w (we are watching) smart app: Accommodating social perception towards public officers’ performance Journal of Physics: Conference Series 9781

Sasmoko, Widhyoyoko SA, Ariyanto. 2017. Corruption Early Prevention : Decision Support System for President of the Republic of Indonesia Int. Conf. Comput. Appl. Informatics 801 1–8

Mihalcea R and Tarau P.2004. TextRank: Bringing order into texts Proceedings of EMNL 85: 404–411

Manalu SR, Willy, Sundjaja AM, and Noerlina. 2017. Review assessment support in Open Journal System using TextRank J. Phys. Conf. Ser 8011

Manalu SR, Abbas BS, Gaol FL, Lukas, Trawiński B. 2017. An expert system to assist with early detection of schizophrenia, 10191 LNAI

A. Zahra et al. 2009. Speech Recognition with Hidden Markov Model : A Review Speech Lang. Process. An Introd. to Nat. Lang. Process. Comput. Linguist. Speech Recognit., 2 400–403

RogerP.D., S. Pressman. 2010. Software engineering : a practitioner’s approach McGraw-Hill

Connolly Tand Begg C 2010 Database Systems: A Practical Approach to Design, Implementation, and Management

Shneiderman B and Plaisant C. 2010. Designing the User Interface: Strategies for Effective Human-Computer Interaction 5 2

Cambridge. Cambridge Dictionary. Retrieved from Cambridge Dictionary Web site: https://dictionary.cambridge.org/dictionary/english/repository on June 26th, 2019

Dictionary.com. Retrieved from Dictionary.com Web site: https://www.dictionary.com/browse/repository on June 26th, 2019

Djamaluddin H, Thamrin I, Siswanto B. 2016. Aplikasi Informasi Kain Tradisional Se-Indonesia Berbasis Web dan Android E-Proceeding of Applied Science 2 220-230

Sasmoko, Ying Y. 2015. Construct Validity in NeuroResearch,” Adv. Sci. Lett. 21 2438–41

Sasmoko, Indrianti Y, Karsidi R, Wuisan D, Ruliana P. 2018. Neuroresearch: Another form of mixed-method Int. J. Eng. Technol. 7 134–138.
[40] Skulmoski GJ, Hartman FT, Krahn J. 2007. The Delphi method for graduate research. *Journal of Information Technology Education: Research* 6 1:1-21.

[41] Gordon TJ. 1994. The Delphi Method *Futures research methodology* 2 3:1-30.