Towards Digital Preservation of Cultural Heritage: Exploring Serious Games for Songket Tradition

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Abstract—Over the past few decades, Malaysia has undergone remarkable technological advancement, establishing itself as a vibrant hub for innovation in Southeast Asia. However, technological progress must be harmonized with preserving and promoting the country's cultural heritage. Digital preservation of cultural heritage emerges as a critical endeavor, particularly for future generations. Nonetheless, there remains a notable deficiency in preservation methodologies for cultural heritage, particularly concerning technological approaches. This paper delves into the realm of cultural heritage and presents findings from a study on preserving Songket's heritage. Interviews were conducted with three experts on Songket heritage, revealing a prevailing lack of awareness regarding Songket heritage preservation. Additionally, the analysis highlights inherent flaws in current preservation methods, hindering efforts to engage a wider audience, particularly the younger generation. The experts unanimously advocate digitizing heritage knowledge, including the integration of serious games, to facilitate Songket preservation and safeguarding efforts. The use of serious games can also attract and engage the younger generation to the heritage of Songket.

Keywords—*Cultural Heritage; digital preservation; serious game; Songket*

I. INTRODUCTION

Malaysia has witnessed significant technological growth over the past few decades, transforming into a thriving hub for technological innovation and development in Southeast Asia [1]. The country has created an atmosphere favorable for the expansion of various industries, including information technology, electronics, and telecommunications, by strongly emphasizing the development of its digital infrastructure. Traveling through time, the rapid growth of technology is especially apparent among the youth. The younger generation drives and shapes the digital landscape through smartphones, social media, creative applications, and digital platforms [2]. They possess a profound understanding of technology and are adept at utilizing it to create, connect, and communicate in previously unimaginable ways. Technology integration has been essential to protecting and promoting Malaysia's rich cultural heritage. Technology is advancing so quickly and permeating every aspect of our lives that we must think about how best to use it to promote cultural heritage, which is also being impacted [3].

Cultural heritage is an essential element in forming identity and society. Heritage plays a role in shaping a person's identity, while culture can sustain development in a country. Moreover, heritage is an important component that creates character, identity, and image for a country. The importance of cultural heritage is undeniable as it contributes to economic growth and intrinsic value at all levels and spans countries [4]. Thus, attracting the younger generation to experience cultural heritage in new and more engaging ways in a modern context is essential.

Furthermore, the challenges to cultural heritage are exacerbated by the swift progression of modern life, technological advancements, and economic growth [5]. This situation poses increased difficulty for younger generations to uphold the cultural heritage esteemed by their predecessors. Malaysia possesses a wealth of precious cultural heritage, including the art of Songket weaving, which requires dedicated preservation endeavors. The present younger generation must be able to access and appreciate cultural heritage according to their preferred learning styles and methods of obtaining cultural heritage knowledge [6]. It is imperative to employ contemporary technology to safeguard and promote cultural heritage. Addressing these gaps is crucial for developing targeted digital preservation strategies that resonate with and actively involve the youth in cultural heritage preservation.

Various technological advancements have been globally embraced to preserve our rich cultural heritage. This discussion provides insights into the diverse specialized strategies that can be implemented to actively promote and enhance our understanding and appreciation of cultural heritage [7]. Nowadays, serious games are widely used in cultural heritage to convey heritage content and educate the younger generation. The use of serious games in cultural heritage is significant in attracting the younger generation to learn cultural heritage since they are very fond of digital games. Serious games enhance learning by offering a diverse array of engagement opportunities [8]. Virtual environments have been utilized in cultural heritage, providing the general public with the opportunity to engage in an immersive experience and appreciate cultural content that is distant both spatially and temporally [9]. Cultural heritage serious games can present heritage information in a fun way [10].

The main emphasis of this paper lies in the analysis of gathered data, indicating a shift towards digitalization methods to preserve the heritage. The remaining paper is organized accordingly: Section II discusses the related work and background of cultural heritage preservation. In contrast, Section III discusses the method used in this study to obtain

information. Next, Section IV presents the results and findings of the study, and lastly, Section V presents the conclusion.

II. RELATED WORKS

A. Cultural Heritage

Cultural heritage is a treasure that has been or is owned by a person or a group of societies or people who collectively share responsibilities for protection and retention. Cultural heritage symbolizes all civilizations' spiritual and intellectual wealth [11]. The United Nations Educational, Scientific, and Cultural Organization, also known as UNESCO, popularized "cultural heritage" in the middle of the 20th century. In its document from the 1972 Convention for the Protection of the World Cultural and Natural Heritage held in Paris, UNESCO defined it as all tangible and intangible cultural [7].

Culture is a term that defines the way of life, thoughts, and behaviors of a civilization inherited from one generation to another. Furthermore, some experts have explained that culture is the value in humans that helps create and build identity. Heritage can be defined as a valuable thing inherited from previous generations that will be inherited by future generations [12]. Cultural heritage is divided into two categories, which are tangible and intangible [11]. Physical artifacts, buildings, and other items having cultural significance that are valued and deserving of preservation within a specific community or society are referred to as tangible cultural heritage [12]. At the same time, intangible cultural heritage is a vast range of customs, knowledge, skills, and rituals firmly ingrained in a group's cultural identity [13]. Tangible aspects of culture often have a longer-lasting impact than intangible elements, emphasizing the enduring nature of physical artifacts and structures in shaping our understanding of cultural heritage over time [14].

Moreover, heritage is a key component that plays a vital role in creating a character, identity, and national image. It is a treasure that has been or is being owned by a person or a group of society or people who collectively share responsibilities for protecting and retaining that treasure. To summarize, cultural heritage can be depicted as the legacy of physical artifacts and intangible attributes of a group or society inherited from past generations, maintained in the present, and presented for future generations [11].

B. Songket

Songket is a valued cloth in Southeast Asia due to its unique quality and historical and cultural significance. Songket is a textile classified within the brocade family from Indonesia, Malaysia, and Brunei. This fabric, meticulously hand-woven using silk or cotton, features elaborate patterns enriched with threads of gold or silver [7]. It is a monument to traditional weavers' ability and inventiveness and is still cherished as a sign of cultural identity and heritage. Moreover, Songket is an intangible cultural heritage art form that serves as a national symbol and identity [15]. Songket is an everlasting textile worn by Malays, notably at ceremonial functions or cultural events [16]. Songket was registered as an intangible cultural heritage in 2021 at its headquarters in Paris, France, during the 16th Session of the Intergovernmental Committee for the Safeguarding of Intangible Cultural Heritage.

However, this craft had to face various challenges to remain relevant. Despite the beautiful design and pattern, Songket is becoming less popular because of the increased pricing and the difficulties in getting high-quality raw materials [15]. Perbadanan Kemajuan Kraftangan Malaysia is an agency in charge of preserving the quality of Songket to commercialize craft products through market, product, and entrepreneur development.

C. Cultural Heritage Preservation

Cultural heritage preservation is essential to ensure that these elements are passed down to the next generations, preserving a link to the past and contributing to an appreciation of identity. Preservation encompasses a range of academic disciplines, including documentation, safeguarding, reconstruction, restoration, conservation, dissemination, and widespread sharing of cultural heritage [14]. Several factors have pushed the handicraft to extinction: lack of government support, a shift towards mass-produced goods, and competition from cheaper imported products [15]. Other than that, the heritage is still practiced but gradually declined among younger people, especially among the educated members of the community [17].

Many preservation steps have been taken seriously by the government. As stated in the Malaysia National Heritage Act, 2005 (Act 645), preservation is an act that aims to stop further deterioration, decay, or obsolete conditions of buildings, monuments, and sites [12]. United Nations Educational Scientific and Cultural Organization (UNESCO) has also established working committees and manuals to ensure that cultural heritage worldwide receives proper protection and attention to preserve its originality[11]. Some innovations have also been identified in Songket weaving, which are modern motifs in Songket weaving [15]. It is to make this handicraft more attractive to current customers, increase customer demand, and remain relevant across the generation. Computer games or serious games can also be used indirectly to preserve cultural heritage and create interest and awareness among the public [11].

D. Serious Game for Preservation of Cultural Heritage

According to Lazarinis [18], cultural heritage is a fitting domain for serious games, and this method can also help support the preservation of heritage and its reproduction. Game-based learning is an effective way to teach and learn. It can help develop interest and motivate learners to enjoy and engage in education [19]. Furthermore, various research and development projects related to traditional heritage have been carried out over the years. When more researchers take up similar projects, more young people become aware of their culture[20]. A researcher from Indonesia [21] has created 3D visualization and animation as content development for digital learning materials for traditional Indonesian cloth (Songket Palembang). Some of the scenes captured from the 3D experience are shown in Fig. 1.

Serious games are effective in promoting pro-social development and learning of a variety of topics, including health, environment, human rights, and international relations, the ability to attract interest, drive effort, encourage persistence of tasks [22], [23] and provide opportunities for problem-based

learning [24]. Serious games can take various forms, such as mobile apps, straightforward web solutions, intricate 'mashup' apps (blends of social software apps), or sophisticated computer games. These games utilize modern gaming technologies to construct virtual environments, offering interactive experiences that may involve social interactions. Additionally, mixed-reality games merge real and virtual interactions, all applicable to cultural heritage applications [25]. The structure of a serious game is contingent upon factors like the learning goals, the genre (such as adventure or simulation), and the specific context of its application [8]. For example, Lazarinis [18] developed a serious game supporting learning in the cultural heritage domain focused on an ancient Macedonian (Greek) city. The game objective is to provide the ability to adapt the application's content to accommodate various learning aims.

Fig. 1.   3D environment of Songket gallery.

Innovations in traditional handicraft development must prioritize authenticity and heritage value [15]. This entails ensuring that any advancement or changes align with the craft's genuine essence and cultural significance, preserving its traditional and historical worth.

III.   METHOD

This study utilizes an interview method to collect data through a survey. For this method, there are three phases involved: setup, data collection, and data analysis. This approach aims to identify cultural heritage awareness, preservation techniques, and the necessity of digital cultural heritage preservation from the viewpoints of experts.

For the first phase, which is the setup phase, the objectives were identified, and the list of the questions for the interview was constructed based on the literature. The questions were divided into four stages: Section A: Demographics, Section B: General Knowledge about Songket, Section C: Songket Development, and Section D: Cultural Heritage Innovation in Technology. They are three experts in the Songket industry; two are experienced weavers of Songket, and the last is an officer from Perbadanan Kemajuan Kraftangan Malaysia Cawangan Terengganu. They all have over ten years of experience in the Songket industry.

Then, for the data collection phase, semi-structured interviews were carried out. In a semi-structured interview, the interviewer used a set of open-ended questions with predefined follow-up questions. Still, the interviewee's answers allowed the interviewer to go deeper into a topic. Each interview session was recorded for use during the data analysis process. The experts' answers were analyzed using thematic analysis techniques for the last process. The technique used to identify, analyze, and report themes within the data.

IV.   FINDINGS AND DISCUSSION

In this section, we discuss the outcomes based on the information obtained from the interviews.

A. Findings on Songket Information

In this interview, we have gathered substantial information about Songket from the insights of three experts. The word 'Songket' originates from 'menyungkit' because in Thai, 'kek' means to hook or pick up, similar to 'songkok' in Chinese, which carries the same meaning. Songket utilizes a weaving method that involves interweaving gold threads with silk threads on the fabric base. This opulent and expensive cloth illustrates the hierarchical structure among the Malay nobles.

1) Process of producing the songket: There are eight processes in the making of Songket. Each process needs to be thoroughly made to produce high-quality products.

a) Dyeing the yarn (Mencelup Benang): Before dipping the yarn into the dye, it must be thoroughly washed. Fig. 2 shows the process of dyeing the yarn. The yarn must be dried after dyeing before proceeding with the next steps.

Fig. 2.   Process of dyeing the yarn.

b) Untangling the yarn (Melerai Benang): The small bamboo-made spindle is used to spin the yarn. This process involves a "Darwin" tool and a comfortable spinning tool (see Fig. 3).

Fig. 3.   Process of untangling the yarn.

c) Winding the yarn (Menganeng Benang): The process of stretching the yarn on the loom is done to determine the length or the number of threads of fabric to be woven (see Fig. 4).

Fig. 4.   Process of winding the yarn.

d) Rolling the yarn (Menggulung Benang): The stretched threads on the warping frame are rolled onto a wooden board (see Fig. 5).

Fig. 5.   Process of rolling the yarn.

e) Spooling the yarn (Menyapuk Benang): After the warping threads are inserted into the teeth or brush of the machine, the spooling work is carried out. Two threads of the warping yarn are hooked through each gap in the machine's teeth (see Fig. 6).

Fig. 6.   Process of spooling the yarn.

f) Stretching the yarn (Mengarak Benang): The "karak" is made from twisted foreign threads. The warping threads, both even and odd, are alternately raised and lowered during the weaving process (see Fig. 7).

g) Lifting the yarn (Menyongket Benang): Creating patterns on the warp threads is done using a "lidi" tool by weaving the warp threads in groups of three or five and then tying them, known as the button-tying process (see Fig. 8).

h) Weaving the yarn (Menenun): The shuttle, filled with the weft thread or gold thread, is inserted left and right into the gaps between the warp threads according to the predetermined pattern until it becomes a piece of cloth. Once the fabric is completed, it is cut to size (see Fig. 9).
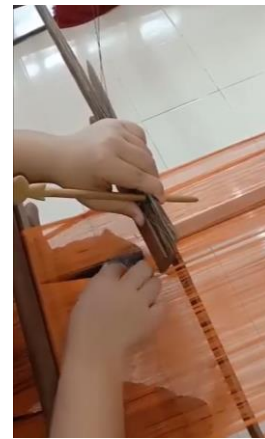

Fig. 7.   Process of stretching the yarn.
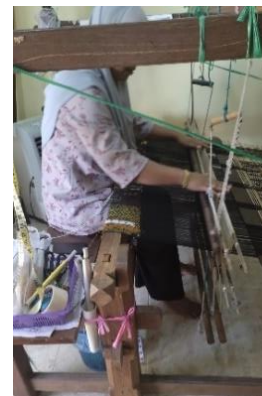

Fig. 8.   Process of lifting the yarn.

Fig. 9.   Process of weaving the yarn.

2) Songket pattern and motif: The motif and pattern used in Songket can vary based on the design customer's request. Every motif and pattern have its own meaning behind it that show the unique identity of Malay itself [26]. It portrays the cultural inclinations and preferences of a vibrant and flourishing society within an environment characterized by its rich tapestry of beauty and distinctive attributes. The Table I shows the major pattern that was used in designing Songket [27].

The Table II shows the popular motifs used to design the beautiful Songket [26]. Lots of motif was inspired by flora and fauna. The designs were mostly inspired by the natural environment that encircles the weavers [28] [26]. Thus, the wearing Songket could be meaningful as it reflects the Malay culture and traditions.

TABLE I. THE CLASSIFICATION OF PATTERN IN SONGKET

Songket	Name
	Full pattern (corak penuh)
	Scattered pattern (corak tabur)
	Scattered repeated bricks pattern (corak bertabur ulangan batu bata)
	Diagonally repeated scatterings pattern (corak bertabur ulangan serong)
	Alternating scattered repetitions pattern (corak bertabur ulangan selang-seli)
	Crosswise pattern (corak melintang)
	Stripes pattern (corak jalur)
	Chevron or zigzag pattern (corak siku keluang)
	Checkers pattern (corak petak catur)

TABLE II. THE CLASSIFICATION OF MOTIF IN SONGKET

Songket	Name

-Bunga Baling
  -Bunga Cina
  -Bunga Mawar Baling Putar
  -Bunga Bintang (pecah lapan)
	Floral Motif

- Chicken - Butterfly	Fauna Motif
	Figurative Motif

B. Findings on Cultural Heritage Awareness

As shown in Fig. 10 below, 67% of the informants believed that the level of cultural heritage awareness is low among the community, especially the younger generation. People are not interested in preserving cultural heritage because they are unaware of its importance. Some of them find it challenging to learn about heritage because of the complicated processes involved in making it. Following the COVID-19 pandemic, numerous Songket weavers have encountered financial difficulties, leading some to cease their weaving activities. However, many organizations have made various efforts to raise awareness following the decreasing awareness, such as campaigns, exhibitions around the country and overseas, workshops, and many more. These efforts can raise awareness among the community to preserve the heritage.
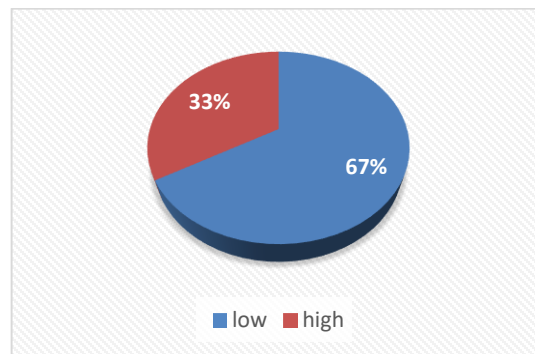

Fig. 10. Level of cultural heritage awareness.

C. Findings on Cultural Heritage Preservation Method

Fig. 11 is the result from the interview that showed the knowledge of Songket weaving is handed down from the ancestors, making there no specific preservation method and no improvement in preserving the knowledge, whether by documentation or technological method.
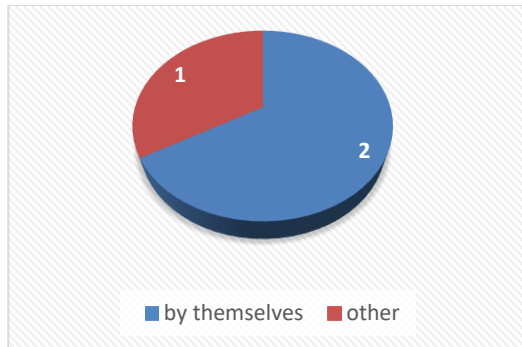

Fig. 11. Current preservation method of cultural heritage.

Nevertheless, a Perbadanan Kemajuan Kraftangan Malaysia representative highlighted their extensive efforts in cultural heritage preservation. They have set up the Institut Kraf Negara, a dedicated institution for theoretical and practical learning of heritage crafts. Among the various traditional arts taught there, Songket weaving is a crucial component. This initiative serves as an excellent platform for those eager to delve into the intricacies of Songket even though they do not have Songket weaver in their family background. Through such an approach, heritage knowledge becomes readily accessible to all interested in exploring it.

In addition to its educational efforts, Perbadanan Kemajuan Kraftangan Malaysia has also introduced a novel approach to safeguard the authenticity of its products. This initiative addresses the challenge posed by the influx of counterfeit items, often sold at lower prices than genuine ones. They have implemented authenticity tags to recognize consumers' difficulty distinguishing between authentic and fake products. These tags serve as a mark of genuineness for each product, as illustrated in Fig. 12 below, ensuring customers can easily verify the authenticity of their purchases.

Fig. 12. The tag to preserve the authenticity of the product.

D. Findings on the Need for Digital Preservation

The discussions highlight a unanimous agreement among interviewees on the importance of digital preservation for traditional heritage. They all agreed to shift towards digital preservation and technological advancement. They are convinced that digital preservation can spark interest among younger generations to engage with and learn about cultural legacy. There is a growing consensus that the evolution of traditional heritage must be synergized with technological advancements, thereby enhancing accessibility to preservation efforts. Hence, serious games emerge as a promising method for digital preservation, particularly in engaging younger demographics. Consistently, all interviewees affirmed the efficacy of serious games as a tool for digital preservation initiatives. Furthermore, there is a shared belief in digitizing heritage knowledge and skills, ensuring their permanent storage for future safeguarding and preservation.

From the findings of this study, it is evident that cultural and heritage elements can be integrated into digital games, paving the way for the development of games as a means of digital preservation. This enables future generations to access and experience cultural heritage interactively, ensuring broader preservation and understanding of historical and cultural richness.

V. CONCLUSION

Today's generation is responsible for preserving and safeguarding our country's cultural heritage as it embodies the identity of our communities. Sustaining its relevance and preservation for future generations necessitates further efforts on all fronts. As a result, the integration of digital preservation is critical, in line with the importance of emerging technologies. Several methods can be used for the digital preservation of cultural heritage, such as digitization, metadata creation, and digital storage and archiving. Besides, serious gaming is one method that can be utilized to digitally preserve cultural heritage while simultaneously attracting and engaging the younger generation with it.

This paper has discussed the topic of cultural heritage and provided findings from an initial study into issues surrounding it, particularly emphasizing the necessity for increased initiatives in its preservation. The awareness and interest of cultural heritage could be higher, especially among youngsters. Considering the knowledge of Songket weaving is presently safeguarded solely by its practitioners and the decreasing number of Songket weavers, it underscores the imperative for digital preservation initiatives. Therefore, digital preservation is vital for safeguarding the sophisticated craftsmanship and profound historical significance of cultural heritage like Songket weaving for posterity, ensuring its beauty and preservation are accessible to future generations. Consequently, serious games can be used as a digital preservation method that effectively engages the younger generation in cultural heritage initiatives.

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