Univerzita Tomáše Bati ve Zlíně
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Doctoral Thesis

Exhibition of Dong Ho paintings in a virtual reality environment at a Fine Art Museum, Vietnam

Výstava obrazů Dong Ho v prostředí virtuální reality v Muzeu výtvarného umění ve Vietnamu

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DEDICATION

This dissertation is dedicated to the childhood memory of Luu Huynh, my grandfather. He is my biggest motivation to pursue my doctoral degree, and he was unable to see my graduation. This is for him.

This project is dedicated to our parents, who had never failed forgiving all our needs when we developed our system and teaching us that even the most considerable task can be accomplished if done one step at a time. I also dedicate this work to Kim, my love, who has encouraged me and whose encouragement has made sure that I give it all it takes to finish what I have started.

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ABSTRACT

In the history of human culture development, the museum was born as a kind of cultural institution understood as a symbol of community culture. A museum is a place where anyone who wants to learn about the culture and history of a country needs to have at least one visit. In many works related to architecture, the museum is the only place to store documents and display artifacts related to the historical process, reflecting the culture of a city, a nation, or a country.

For cities with hundreds of years of history, a historic center is often a place where old and new cultural values are symbiotic. These prices continue and change during a continuous process. The city has also faced the abandonment of past achievements in the modernization context. Therefore, the relationship between conservation and development is often a controversial issue in the process of renovating art museums. At present, most developed countries admit the harmony between these two elements is an essential need in the strategy to preserve cultural and artistic traditions.

On the contrary, it is still a painful problem that has not yet ended in Asia. An undeniable fact is that the city-county has not appropriately preserved museums in Vietnam and especially Ho Chi Minh City. This fact has led to the young generation in the city are not interested in visiting the museum. One of the main reasons is that the face with the contemporary exhibition ways has many mistakes and wrong knowledge of installation.

In many works related to architecture, the museum is the only place to store documents and display artifacts related to the historical process, reflecting the culture of a city, a nation, or a country. However, the strength of the technological age and the consequences of the war occurred as the storm destroyed the cultural identity layers. The city has also faced the abandonment of past achievements in the modernization context. Therefore, the relationship between conservation and development is a controversial issue in the process of reservation art-folk painting and art museums. It is still a painful problem that has not yet ended in Vietnam. An undeniable fact is that the city-county has not appropriately preserved museums and art folk paintings in Vietnam. This fact has led to the young generation in the city are not interested in visiting the museum.

Among the folk paintings in Vietnam, Dong Ho paintings belong to the line of paintings printed on wood carving planks, created, produced by the villagers of Dong ho village, and developed into craft villages. This line of painting attaches and vividly shows the traditional Vietnamese agricultural society, the working life of a traditional farmer, and the daily life of the Vietnamese people. Currently, Dong Ho folk paintings are in danger of dying out due to the impact of the market economy, changes in people's aesthetic needs, and difficulties in producing paintings. Besides, according to several painters, Dong Ho paintings are no longer as innocent, simple, "pure Vietnamese" as before but are gradually being commercialized, with no rich colors like ancient paintings. Today, Dong Ho's painting profession exists weakly; only a few families maintain it. According to recent statistics, the number of artisans is only three people, and the number of practitioners is about twenty. The number of artists who are still capable of teaching

is only two people (Mr. Nguyen Huu Sam and Mr. Nguyen Dang Che) who are all elderly (Dung, 2013).

Virtual reality technology has become a new trend in human visual communication and visual arts in today's modern context. Virtual reality technology allows people to break down geographic barriers and planes, open up another dimension of 3D models, and even help people immerse themselves in various virtual reality environments. In fact, in terms of physical and geographical conditions, it is difficult for humans to experience.

In the face of the disappearance of a line of Vietnamese folk paintings with long-standing cultural value, as a Vietnamese, I feel a part of my responsibility to research and find solutions to preserve keeping the Dong Ho folk paintings. Through this research on virtual reality technology, I have formed the idea of bringing Dong Ho folk paintings in the form of 2D hand-drawn paintings into the virtual reality environment. This project will be a process of concept formation, 3D modeling, and virtual reality environment construction of the museum and Dong Ho folk painting village. Finally, a short virtual reality video will help users experience inside the space of a Dong Ho painting village that has entered a restored legend. The next step is to conduct experiments and compare the correlation between people exposed to Dong Ho painting in 2D in traditional 2D format and experience the VR video.

This thesis aims to find a solution that is suitable for the modern trend of preserving the world's art and applying it to the preservation of Vietnamese folk paintings. In addition, the thesis also wants to perform the experiences in two traditional folk painting environments and folk painting in the form of VR environments and collect data comparing the effectiveness of these two experiences. Finally, this thesis aims to create new inspiration for the popularization and enjoyment of Vietnamese folk painting by the country's young generation.

Key words: Fine Art museum (FAM), museum exhibition, preservation, Dong Ho folk painting (DHFP), virtual reality (VR), VR environment (VRE), immersed

ABSTRAKTNÍ

V dějinách vývoje lidské kultury se muzeum zrodilo jako druh kulturní instituce chápané jako symbol kultury komunity. Muzeum je místo, kde každý, kdo se chce dozvědět o kultuře a historii země, musí mít alespoň jednu návštěvu. V mnoha dílech souvisejících s architekturou je muzeum jediným místem pro ukládání dokumentů a vystavení artefaktů souvisejících s historickým procesem, odrážejícím kulturu města, národa, země.

Pro města se stovkami let historie je historické centrum často místem, kde jsou staré a nové kulturní hodnoty symbiotické. Tyto ceny pokračují a mění se během nepřetržitého procesu. Město také čelilo opuštění minulých úspěchů v kontextu modernizace. Vztah mezi konzervací a rozvojem je proto často kontroverzním problémem v procesu renovace muzeí umění. V současnosti většina vyspělých zemí připouští, že soulad mezi těmito dvěma prvky je nezbytnou nutností ve strategii zachování kulturních a uměleckých tradic. Naopak je to stále bolestivý problém, který v Asii ještě neskončil. Nepopiratelným faktem je, že městský okres nemá náležitě zachovalá muzea ve Vietnamu a zejmena v Ho Či Minově Městě. Tato skutečnost vedla k tomu, že mladá generace ve městě o návštěvu muzea nemá zájem. Jedním z hlavních důvodů je, že dnešní výstavní způsoby mají mnoho chyb a špatné znalosti instalace.

V mnoha dílech souvisejících s architekturou je muzeum jediným místem pro ukládání dokumentů a vystavení artefaktů souvisejících s historickým procesem, odrážejícím kulturu města, národa, země. Síla technologického věku a důsledky války se však projevily, když bouře zničila vrstvy kulturní identity. Město také čelilo opuštění minulých úspěchů v kontextu modernizace. Vztah mezi konzervací a vývojem je proto kontroverzní otázkou v procesu rezervace umění lidové malby a muzeí umění. Je to stále bolestivý problém, který ve Vietnamu ještě neskončil. Nepopiratelným faktem je, že městský okres ve Vietnamu náležitě nezachoval muzea a umělecké lidové malby. Tato skutečnost vedla k tomu, že mladá generace ve městě o návštěvu muzea nemá zájem.

Mezi lidovými malbami ve Vietnamu patří obrazy Dong Ho do řady obrazů tištěných na dřevořezbářských prknech, které vytvořili, vyrobili vesničané z vesnice Dong Ho a vyvinuli se v řemeslné vesnice. Jedná se o linii malby, která připojuje a živě ukazuje tradiční vietnamskou zemědělskou společnost, pracovní život tradičního farmáře a každodenní život Vietnamců. V současné době lidové malbě Dong Ho hrozí vymření v důsledku dopadu tržní ekonomiky, změn v estetických potřebách lidí a potíží při produkci obrazů. Kromě toho, podle řady malířů, obrazy Dong Ho už nejsou tak nevinné, jednoduché, „čisté vietnamské" jako dříve, ale postupně jsou komercializovány, bez sytých barev jako starověké obrazy. Dong Ho malířská profese dnes existuje slabě, udržuje ji jen několik rodin. Podle posledních statistik jsou počet řemeslníků pouze tři osoby, počet praktikujících asi dvacet, počet umělců, kteří jsou ještě schopni vyučovat, jsou pouze dva lidé (pan Nguyen Huu Sam a pan Nguyen Dang Che). všichni starší (Dung, 2013).

Technologie virtuální reality se v dnešním moderním kontextu stává novým trendem v lidské, vizuální komunikaci a ve výtvarném umění. Technologie virtuální reality lidem umožňuje

prolomit geografické bariéry a roviny, otevřít další dimenzi 3D modelů a dokonce pomoci lidem ponořit se do různých prostředí virtuální reality. Ve skutečnosti, pokud jde o fyzické a geografické podmínky, je pro člověka obtížné zažít.

Tváří v tvář mizení řady vietnamských lidových maleb s dlouhodobou kulturní hodnotou cítím jako Vietnamec část své odpovědnosti za výzkum a hledání řešení, jak zachovat zachování lidových maleb Dong Ho. Prostřednictvím mého výzkumu technologie virtuální reality jsem si vytvořil myšlenku přinést obrazy Dong Ho ve formě 2D ručně kreslených obrazů do prostředí virtuální reality. Tento projekt bude procesem tvorby konceptu, 3D modelování, budování prostředí virtuální reality muzea a vesnice lidové malby Dong Ho. A nakonec krátké video virtuální reality pomůže uživatelům zažít vnitřek prostoru malířské vesnice Dong Ho, která vstoupila do obnovené legendy. Dalším krokem je provést experimenty a porovnat korelaci mezi lidmi vystavenými malbě Dong Ho ve 2D v tradičním 2D formátu a zažít video ve VR.

Cílem této diplomové práce je najít řešení, které je vhodné pro moderní trend konzervace světového umění a jeho aplikace na záchranu Vietnamu mé lidové malby. Kromě toho chce práce také provést zkušenosti ve dvou prostředích tradiční lidové malby a lidové malby ve formě prostředí VR a shromáždit data porovnávající efektivitu těchto dvou zkušeností. V neposlední řadě si tato práce klade za cíl přispět k vytvoření nové inspirace pro popularizaci a oblibu vietnamské lidové malby mladou generací země.

Klíčová slova: muzeum výtvarného umění, muzejní výstava, konzervace, lidová malba Dong Ho, virtuální realita (VR), prostředí VR, ponořeno

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DHFP   Dong Ho folk painting

FAM   Fine Art Museum

FAMHCM   Fine Art Museum Ho Chi Minh city

HCMC   Ho Chi Minh City

RG   Research goal

RQ   Research question

VR   Virtual reality

VRE   Virtual reality environment

WIDHP   Walk into Dong Ho painting exhibition

1. INTRODUCTION

1.1   Introduction

Asia is the largest and most populous continent in the world. History has proved that Asia is home to many famous civilizations such as Mesopotamia, Indo River, Ganges, Yellow River, Mekong River, etc. Besides, Asia is also a source of diverse languages. Customs and life of prehistoric people to the present. All created for the continent a rich source of cultural heritage. Vietnam is also a country in the history of cultural development.

With a cultural history spanning more than three thousand years, Vietnam has more than 3,150 historical sites and 120 museums spread across the country. Cultural facilities and history are a solid foundation for the museum system to ensure the content of exhibits, from artifacts to historical documents. Typical of Ho Chi Minh City, one of the economic and cultural centers of the country, it has many museums of fine arts and history. However, the museum is still not a destination for visitors, students, tourists, and city people. One of the main reasons is that the museum displays are inconsistent in design and lack media investment. Museums exist as a visible must-have structure for the city, but there is no careful preservation, regularly refreshing, or updating the display trends to create an engaging audience.

The purpose of the museum is to convey stories about the life, people, and culture of a people. Awareness-raising considers cultural heritage to be the root of cultural identity. Preserving and promoting heritage is the solution to building the culture of each nation and each nation. Conservation is also a tool to participate in the trend of globalization, a competitive advantage for other countries. Therefore, innovating both content and form as strengthening methods of preserving heritage in art and historical museums is an urgent issue.

Museums are known to tend to display static exhibits. It is also understandable because the outside target is to provide knowledgeable information, and this is a place to store and secure historical arrays. Nonetheless, with the Virtual Reality museum in use, it is possible to change this feature dynamically.

Malreaux (Malraux, 1978) was one of the first people to introduce the concept of a museum, a different kind of environment without walls for viewing and performing art. Lately, the concept of a virtual museum and technology was coined by Tsichritziz and Gibbs (D. Tsichritzis, S. Gibbs, 1991). They named it "Virtual Museum," and it has emerged until now.

The purpose of museum exhibitions is to disseminate precise messages from the objects to their visitors, which are noticeable through the form and display of exhibited objects within the museum background. By using multimedia with virtual reality and providing multisensory experiences, scientific and cultural information communicated by museum exhibitions can be augmented (Grigore Burdea, Paul Richard, Philippe Coiffet, 1996) (Christopher D. Wickens, Diane L. Sandry, Michael Vidulich, 1983).

With augmented reality features, museums in Ho Chi Minh City (HCMC) can bring art to life. Scientific concepts, architectural details, and other elements that visitors are granted by revealing from a different and extensive perspective. It does not only make it easy for visitors

to answer questions but also partially reflects the story behind an era style, an influence and allows the user to have a sense of authenticity during the discovery process (HoaLT, 2019).

The thesis is formed by finding new methods to help preserve Dong Ho Vietnamese folk paintings and doing experiments to compare the effectiveness of the interaction between traditional folk painting exhibitions and exhibitions with contemporary virtual reality methods. The project has focused on the purpose of a Virtual Environment (VE) that would enable museum visitors to view and manipulate 3D exhibits. The author will renovate the classic Dong Ho paintings, the most popular and famous in Vietnam culture, from 2D painting to 3D modeling. In the next step, the project also redesigns the interior space of the Fine Arts Museum (FAM) focus to serve the new 3D environment experiment. Furthermore, the necessity of numerous experimental evaluations defines the best structure of VR devices. The configuration quality would enable users to navigate within the VE parallel control exhibits in an effective and perceptive manner (Santiago González Izard et al., 2019). The number of people participating in museums required the diversity of their age, sex, occupation, and social level. They will attend through the VE by using the Oculus glass and fill in multiple-choice questions to explain their communication feelings in the end. For a larger purpose, the thesis has a plus meaning to contribute to arousing the exploration of Vietnamese folk painting, popularizing knowledge about the country's traditional history through works of art.

1.2   Statement of Research Problem

The relationship between the museum and the public has long been a noticeable transformation over the past decades. In particular, the magnitude and importance of the museum are increasingly interested and developed, but the media museum model lacks listening to the public's voice (Weil, The Museum and the Public, 1997) (Weil, Making Museum Matter, 2002) (Hooper-Greenhill, Changing values in the Art Museum: rethinking communication and learning, 2000) (C. Lang, et al., 2006) (Sandell, 2012). Amid many conflicting opinions, many agree that the museum, as a cultural organization "serving the society and its development," should strive to provide human experience. As wide as possible, museums should also focus on improving the relationship between the museum and the art-loving public.

Show status of museum exhibitions in Vietnam additon falls into a particular situation between the hospitality market and the media display method. The buildings that have a history of more than 100 years are used as museums in the city, typically shaped as the Museum of Fine Arts, increasingly degraded in architecture, and at the same time lacking creativity in the way art is exhibited. These issues persisted for many years, leading to extended periods of public interest in the country's art. Museums generally have exhibitions and themes that change seasonally or quarterly of the year to enhance interaction and attract the art-loving public. It is the problems that still exist that the Fine Arts Museum is gradually falling into a certain distance, poor in the method of the exhibition, the art of protection, and gradually losing its position in famous museums in the city (Le, 2007).

According to the history of Dong Ho villagers recorded, Dong Ho painting was born in the 11th century in the Ly Dynasty at Mai village (Dong Ho, village nowadays). The village is located on the southern bank of Duong River, now in Thuan Thanh district, Bac Ninh province, about 35 km from Hanoi. (M. Nguyet, B. Van, 2019). During this period, Dong Ho was one of

the places that made famous wood carving traditional paintings alongside other lines of traditional paintings, Hang Trong, Kim Hoang.

The peak period of the painting village was from the late nineteenth century to the 40s of the twentieth century. At that time, there were 17 families in the village. They all made paintings. Every year, around July or August, the whole village was busy preparing for the Tet season; the village was full of colors. Traditionally, Dong Ho paintings are often an indispensable element in Vietnamese families every Lunar New Year season. Dong Ho painting also has other names such as Tet Painting or Xuan Tranh because their bright colors show an optimistic spirit (M. Nguyet, B. Van, 2019). The paintings show pictures of Vietnamese village landscapes, many other metaphorical images such as animals and babies that mean luck and success to families in the New Year (Anh, 2019). Before 1945, Dong Ho village had more than 150 families making paintings. However, with the dominance of the wave of modern painting and the changing lives of Vietnamese people, Dong Ho paintings gradually disappeared from Vietnamese families on holidays and New Year. Most people who buy Dong Ho paintings today are tourists or as gifts for foreigners who are still interested in traditional art (M. Nguyet, B. Van, 2019). For that reason, the villagers of Dong Ho village also quit the profession of painting to move to another job to earn additional income, such as making joss paper and gold paper. At the same time, the tradition of printing old paintings by hand was also gradually replaced by a series printer, losing the folk character of Dong Ho's paintings (Anh, 2019).

The disappearance and loss of Dong Ho Painting village are becoming an urgent issue. In addition to maintaining and preserving this folk painting line, popularizing the line of paint to the masses and young generations is also a problem. However, in Dong Ho village, very few artisans still know how to make traditional paintings. Most of these artisans are old; if there is no continuation, this painting line will disappear over time. Therefore, Vietnam is completing a dossier on Dong Ho folk paintings to propose to UNESCO as an intangible cultural heritage in need of urgent protection (M. Nguyet, B. Van, 2019).

1.3 Research goals (RG) and research questions (RQ)

Within the framework of the exhibition of Dong Ho paintings and a virtual reality environment, the research had three main goals:

RG1 Study the historical value and artistic value of Dong Ho folk paintings
RG2 Research and determine measures to preserve Dong Ho folk paintings in the form of 2D paintings in a virtual reality environment
RG3 Conduct experiments and compare the differences between traditional folk painting exhibition environments and virtual reality environments.
RG4 Evaluate the experimental results and draw new methods to preserve traditional folk paintings
RG5 Study on the difference between the visual effects and the attitudes of the viewers between the traditional painting exhibition and the folk painting exhibition in the virtual reality format
To reach the research goals, several research questions had to be addressed:
RQ1 What factors are causing difficulties in preserving Dong Ho folk painting in Vietnam?

RQ2 What is the new method of exhibiting traditional folk art in Vietnam from now and shortly?

RQ3 How to apply virtual reality exhibitions to traditional ways of collecting art in museums in Vietnam?

RQ4 Does the exhibition by the traditional method attract viewers, especially young people? How do they feel that the presentation of folk paintings in virtual reality is different from the conventional exhibition-style?

1.4 Research stages and methodology

The author's method used in this study is practical design research combined with a quantitative method to conclude. The practical research method is shown in the author's process of participating in designing a short film that reconstructs two Dong Ho folk paintings from a 2D version to a 3D version. The footage is presented as a virtual reality video clip that can be experienced on a VR set or viewed as a standard video. The quantitative research method will be applied through a survey of questions related to viewers' perceptions of the film. The survey results will be possible to conclude how the research affects the research subjects. The author used the survey to offer a form of exhibition and preservation of Vietnamese folk paintings.
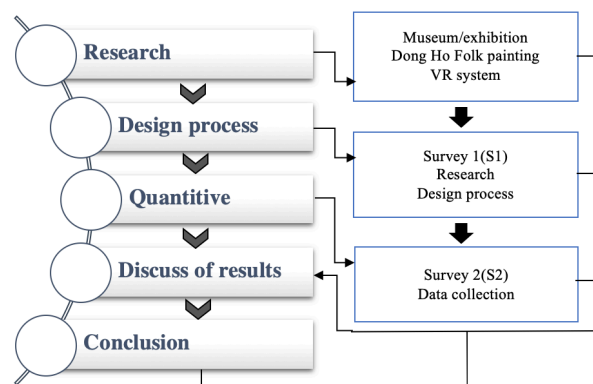
Fig. 1 Summary of design method of this study. Author's own.

This thesis includes the following design stages:

- **Stage 1 (S1):** The first stage is to conceptualize the content that will make a virtual reality product: Determine how to make a VR game or a VR application, for what field, how the content will run and context and the objects the environment. Determine what type of VR headset to use to deploy the game or application to. The programmer will program the vr to match the selected glass device for the most feasible deployment.

- **Stage 2 (S2):** Research premises of Fine Art Museum and the exhibition space layout. Draw a model of the exhibition space in 3D and put it into a VR environment without exhibiting objects. Research on the characteristics, nature, and environment of Dong Ho folk painting village in the nineteenth century. Draw a spatial model of Dong Ho painting village using 3Dmax software and put it into a VR environment without receiving objects in the painting. Research, classify and select Dong Ho folk paintings suitable for reconstruction in 3D. After selecting the necessary pictures, research the characters and elements in the pictures to make them characters using specialized

software. Redraw character models, objects, and other elements according to the characteristics of each type of painting.

- **Stage 3 (S3):** They combine characters and objects (S3) into the scene of the 3D village of Dong Ho folk painting village (S2). Note that choosing the space and scene suitable for each type of painting is still the landscape of the original painting version. At the same time, to edit, inspect, remove, or add missing or redundant objects and details in the whole scene of Dong Ho folk painting village.

- **Stage 4 (S4):** VR programming is the complete programming VR application into a complete product. The designer carries out the entire scene of the painting village (with all characters, objects, and environments added) into the scene of FAM's exhibition space (S1). In the process of doing, the above must test the functions, context, actions of the game, and products that meet the standards of the exhibition scenario. Add character dubbing, sound, and music to match the video. After testing the video's final version, we then move on to the installation and integration of the selected VR glasses.

- **Stage 5 (S5):** Show a video to a group of 15-65 years old to check the number of interactions and complete a survey of viewer behavior and feelings. From there, draw conclusions, discuss and compare traditional folk painting display methods and new display methods through a virtual reality environment.
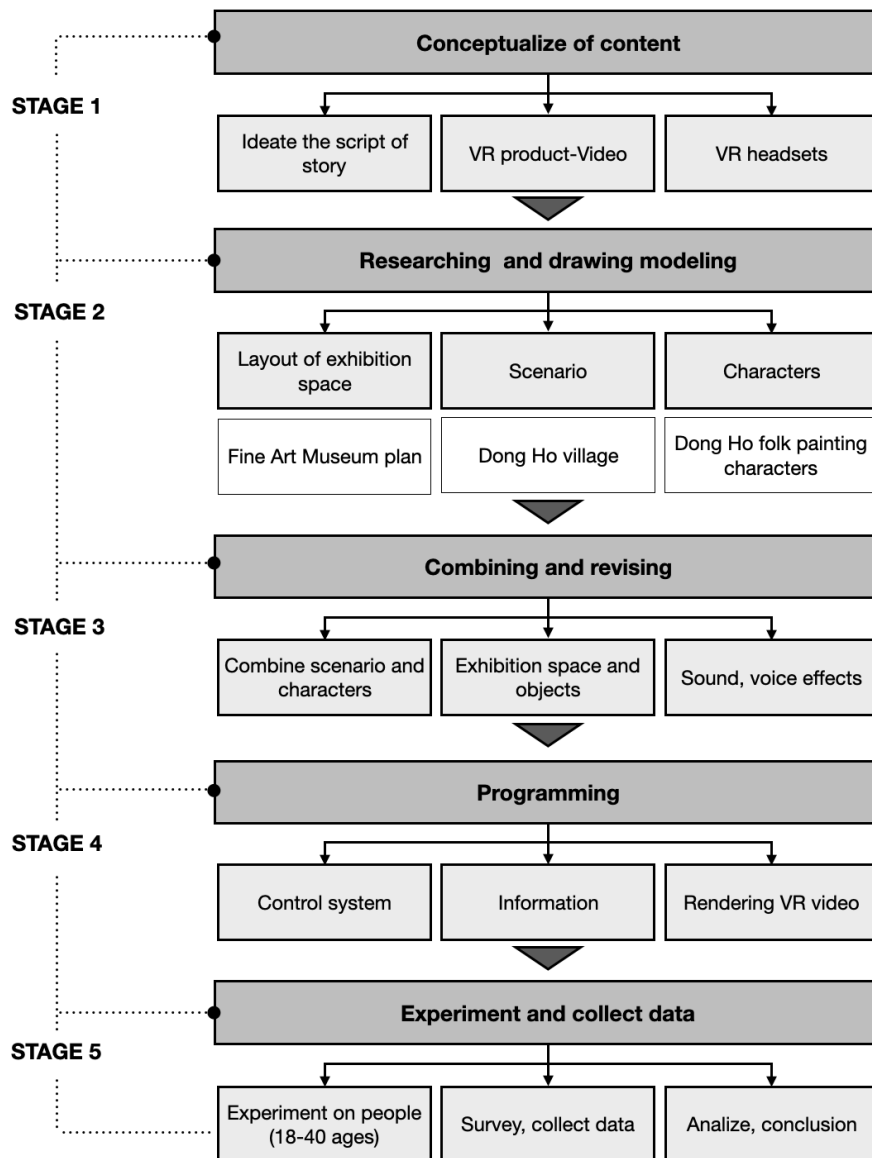
Fig. 2 The diagram of the five design stages in this study. Author's own.

1.5   Research Objectives

The coldness of the public coming to museums has existed in Vietnam in general and Ho Chi Minh City in particular. Parallel to that, folk paintings are increasingly fading and demand to find conservation measures to suit the change of time. This study conducts extensive research into the situation of the Fine Art Museum, the problems of current art exhibitions, and to find solutions to overcome these problems.

The study similarly conducted extensive research on the history and characteristics of the Dong Ho folk painting line. The thesis will classify and give the reasons for the disappearance of the famous folk painting line for a while. In spite of everything, the main objective of the thesis is to study the method of restoring and transforming the famous Dong Ho paintings from a 2D version on drawing paper into a 3D version operating in a virtual reality environment. Post-production will be conducted to create a virtual reality exhibition space for the first time in Vietnam, with the main content being the characters in the Dong Ho series. Compare the

public's specialties and the results of shared experience between how traditional folk paintings are exhibited and how information is exhibited in a virtual reality environment.

1. 7 Research contributions

This thesis provides a source of knowledge about Vietnamese folk painting and how to exhibit traditional folk paintings in Vietnam. In addition, the thesis provides new information about current art exhibition trends in the world. The results of this study are:

- Information about the origin, history of formation and development, special features, and techniques of Dong Ho folk painting in Vietnam
- Discover the new exhibition method used for Dong Ho folk paintings.
- The video describes an exhibition of Dong Ho folk paintings in the form of a virtual reality technology application.
- Data information compares the traditional painting exhibition method and the new exhibition method applying virtual technology.

The thesis completes the contribution to the management of cultural heritage as well as the art museum in Vietnam with the following items:

- Research on visual communication in the exhibition of Dong Ho folk paintings at the museum.
- Research environment reality exhibition of the Fine Art Museum in Vietnam
- Study method of converting Dong Ho folk artworks from the standard drawing version to a virtual environment.

This thesis is a significant contributor to cultural and artistic heritage preservation and management as it collaborates with studies related to past heritage conservation issues. At the same time, this study gives specialist bodies the ability to make decisions related to practical topics and has a practical basis for comparison.

1. 8 Limitation of Study

When put on the scale to compare with other art museums, the art museums in Ho Chi Minh City will have a lot of difficulties in promoting themselves to their public market. The familiar term "going to a museum" is a daily activity in Europe and America, alien to young people and unattractive to adults. In general, the fake city in particular and the Vietnamese people in general are captivated by the American culture, Western popular culture (Hoang, 1993) and recently Korea's entertainment culture.

In addition, the levels of governmental cut assistance in the cultural field also establish many new formulas for the cultural domains in Vietnam. According to Lidstone and Doling (2000), only out that from the year 1988 onwards, the government waived the decision that generous state funding for cultural and arts organizations should be reduced and eliminated entirely. all for the common good in some cases (G. Lidstone and T. Doling, 2000).

In the process of researching documents, the author encountered many difficulties in collecting documents, books, newspapers, scientific journals related to museums, and folk paintings of Vietnam. Profit of the conscience of the careers conforms with research results and advanced calculation application. This status in the area of culture and art in Vietnam is still very manageable and lacks proper attention.

Literature on folk paintings and valuable manuscripts is still very limited or has been removed over time. Therefore, another limitation in this topic is the fact that the information is accurately determined in the historical and scientifically proven sense of Dong Ho folk art.

The topic also did not receive any support from universities, government, or museum and art organizations. The costs for the process of researching, testing, and applying virtualization technology to the design and protection of Dong Ho folk are very high. Due to the above-mentioned human resources, the results of the topic may not be able to achieve the goal of reconstructing most of the paintings of Dong Ho and archived to this day, but only some sample information can be used.

1.9 Organization of Thesis

This study comprises seven chapters and a list of references. These figures and tables are illustrated within the text. A list of figures and tables is placed at the beginning of the thesis. The references are placed at the end of this thesis. A summary is made at the end of each chapter to provide critical information.

Chapter 1	Overview of research includes the research problem, research question, the research objective, and research structure.
Chapter 2	The development stages of art exhibitions at the museum in the world and in Vietnam. The research facility introduces the Fine Arts Museum Ho Chi Minh (FAMHCM), the general historical background, the current state of the exhibition, and the remaining issues.
Chapter 3	History and development of Dong Ho folk paintings, techniques, materials, and printing methods. Historical, cultural and artistic value of Dong Ho painting for national identity preservation.
Chapter 4	An Introduction to Virtual Reality (VR). VR system and software. Representation and user interaction in VR. Apply VR to art and exhibitions.
Chapter 5	Design methodology and process. Collect user performance from ouput VR video.
Chapter 6	Discussion of result/findings
Chapter 7	Conclusions, lmitations and future research

Fig. 3 Organization of thesis. Author's own.

2. MUSEUM LEARNING

2. 1 Introduction

Museums are known to tend to display static exhibits. This is correspondingly understandable because the outside target is to provide knowledge information, and this is a place to store and secure historical arrays. In 2004, Adler (Adler, 2007), a well-known museum researcher, agreed with the International Museum Association as well as many scholars and museum experts, along with the decision of the International Museum Council (ICOM) considering museums to be a non-profit and permanently social service organization(Ahmad, S. et. al, 3013). This shows that the museum definition is updated and developed in accordance with the needs of society, associated with the reality of the global museum community. In 2007, at the 21st Congress in Vienna, Austria, ICOM took the role of the museum to a new level. The museum also functions as an institution for acquisition, conservation, research, communication, and exhibition for research, education, and enjoyment purposes. Museums hold meaningful exhibitions as a means of presenting a project, as a reference to the international community (Ahmad, S. et al., 2013) (Ahmad, S., Abbas, M. Y., Yusof, W. Z., & Taib, M. Z. , 2013).

According to Tambi (2011), which is supported by Ramet-Gassert, Walberg (1994) acknowledges that museums are an integral part of learning and significantly contribute to providing broad education to the community. Through the above statement, besides the school, the museum can be seen as a place to provide knowledge, stimulate viewers' curiosity, observation, and creativity. Museums therefore present a unique context, an informal learning environment that is often visited by many people (Chipangura, N., Marufu, H., 2019).

2. 2 Art Museums in the world

2. 2. 1 A brief of the history of Art Museums

When people think about museums, people frequently imagine art museums, spacious, connected rooms with solemn high ceilings, where visitors stand in silence and enjoy the rows of paintings and items neatly. There are many types of museums, such as the practical science museum, history museum, the ethnographic museum, the art museum, and the storytelling of the items on display varies widely in each museum.
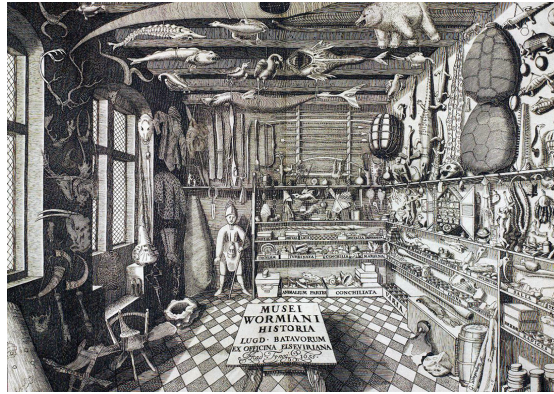
Fig. 4 Frontispiece depicting Ole Worm's cabinet of curiosities from Museum Wormianum, 1655. Ole Worm was a Danish physician and natural historian. Engravings of his collection were published in a volume after his death.

According to Geoffrey D. Lewis, the Museum is an organization dedicated to preserving and interpreting tangible evidence about humanity and its surroundings. Through the retention of a lot of evidence in kind, the basic documents have made a clear difference with the library. Since these raw materials and materials are used for learning and research through installations exhibitions. In many situations, some artifacts lose information about when, and where they were born, and will be communicated to viewers through other means. The museum was born with many different purposes (Rodini, 2018). However, the museums have a common history to tell. The museum is not just an organization of many things, precisely the museum is a place to reflect the complexity of the cultures that have produced them, including politics, social structures, and ideological systems of the museum itself.

2. 2. 1. 1 Etymology-From mouseion to museum

The word "museum" begins with the classic Greek goddess of inspiration, the nine Muses, a designated, a philosophical institution, or a place of contemplation. Although in ancient Alexandria, founded by Ptolemy I Soter early in the 3rd century BCE, "Museion" was more like a university with a library rather than an artifact display (Rodini, 2018). While scholars generally assume that museums are mainly located in 17th or 18th century Europe, historical evidence suggests that there are exhibits and collections of objects in the squares public in ancient Rome, medieval treasures, and traditional temples in Japan.

The Latin origin confined the museum to the Roman era as the main place for philosophical discussion. The word museum is then used again in 15th century Europe, depicting the collection of Lorenzo de 'Medici in Florence, Italy. However, the word museum now carries the concept of holiness rather than a representation of a building (Lewis, 2021).

By the 17th century, the Ole Worm collection in Copenhagen was called a museum. Later in England, the museum was also used to describe the collection of John Tradescant in Lambeth, the catalog of which was published titled Musaeum Tradescantianum in 1656. The collection was transferred to the University of Oxford in in 1965 after becoming the property of Elias Ashmole. Later, a building was built to exhibit the collection and then opened to the public in 1683. It was now called the Ashmolean Museum. The legislation on the use of the museum

was drafted in 1753. After some ambivalence and debate, finally the idea of an organization called the museum was established, considered as a place to preserve and display a collection to the public in the 18th century.

During the 19th and most 20th centuries, the use of the word museum was to denote a building containing cultural material accessible to the general public. In the long run, increasingly museums keep changing on the basis of social change. There were more outdoor museums, electronic museums, and as electronic technology appeared, we saw the advent of digital museums. Although virtual museums offer an attractive new approach for visitors, and bring some benefits to the museums. Nonetheless, virtual museums are still dependent on the collection, preservation, and interpretation of material that exists from the actual museum's prototype.

2. 2. 1. 2 Art museums

According to the media, the art museum will be a place to display collections of paintings, sculptures, and decorative art. The target audience of the art museum (also known as the art gallery) mainly communicates freely with the works. For that reason, aesthetic value is the most concerned factor in accepting items for collection. Since the 19th century, a number of art museums have included industrial art, aimed at encouraging good industrial design. Exhibiting works of art comes with additional problems for the curator (Lewis, 2021). The artworks exhibited convey a visual message and directly influence visitors. While in other museums, the display is stereotyped and classic. For art museums, the curator of the work is particularly interested in its performance. The ambience in which the work is to be placed is unobstructed, which must be enhanced by highlighting the appearance and color of the work, combined with the right lighting and background. Artificial light used to be a priority in painting exhibitions both to create effects and to avoid harmful effects from natural light. However, the downside of the clone light is to cause a fake feeling of excessive performance that inhibits the viewers' appreciation and experience of the work. At the moment, museums focus on the use of natural light that is used indirectly. Typically at the Tate Britain Museum, London, UK, the exhibition space uses a mixture of natural daylight and simulated light (Lewis, 2021).

Fig. 5 Gallery Prado Museum, Madrid

Some museums display works on floors according to the custom of the past to display more works. Certain churches are also open to the public, such as museums. The study of suitable

contexts for exhibits is also interested, leading to ancient houses, ancient furniture, and the conservation of rural houses. Some places introduce performing arts, lighting elements, sound, music, movies, or video displays to aid in improving the interpretation of the work to the viewer. Another important factor is the preservation of art artifacts. A number of art materials are very sensitive to the environment, so care should be taken in controlling the temperature, humidity, and light they are exposed (Lewis, 2021).

In many cases of exhibiting great arts, the role of the museum becomes as a separate institution to the art public in its development. This can be found as for example at the Pompidou Center in Paris, the Stedelijk Museum in Amsterdam, and the modern art museums in Stockholm, unique and special art forms are on display. Experimental display screen collections of mass art often have a high purchase cost, thus playing an important role in the main activities of the museum. Sculptures are often exhibited outdoors or other works of art such as sculptures in Washington, D. C, Open Air Museum in Hakone, Japan (Lewis, 2021).

2. 1. 2 A changing the role of information professionals in museums

In Vietnam, the open-door policy of the state has led to economic changes, the expansion of archives, the application of the science and technology ministry, and the improvement of people's lives. The necessity for enjoying the culture and entertainment of the people is on the rise. The popularity of television and the internet with increasingly appealing programs to individual families addressing the parts people demanded, but not stopping them from leaving their homes and looking to recently distant cultural, tourist, sports, entertainment facilities or places. The culture of enjoying the level of the people is raised a lot, the quality of service and entertainment culture must similarly be improved. This demand of the people is a favorable condition for the museum to open its doors to welcome guests. On the other hand, it is a enormous difficult taks to allocate our time for activities on the basis of where and what.

Previously, during the time when the whole country was liberated and the social regime was under a subsidy period, museums did not have to think about many jobs "to feed themselves". Granted a guarantee on the state of museum delays, which deactivates the museum's functionality. Currently, museums are not outside the law on the market economy anymore. The museum cannot take its servers lightly; then again must operate and try to entice the public to visit the museum because it is the primary source of income for the museum. Thus, due to the needs of customers (the need to enjoy the culture of the public) and the requirement of the museum's owner (the need to raise revenues to nurture professional activities), the museum must diversify its activities are of high quality (Huy, 2015).

As mentioned above, the public plays a vital role in the museum. It is indispensable to understand the company's needs. With their advanced level of awareness and awareness, people do not readily accept any "dishes" that the museum offers, but they have their own choices. To attract the public to the museum, first of all, the museum must understand clearly to respond to the requirements of the public; that is, the museum does not merely offer exhibitions or activities. Subjectivity without regard to interests, needs, or opinions of the public. Therefore, only when there are diverse, periodical, attractive, informative, and educational displays and

activities at the same time the information about such activities is disseminated to the public then the museum really "reaches out" to its public (Huy, 2015).

2. 2 Museum exhibition
2. 2. 1 Museum exhibitions as a function of museums

Many scholars have agreed that the exhibition is the core function of the museum. The museum's exhibitions open to the public are the main attraction and benefit of the museum itself. Museum scholars also fully agree that museum exhibits are meant to bring about transformative, expansive, and transformative experiences. Visitors will show their attention, interest, and judgment on many aspects of their perceptions through the exhibition.

According to Dawson (Macdonald, 2006), the museum is a cultural institution that exhibits, collects, records, and preserves objects, artifacts, or specimens such as property. The museum performs activities such as display, research, and interpretation by imparting meaning through exhibitions for educational purposes. Another statement from Maryland (Barry Lord, Gail Dexter Lord, 2001) said that the museum's exhibition must help convey deep feelings into the minds of visitors through artifacts and works. The interface demos are the key to developing a visitor's vision. Museums generally offer two elements to visitors: collection (objects or archives) and knowledge (events or stories). The two above factors create the meaning of the work. Once either of these two factors are omitted, the variety of collections and knowledge in the world will not develop underestimated.

Meanwhile, Hooper-Greenhill's definition of "meaning" was built in connection with the museum's collections (Hooper-Greenhill, Changing values in the Art Museum: rethinking communication and learning, 2000). Each collection usually includes many objects grouped to create visual statements. This combination will form a visual story. For that reason, the ideas on display are often cohesive to convey in the exhibition's texts, which may give a preferred interpretation of the different displayed images (Hooper-Greenhill, Museums and Their Visitors, 1994).

2. 2. 2 Museum exhibition as the communication of meaning

The museum's tool for communicating with righteousness is the exhibition itself. Currently, along with the rapid development of science and technology, the preservation of natural and cultural heritage and the popularization of multimedia communication have also developed. Genres in the exhibition show objects, including visuals, audio-visuals, and interactive experiences. Unlike styles of display for retail or commercial purposes, museum displays feature a unique creative experience. Previous evidence that in earlier stages of the museum, its introduction was more educational in the display method. Exhibitions are successful when they adopt a method of educating visitors about the show's theme. These exhibits are always helpful and educational and contribute to the museum's success (Ahmad, S., Abbas, M. Y., Yusof, W. Z., & Taib, M. Z. , 2013).

As museums are becoming progressively more popular, the application of new techniques, modern audio-visual media, and the creation of many new experiences has been discussed in the exhibition. Museum. Interactive experiences can spontaneously boost visitor interest and

awareness of exhibits. In each different theme of the museum exhibition, learning and education through the exhibition will delight visitors depending on the flexible variation in the exhibition's exhibitionism. Lord (2001) (Barry Lord, Gail Dexter Lord, 2001) stated that due to several ways of conveying the meaning of the objects on display, creating a sense of curiosity stimulates visitors to explore that object. Therefore, the purpose of the exhibition is to effectively convert some aspects of the visitors' attitudes, preferences, and values and increase confidence in the perceived authenticity of visitors to the object display.

According to Dawson (Macdonald, 2006), it redefines the museum's tendency to develop unique exhibition ideas and is considered an essential means of communication. The exhibition helps enhance the customer experience with various types of exhibitions matching a wide variety of themes. In addition, communication also contributes to making exhibits more engaging through combinations of exciting new types of architectural experiences and changes. This change highlights the city's character through the image owner on the street to communicate with the surrounding areas.

2. 2. 3 Modes of exhibition apprehension

Granting there is abundant to explore in museum exhibits, the exhibiting methods of visitors (Lord, 2001) (Barry Lord, Gail Dexter Lord, 2001) are generally classified according to the following four criteria:

- *Contemplation:* This is the museum-preferred method of cosmetic experience. In addition, it is also used in museum history and science. This method is used to display the art map to create or sample an item for the target type high and is used differently with people around. According to the communication system method, the works have information labels to give us outstanding information, such as the doctor's name, work date, month, material, and sponsor, to ensure product impact. It is out in the end. Now, the works are created with sound effects and LCD screens with movie art, creating deep inspiration and enhancing viewers' reflection. Nowadays, many museums and galleries apply this method of display. The viewer may not operate the quality during the enjoyment task when the intellect and emotions inside are very actively engaged.
- *Comprehension:* History and natural sciences museums often organize reverse exhibits according to the context and theme. In it, the exhibits on display are linked together for no viewing or research purposes. They can be placed in a room set or grouped in a theme decorated scene in a display box (of glass or transparent materials) or a space. Images can be layered, combining words and images to aid in understanding the exhibit's meaning. In this approach, the properties of every object should still be appreciated. This approach encourages the participant to find the meaning of the specimens through an overall relationship between the context objects and a topic. An activity in creating visitor relationships and object comparison is enhanced. Transformative experiences will include exploring the meaningful impact of specimens in their context of existence or referring to the exhibition.

- *Discovery:* Traditionally, this model was used extensively in natural history museums with specimen collection systems, and now it has been modified and applied in all other museum types. This model with intellect and visual interaction is more active than another method in the museum exhibition. Visitors were able to explore multiple specimens and experiment with individual examples or their relationships. Nowadays, museums have classified each object in their archives, but visitors can access them visually using a glass case or drawer. Providing complete catalogs on the computer screen or multilayered cards next to the storage compartments will further enhance the meaning and discovery of the specimens.
- *Interaction:* The method is favored by many science centers and children's museums. Using the staff and the exhibit apparatus, the specimens are identified as a valuable educational collection that helps visitors discover the meaning of the specimen. In visitor surveys, the results show that the kind of exhibit with the foremost vital interaction is when there is a knowledgeable guide, the show is performed or wearing antiquity. The interaction between the guide and the visitor delivers the museum's most straightforward experience. Where quality-trained instructors or staff ask suggestions and have a way of engaging visitors through presentations about their collection will increase the feeling of experience guests.

Modes of Apprehension	Types	Common in (but not limited to):	Characteristic
Contemplation	Aesthetic	Art Museums	Individual perception of specific works
Comprehension	Contextual or thematic	History, archeology and Ethnographic Museums	Relation perceptions of artefacts in context or in relation to a theme
Discovery	Exploration – as in visible storage	Natural Science Museums	Exploration of specimens grouped by categories
Interaction	Live demonstration; multimedia	Science Centre	Kinaesthetic respons to stimulus

Modes of Visitor Apprehension of Exhibitions

Table 1 Summaries the mode of visitor apprehension of exhibitions

2. 3 Fine art museum (FMA) in Vietnam - Case study Fine Art Museum in Ho Chi Minh city (FAMHCM)

2. 3. 1 Fine art museum in Vietnam

Fine art is an art form that reflects the real world with artistic images through various materials in the unique way of each author. The general orientation of art is to bring beauty to people, serving their practical needs. At the same time, fine art honors beauty with the top-notch artworks of master folk and professional artists whose products have been selected and have a significant influence on society. Fine art has become a part of cultural/artistic heritage – for research, collection, preservation, display, and promotion in fine art museums. The

characteristic of fine art is to awaken aesthetic feelings deep in the human soul through visual perception/intuition, what's more known as vivid visualization.

Fig. 6 One exhibition in Fine Art Museum Vietnam, Hanoi capital

Moreover, one must recognize the Museum of Fine Arts as a unique environment for the masses' enjoyment and experience of attractiveness in the whole society. It must be organized and arranged as a destination/"artistic rendezvous" of the art world. We are aware that the museum's characteristics are reflected in the collections of original artifacts kept in the preservation warehouse. Display themes organize the collections to serve the needs of scientific research, education, and helpful dissemination of knowledge for people.

We see that the fine art museum has an extraordinary strength that other types of museums cannot master: collections of original artifacts kept in storage and combinations in the museum's galleries. An art museum is always the ultimate artwork of master artists (folk and professional) in painting, sculpture, and graphics. Furthermore, therefore, we cannot and should not define a "frozen framework" that binds the fields of operation of the Vietnam Fine Arts Museum. Some national and international museum definitions can be cited here for a deeper understanding of the concept of the fine art museum.

In the Law on Cultural Heritage, a *museum* is defined as "a cultural institution to collect, preserve, research, display and introduce cultural heritage and material pieces of evidence about nature, people and nature."

First, we distinguish two types of objects cited in museum definitions: artifacts and the public (users, exploiters, and consumers of museum products). Those two objects will always be artifacts, works of art, and visitors (domestic and international), especially artists who compose, research, and critique fine arts for the Museum of Fine Arts.

Second, the Museum's activities are geared toward the research, collection, preservation, display, presentation of physical shreds of evidence, and information about such physical evidence to the public. Furthermore, accordingly, the Fine Arts Museum (FAM) must focus on the material evidence related to the aspect of the visual arts (the original, accurately dated, with the high aesthetic value of each period of aesthetic history). Art, with diverse art styles of each specific author/artist, provides scientific information and basic knowledge of fine art to guide the public to appreciate the beauty contained in works of art.

Third, museums are specific and non-profit cultural institutions. The main goal is to serve the community's interests, even though museums still provide services appropriate to their nature and function. The museum's features that visitors in need will acquire with money (and the

amount collected from these services is not tiny). We believe that the Vietnam FAM people are still hesitant and lack creativity in researching compatible services to attract the public to the Museum (Bài, 2017).

The professionalism of the Vietnam FAM is demonstrated through the museum's storage of artifacts and the structure of the permanent display. After 50 years of non-stop operation, with the efforts of many generations of leaders and staff of the museum, we have nearly 20,000 artifacts that reflect the historical development process (Bài, 2017). Vietnamese fine art with many different forms and materials through typical works of typical artists in the national fine arts. Moreover, those typical works of art are systematized into collections and preserved in separate warehouses with suitable technical equipment. The author supposes there is a huge step forward compared to what we had at the museum's opening in 1966. Some fairly complete collections can be mentioned as follows: Collection of paintings (over 7000) works in-kind), collects sculptures (over 1,000 artifacts), collects traditional fine arts (over 2,000 artifacts), collects ceramics (over 6,000 artifacts).

Fig. 7 Dong Ho folk painting exhibiton, Old and Modern, 2018

Twenty years ago, the Vietnam FAM had the following display topics: Fine Arts of Ethnic Minorities; Prehistoric and prehistoric art; Feudal art from the 11th to the 19th centuries; Ancient Vietnamese sculpture from the 13th to the 18th centuries; Folk Arts and Crafts; Statues before 1945; Statues in the period 1946 - 1954; Modern painting (Bài, 2017). At present (2016 - 50 years), the content displayed at the Vietnam Fine Arts Museum has been structured more logically and logically according to the historical process and thematic suitable for the type of historical FAM as follows: Prehistoric and prehistoric art; Fine Arts from the 11th to the 19th centuries; Fine arts from the 20th century to the present; Traditional applied arts; Folk art; Vietnamese ceramics from the 11th to the 20th century (Bài, 2017).

2. 3. 2 The Fine Arts Museum Ho Chi Minh (FAMHCM)

Many social history and heritage places are adapted for visitor attractions since they represent distinctive characteristics that express the history, culture, or environment (McKercher, 2002). These places also reflect the vibrant scene of a region's customs, cultural identity, and surroundings. Although the critical goal of museums is to serve as custodians of the heritage and cultures of areas and nations by preserving and restoring traditional historical objects

connected with those places (Cho, 2013), this task often includes the propagation of information regarding and exhibit of their objects (Paul Capriotti, HugoPardo Kuklinsk, 2012). For more than a century, these features affected museums to be accessible to visitor arrivals for many purposes.

Museums are often being questioned to validate their viability, and this explanation is also started demanding economically challenging. Museums might play a critical role in adding regional or national income production, offering jobs or education, and minimizing cultural issues in the macroeconomic social structure. The audiences' absences at museums or art galleries in Ho Chi Minh City are progressively common in real life. The challenge lies perhaps not in the massive change from colonial archeological collections to 20th-century museums and galleries but also in the possibility that the community is not the primary target audience. Although the Museum's definition has never been implemented and incorporated into the citizenry's public activities, local involvement declined significantly. Museums of art present a substantial obstacle to rationalizing and attracting visitors as arts and museums are unfamiliar and unique to South-East Asian communities, especially in Vietnam. E.g., regarding items and objects taken from their original contexts in monuments or monasteries and placed in a nearby anthropology museum, citizens might see significantly less relevance. They did not notice that art was distinct from crafts, which often serve in shared experience and are linked to rituals and spirituality. The definition of art as anesthetics and amusement artifact had little part in the local Vietnamese experience. Recent art projects may have opened their doors to the establishment's culture, but most citizens also had no code to appreciate art pieces. One challenge was the art space—the Museum as a touch zone—which did not occur in connection with Western modernists' emergence in the region. The art museum's shortage has become more problematic as modernism was confronted by contemporary post-modern and various art forms. The divide between sculpture, galleries, and community has appeared to deepen.

The majority of Vietnamese museums are historical museums that reflect the country. The two largest Art Museums in Vietnam: the Vietnam Fine Arts Museum (VFAM) in Hanoi and the Fine Arts Museum Ho Chi Minh (FAMHCM), reflect the nationwide historical establishments that uphold Vietnamese nationalist agendas. The VFAM honors the ethnic origins of the Vietnamese people throughout Asia, defiance of external invasion, and endurance to war hazards. The art specimens of the Museum are categorized into three cycles: from the earliest, ancient to the 11th centuries, from the 11th to the 19th, and up to the 20th century. The dual scope of the anthropological and fine arts is critical for the Museum to display its acquisitions, informing the audience about the status of artifacts in Vietnamese culture while showcasing their artistic elegance. Vietnamese artists integrate the advantages of global art while maintaining their native personality (VNFAM, 2011).

Concerning the VFAM, the FAMHCM maintains a national archive of Vietnamese paintings. However, it exposes the absence of works from the post-colonial Southern artists of the former capital area of the South of Vietnam. After the Đổi Mới (Reform Era), Ho Chi Minh City became Vietnam's socio-economic capital. The Museum became a central site for the society to associate with the local and national art heritage. Therefore, South Vietnamese arts' distinctive heritage has been ignored or otherwise blurred by the government-supported cultural factual record from post-colonialism to reconciliation duration. Many art experiences and artists in the southern Republic of Vietnam have been substituted by their Northern

communist equivalents (Corey, 2014). Whereas the philosophy of acquisition of the FAMHCM remains conservative, the Museum has expanded its spaces to showcase more creative Vietnamese contemporary art. The Museum has been leased to numerous arts organizations since the 1990s to organize installations and activities. Nevertheless, this partnership is intensive; the Museum exclusively controls the kinds of events it approves, provides limited to no resource abilities to project administrators, and demands the planners to conquer many administrative challenges. The Museum will terminate programs – as those it considers excessively controversial or inflammatory – at a certain period if the activity does not satisfy such criteria.

The Museum is planned to satisfy the requirements of the communities in the metropolitan area to embrace visual art and be a destination for tourists to discover and explore Vietnamese art historians. Over a preparation process for facilities and objects, the Museum was launched to the community in late May 1989. At present, the Museum has over 21,000 objects grouped into valuable collections. The museum artworks are divided into two critical areas: Classical art - native crafts and contemporary art with notable acquisitions such as rebellion paintings and artworks from Indochinese and Gia Dinh college artists. Other authors are Nguyen Gia Tri, Nguyen Sang, Diep Minh Chau, Kim Bach, Dinh Ru, Quach Phong, etc. They represent the core characteristics of the Vietnamese art community and fine art in the southern regions (VNFAM, 2011).

2. 4 The current stage of exhibition in Fine Art Museum Ho Chi Minh (FAMHCM)

2. 4. 1 Reflected on painting exhibits in the FAMHCM

Museum encounters can usually be included as evidence of what has become recognized as traditions and cultural attractions (Johanson & Olsen, 2010) and consideration for what influences tourist enjoyment. Harrison and Shaw (2004) suggest that tourist engagement is considered a fundamental strategic priority. Satisfaction was often seen in museum environments. For instance, Goulding (2000) investigates tourist results in the production of exhibition encounters and proposes that scenery configuration, navigation, and crowding concentration rates are essential. Admittedly, she concluded that so much prior literature on museum visitation has been oriented toward socio-demographic analysis. Little consideration has been devoted to the guest's perception that uses provided a sequence of substantive behaviors. It might be asserted that service interaction is influenced by various social and economic, cultural, emotional, behavioral, environmental, and social configurations, all of which must be rendered when quality experience consideration is delivered.

Booth (2014) presented the latest museology study that alternative ideas on communication, content production, promotion, and visitor engagement have helped attract visitors to art galleries more comprehensively. Enrolling guests in the tourist gaze, encouraging this perception to be optimized and personalized, and concentrating on impact rather than philosophy, are facilitated by using emerging immersive technology tools, innovative ways of curation, and fantastic architecture declarations. Conversely, verification of modern

museology's integrated and revolutionizing potential is sparse, both to broaden tourist demographics and in approaches to societal community development (Booth, 2014). Civilization shifts; the 19th century adopted contemporary frameworks are now under pressure. Many approaches to society's standards threaten the museum's values and ideals, notably the arts center. The post-colonial and postmodern society involve a comprehensive examination of the community association, and the museum's existence can be named. Then the art museum's obstacles concentrate on two sectors, all critical to its identification. Both contribute to the postmodern authority's actual situation: the first addresses what should be expressed and who need to speak; narration and expression matter. The second involves who responds, which is a subjective topic, comprehension, and interpretation development.

Young folks' usage of museums and art galleries is a dynamic and competitive phenomenon. It can anticipate the substance and consequences of indications of current policies on art museums and adolescent people's thoughts according to their requirements, expectations, and desires, as well as the probable factors behind their choices, in line with the increased practical improvement of research and planning. Museums and galleries are considered places for many youngsters' memories of compulsory field trips to contemplative displays in gloomy buildings (Whittington, 1997; Anderson, 1997). They seem to be unable to utilize these facilities and comprise a limited fraction of the total amount of tourists. Furthermore, most young people tend to be neglected or disconnected from popular arts. Art is perceived as a minor theme in the program during education, and there are minimal strategies for improving creatives or exhibits (Harland et al., 1995; Hargreaves, 1983; Lazotti, 1988). Beyond college, traditional masterpieces also often seem to be overlooked in younger viewing experiences. In contrast, youngsters seem to be either at the fringe or uninterested in constructive engagement in art experiences displaying a fascination with the youth's subculture (Willis, 1990; Visalberghi, 1988; Harland et al., 1995; Anderson, 1997).

2. 4. 2 Exhibitions and the dilemma in the FAMHCM

Vietnamese contemporary arts were initiated due to the many difficulties of visibility, accessibility, and finances. A wide range of modern Vietnamese artists has matured throughout the last two decades to represent what they perceive to become a more vibrant, authentic, and regional vision of postmodern Vietnam (Taylor, 2005). While simultaneously experimenting with different approaches to stretching modern art's philosophical and technological parameters within the state safety margins and art industry (Kraevskaia, 2002). As Vietnam is fast developing into a globalizing economy, social relations have facilitated Vietnam's contemporary art between Vietnam and external societies. Numerous Vietnamese art practitioners have traveled abroad to research, show, and cultivate, representing Vietnamese arts worldwide and carrying their experiences and knowledge back to Vietnam (Kraevskaia, 2002). The emergence of the Internet in the 2000s enabled everything to be more comfortable and quicker than ever before, investigating and sharing artistic experiences (Taylor, 2014). Social networking is becoming an essential instrument for connecting visibility and sharing discourse between artists, arts groups, and the broader community from domestic and international cultures (Pearlman, 2015).

The FAMHCM seems to be disconnected from its audience, primarily younger audiences. There are very few youngsters at the museum attending exhibitions or premiers; there are multiple causes, two key factors to be discussed: a shortage of contemporary exhibits aimed at younger audiences and the strong emergence of Vietnamese independent arts organizations. Galleries and museums are perfect venues for cultivating an engaging association between youngsters and the arts, focused on comprehensive engagement and youth desires and expectations (Bourdieu and Darbel, 1991; Gardner, 1981; 1982). In contrast, integrated visitor instruction (at any age), exhibition, or museum instruction focuses on individual observation rather than established standards (Falk and Dierking, 1992; Falk et al., 1995). Throughout this context, the museum's spontaneous characterization of instruction appears to foster dedication to innovative, immersive interpretation mechanisms that relate primarily to youth's specific systems of expression and standing. Based on O'Connell's research, there are three highlighted critical priorities for youth-oriented museum education reform: a) identifying new positions for youngsters; b) recognizing and determining their necessities; and c) creating new ways to include both instructors and youngsters in the development phase (Lemerise, 1995). As mentioned below, such priorities were established in several instances of exhibition and museum youth programs, not just at the initiative execution level but also at the early phase of its planning, judgment, and organization.

The initiatives coordinated by two Vietnamese independent organizations, including The Factory Contemporary Arts Centre (FCAC) and Salon Saigon, address national and global aspects of Vietnamese society, which are scarcely seen throughout nation agendas and the printmaking industry. They identify domestic and international aspects. Many courses offered a sophisticated view of Vietnam's background and social science challenges from locally and internationally lenses, whereas some programs supported spaces for visibility of certain minority groups. Vietnamese artists, curators, and social analysts addressed their political orientation and traditions in other showcase programs produced by the agencies. The agencies offer artists resources and encouragement for exploring essential Vietnamese cultural constructs through individual development and training courses. Exhibitions, awareness campaigns, and cooperation activities introduced the perspectives to local and foreign audiences. These self-governing art organizations have delivered services desirable to specific cultures; conventional productions are more attractive to standardized susceptibility, while wide-ranging activities are attractive to the young audience. The multifaceted interactions generated by independent arts agencies compete against Vietnam's monocultural nation paradigm and economic narrative. Although Vietnamese art museums characterize the past of republic, revolutions, and rebellion through woundless national perspectives, independence exhibits address participants' emotional afflictions and experiences. Although the creative advertisement industry accepts the dystopian interpretation of Vietnam, exhibits such as TechNoPhobe at FCAC and Future ASIA Bodies at Salon Saigon portray Vietnam's scientifically advanced, interconnected global embodiments. Whereas museums and the art industry promote popular aesthetic appeal and mediums, including French impressionism and silk painting, these two organizations are fascinated with reflecting and exploring the possibilities of creative expression (*see also* FCAC, 2016; Salon Saigon, 2020) (Fig. 8).

Fig. 8 Independence Vietnamese art projects, from left to right: TechNoPhobe at FCAC and
Future ASIA Bodies at Salon Saigon

Independent Vietnamese arts associations serve specific demographics with the opportunity to grow communication about Vietnam. The impact is a complex, intricate, and social critique of Vietnamese representations that have not been seen in national museums or the fine art industry. Community alliances enable multicultural groups with the potential to cultivate empathy and represent their viewer's personality norms and expectations. Thus providing audiences a position in societal entities' programmatic and operational orientations; therefore, audiences experience great satisfaction, integration, and appreciation of cultural organizations.

3. BIOGRAPHY OF DONG HO FOLK PAINTING THE DANGER OF LOSING A LINE OF DONG HO FOLK PAINTING IN VIETNAM

3. 1 Biography of Dong Ho Folk painting

3. 1. 1 History of Dong Ho painting village

Dong Ho folk painting line is one of the three most famous folk painting lines of our country. Dong Ho is the place name of Dong Khe village, Song Ho commune, Thuan Thanh district, Bac Ninh province. There is a pure Vietnamese village nestled on the south bank of the Duong River, about 30km northeast of Hanoi. In the past, the town had the ancient name of Dong Mai or the name of Nom was Mai village of Tong Ho, Sieu Loai district, Thuan Thanh district, Kinh Bac town. According to the book Dai Nam Nhat Thong Chi (XVII, 1993) the Thien Duc river (present-day Duong river) flows through Sieu Loai district (present-day Thuan Thanh), also known as is Dong Ho river, with Dong Ho wharf. Thus, the place name Dong Ho has been recorded in bibliographies for a long time (Nguyen T. Thu et al., 2019).

Dong Ho village is located in the middle of Kinh Bac land with thousands of years of civilization. Since a few thousand years ago, Kinh Bac has had many Vietnamese villages residing and establishing villages since the reign of Hung Vuong. Even in Thuan Thanh district, there are ancient villages of Dai Trach (Dinh To commune), Ngu Thai (Ngu Thai commune), Bai Giua, Song Dau (Thanh Khuong commune). A little later, in Thanh Khuong commune, it is still famous. To an ancient political and cultural center of Luy Lau, also known as Lien Lau. Thuan Thanh area was also an early Buddhist center with the center of ancient pagodas belonging to the Tu Phap system, the earliest being Dau pagoda. Dau Pagoda was built between 187 and 226 AD, considered the oldest pagoda in Vietnam. There is a legend about the Indian Zen master Tini Da Luu Chi, who came here to practice and propagate Buddhism from 580 AD (Nguyen T. Thu et al., 2019).

Furthermore, at this juncture is the famous But Thap pagoda with a statue of Buddha with a thousand eyes and a thousand hands, and the wooden tower of Cuu Pham Lien Hoa. The pagoda is located on the right bank of the Duong River. An area of Thuan Thanh literature has given birth to Dong Ho village with the unique heritage of Dong Ho folk paintings. In the past, Dong Ho village was impoverished, according to the oral tradition of the village elders. The village does not have a tiled house or a brickyard (Dung N. D., 2018). In the past, the town was located on the banks of the Duong River. The name Dong Ho village is explained there is a lake to the city's east. This information is incorrect because the name Dong Ho has entered the bibliography for quite some time. According to the elderly in the village, around 1917, the town moved from the riverside to a higher dyke terrain. That is the location of the current Dong Ho painting village. The villagers also moved the communal house outside the riverbank to the new town in the dike. According to Mr. Nguyen Huu Qua, when he was a child, he saw water

flooded to the foot of the old communal house; perhaps because of this flood, the people of Dong Ho had to move the communal house and move the village to its present location.

Fig. 9 Dong Ho village communal house, a place of worship and closely associated with painting production

According to the Nguyen Dang family (Dung N. D., 2018) (Nguyen T. Thu et al., 2019) (Nguyen T. Thu et al., 2019)Dong Ho painting village dated back to the Le Dynasty in 1527. However, we do not have the material to test this document. Dong Ho village has a small model, only includes 18 hamlets with 17 families, located in the middle of the critical waterway, Duong river, near the focal point of 6 rivers (Luc Dau Giang), convenient. For waterway traffic, it connects the four regions of Kinh Bac with Thang Long and the four ancient lands of Hai Dong (Hai Duong). Such traffic advantages have contributed to making Dong Ho paintings easy to distribute to many North and Central Vietnam regions. When Tet comes, every countryside has pictures to hang on the right occasion. Dong Ho has folk as a roofed village. There is a folk song about the painting profession in the roof village, it must have been a long time, because these days few people know the Vietnamese name like the village. Dong Ho is a small village, currently with only a few roofs. There was originally a handicraft village with three ancient occupations: making horses, folk paintings, and artillery.

Fig. 10 The communal house yard is on a festival day, and the villagers offer offerings to a festival

Besides the famous folk painting, Dong Ho has the profession of making votive papers to supply many places. Perhaps these two professions are closely related, both based on the resources of the hands and with similar production techniques. The custom of destroying all

cryptographic elements spawns votive-making and specialty item-making careers. Dong Ho is such a village. The lines of Dong Ho's code are full of spirituality. The row of horses is like a bridge connecting the real world with the shimmering, fanciful, colorful, and super-imaginary world where loved ones from the mountains are "dwelling.

Ancient bibliographies also record:

> "In Sieu Loai District: General Dong Ho makes all kinds of people and objects" (Vietnam Institute of Social Sciences, Institute of Han Nom Studies 2009: 76).

The Dong Ho craftsman made many artistic diplomas that did not slow down the process of folk painting. The village has both a Painting festival and a Ma festival. During the celebration, the Dong Ho people choose chickens to fat, code, become emperors, compete in the communal house yard, and play chess. Besides pulling, they work as goods for Dong Ho villagers. More firecracker jobs. Although Dong Ho produces both wares and dynamite, what makes people remember many people are still making folk paintings.

3. 1. 2 Lines of folk paintings in Dong Ho Village

In the past, when people thought of Dong Ho folk paintings, they only thought of wooden and hand-painted folk paintings. Conversely, the Dong Ho art staff also produced some world paintings and made extra paper. Therefore, when studying Dong Ho folk paintings, it is impossible to talk about world paintings and paper paintings besides the line of wooden and hand-painted paintings that we still call Dong Ho folk paintings.

3. 1. 2. 1 Do The paintings

Paintings made by artisans Dong Ho produce to serve religious and spiritual needs. The mentality of the people in the past was that there was an afterlife; people still had to have an average daily life and production. They also could return to the world of the living to harm people, animals, and the world object. So they require a kind of web world graphics for a particular person or animal, with the human desire peaceful life, not destroyed by evil spirits. Expressive paintings are often made simpler than other folk paintings in Dong Ho (Chuong, 2010).

Fig. 11 Elephant and horse painting, Do The painting of Dong Ho village.

The model belongs to the family of artisan Tran Nhat Tan. Size 26x37cm.

3. 1. 2. 2 Engraved paper paintings

According to painter Duc Hoa, a well-known researcher, as there are not many articles on printed paper, this is a study on this type of painting in Vietnam, a kind of painting that few people know, rather than say anything. big head up. While there are several articles and a few dense books on the famous Dong Ho painting series, it is confidential as there are no research articles on this type of painting in Vietnam. The same product produced in Dong Ho village, the folk paper Troop painting, is a junior born after the Dong Ho painting line (Chuong, 2010).

It is indeed challenging to find a great start-up of painting paper in our country. The memories of Dong Ho artisans only show that some artisans in the village had small souvenir paper a few generations ago during the French colonial period. It was also a time when they made a beautiful picture of Two vases (2 vertical panels) or Four vases (4 vertical panels). On the other hand, if Dong Ho folk prints all images on the newspaper, there should be a couple of sturdy parts, "the dish is finished." The paper pictures are often broken, must be glued on the parchment background, or if not, must be pasted up the glass or time to without the format when viewing backlit. Painting paper is a standard feature of China, capable of transforming everything into determinants. Paintings are charms, pray for peace and fortune, and are often glued on glass. Meanwhile, Dong Ho folk drawing paper is somewhat simple, rustic, bold in the countryside. We usually for decoration, souvenir and small size (Phuc, 2015).
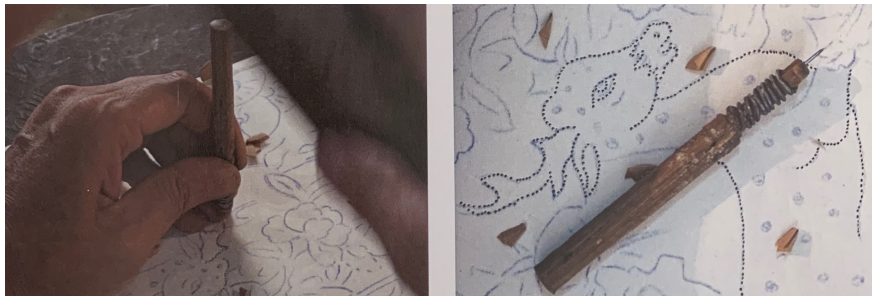
Fig. 12 Multi-layer paper carving process

Around the years 1955-1980, several Dong Ho personnel were recruited into the management department in art agencies. Such as the Vietnam Fine Arts Museum (Mr. Nguyen Dang Khiem), the Vietnam College of Fine Arts (Ms. Nguyen Dang San) or the College of Industrial Fine Arts and National Culture Publishing House (Nguyen Dang Che), with the mutual influence, all modern painters and artisans were created for several people. A powerful tool that uses paper technology to create paintings that can be hung at national art exhibitions and other exhibitions. It was also the heyday of Vietnamese paper painting: the Vietnam Fine Arts Museum purchased and collected some of Nguyen Dang Khiem's images as original works of art (Phuc, 2015).

The topic of drawing paper: If it is a paper, the topic is always simple: flowers, plants, animals, insects. Sometimes it is not a picture but just a condensed and simplified image to formalize through the stroke (Dung K. , 2013). A few years ago, staff member Nguyen Dang Che in Dong Ho village was still selling Dong Ho paintings and papers, mainly a set of 12 animals. In Hanoi, it is also a document. However, the father and son of artisans Dang Khiem - Dang Giap made

the whole picture of 4 lonely women (removed details), looking more luxurious and going to the page of modern papers, with topical topics:

- Uncle Ho's portrait
- Collective production
- Development of poultry flocks
- Both production and combat
- Encouragement of young people to join the army

Fig. 13 Set of paper cards "Long, Ly, Quy, Phuong".
Sample of the family of artisan Nguyen Dang Che. Size 16x21cm.

The images in modern folk papers are modern characters such as leaders, soldiers, farmers, militiamen, or cooperatives members (Nguyen T. Thu et al., 2019).

- *Picture frame:* In the form of white paper, the time paper is also small in size: the time was placed on a 10 x 12cm background, now raised to a 12.5 x 18cm background (folded in half for the other page to allow the buyer to have a copy of the paper). We can write, save and, sign, send to family, friends, or partners). The set of 12 zodiac animals is also included in the cover book of 15 x 19cm, with solemnity: Dong Ho paper painting + picture of a horse + caption below: artist's name, medal, address, phone. Nevertheless, make papers (glued on white paper) only about 8cm x 12cm in size and paired in circles, ovals, or squares. Quartet paintings are about 20 x 60cm or 25 x 60cm each. The To Nu set alone reaches a size of 30 x 70cm each.

- *Paper painting technique:* Usually, people scan and transfer some parts on the paper, then dry and create a very sexy color-played visual effect. Artists rank 3 - 4 - 5 layers of colored paper and then arrange. More layers will be too thick and difficult to learn; the fee is public for thin coal. Peel off the coating and paste it with a white parchment profile to make it stand out. The knife is also sharp when carving wood, sharpening it very well.

- *Decorative paper unique folk papers:* it should call "metallic" because, in the past, artists used paper coated with a metal such as copper, silver, or gold and gold. Page Kim is a non-standard word usage that has been familiarized. The paper coated with gold, silver, or copper luster may have been industrially produced, which is very available and beautiful. Drawing paper needles are often stored, removing unnecessary blanks, keeping the plot that needs to show. Usually, there are 3-5 layers. The gold or silver metallic page is always at the bottom, considered the base. Artists use the technique of perforating metal to make paintings.

  On the other hand, they do not draw lines on gold foil because it will be ugly. The floating metal points will be fancier and more attractive than the strokes. They then graded the colored paper so that the integration was slightly smaller, the layers of colored paper on the same layer as small as possible. As explained by artist Dang Giap, the term craft village means arranging smaller color patches, gluing profiles on top of each other, creating fascinating color transitions allowing the below color to come out vividly.

The late artist Dang Khiem used many paintings with folk themes, such as the quartet of four seasons and four female elements. It was during the difficult time of granting that his website's drawings and papers improved and advanced to the pinnacle (Nguyen T. Thu et al., 2019). They are composing tools according to modern ideas and performance styles. Today's standard painting tools still follow ancient themes but sometimes are very topical, such as Uncle Ho Do's Portrait. In the latest fashion, artist-artist Dang Giap also created a few metal paintings of Ba Trung and Ba Trieu with the media just created. Today, Mr. Giap still spontaneously composes tinsel paintings for sale or exhibition. This painting is a very detailed picture, meticulous to the feat with many stages to be careful because if done wrong, the image will be damaged immediately! The paintings sell well because of their rarity, limited quantities, vibrant colors, and no competition. According to artist Nguyen Dang Giap, sometimes, to use materials to make folk paintings, people save trifles to make pretty paper pictures. There are paper drawings with images, and horses are prevalent (Phuc, 2015).

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┌─────────────────────┐     ┌─────────────────────┐
│                     │     │  Prepare paper color.│
│ Draw sample and model.│───▶│ Scan and transfer several│
│                     │     │  colors on the paper. │
└─────────────────────┘     └─────────────────────┘
                                       │
                                       ▼
┌─────────────────────┐     ┌─────────────────────┐
│ Place the shape on white│   │                     │
│ parchment under the │     │  Paint the painting on│
│ colored paper liner and│──▶│  white, black, or Dó │
│ proceed with a      │     │       paper.        │
│ specialized knife.  │     │                     │
└─────────────────────┘     └─────────────────────┘
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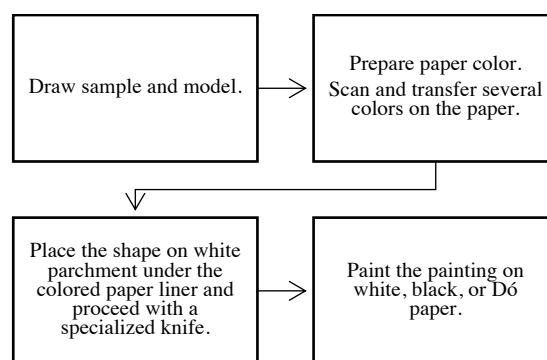
Fig. 14 Describe the paper carving process for single paper carving (1 layer)

3. 1. 2. 3 Wooden folk paintings

The last of the Dong Ho paintings is the most well-known, folk paintings produced by woodcarving for printing or hand painting. Temporarily dividing those types of images by

logic, execution, wood paintings, and hand-drawn paintings account for many long-standing researchers, artists, and the public enjoying too many.

Fig. 15 Woodblock prints are used to print each color layer of Dong Ho folk paintings.

3. 2 History of Dong Ho Folk painting (DHFP)

Dong Ho's painting profession is said to have originated when people began to grasp the wood carving technique of Lieu Trang from the mid-15th century (Nguyen T. Thu et al., 2019). The painting profession of Dong Ho village officially started around the 17th century. Dong Ho village has trade advantages near the wood carving village in Hai Duong in terms of geographical location. This village provides wood carvings for prints. Some surrounding villages, such as Dao Tu, produce pine brooms for painting and painting. Dong Ho village has all the necessary conditions to become a traditional Kinh Bac folk painting village.

Fig. 16 Paintings of Playing flute and carring buffalo, and Paintings of Group of fish,
typical Dong Ho paintings

Besides making Dong Ho folk paintings, people also made votive paper (only paper objects and used to burn when worshiping the dead) before 1909. History books of the Nguyen Dynasty period recorded the profession. Votive paper and Dong Ho painting craft coexist and support each other. During this period, Dong Ho village was a significant center of painting production.

Dong Ho folk paintings have the feature of not having an artist's registration. The person who created the model and printed and painted the picture did not leave any traces on the picture. However, the people of Dong Ho village still remember all of the artisans in the village. They are the true creative artists; their works are the original model for Dong Ho artists to follow and create more diverse paintings (Tran Lam, Trinh Sinh, 2011).Before 1945, the French

imported ram paper and pigments, adding modern materials to the craft of making folk paintings.

Around 1960-1961, Song Ho Agricultural Cooperative was established, the first folk painting group was born. The cooperative contracts to members of the cooperative at the stage of coloring materials. Many Dong Ho folk paintings were first printed in the "Folk paintings" collection. In 1971, a collection of 15 pages of Dong Ho folk paintings, printed according to traditional techniques, participated in the International Book Fair (I.B.A) held in Leipzig (German Democratic Republic) and won the Gold Medal (Tran Lam, Trinh Sinh, 2011). Before 1986, Dong Ho paintings were exported to socialist countries. Typically, the set of paintings of Quan Am Thi Kinh, including four paintings by artist Nguyen Dang Khiem, attended the Vietnam Culture Week exhibition in former Czechoslovakia (Czech Republic).

In 1990-1991, artists Nguyen Huu Sam and Nguyen Dang Che respectively established their painting production facilities, restoring the current color paintings. In 2013, the Dong Ho folk painting profession was recognized as a National Intangible Cultural Heritage. In March 2017, the President of Bac Ninh province approved a detailed outline to develop a national candidacy file to request UNESCO to include the profession of making Dong Ho folk paintings on the list of intangible cultural heritage in need of protection emergency. The dossier development period lasted three years, divided into two phases: survey research, inventory, consent form, construction, and submission of dossiers on time.

3. 3 Dong Ho Folk painting process

3. 3. 1 Prototyping techniques

Prototyping is an important step. In the past, artisans often chose stable antique models. At that point, besides the antique models, the artisans began to create new ones. New models are improved with more details, villagers comment and edit more for artisans to complete the work. Choosing a new model will come to the engraving of the plank. Initially, the woodcarvers were mainly from Lieu Trang village. After that, artist Dong Ho can compose and take samples. When creating a pattern, the artist must determine from the very beginning: distinguish which patterns to print and which ones to print and color, and colorize accordingly.

3. 3. 2 Wood carving technique

After making a new pattern, carving a plank requires the artisan to separate the pattern into each plank. Each pattern is a printed board. When finished printing, the overall picture will be published. Usually, a picture has to be engraved with many boards, maybe up to 5 boards for five different colors. There are two types of boards, printed boards and color printed boards. The worker, when printing, must align to the correct position to avoid the same color. According to the image on the plate paper, the engraving must be smooth, with a high degree of flatness to make a negative on the engraving board. After printing is completed, the result obtained is a positive of the picture (Nguyen T. Thu et al., 2019).

Fig. 17 Thi type of wood, Ink cage wood used to engrave printed boards and wood carving tools

Wood for making carving boards must be smooth, flexible, durable, color-permeable, and not chipped. Artists regularly use Thi wood, Jackfruit wood to make printed boards. There are repeatedly types of wood for color printed boards with flexible, smooth, and have a porous texture that is easy to absorb the color. Printmakers often choose wood from a few years ago to cut the boards, dry and press them flat, then smooth them to avoid warping. Tools for carving boards are iron chisels of different sizes to meet each need for carving boards. The people of Dong Ho village consider printed boards to be heirlooms, passed down from generation to generation, but printed boards have minor wear and tear. Others can be saved for fifty to a hundred years.

3. 3. 3 Do paper production techniques

The beauty of Dong Ho paintings correspondingly comes from special printing paper called Do paper. This type of paper has been produced by the Vietnamese for hundreds of years this year in Yen Thai (Ha Noi capital), Dong Cao (Bac Ninh province). Do is a particular type of paper, with long durability, used to print scriptures and folk paintings. Dong Ho paintings often use dó paper materials from Dong Cao village (Bac Ninh province).
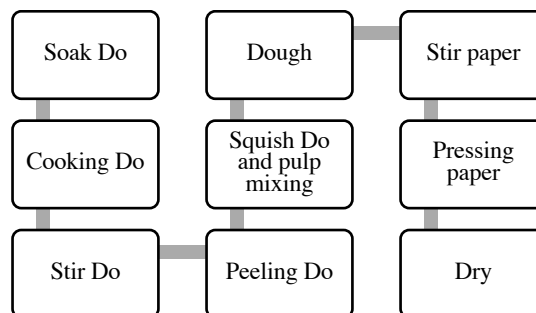
Fig. 18 Do papermaking process

Fig. 19 Papermaking process Do at Dong Cao village, Bac Ninh city

3. 3. 4 Diep scanning technique

No more than Dong Ho paintings have a way to stir up the wind to sweep shellfish powder on the surface of the painting. To make the iridescent beauty of scallops is a unique, labor-intensive, and centuries-old technical process: the craft of making oyster paste.

Fig. 20 A sample of white scallop shells and the production process of scallop powder

Workers need to go to the sea to collect dead scallop shells specialized for making paper (Mop disk shell). This type of oyster has paper-thin, moon-colored color or lives in shallow coastal waters. When bringing the shells back, the worker must pick up all the mixed shell fragments, then wash them thoroughly and dry them. Then, they put the cockles in the mortar and pounded them like rice into a powder for two hours. Today, this process uses a motor blender to replace human power. The result is a fine, milky white powder. After that, the powder is mixed with water and then holds a round ball, dried for use gradually. When making folk paintings, people mix that powder with the paste made from glutinous rice flour to create a smooth, viscous paste and then use a pine brush to sweep the surface of the Do paper to create a specialized Diep paper.

Fig. 21 Process of mixing scallop powder with glutinous rice and applying it on the surface of Do paper

3. 3. 5 Dong Ho painting production techniques

Technique of printing face-to-face, color overlapping

Dong Ho's painting production techniques include hand-painted and then printed, painted with color strokes, and printed and then stroked. The traditional way of printing Dong Ho paintings is printing like a stamp, different from the backboard printing of Hang Trong folk paintings (Khue, 2015). The Do paper is below; the engravings of each color are close up. The final product is a multi-color painting mixed with different prints. The worker will print each copy in turn, one color at a time, but make sure the colors match and do not smudge. Therefore, the craftsman must make woodblocks that have a final match. Another technique is color overlay printing, which creates intermediate colors or vibrant patches of color without drying. The craftsman intended to create an exciting novelty for traditional folk paintings.

Fig. 22 Steps to print each color of a finished painting

Printed boards are trimmed so that there are no excess spaces, avoiding ink lines and smudges. Therefore, the board often has a curved shape according to the part of the image printed in each color (Hang, 2006). The used plank usually includes one stroke and many color boards. The color board has four engravings. A printing color overlap will create six colors. A good artisan will know how to mix colors for the eye.

Fig. 23 The technique of "blocking" colors creates different shades of light for the picture
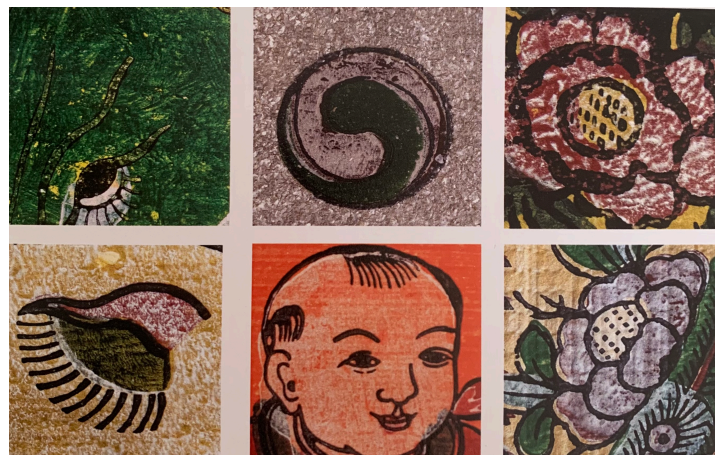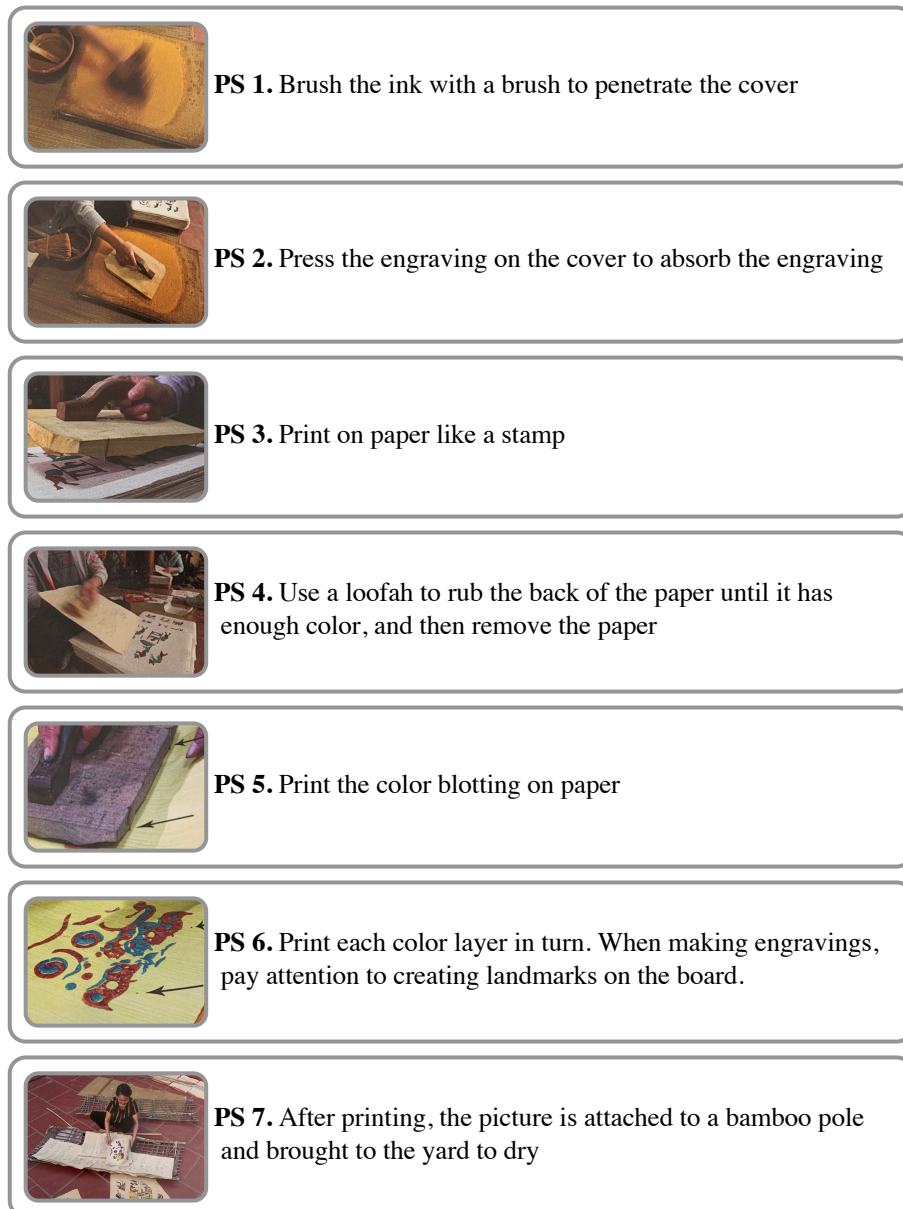
Fig. 24 The printing technique uses many color boards to create a bicolor color

When engraving the pattern, the craftsman uses a pre-engraved plank to get the overall outline. Nevertheless, the stroke board is the last printed board when officially printed. The process of rubbing the loofah on the back of the Do paper depends on solid or weak rubbing force to get different dark and light colors. Even the gender of the craftsman affects the force of color hitting the painting (Hang, 2006). Typically, men have a more robust color hitting force than women, so the color of paintings is darker woman paintings. Through the production stages,

the craftsmanship of Dong Ho folk paintings can be seen. Each painting is a different expression through the selection of colors and many influencing factors.

PS 1. Brush the ink with a brush to penetrate the cover

PS 2. Press the engraving on the cover to absorb the engraving

PS 3. Print on paper like a stamp

PS 4. Use a loofah to rub the back of the paper until it has enough color, and then remove the paper

PS 5. Print the color blotting on paper

PS 6. Print each color layer in turn. When making engravings, pay attention to creating landmarks on the board.

PS 7. After printing, the picture is attached to a bamboo pole and brought to the yard to dry

Fig. 25 Dong Ho Folk Paintings Stage (PS)

Coloring materials

A unique feature in Dong Ho folk paintings is the coloring materials from nature. These materials are taken from trees, grass, flowers, leaves in the countryside, such as flower buds, indigo leaves, wine bark, Gac fruit powder, bamboo charcoal, copper rust, placer. The craftsman also mixes many other intermediate colors from the essential color palettes based on his experience and aesthetic sens
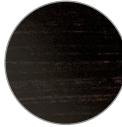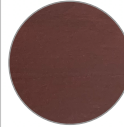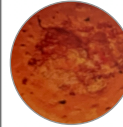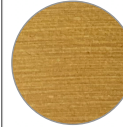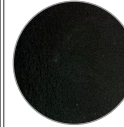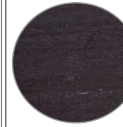
Black	White	Red	Orange	Yellow	Green	Blue	Pink
Use bamboo leaves and straw to burn to ashes, put in a barrel to soak for a year, decanted the condensed water, and then mix it with glutinous rice	Crush the white scallop shell, then mix it with glutinous rice	The vermilion stone on Thien Thai mountain is broken into a small dam, finely ground, dried, filtered, and mixed with glutinous rice flour	Grind the Hien flower to form a powder, then mix it with glutinous rice	Cook Hoe flower buds to thicken, then mix with glutinous rice	Taken from the leaves of the mangosteen tree, pounded sage leaves, mixed with glutinous rice	Buy from ethnic minorities, soak indigo leaves to get color	Mix scallop shell with red lipstick

Fig. 26 The method of creating paint colors from natural materials

The paper backing stitch to color the background must use light scallop powder to apply a few layers to make it white. The final paint will create a beautiful grained paper-like fine wood grain. When painting, the artisan must use a pine broom. Paint must be vertical with pictures showing people's faces, horizontally with pictures of animals.

3. 4 Classification of Dong Ho painting themes

Dong Ho folk paintings are one of the three major lines of Vietnamese folk paintings. The lines of paintings almost all depict topics such as wishes, worship beliefs, charms, and religious rituals. Dong Ho's paintings have an idyllic beauty, with a whole line of Tet and worship paintings (Hang, 2006). In the integration and interweaving of Vietnamese folk paintings, Dong Ho's woodcut paintings have some specific characteristics on the subject, ordinarily including nine types as follows:

> *i. Worship paintings:* This topic is an array of Dong Ho paintings with religious and spiritual themes that people pay great attention to the painting. The gods, handed down in folklore, are included in paintings such as Master Cong and Master Tao. In the people's minds, these gods bring prosperity and happiness, which farmers highly value. Some other gods, such as Than Tai, symbolizing the god's wish to be protected and peaceful life, are also included in Dong Ho paintings. People believe in supernatural forces to help them relax and overcome difficulties in daily life.

> *ii. Painting of couplets, five fruits:* The couplet painting, also known as the picture book of the letter, is a traditional Confucian culture. This type of painting is usually hung in the middle of the house. The painting of the book often depicts symbols of

Oriental culture such as dragons, phoenixes, gathering clouds, and the sun with a high educational meaning.

A couplets picture is two lines of large letters drawn vertically and symmetrically. Artists will transform the word Confucian into decorative shapes with more colorful colors than the couplets in the temple. The words on the couplets carry the wish for a peaceful life and gratitude to the ancestors.

Five fruits is a Tet offering consisting of five different fruits. The lines of folk paintings used to paint five-fruit paintings for sale during Tet from the mid-twentieth century to the end of 1989-1990.

iii. Tran Trach paintings: This line of paintings is hung to protect, exorcise, and bless the owner. The people of Dong Ho village used to hang pictures from the gate of their house. These types of paintings are usually hung from the gate. The main drawings are Vu Dinh, Thien At.

iv. Historical paintings: The theme of the paintings often revolves around heroic characters such as King Ph Dong Thien Vuong, General Tran Hung Dao, General Ngo Quyen fighting the Southern Han army, General Dinh Tien Hoang, Hai Ba Trung. In addition, the theme also has an array of paintings related to folk martial arts such as wrestling, arena, tug of war, buffalo fighting.

v. Congratulation painting: The painting shows the desire to have much fortune in life, develop fame and career, and hope to change people's lives. Paintings usually come in pairs, with Chinese or Confucian characters added. The paintings often use images of officials reading books or stylized images of animals acting like people studying and teaching. The painting also stylizes the words Tam, Phuc, Duc, and Tho to express the desire of the people of Dong Ho to pass the exam.

vi. Paintings satirical: The relationship between villagers and village officials is reflected in this line of paintings. The mandarins were consistently exploiting and demanding bribes, causing many difficulties for the villagers. Therefore, Dong Ho folk paintings borrow the mouse wedding scene to talk about the image of corruption and bribery of cats that are critical of the mandarin regime. The images used are often metaphorical, with deep meanings that satirize the problems in the old society.

vii. Comic paintings: Comics are primarily illustrations of fairy tales or legends passed down orally through folklore. Through the talents of the artists, the old stories are vividly expressed by lines and colors, selecting typical scenes according to the artists' understanding. Comics commonly have several consecutive pictures drawn along the vertical axis and form a duo. Paintings are often written with Han-Nom characters to clarify the meaning of the plot.

viii. Decorative picture: This line of paintings depicts the beauty of man and nature. Sometimes only paintings praise the pure beauty of animals or farming scenes of farmers.

ix. Paintings of daily life: This painting depicts the people's daily activities such as chess, swinging, dragon dance, lion dance, wrestling, sword fighting, tug of war, and buffalo fighting. A couple of paintings also show the fun when depicting scenes of jealousy, playing swings, sometimes changing the subject to suit the context and time.

3. 5 Dong Ho painting. Vietnamese folklore value

3. 5. 1 Value socialiation of Dong Ho paintings

When we carefully study the value of Dong Ho folk paintings, we can see that the images carry many cultural values. The themes of the paintings reflect all aspects of the life of Vietnamese society, in which agriculture was the main focus of are the daily activities of farmers and their livestock, poultry, and their aspirations simplicity of the people at that time.

Through the images of folk paintings, viewers can understand the social context and comprehend many unknown artists' talents. Folk paintings are a treasure of the cultural heritage of invaluable Vietnamese peoples, from the largest ethnic group to the ethnic minorities living throughout the country.

Unlike modern art paintings, folk paintings are the closest to the daily life of farmers, which occupied the majority of Vietnamese society in the past. Most of the painting themes revolve around pigs, chickens, fish, toads or fields, thatched roofs. The simplicity and proximity to rural life make folk paintings have a substantial spread from the South to the North. Moreover, the distribution of pictures is from the village fairs held periodically according to the village's custom.

Paintings are most frequently bought and hung during Tet. Whether poor or rich, every house must have at least one folk painting hanging in the home. Along with "Fat meat, onion pickle, red couplets / Trees, firecrackers, green Banh Chung," folk paintings have long been a familiar recipe of the Vietnamese traditional Tet holiday. The beauty of the paintings and the close content is reflected in the rustic and natural color scheme; the Do paper material goes through many stages and the layout and unique decoration. The price to buy a Dong Ho painting is not exclusive, suitable for the pocket of the rural people. Through paintings, people put into it with the desire of everyday life to come to Tet; the topics of paintings also help their hearts.

3. 5. 2 The artistic language of Dong Ho paintings

Dong Ho's painting is an actual work of art. The beauty of painting lies in the graphic art of visualizing. The first is how to create clear, coherent bold lines that are usually printed with a black border. These borders surround different dark and light colors to create a vivid effect (Art Institute, 1973).

a. Material: The drawing is placed on a glittering Do paper background. The raw material of dó paper has edges that do not need to be trimmed flat. The surface is rough as if it has just been made from the factory, along with the natural carding lines, making the picture rustic beauty, increasing the painting effect many times.

b. Surrealism: The beauty of Dong Ho's paintings shows the surrealism of the paintings. Please take a picture of the Pigs as an example; although the pigs are drawn from a horizontal perspective, they are still depicted with two ears and two nostrils like a straight view. This style is different from the realistic style like the photographic method. The style is a description dating back to the Dong Son culture. The ancient Vietnamese described the bird flying on a field drum; when looking at the bird's body, viewers still see the fish with two wings spread. Another style is that the artist ignores the law of myopia to focus on the main subject. Many paintings have the ratio of a fish or shrimp as long as the boy holding the animal. Sometimes baby sentences are drawn sitting on a large cat. The artist's purpose is to put the images together to create unique surrealism.

c. Artist: It is worth noting that the anonymous artists who paint Dong Ho paintings are all from their romantic imagination and their memory. In contrast to the painters who paint realistically depicting nature and people. The use of recognizable lines compared to other paintings exudes a liberal, rough, unpolished quality.

d. Color: Alongside, it is impossible not to mention the art of playing color in Dong Ho paintings. Researcher Henri Oger recognized the difference between Vietnamese and Western paintings: "An Nam folk paintings are presented in the form of a collection of strong, contrasting colors. Through these paintings, people realize preference for bright colors" (H. Oger 1909). A black border binds the images in the picture. The layout is opposite and flexible. The painting uses primary colors and pairs of opposite colors such as red-yellow, green-orange, and white-black to create a unique feature for Vietnamese folk paintings. The features of using colors are strong and colorful, such as accents in the general context such as communal houses, nail columns, and stone feet in favor of cold colors. In addition, the bright and striking colors are also a signal to welcome spring, creating joy for the new year.

e. Block array combined with message material on paper: The block array in the picture is shaped according to the principle of convention, rustic, uniform texture. The good-looking feeling comes from the robust and harmonious block with the array. Artisan Dong Ho has created many unique creations, unlike any other in the world, using scans as the background of drawing paper. The material is also scanned for vertical or horizontal grain to highlight the image that the painting wants to reflect. Painter Vu Dinh Tuan commented: "Paper material creates "resonance" and depth, making the colors printed on the paper background more splendid." The colors emitting sound an intermediate layer of padding makes it easier for the printed colors to catch on to the paper.

f. How to hang Dong Ho painting: Numerous Vietnamese families in the past not only hung one picture but hung many pictures in groups of pictures. The central painting is located between the houses to worship ancestors. Two house pillars are two red couplets. At living space would hang pictures with historical themes (Hai Ba Trung, Dinh Tien Hoang) or lifestyle themes (wrestling, jealousy, coconut collection). Paintings of earthworks, battles, and gods are often hung at the house door.

3. 6 The danger of losing a line of Dong Ho paintings in Vietnam

Through many ups and downs of its history, Dong Ho folk paintings are motionless a valuable cultural heritage in the treasure trove of Vietnamese folk paintings. Nonetheless, in the era of developing science and technology, this line of folk paintings faces many risks of being lost and gradually disappearing from the young community in particular and the Vietnamese people in general.

In 1967, in the face of the increasing danger of villagers giving up making paintings, the local government assigned artisan Nguyen Huu Sam to gather 50 enthusiastic and highly skilled artisans to establish a cooperative produce Dong Ho folk paintings. Thanks to that, Dong Ho paintings were revived and exported to many countries worldwide, such as Japan, France, Germany, Singapore, and the US. However, by 1990, Dong Ho paintings were no longer as famous due to the impact of the market economy and changes in people's tastes. Dong Ho painting production cooperative dissolved. In just a decade, more than 90% of households in Dong Ho quit painting and switched to other occupations with higher incomes (Lu, 2018).

From 1990 until now, the profession of making Dong Ho paintings has existed in solitude, with only 2-3 households remaining in the village. From more than 50 artisans, the whole village now has only a few artisans and about 20 workers. In the face of the danger of losing their old craft, the family of the late artisan Nguyen Huu Sam and artisan Nguyen Dang Che have not hesitated to spend money to collect thousands of precious engravings for many years from old artisan families (Lu, 2018). The artisans are dedicated to passing on their craft to their descendants. The next generation of artisans has continued to create, inherit the legacy of their ancestors, preserve traditional folk paintings and create many new paintings following market demand. Artist Nguyen Huu Qua - the second son of the late artist Nguyen Huu Sam, has become the owner of a famous painting factory in the village, attracting many domestic and international tourists to enjoy and buy paintings.

Artisan Nguyen Dang Che's family has invested nearly 3 billion VND to build the Dong Ho painting preservation and preservation center with a paper production area, a painting printing area, and a display area for visitors. This center is a place where young people in the village learn how to make paintings and learn about the traditional craft. The center for the preservation and preservation of Dong Ho paintings of the family of artist Nguyen Dang Che is the most prominent place to preserve and preserve Dong Ho paintings in the country and a familiar address for those who love folk paintings.

Contiguous, according to some artists, Dong Ho paintings are no longer innocent, simple, "pure Vietnamese" like before, but are gradually being commercialized, without the deep colors like ancient paintings. Because white color is mixed into the scallops to save the number of scallops, causing the paper to lose its iridescence. At the same time, the colors used also changed to industrial colors for cheap and convenient. The new engravings are often rough and sketchy, not as delicate as the old ones. In particular, some engravings have been chiseled out of Chinese characters, or Nom characters, which are part of the composition of the paintings, causing the paintings to lose their completeness.

Today's profession of making Dong Ho paintings exists "weakly," only a few families maintain. According to recent statistics, the number of artisans is only three people. The number of practitioners is about 20 people. The number of artisans who can still teach is only two people (Mr. Nguyen Huu Sam and Mr. Nguyen Dang Che) were elderly. Faced with this risk, the Provincial Party Committee and the People's Committee of Bac Ninh province have had several guidelines and measures to preserve and promote the value of the intangible cultural heritage of Dong Ho folk painting craft. Such as promulgating Resolution on developing handicraft villages, including Dong Ho folk painting; promulgate Decision on construction and development of concentrated industrial parks assigned Bac Ninh Department of Culture, Sports and Tourism to implement the project "Preserving the intangible culture of Dong Ho painting village." The Party Committee, authorities, and people of Song Ho commune, Thuan Thanh district proposed to the Ministry of Culture, Sports and Tourism to organize a survey, assess the current situation, organize a scientific seminar on the profession of making folk paintings Dong Ho space. Then, the committee made a dossier to request UNESCO to register it on the List of Intangible Cultural Heritage in Need of Urgent Protection at 2017.

4. VIRTUAL REALITY

APPLICATION OF VIRTUAL REALITY IN FINE ART EXHIBITION

4. 1 Introduction

Museums are known to tend to display static exhibits. This is understandable since the outside target is to provide knowledge information, and this is a place to store and secure historical arrays. Nonetheless, with the Virtual Reality museum in use, it is possible to dynamically change this feature.

Malreaux (Malraux, 1978) was one of the first people that introduced the concept of a museum which was a different kind of environment without walls for viewing and performing art. Lately, the concept of a virtual museum and technology was coined by Tsichritziz and Gibbs (D. Tsichritzis, S. Gibbs, 1991).They named it the term "Virtual Museum" and it has emerged until nowadays.

The purpose of museum exhibitions is to disseminate precise messages from the objects to their visitors, which are being noticeable through the form and display of exhibited objects within the museum background. By using multimedia with virtual reality and providing multisensory experiences, scientific and cultural information communicated by museum exhibitions can be augmented (Grigore Burdea, Paul Richard, Philippe Coiffet, 1996) (Christopher D. Wickens, Diane L. Sandry, Michael Vidulich, 1983).

With augmented reality features, museums in Ho Chi Minh City (HCMC) can bring art to life. Scientific concepts, architectural details, and other elements that visitors are granted by revealing it from a different and extensive perspective. This not only makes it easy for visitors to answer questions but also partially reflects the story behind an era style, an influence and allows the user to have a sense of authenticity during the discovery process (HoaLT, 2019).

The article Applying Virtual Reality (VR) to Enhance the Interpretation of The Museum of Art (TMOA) in Ho Chi Minh City is part of the project Dong Ho painting restoration project used in magic exhibitions at TMOA in Ho Chi Minh City, has been taken in two years from 2020 to 2022. The project has focused on the propose of a Virtual Environment (VE) that would enable museum visitors to view and manipulate 3D exhibits. We will renovate the classic Dong Ho paintings, which most popular and famous in Vietnam culture from 2D painting to 3D modelling. In the next step, the project also redesigns the interior space of TMOA focus to serve the new 3D environment experiment. Furthermore, the necessity of numerous experimental evaluations defines for determining the best structure of VR devices. The quality of the configuration would enable users to navigate within the VE parallel control exhibits in an effective and perceptive manner. The number of people participating in museums required the diversity of their age, sex, occupation, and level social. They will attend through the VE by using the Oculus glass and fill multiple-choice questions to explain their communication feelings in the end.

4. 2 What is virtual reality

Virtual reality (VR) is a computer simulation that creates images of a world different from the physical. More specifically, virtual reality is a medium that allows actual participants to immerse themselves in some environment other than physical reality. People can use virtual reality as a medium to share ideas and experiences. The experience part is a "virtual world" created on a computer, called a virtual world. This computer simulation will track the participants' movements and adjust the sensory screen to bring them to the child. As Sherman and Craig define, people feel immersed and present in the simulation: A medium composed of interactive computer simulations that sense the participant's position and actions, providing synthetic feedback to one or more senses, giving the feeling of being immersed or present in the simulation (Alan B. Craig et al., June 2, 2009).

Fig. 27 Commonly used technical tools of VR system

This definition suggests that virtual reality experiences will create synthetic stimuli for the user's multiple senses. The highly stimulated senses in a typical VR system are sight, sound, then cutaneous haptic (touch), and force recuperation. Some senses such as vestibular (balance), olfaction (smell), and gustation (taste) are rarely used.

In order to bring high-quality real feelings to users, there are many special hardware devices involved in the VR experience. The device that helps display the familiar experience environment is a head-mounted display (HMD). HMD is a device that contains a small screen in front of each eye, with a strap around the head. In addition, VR technology is also displayed on a large screen or a combination of screens when it is necessary to cover many participants, collectively known as the large test screen (Alan B. Craig et al., June 2, 2009).

Some terms are often used in the process of experiencing virtual reality, such as tracking human body movements, user navigation, or cyberspace. Cyberspace is a term describing two user objects in two different spaces that can communicate through a virtual intermediary platform, creating a feeling of close interaction for users.

Two other terms that are equally important are "telepresence" and "augmented reality" (AR). Telepresence, although similar to VR in terms of means to place participants in a different

location from reality. The differs in that this location is due to geographical reasons or the terrain is too rugged or dangerous and inconvenient for people directly going there. Augmented reality (AR) also brings users an altered view of the natural world. The difference is that the actual space is still present, and AR adds virtual images to the user's normal senses. For example, users' sense of sight can place more objects in space, and doctors can see through the patient's body or the mechanical parts inside military equipment (Alan B. Craig et al., June 2, 2009).

4. 3 Virtual reality system

Creating a virtual world is an integrated system of many different interconnected components. The main components of a virtual reality system include the system hardware, the supporting software that links the display and input hardware together, the virtual world content that the user will interact with, and finally, the User interface design suitable for users (Alan B. Craig et al., June 2, 2009).

Typical VR System
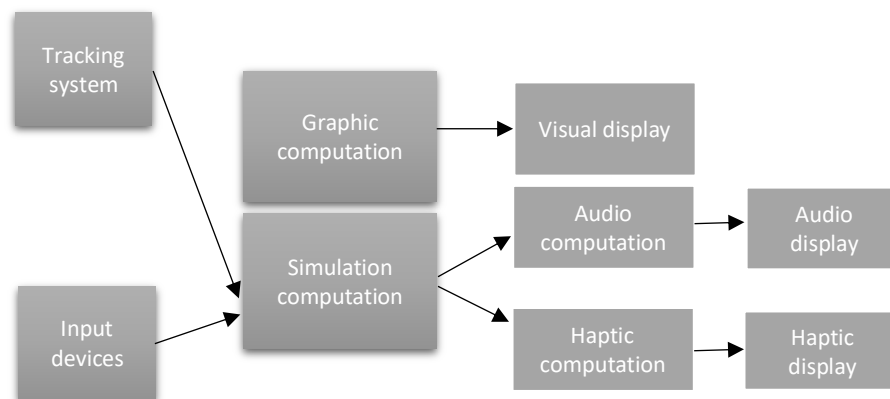
Fig. 28 This diagram illustrates how the various components are integrated in a typical VR system. Author's own.

4. 3. 1 Hardware

Hardware is classified as display devices, consciously activated user input devices, and user monitoring input devices along with the computer that supports the modeling and rendering of the virtual world.

4. 3. 1. 1 Computer/graphic engines

Practical VR experiences require real-time interaction, so the computer system has specific requirements. Computational systems are usually performed on a single mainframe that fulfills all requirements or can be performed on multiple computers. The machines need to connect through a high-speed network for low latency when using multiple computers. In any VR system, the delay or time delay between an event happening and the time its result appears is

the critical factor. Any delay that occurs in the system reduces the overall computational efficiency of the system (Alan B. Craig et al., June 2, 2009).

The computer system needs to meet the need to be powerful enough to perform calculations that simulate the physical world of the virtual world and to have enough performance to render graphics from the computational components of the graphics engine, the media that generates the sound, and the output display other senses, for example, as tactile information when touching an image.

Graphics engines must quickly render charts sync display updates between multiple monitors for binaural, multi-monitor, or possibly multi-projector transmission. No synchronization between monitors will result in the image appearing discontinuously between two neighboring screens.

In addition, active sound positioning aggressiveness can be sent to the external handlebar is also a requirement for modern computer systems. A system VR needs to be able to perform multiple impacts simultaneously, multi-threading through the use of multiple computers at the same time also meets this need.

Many of the significant VR projects in the 1990s used buggy computers with multiple CPUs and multiple hardware versions with high rendering capabilities. With the change of the 3D graphics acceleration engine, it is possible to use personal computers to implement VR systems with complex contrasts (Alan B. Craig et al., June 2, 2009). However, the cost of a complete VR system is still very high compared to that of a typical computer system.

4. 3. 1. 2 Visual displays

The visual system is the primary means of communication for most people. On the virtual reality system, the part that displays the virtual reality image is the part that has the most influence on the viewer and the experience. There are different visualization models, i.e., fixed, hand-based, head-based. Each has different advantages and disadvantages depending on the advancement of technology and monetary resources. In general, the goal of any virtual reality system is to replicate the feeling of physical reality, so stereoscopic displays are often used to create a sense of reality for the viewer.

Fig. 29 The images displayed on the computer screen are the interactive visual images of the user through the VR headset

First, it has to be a sizeable static screen such as a CAVE, wall monitor, or desktop monitor to fill the large portion of the field-of-view (FOV) for one or more people to experience. The static capacity and high FOV coverage make the user-controllable between the virtual world and the natural world for this type of monitor. However, this visual display system has the disadvantage that it is difficult to cover the natural world in some cases. Depending on the number of people covered, the number of projectors and screens may vary. This screen means more rendering systems are needed. Although there have been many improvements to CAVE's screen space, the cube surrounds the viewer with screens. The projection will have to be continuous from the top-down and the screen from the bottom up. The system requires a considerable cost and challenge in assembly, transportation, operation, and maintenance.

The most common type of display in film and television are head-based displays (HBDs). Historically, it was called helmet-mounted displays (HMD) because it was mounted on a fighter pilot's helmet. Monitors often come with headphones and are mounted right in front of the wearer's eyes, which are pretty heavy. Later versions of the improved HBD are lighter in weight and have a significantly smaller screen than the original. The screen becomes like essential sunglasses that create a sense of closeness for the user. The remarkable feature of this type of screen allows viewers to freely turn around and navigate in the virtual world and has been dubbed a 100% field-of-regard related field. This display requires less space, is easy to move, convenient, and costs significantly less than fixed screens.

Conversely, precisely because of the flexibility of the display of HMDs also makes any lag on the system more noticeable to the user. As a result, users are prone to feeling dizzy, headache, and nausea. In addition, despite the significant weight reduction, the pressure of the screen on the head attached to the cable to transmit video is also a drawback of this screen. This screen also limits the number of users at a time; the contact environment is narrower and isolates the user from the surrounding environment, making it difficult to discuss during the experience. The screen size has shrunk to fit a head-worn solution, so the resolution is much lower than a fixed static screen.

The desktop VR monitor features a standard computer monitor enhanced with stereoscopic visualization. It is similar to a giant screen and static display. They combine VR software, input devices, necessary tracking devices, and a computer screen, the scene displayed on the screen feels like a fish swimming in an aquarium. If viewers move their heads in different directions, they can see images from different perspectives in the virtual world. The cost for this system is negligible and can be used right at the user's desk.

With the development of technology, computer hardware has reached the level of developing VR systems on laptops, although not many laptops have stereoscopic screens. The most significant disadvantages are that the size of the desktop screen limits the user's field of contact, the cost of software upgrades, stereoscopic displays, and tracking devices are also higher than those of conventional devices be different.

4. 3. 1. 3 Haptic display

Tactile display refers to the touch of the human body. *Touch* is a complex term that manifests not only through the "tactile" (input through the skin) but also through the "proprioceptive"

musculoskeletal system. For example, feeling the roughness of a wooden surface or feeling the weight of an object is related to touch.

Most devices designed for tactile displays focus on tactile presentation and user experience. Depending on the technology, it can create force or create a light feeling on the skin.

The tactile displays are divided into "world-grounded" (stationary) versus "self-grounded" (body-based) displays.

A "world-grounded" display can be attached to the space ceiling or glued somewhere to some real-world object. The user grasping an object can feel the surface and weight of the object when the user wants to move the object, thanks to the many links that lead them to feel the friction and the weight of the object. Alternatively, when an object moves, the tactile screen creates an impact force that the user can feel when they touch it.

For the "self-grounded" display, the user will be wearing a glove-like device equipped with a small vibrator for tactile visualization. The "self-grounded" display is as effective as a grounded display, allowing the user to feel the touch of the skin and the object's shape thanks to the mount-mounted device.

4. 3. 1. 4 Input devices and user tracking

The virtual reality system has two types of input "cognitive input" (specific user-triggered events) and "user monitoring" (tracking the user's body movements). In other words, the duo acts as an active input that uses a passively inspired receiver for attributes like the user's location. The shape of the system host computer to create a will not be matchable if there is no input.

The sensor location is the device used to track the user's usage, and it holds the most critical position in any VR system. Standard sensors include optical, mechanical, electromagnetic, ultrasonic, inertial/gyroscope, and neurological/muscular devices. The best position variable is to verify the word limit for the system.
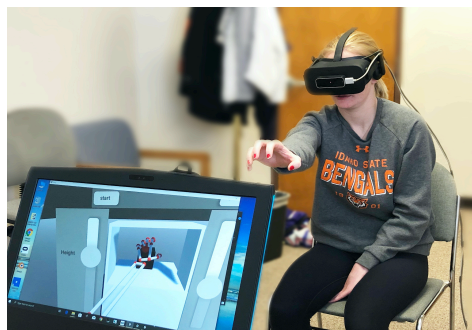
Fig. 30 Hand movement in VR environment

4. 3. 2 Software

4. 3. 2. 1 Laws odd nature simultation code

Many types of VR experiences have some programming that governs behavior and interactions with objects according to the laws of nature. The user cannot act on the object in this context but only works around the simulated environment. The user may have global behaviors on

specific objects subject to more advanced simulations. Some other simulation apps try to simulate the real world as best they can by following math and physics formulas from real life.

4. 3. 2. 2 Rendering libraries

The rendering library is a collection of rendering algorithms suitable for depicting any meaning. The libraries of rendering visualizations are developed for the visual element and auditory and tactile applications. Users will experience what transforms the world's internal computer database from rendering libraries.

This library has features that represent the basic features of the scene and other multi-screen functions. This library can also support advanced graphical functions such as collision detection or object description hierarchy.

4. 3. 2. 3 VR libraries

The task of the VR library is to collect the necessary information about the user display the outputs appropriate to the user's current location and actions. The library also has to perform simulation and rendering capabilities, analyzing input data at high speed to make the simulated VR world look lifelike and respond to participants' actions quickly. It shows that the VR library needs to be able to execute multiple tools simultaneously to achieve fast and accurate real-time feedback.

4. 3. 2. 4 Ancillary software

During the presentation of the experience, in addition to the required software, it is necessary to use much different software to create a convincing and realistic virtual reality experience. In such cases, the audio editing software needed to build the audio tracks will be heard in the experience. The image processing software helps create a sensible texture map. The operator will control experience parameters through the user interface libraries associated with the VR experience.

4. 3. 3 User interation

Unlike the traditional computer systems known previously virtual reality (VR) presents an unprecedented mode of interaction between humans and the virtual world. One drawback of this new mode of interaction is that there will be no established set of traditional communication languages and must be borrowed from a two-way user interface. In spite of this, when using borrowed models, taking advantage of these languages designed for traditional 2D environments for use in 3D virtual environments is a challenge.

- Interaction methods:

One form of interaction in a real-life environment is to mimic the actions in physical environment entities. For example, to move any object, the user moves their hand to the object, selects the object by closing their fingers, moves their hand to change its position. This form is live interaction that simulates by tracking the position of hands and fingers.

Other forms of computer interaction with which we are familiar are human, virtual, and physical interactions. We usually physically interact with the computer mouse and keyboard

in a conventional computer system. In virtual reality systems, they are replaced by the steering wheel, gloves, a handheld wand attached to the input devices to the system.

Another common form of interaction in VR systems is virtual input interaction. The virtual buttons are displayed directly in the VR environment, which can be activated by the user based on physical interaction or virtual contact with the virtual button.

The final form of interaction is the presentation of control parameters through an agent. Communicating with an agent makes it possible to know the user is desired command or action for the system.

- Targeting object

A simple way to make choices in the virtual world is to choose a direction or choose an object. Making quotient choices is using human body parts such as eyes, fingers, and turning head. Through the voice software pre-installed in the system's menu memory, the user can also choose by pointing to the desired object or referring to the object's name.

- Operating the virtual reality

After selecting an item, the user usually takes some action on that item. When manipulating experiences, there are two ways to act on objects: by mimicking the effect of forces on them or by changing the properties of objects in virtual reality or supernatural modification.

For example, a house in the virtual world can be changed from white to blue by painting a virtual color on the house through imitation of the real thing. In addition, it can be changed to another color through menu colors (supernatural modification).

- Navigations

Navigation is a familiar technique used in everyday life or the media, the network, and the internet in the real world. Navigation often describes how we move from one location to another, for example, when we walk, run, drive, fly, skate, snowboard, or paddle in a virtual reality world. The navigation terminology in VR splits into two subsections: travel and route finding. Using information about the VR world to give direction and control movement speed is navigation. Travel navigation controls the movement of an object in the VR world, such as jogging or driving a car.

Fig. 31 The user interacts with the VR environment like a driver in a car

4. 4. Explaination of the effort developing of VR environment

Presently, Virtual Museum applications adjust from entire cave systems to partial multimedia presentations. VR systems bring a compelling sensory and affective experience that is certainly afforded by fully immersive might be the most effective system in an exhibition at the museum. The number of installations worldwide is limited because these systems use cutting-edge technology at an extremely high cost (G. Lepouras, A. Katifori, C. Vassilakis & D. Charitos , 2004).

Changing from a classic model of an exhibition to create a VE may provide an enriching, intense, and entertaining presentation of assured exhibits to visitors. Furthermore, these previous examples of VR exhibitions in museums show several other reasons that may explain the exertion of improving such a system:

- Deficiency of space: Most museums display a small percentage of the exhibits they own since presentation space is frequently limited. Depending on the shape, size, and material of objects may be too breakable, cumbersome, or of high value to be exhibited. In this case, the stored objects can be successfully displayed by VR presentation within the environmental context of the real circumstance museum (G. Lepouras, A. Katifori, C. Vassilakis & D. Charitos , 2004).

- Simulation of the exhibition environment: Visitor possibilities view a simulation of vital objects, species, architectures, or environments by a VE system offering. These environments may either:

- No extended exist today

- be damaged and in the requirement of reconstruction renovation

- not be able to experience because they exist in a served weather condition or their conditions do not allow for their interior to travel through.

- Performance in an unsafe or isolated environment: Images within an ancient warrior, dinosaur, or on the mountains of Jupiter, which may be too complicated or too unsafe to physically visit. A VE system is the most guaranteed way of visiting this kind of environment.

- Ambulatory exhibition: A mobile VE system, which is a method where the digitized content of a museum is experienced in a practical manner, can be easily carried to any exhibition site or remote location. A wider audience may view significant exhibitions without the requisite of far-removed.

4.5 Suggestion for Visual Reality (VR), application of an art exhibition in the art museum in Vietnam

Museums steadily embrace displays and support initiatives that prioritize human experience and collaboration (Abercrombie & Longhurst, 1998; Stylianou-Lambert, 2010). While conventional museological types consider tourists as inactive information users, the current museology strives to increase citizens' proactive participation via digital technology and customized personal interaction. It is suggested that this is more culturally integrated and

encourages personal and interpersonal change (Stylianou-Lambert, 2010). O'Connor (2010) argues that Digital technology's growth will introduce innovative ways of involvement and participation in the artistic field and encompass multiple influences and management approaches. Study results of experiences with culture and art facilitated by new technology, for example, find that those interested in museums and virtual art are equivalent or similar to people who attend and associate more frequently (e.g., Dean, Donnellan, & Pratt, 2010; Holdgaard, 2012).

The cultural objects displayed in a museum's physical surroundings are commonly seen in the display where minimal information is accessible. Museum items could be scanned and interpreted in an enjoyable digital environment at simulated museum exhibitions. A simulated museum might include specifics that traditional exhibits cannot present in a museum display. Thus, museum curators are granted a more satisfying experience due to a deep understanding of artifacts through the interactive context instead of the ones sealed in a display cabinet with a necessary explanation on a label. In such immersive experiences, consumers can interactively and flexibly navigate galleries. Digital museum exhibits offer virtual guests the opportunity to examine and interact with an item from all dimensions. Digital visitors will navigate themselves; they identify where the displays are located in the digital arena. The artifacts themselves will express their value when explored in combination with other area objects and with a narration that ties the artifacts to their history and helps bring to reality the possible cohesiveness of artifacts and their stories (*see also* Soren, 2004).

As described above, the number of young audiences attending at the art museum is decreasing since they can not pursue their specific motivation, tackling the issues of the Vietnamese Art Museum in general and the HCMCMFA in specific. The following levels of info about the artifacts are presenting, as well as the museum's current approach to youth is indeed not exactly ideal. The VR approach will enable the HCMCMFA to handle the situation. Virtual museum-focused groups are museum curators and end-users. In the second group, three subcategories may be divided: experts, academics, and visitors (Bowen et al., 2004). Digital museum exhibits will provide a significant volume and level of experience, intended to expand insights, operate efficiently, and cultivate a broader understanding of each of the previously mentioned demographics of cyber guests. They might satisfy the demand for the essential and differentiated knowledge of ordinary tourists and need no additional support to decode the meanings and ideas within museum objects (Paternò & Mancini, 2000; Hooper-Greenhill, 1992).

Digital museums are often capable of presenting in-depth appropriated knowledge for different groups of visitors, thus bringing attention to not just one but several museums and art galleries, to various investigations, including the descriptive analysis criteria of experts and students. In comparison, artistic galleries can attract audiences who are rarely accessing museums or exhibitions and have no relevant familiarity or interest in the exhibition's subjects (Economou, 1998). Guests at digital art museums are offered chances to improve vital skills. A virtual museum will allow visitors to discover, practice individuality, and be prominent users, constructing their virtual tours and directions. Besides, interactive platforms can be used as intelligent systems that enable virtual tourists to surpass human experience limitations such as

memory or decision- making weaknesses and achieve their expertise (Pea, 1985). A typical indication of this would be virtual museum tourists' potential to construct an individual multimedia showcase of digital artifacts, a display that suits their expectations and can exchange it with others. More educational opportunities arise in a simulated museum setting than in a traditional museum (Davallon, 1998; Mokre, 1998). Many digital museums have been constructed to reflect the functionalist concepts of educating by construction and experimentation, including engagement, experiencing, and learning together (Hein, 1991; Falk, 2000). In a simulated museum world, guests are not spectators but engage with learning artifacts and create information themselves. Moreover, interactive platforms are used as cognitive technology that enables simulated tourists to overcome human mind limitations such as memory or problem-solving limitations and create their expertise (Pea, 1985).

The restoration process we summarized in Project work flow will be followed over the two-year project period. This process consists of three main steps: Planning, Modeling and Programming. In the planning section, we will conduct research and select a concept story for the VR movie. We also conduct a selection of the most iconic and iconic paintings of Dong Ho folk painting. Then we will conceptualize the scenario and story setting. At the same time, we also created the story board for this period and corrected many times to complete the script. In the Modeling section, we will continue to refine once more but more specifically the characters in the selected paintings. We use popular modeling and animation programs such as 3DMaya, 3DsMax, to reconstruct the character modelling story background. Texture mapping will use larger software such as 3DMaya, Blender, Unity to render 3D spatial scenes and can be used in VR. We also check, test, and fix errors in rendering and rendering. The Programming section links modelling environments and contexts to the same video. In this section, stages such as adding subtitles, annotations, sound, and animations are also edited and edited to be included in the final movie.

5. DESIGN PROCESS
QUANTITATIVE SURVEY RESULTS

5.1 VR videoclip design process

Designing and restoring Dong Ho folk paintings to include in a virtual reality video is not an effortless process. The author collaborated with a professional studio to discuss, edit and give the final result of a VR video called Walk into Dong Ho Painting. The two-minute video was made over five months (not including prep and concept), and the making of the film is described in the process summarized below.
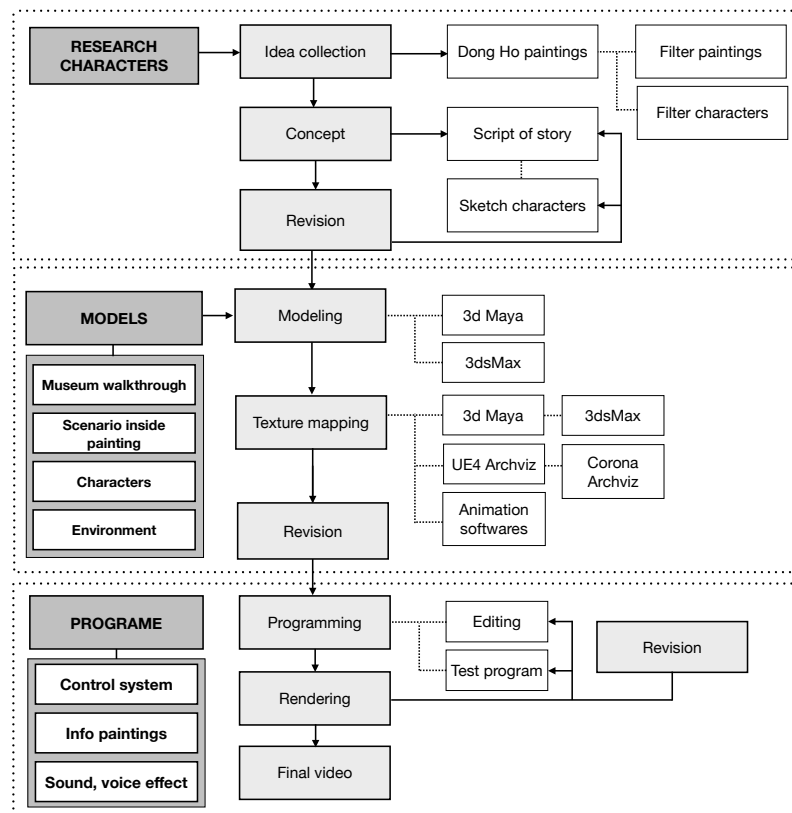
Fig. 32 Workflow for the development of the VR video – A: PLAN (top), B: MODELLING (center) and C: PROGRAMMING (bottom). Author's own.

5.1.1 Research characters, history, context
5.1.1.1. Recap the survey before design and select characters

Front of choosing paintings and characters to recreate in virtual reality, the author did a survey with Vietnamese people about their understanding and aspirations for Dong Ho folk paintings. The survey includes 21 questions (4 questions about personal history, 17 questions about Dong Ho folk paintings and museums in Vietnam). The survey was opened for seven days from

September 10-17, 2021, with 163 participants, aged 15-65 years old, across all provinces in Vietnam.

Bạn có mong đợi được thấy tranh Đông Hồ nào dưới định dạng Thực tế ảo VR? (có thể chọn nhiều hơn 1 tranh)
162 câu trả lời
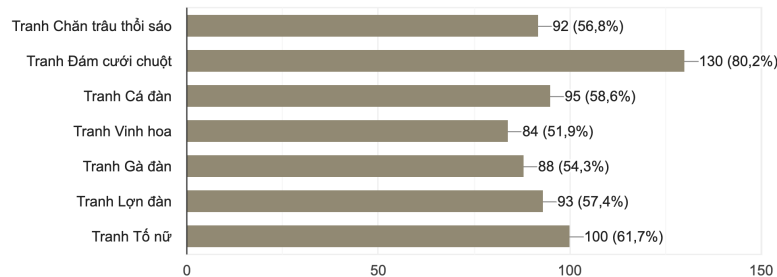
Fig. 33 The survey Vietnamese for the favorite painting which they want to see in a virtual reality environment

The survey shows that 42% of the survey participants are from Ho Chi Minh City. The remaining 58% of the survey participants are from Hanoi, Nha Trang, Hue, Da Nang, Da Lat, and some Western provinces of Vietnam or currently residing abroad. The age of survey participants from 15-20 years old accounted for 62.3%, 23.9% aged from 21-30, 8.6% of people aged 31-40 years old, the number of people aged 41-50 years accounted for 1.8%, and the remaining 2.5% are 51-60 years old. The proportion of women accounted for 69.9%, and men accounted for 30.1%.

Through the question of knowledge about Vietnamese folk paintings, more than 98.2% of the survey respondents knew about Dong Ho folk paintings, and only 0.6% of people had never heard of them. Vietnamese folk. However, understanding the basic knowledge of paintings does not give positive results; some famous paintings are not well known. Materials, methods of painting, and origin of Dong Ho folk paintings are also not well understood through survey data. 35.8% of people know about the characteristics of paintings are woodcarving and hand-painted. Up to 52.5% of people who know Dong Ho folk paintings were ranked on the national intangible cultural heritage list in 2013.
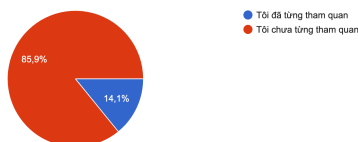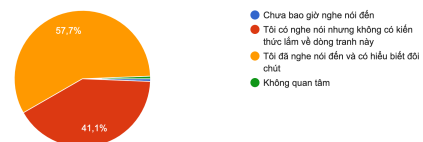
Fig. 34 Survey on the number of times Vietnamese people attend the Dong Ho folk painting exhibition (Left chart)
The survey Vietnamese for understand how much popular of folk painting in Vietnam (Right chart)

Regarding visiting museums, the survey also showed that they rarely went to museums before the covid epidemic. 47.2% of survey respondents have never visited a museum or art gallery,

and 44.2% of people indicate that they visit a museum or gallery 2-3 times a year. Most think that art museums in Vietnam lack publicity, are boring and outdated, do not interact much with the audience, and do not create interest in the museum. They also expressed their expectation that the museum will be designed with a well-organized, interactive art space through visual and sound effects, more exciting museum displays, and more vivid knowledge of artwork.

Regarding VR technology, 65.4% of survey respondents have heard of this technology, while 28.4% have never heard of it. Only 5.6% have ever participated and experienced VR technology. It is understandable that up to 92.6% of survey respondents feel curious and want to participate in an art exhibition applying virtual reality technology. 93.3% want to see Dong Ho folk paintings displayed in 3D in VR.

Finally, the survey results showed that the two paintings that achieved the highest number of voters wishing to see the exhibition in 3d virtual reality were The Mouse Wedding (80.2%) and the Beautiful Woman painting(61.7%).

Based on this survey, the author has selected to research and adapt two paintings of The Mouse Wedding and the Beautiful Woman painting of a palace made from the 2D format, woodcarving, and hand-carving into 3D virtual reality format. These two paintings will also appear in the actual video of the Dong Ho folk painting exhibition that the project is researching.

5.1.1.2. Research paintings

Fig. 35 The Mouse Wedding, Paintings satirical Line, Dong Ho Folk painting, sample of artisan Dang Khien Nguyen. Size 26x37cm

• **The Mouse Wedding painting**

The lineup in the picture consists of two rows:

In the upper row, four rats are approaching the front of the cat. The old rat took the lead, brought out the dove with both hands, but was afraid of shrinking its neck, tail, and cowering. Although his head was raised higher, the second old rat still bent his back, or his hands were shaking, his claws were clumsy as if he was afraid of dropping the offering of carp, which the cat loved so much. The third mouse is the old mouse playing the trumpet, still glancing at the old cat's attitude. The third rat is a young mouse who plays a deep horn, stooped, and stooped. On the heads of the mice, there are Chinese characters from left to right: Protecting body (keeping body), Lao Tieu (old mouse), and Composing music (playing the trumpet). Hold the first mouse and the old cat with the word Tong Le (give the offering). On the right corner of the picture,

the old cat's head is the word Mieu (cat) to help viewers know more about the family of the mouse, bringing tribute to the old cat.

In the right corner of the picture is a giant cat, enormous (personification and exaggeration of the proportions of the body more considerable than the horse in the lower row), sitting half-heartedly, one leg extended as if preparing to receive a gift ceremony. The old cat shows with stripes on the face and the back contours. The legs highlight the cruelty with a pretense of benevolence.

The bottom row is the wedding scene with eight rats. Leading the way is a male rat, wearing a hat with a dragonfly on his head, wearing a green robe, wearing shoes on his feet, sitting on the back of a pink horse. The rat is facing back; his face is arrogant and smug because he just got his doctorate and married a beautiful wife. Next to it is written the Chinese character "Giai te." Behind the maid was a black rat holding a parasol and a half-black, half-white rat with a sign "Nghinh hon." The mouse holding the parasol looked dignified. The one holding the sign naughty turned back to look at the bride's candy. The remaining four rats carried the palanquin. The two in front of them looked straight ahead and profound. The two behind looked back, either intentionally showing us that the procession might continue or watching for fear of the cat chasing us from behind (Nguyen T. Thu et al., 2019).

The bride sitting in the palanquin also wears a scarf wears a blue brocade shirt, looks at her husband riding a horse ahead, proud and satisfied.

Meaning of the picture: With a history of about 500 years, the painting Mouse Wedding has humorous and profoundly satirical content.

The picture is funny in that how can there be a mouse to pick up the bride and get married? The folk artist breathes the soul into the picture and anthropomorphizes the mouse so that they have a human appearance and know how to get married. The irony is that the other rat groom who wants to receive the bride has to bring birds and fish to feed the cat (Minh, Tranh Đám cưới chuột - tác phẩm nghệ thuật nóng hổi tính thời sự, 2020).

The cat in the picture represents the ruling and exploiting class in ancient society. The mouse is a metaphor for the industrious, honest, and simple farmer. The picture has no captions. Nevertheless, anyone who sees it also recognizes the subtle metaphor of the folk craftsman. Rats are inherently sly, mischievous, suspicious, constantly wary of cats - sworn enemies, and witty satirize cats greedy for bribes. Therefore, the painting Mouse Wedding was born to satirize and deeply lash out at the unjust, antiquated, corrupt feudal system that always oppresses gentle farmers.

Fig. 36 Beautiful Woman, Decoration Line, Dong Ho Folk Painting, Sample of artisan Dang Che Nguyen. Size 37x52cm.

- **Beautiful Woman painting**

The picture of four beautiful women is composed of four paintings with images of four beautiful girls showing their forte. Next to four vases represent the four seasons of Spring, Summer, Autumn, and Winter. This painting belongs to the line of traditional Dong Ho folk paintings, which are engraved with woodblocks with the traditional folk painting method. The picture has a simple black and white colors forming a very popular Dong Ho quartet.

The phrase: "To nu" here means "beautiful girl" who is beautiful in the soul and beautiful in talent (Nguyen T. Thu et al., 2019). Usually, the Four Precious Elements paintings show four virtues of a talented ancient woman: holding, examination, examination, and painting (that is, good at playing the lute, good at playing chess, knowing how to write poetry, and know-how to draw). The four beautiful girls all play musical instruments in the quartet of ladies of the Dong Ho painting series. That is the unique point of this Dong Ho's Four Quarters paintings collection.

> *Meaning of the picture:* The meaning of Dong Ho folk painting four quarters of the female element not only shows the four seasons of the year. It also shows the beauty and talent of Vietnamese women who are gentle and have a talent for singing.
>
> The four female elements are in harmony. The girls are not all the same height: She plays the highest fiddle, then plays the flute lower, and holds the flute a little lower. Moreover, she holds the fan. Of these four props, the sound of the lute gives the highest timbre, then the flute, the second click of the "senh," which is an ancient percussion, and the lightest is the sound of the fan. The critical point of the art is that borrowing forms show the meaning inside. Artists have taken the numerical height to express the high and low levels of the sound to praise the sonic beauty of the props. Beautiful Woman painting is a surreal picture; the beauty is not in the person's description. The idea of the artist who made the quartet of female feminist paintings lies in that profound point (Tam, 2021).

5.1.1.3. Research history custome, sketch characters

- **Mandarin costumes of the Le period**

Under the Le So dynasty, the costumes for mandarins had different regulations and names compared to the Ly - Tran dynasties.

a) *Court uniforms:* Unlike the Ly Tran and Le So dynasties, on the days of worshiping and enthronement of the king, Thanh Tiet, Te To, Te Thai Mieu, and the first day of the Lunar New Year, the costumes worn by the kings and mandarins are called Dai costumes. The king wore the crown during the dynasty, but the mandarins wore the imperial dress.

b) **Gongfu:** This is the dress worn to the court of the mandarins on the 1st and full moon days of every month

c) **Casual clothes:** The mandarins wore these clothes on the court's typical day every month and wore them at the office.

- **Short-legged delivery for commoner**

The short, long skirt is not over the upper body, tylically used for women. In Vietnam during the Le Dynasty, the short-legged commissar was regularly tied outside, similar to the previous periods of China, and had similarities with the Japanese hakama bandwagon.

Nonetheless, the short strapless short-sleeve dress of the Le dynasty can be distinguished from the regular strapless short-striped belt of the dynasties in China in that the outer dress is shorter than the inner one (or skirt), revealing two layers of skirts. Meanwhile, in China (as well as Japan and Korea), the outer dress is long enough to reach the ground, covering the inner dress (or skirt).

Fig. 37 Mandarin customers and short-legged delivery for the commoner of Le Dynasty

Fig. 38 Concept of customers Le Dynasty for commoner and courting year 1500 in The Mouse Wedding painting
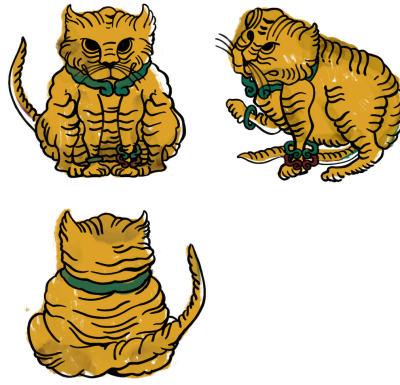
Fig. 39 Concept of the old cat in The Mouse Wedding painting

5.1.1.4. Context of virtual reality environment

Fig. 40 Exterior and in the courtyard of the communal house of Ho village

The communal house of Ho Dia village is located in Song Ho commune, Thuan Thanh district, North province. The communal house was built when the village was first established, nevertheless mediocrity remembers the exact size of the structure. In 1635 the communal house was rebuilt with bamboo and leaf paintings. In 1907, it was embellished and completed in 1911, with the wooden architecture, the hand beam, the bamboo rafters, and the thatched roof. The communal house of Ho village was built on a large and tall land in the center of the old Ho village (now Hong Ky village); anyone who comes here will receive a peaceful feeling in the village. Near the communal house, an ancient tree is hundreds of years old. Through many historical changes, this tree is still standing full of life.

In 1927, the communal house was embellished for the second time and completed in 1937. The roof was made of bamboo, the thatched roof of bamboo and thatched leaves was replaced with wood, and the roof was roofed with tile nose. The communal house has the same structure as other communal houses, including the communal house gate, the communal yard, and the tremendous communal house. On the other hand, only the communal house yard and the tremendous communal house remain on the monument site.

In the communal house of Ho village, the architectural shape of the wooden frame and the decoration of the lines (edges), floating and sinking on architectural elements such as hitchhiking, first sentence, passer, trapezoid, beam, have been made for the interior of the building to become soft and flexible. The motifs are also expressed and decorated elaborately and meticulously on different parts of the architecture. The chrysanthemum leaves are carved in an oversized shape, with enough leaves, veins, and serrated edges with fern leaves.

5.1.1.5. Script of virtual reality(VR) story

Name of the VR video clip: WALK INTO DONG HO PAINTING (WIDHP)

Scene 1: The clip title appears: Walk into Dong Ho Painting. Background: The main hall of the museum fades to clarity.

Scene 2: The space scene from the main entrance to the museum is slowly introduced into the lobby space. Then slide the camera to the space with Dong Ho Painting Exhibition posters.

Scene 3:

- Continue to slide the camera to the interior exhibition space.
- Get close to the Mouse Wedding.
- Click effect.
- Transition the scene feels like the viewer jumps into the picture.

Scene 4: The scene inside the painting, from above, looks down at Dong Ho village's communal house. The camera moved lower and lower to Dong Ho communal house entrance and then moved inside the communal house yard.

Scene 5: The camera scans through the group of rats with the groom sitting on a horse, then the bride and her entourage next to them, making offerings to the cat. (Viewers can rotate 360 degrees while the camera moves.) Background 360: Dong Ho village communal house

Scene 6: The screen jumps out of the picture and back into the museum space, scrolling through a few artifacts for 3-5 seconds to the following picture, Beautiful Woman painting. The effect of clicking on the picture and the viewer is like being brought inside the picture.

Scene 7: In the scene inside the communal house yard of Dong Ho village, the camera can scroll from the front to the specific girl from left to right (girl number one to number four). (Viewers can rotate 360 degrees while the camera moves.)

Scene 8: Effect scene out of the picture. A viewer can spend 5-10 seconds describing the museum space and traditional exhibits related to Dong Ho paintings. The scene then fades out and gently ends the clip.

5.1.1.6 Poster of the exhibition

The exhibition carries the spirit of a modern, simple, and highly artistic space. The main character of the exhibition is the display of Dong Ho folk paintings and artifacts of the same style and historical period. The poster is designed from a mood board using a serif font but not too rigid, with a bit of modernity because the exhibition uses virtual reality technology. The color tones used include typical colors from Dong Ho folk paintings, such as blue, yellow-orange, and crimson. The poster's background is inspired by the image of the Mouse Wedding painting to keep the spirit of traditional folk painting. The poster is A0 841x1188mm in size and is hung near the lobby with the reception desk, so viewers can look at the poster before entering the exhibition inside.

Figure. 41 Moodboard of the exhibition poster and the final poster of WIDHP exhibition

5.2. Models system

5.2.1. Museum sample modeling

- **Project information**

Thang Long Cement Factory is one of two factories along Cua Luc Bay, built-in 1987 according to the government's industrialization policy at that time. Inspite of the trend of sustainable urban development, factory activities are causing higher levels of urban landscape pollution than allowed. Realizing that, Quang Ninh province decided to force stop and relocate the factory until 2025. Instead of demolishing the post-relocation concrete structure, the architect took advantage of the solid shell and renovated it into a space that can be used for many types of works.

- **Location:** Thang Long Cement Factory is located in the relocation policy in Ha Long city, Quang Ninh province.
- **Scale:** improved land area 2.2 ha.
- **Natural condition:**

The southwest borders the residential area and the Ha Long seafood hill villa project.

North - Northeast borders Cua Luc bay.

The south - southeast are hills and Ha Long tourist area.

- **Design story**

Cultural and artistic values are the two main factors that convey design emotions to work. Between the pace of modern life and the artistic breath, a Contemporary Flow is formed, expressed in various forms of expression from pictures, compositions, installation art. Performance flow carries meaning throughout, continues the culture, and leads contemporary art closer to the public. The TNEMEC architectural complex is considered a great work of art, surrounded by other works of art. These works take mineral resources, cultural, and archaeological deposits as materials for artistic creation. The light and color of the materials are the main languages that guide the emotions and form the passage in the correct sequence that the author places to enter the space.

- **Materials, colors, light set up**

75

The materials used in the design are minimalistic, providing the background for the exhibition space and creating flexibility for the author's decoration purposes. Therefore, the wall, ceiling, and floor systems create a seamlessness in the materials that bring the connection in the same space. Lighting design and layout is an effective solution to honor the value of the exhibition products and clearly show the objects on display. In addition to natural light from skylights and large glass frames, artificial light is the key light source to balance, guide, and create accents throughout the space. The value of preserving the heritage of the silos and mills will be expressed in the spirit of preserving the ontological roots through the original raw elements, from the traces of oxidation bearing the bold moss of the time. Materials such as concrete, industrial iron, and steel. The originality of geology and minerals inspires colors. Earth tones become the primary color, accented with colors from materials used in the exhibition such as coal, glass, sand, crystal, and underground archaeological remains.

- **Museum lobby area:**
- **Advantages:** High and wide ceiling space, significant column steps, creating open and airy space
- **Disadvantages:** Many windows catch the harsh sun from the west. Architectural language and interior are unbalanced.
- **Renovation solution:** Breaking down the partition between the two spaces creates an open space, helping the light be distributed evenly while saving the amount of Western sunlight for the lobby area and bringing natural light to the exhibition space.
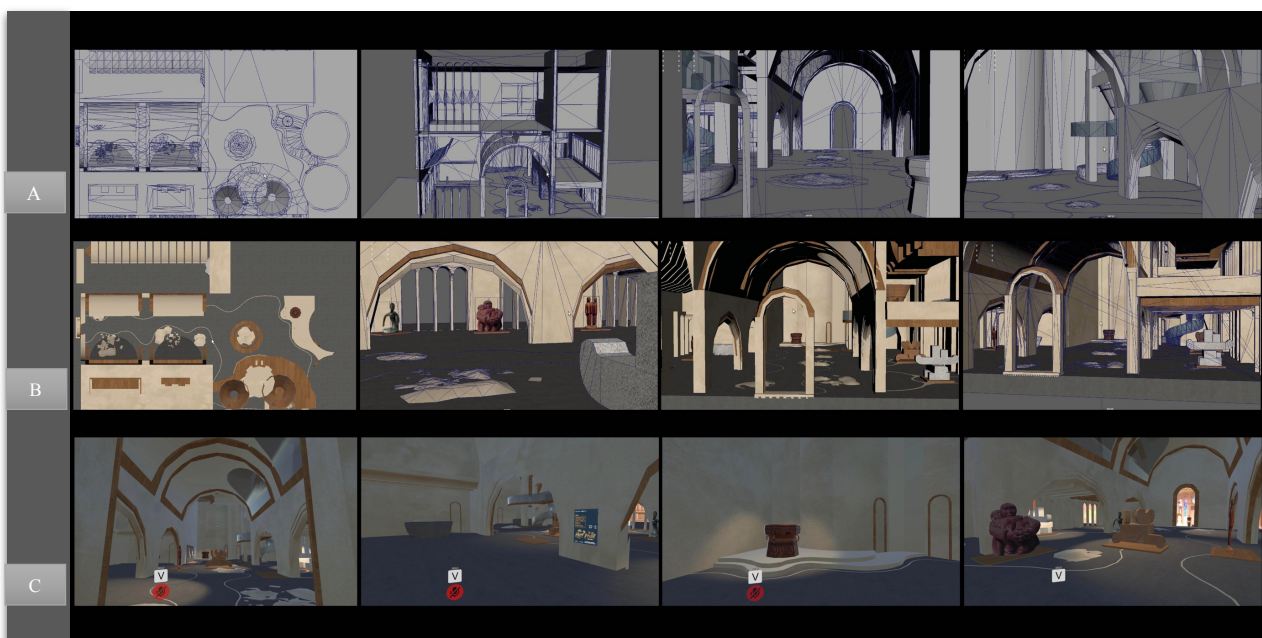
Fig. 42 Process of drawing the exhibition space (TES)

Process A(PA): Create 3D TES from 2D drawing by using 3DMax software

Process B(PB): Map the texture, material, color for TES and set up objects by using 3DMax software.

Process C(PC): Set the overall lighting, and the light emphasizes the paintings for TES. Grid processing optimizes all maps to fit into VR.

5.2.2 Dong Ho painting modelings

- **Dong Ho temple context: Dong Ho village communal house**
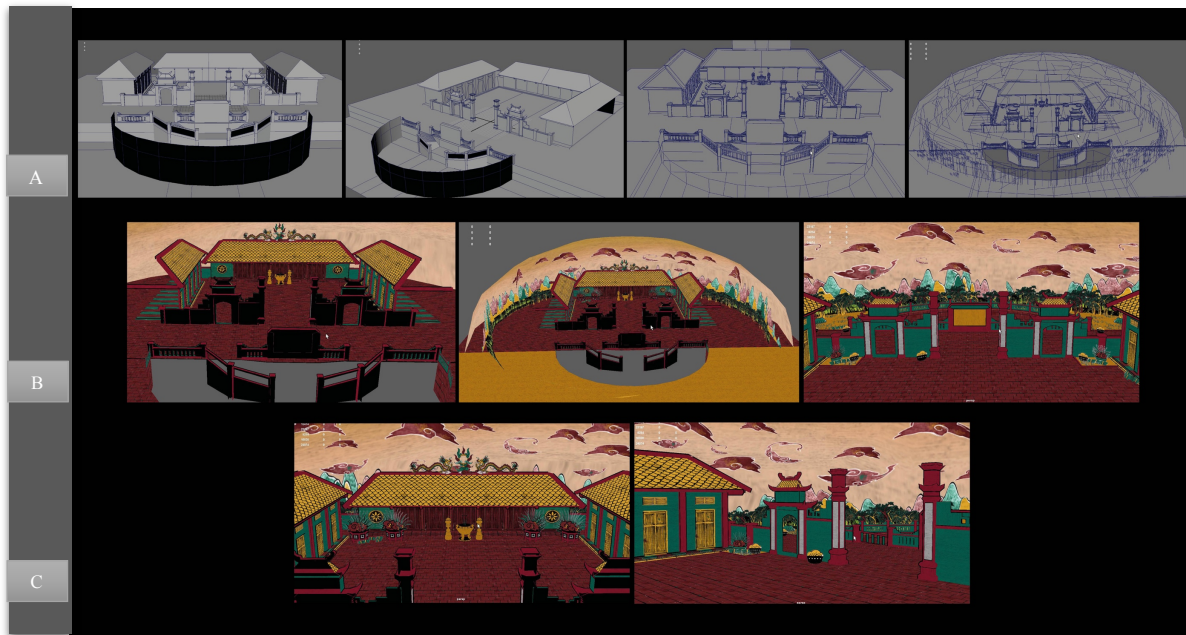
Fig. 43 Process of drawing Dong Ho village communal house (DHVCH) modelings

    PA Create 3D DHVCH from 2D drawing by 3Dmax and Blender

    PB Map the texture, material, color for DHVCH and set up objects by using Blender

    PC Apply 2D materials to 3D using the reverse map technique in 3dmax

    Grid processing optimizes all maps to fit into VR
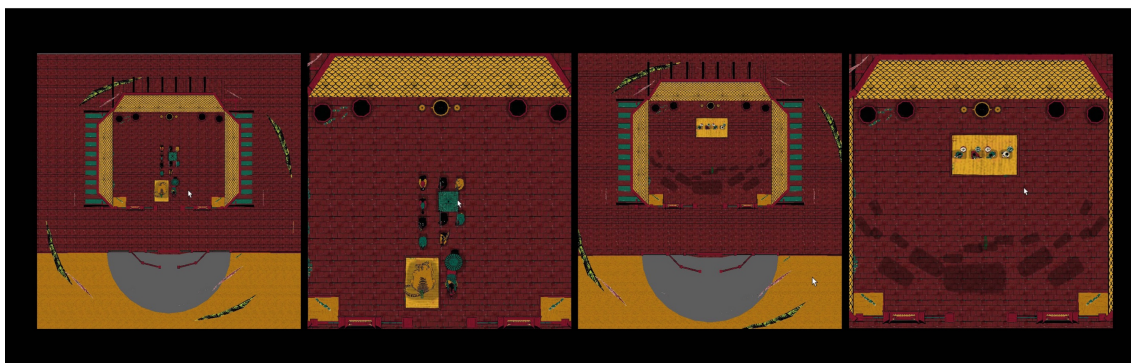
Fig. 44 Views from top position of The Mouse Wedding (2 fig left) and Beautiful Woman (2 fig right) set in the courtyard of DHVCH

- **Mouse wedding characters**

Fig. 45 Process of drawing The Wedding Mouse painting modellings

PA Create 3D DHVCH from 2D drawing by 3dmax

PB Map the texture, material, color for DHVCH and set up objects by using Blender

PC Apply 2D materials to 3D using the reverse map technique in 3dmax

- **Beautiful woman characters**
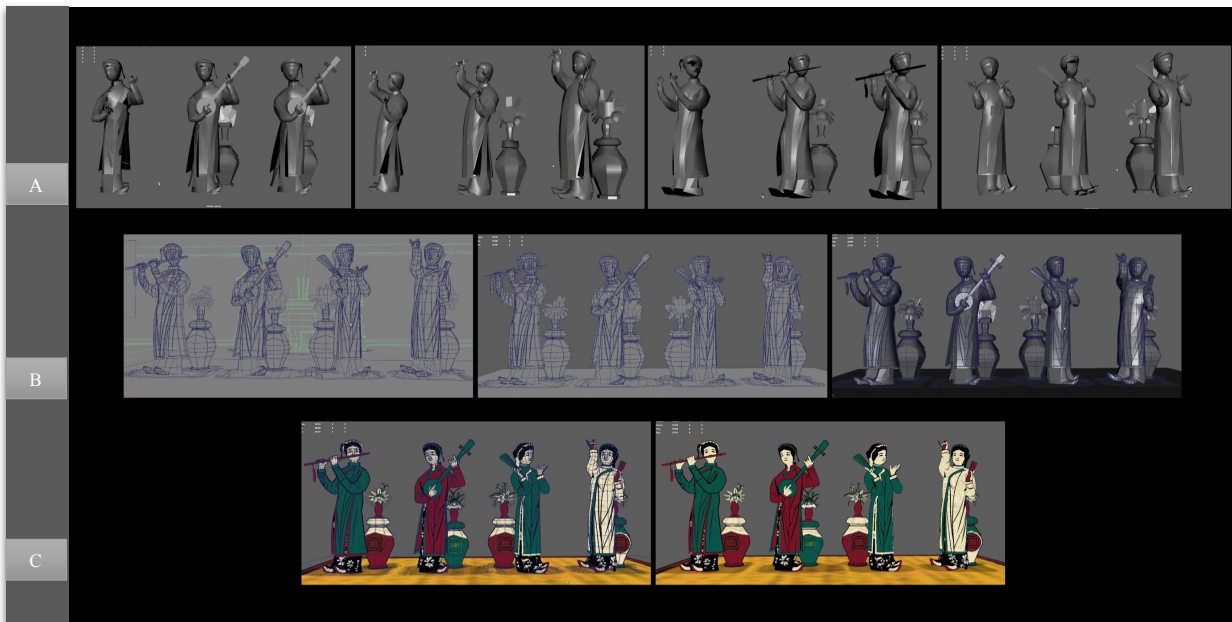
Fig. 46 Process of drawing Beautiful woman painting modellings

PA Create 3D four woman from 2D drawing by 3Dmax software

PB Combine four modellings and set up in the scenario of DHVCH

PC Apply 2D materials to 3D using the reverse map technique in 3dmax

Fig. 47 Some views of Dong ho village communal house modellings with
two paintings set up

PA The Wedding Mouse modelings set up in the scenario of DHVCH

PB Beauty Woman modelings set up in the scenario of DHVCH with viewers

PROCESS	DETAILS	TIMELINE
A. SOFTWARE	• Museum rendering, painting: 3ds max, Maya, Blender • Bring it all into VR: Unity • Filming: OBS • Movie editing: Adobe After Effects	
B. TEXTURE, MATERIAL	• Draw 2D materials of female paintings, mouse wedding paintings, Dong Ho village hall with Clip Studio Paint software. • Process images of materials in exhibitions using Photoshop software. • Apply 2D materials to 3D using the reverse map technique in Maya. • Grid processing optimizes all maps to fit into VR.	October, 2021 to February 2022
C. VR PROCESS	• Lay the floor flat so the character does not fall out of the scene. • Include all 3D-drawn products. • Create one wall and floor to place two pictures on. • Set the overall lighting for the museum, and the light emphasizes the paintings. • Place pre-processed materials to all 3D products. • Set the scene outside the museum. • Set the character drop point so that the character has a place in the museum, not free-falling (all characters, when falling into the museum, will be at the same drop point to not fall from the scene). • Assign poster available. • Assign pictures and describe pictures. • Technical processing click on the picture so that the picture frame appears with the picture and the information. • Technical processing to change the scene from museum to Dong Ho painting. • Technical processing to press back, the museum returns to its original state.	January to March 2022

D. CAMERA SET UP	• All video recording data is in VR chat software. • Characters will be dropped when participating in the scene. • The character will move and use his perspective as a camera to record the entire image in the VR scene. • Edit video with After Effect software (insert audio, cut and edit necessary parts in the clip). • Convert clip format to conform to Youtube's 1080 standard.	March 2022

Table 2 Recap programe, VR process, camera set up. Author's own.

5.3 Quantitative survey results

5.3.1 Measurement model verification

Google Forms could be a survey administration software included as a part of the free, web-based Google Docs Editors suite offered by Google. The service includes Google Docs, Google Sheets, Google Slides, Google Drawings, Google Sites, and Google Keep. Google Forms is simply available as an internet application. The app allows users to make and edit surveys online while collaborating with other users in real-time. The collected information will be instinctively entered into a spreadsheet.

This study uses all survey data on Google form for convenience, security, and accessibility to all survey participants. The survey on Google Form can set the time limit for answering questions, giving accurate and immediate results. The way of synthesizing the answers and giving a statistical table, the percentage is highly accurate and precise.

5.3.2 Quantitative survey results

In this study, the author conducted two surveys to get the results.

The first survey (1stS) with 163 participants (including Vietnamese and foreigners) was conducted from March 15 to March 30. This survey aims to measure the understanding of Vietnamese folk paintings, Dong Ho folk paintings, and the younger generation's taste in folk painting exhibitions. This survey was mentioned in the character research and survey section (5.1.1).

The 2nd survey (2ndS) with 120 participants (Vietnamese only) was conducted from April 1 to April 10. After submitting the link to the VR chat exhibit Walk into Dong Ho painting (WIDHP), this survey was conducted for online viewers. The exhibition aims to measure the audience's interest in the folk painting exhibition in the VR environment and their expectations for future VR exhibitions.

The above surveys were conducted on the Google Form platform and sent survey links via email and social media.

Table 3

A quick preview of the survey data shows that more women are interested in folk paintings than men when more than 114 Vietnamese women (69.6%) and 20 foreign women (68.9%) are willing to participate in the survey in table 3 below. The survey shows that more than 80% of survey participants are between the ages of 15 and 40, of which more than 60% are from puberty and very young, from 15-20 years old. The young generation is also the object that the study wants to target to examine the tastes and attitudes of young people towards traditional folk paintings of the country.

Table 3 Demographic profile of research participants 1stS

No	Factor		Vietnameses		Foreigners	
			Frequency	%	Frequency	%
1	Age	Range 15-20	103	63.2	2	6.9
		Range 21-30	39	23.9	5	17.2
		Range 31-40	14	8.6	15	51.7
		Range 41-50	3	1.8	5	17.2
		Range 51-60	4	2.5	2	6.9
		Range 61-65	0	0	0	0
	Sub-Total		163	100	29	100
2	Sex	Male	49	30.1	9	31
		Female	114	69.9	20	68.9
		Another gender	0	0	0	0
	Sub-Total		163	100	29	100
	Grand-Total		**163**	**100**	**29**	**100**

Source: Field data from Vietnam, from 15 September to 30 September 2021. Google Form.

Table 4

The survey in table 4 also showed that the participants' occupations were mainly students; students accounted for more than 77.2%. Master and Ph.D students make up 3%. People who work related to offices, organizations, and companies accounted for 16.7%. No people of retirement age participated in the survey. The author intentionally targets the survey subjects who are working and studying at school as they have many sources of knowledge to access every day. In addition, this survey will similarly show clearly whether the Vietnamese people's social awareness has a capable understanding of their nation's cultural and artistic traditions. The survey included 29 people from European countries (this is an additional survey). Although the number of participants in the survey is not abundant, it shows whether the popularity rate of the famous Dong Ho folk painting line is internationally loved or interested.

Table 4 Demographic profile of research participants 1[st]S

No	Factor		Vietnameses		Foreigners	
			Frequency	%	Frequency	%
1	Job	Highschool, college	125	77.2	2	6.9
		Master, Doctoral degree	5	3	5	17.2
		Officer	27	16.5	15	51.7
		Part time, freelancer	11	6.7	5	17.2
		Intrepreneur, bussiness	2	1.2	2	6.9
		Retirement	0	0	0	0
	Sub-Total		163	100	29	100
2	City	Ho Chi Minh(Vietnam)	47	22.8	0	0
		Another city (Vietnam)	116	77.2	0	0
		Helsinki (Finland)	0	0	2	6.9
		Stockholm (Sweden)	0	0	15	51.7
		Zlin (Czech Republich)	0	0	7	24.1
		Hamburg (Germany)	0	0	5	17.2
	Sub-Total		163	100	29	100
	Grand-Total		**163**	**100**	**29**	**100**

Source: Field data from Vietnam, from 15 September to 30 September 2021. Google Form.

Table 5

Table 5 The participants knowledge about Vietnamese folk paintings 1stS

No	Factor	Vietnameses		Foreigners	
		Frequency	%	Frequency	%
1	Number of people who know about folk paintings and have a bit of knowledge	94	57.7	0	0
2	Numbers who have heard of folk paintings but have no knowledge	67	41.1	10	34.5
3	Numbers who no have heard of folk paintings before	2	1.2	19	65.5
	Grand-Total	**163**	**100**	**29**	**100**

Source: Field data from Vietnam, from 15 September to 30 September 2021. Google Form.

Table 6

Table 6 Recognize the familiarity of Vietnamese folk paintings 1stS

No	Factor	Vietnameses		Foreigners	
		Frequency	%	Frequency	%
1	Dong Ho folk painting	160	98.2	3	10.3
2	Kim Hoang folk painting	21	12.9	0	0
3	Hang Trong folk painting	60	36.8	2	6.9
4	Glass Southest folk painting	12	7.4	0	0
5	Sinh village folk painting	16	9.8	0	0
6	Numbers who no have heard of any folk painting lines before	1	0.6	14	48.3
	Grand-Total	**163**	**165.7**	**29**	**100**

Source: Field data from Vietnam, from 15 September to 30 September 2021. Google Form.

Table 7

Table 7 Demographic profile of research participants 2ndS

No	Factor		Vietnameses	
			Frequency	%
1	Age	Range 15-20	75	62.5
		Range 21-30	21	17.5
		Range 31-40	12	10
		Range 41-50	6	5
		Range 51-60	5	4.2
		Range 61-65	1	0.8
	Sub-Total		120	100
2	Sex	Male	32	26.7
		Female	88	73.3
		Another gender	0	0
	Sub-Total		120	100
	Grand-Total		**120**	**100**

Source: Field data from Vietnam, from 25 March to 5 April 2022. Google Form.

Table 8

Table 8 The level of interest in the virtual reality exhibition space

Walk into Dong Ho painting (WIDHP) 2ndS

No	Question	Degree evaluation					Vietnameses	
		1	2	3	4	5	Frequency	%
1	The level of interest in the virtual reality exhibition space WIDHP (Rate from 1 to 5)	0	1	13	55	51	120	100
	Grand-Total	**0**	**0.8**	**10.8**	**45.8**	**42.5**	**120**	**100**

Source: Field data from Vietnam, from 25 March to 5 April 2022. Google Form.

Table 9

Table 9 Impressive level with the exhibition of Dong Ho folk paintings in VR 2ndS

No	Question	Degree evaluation					Vietnameses	
		1	2	3	4	5	Frequency	%
1	Do you find Dong Ho paintings presented more impressively and vividly than traditional 2D painting exhibitions? (Rate from 1 to 5)	0	2	11	71	36	120	100
	Grand-Total	**0**	**1.7**	**9.2**	**59.2**	**30**	**120**	**100**

Field data from Vietnam, from 25 March to 5 April 2022. Google Form.

Table 10

Table 10 Desire level to see more Dong Ho folk paintings in VR 2nd S

No	Question	Degree evaluation					Vietnameses	
		1	2	3	4	5	Frequency	%
1	Please rate your desire to see more DHFP in the VR exhibition environment. (Rate from 1 to 5)	0	0	12	74	34	120	100
	Grand-Total	0	0	10	61.7	28.3	120	100

Field data from Vietnam, from 25 March to 5 April 2022. Google Form.

Table 11

Table 11 Level of Interested in learning more about Vietnamese folk paintings after seeing the WIDHP exhibition 2nd S

No	Question	Degree evaluation					Vietnameses	
		1	2	3	4	5	Frequency	%
1	Please rate your interested in learning more about Vietnamese folk paintings after seeing the WIDHP exhibition (Rate from 1 to 5)	0	2	19	72	27	120	100
	Grand-Total	0	1.7	15.8	60	22.5	120	100

Source: Field data from Vietnam, from 25 March to 5 April 2022. Google Form.

Table 12

Table 12 Predict application of this VR exhibition in the future 2nd S

No	Question	Possitive (%)	Negative (%)	Vietnameses	
				Frequency	%
1	Do you think in the future this type of exhibition will continue to be invested in and promoted at museums of Vietnamese folk paintings?	117	3	120	100
	Grand-Total	97.5	2.5	120	100

Source: Field data from Vietnam, from 25 March to 5 April 2022. Google Form.

6. DISCUSSION OF RESULTS/FINDINGS

CONTRIBUTIONS OF THE DOCTORALS THESIS

In this section, the author discusses the study results to answer the research questions from part 1 of the thesis, i.e. RQ1, RQ2, RQ3, RQ4, respectively. Each question will be discussed in turn in sorted order. This is presented for the reader to follow the discussion more understandably and vividly. In the next section, the author will recap and focus on the contribution of the thesis based on the research goals made in part 1.

6.1 Discussion of results/findings

RQ1 *What factors are causing difficulties in preserving Dong Ho folk painting in Vietnam?*

First of all, the first difficulty is that there is not account compulsory attention from the competent authority and the local government of Bac Ninh province. According to selected documentary sources, at least one Dong Ho folk paintings exhibition shows per year. Unfortunately, they lack investment in installation of space design and not highlight the actual value of Dong Ho folk paintings. The proposal to build a profile of the profession of making Dong Ho folk paintings was planned a few years ago in to hope that, if it becomes a world heritage site with specific regulations on conservation, promoting heritage will "save" a craft that is in danger of disappearing. According to the deadline, in December 2019, the dossier of Dong Ho painting village will be considered by UNESCO in its regular meeting. Among the Intangible Cultural Heritage of Vietnam recognized by UNESCO, there are merely festivals, social practices, and performing arts.

Consequently, if the profile of Dong Ho's painting profession is approved, this will be the first traditional craft of our country to be honored by UNESCO. Nevertheless, due to the issue of the covid-19 pandemic, so far, this approval process has been delayed. In addition, the government is still concerned with more pressing issues regarding the national economic situation during this period. The national artistic and cultural conservation needs are in the last order of priority (Lu, 2018).

According to artist Nguyen Dang Che, the next difficulty said over the years of working in the profession. He has realized that one must live by it to maintain a job. The people in his village know about skills in painting art. Afterward, due to limited market demand and difficult life, it is not intricate for people to switch to other occupations. Since he has a passion for the traditional paintings of his homeland, he correspondingly studied fine arts and worked in many different cultural agencies. He would like to retire early to focus on painting since his family can manage, run a business and live off paintings. That fact helped to convince his children and grandchildren to quit farming and make wares (Lu, 2018).

Nevertheless, if people wish to preserve and promote the painting profession, they demand the support of functional agencies and cultural and professional organizations, especially the investment and construction planning. We educate young people not only painting techniques but also passion, hoping to see the value of heritage. In the long term, Bac Ninh province craves to have acceptable policies for artists, for learners to make paintings, compensate for the price of products, and make efforts to promote, introduce, and obtain output for products. In addition to the general responsibilities of the relevant agencies, departments, and sectors, the artisans

and people themselves necessitate having responsibilities such as transmitting knowledge and techniques and teaching about the cultural roots and local identity. The legacy will have a mission to preserve culture for the younger generation.

Moreover, the younger generation requisite to be aware of cultural values to protect and maintain the national heritage. The case of artist Nguyen Dang Che is an example. Before the change in life and market mechanism, he struggled and challenged himself a lot to find a way to develop Dong Ho paintings. At the international scientific conference, "Protecting and promoting the artistic value of DHFP in contemporary life," coordinated to organize from November 1st to 2nd, 2019, domestic and international scientists discussed and shared experiences on how to promote the traditional values, culture art of the nation. In this workshop, Asian countries raised similar difficulties in maintaining their national craft villages. The current solution for preserving Dong Ho folk paintings is still lacking in output sources. While the painting production process is quite long and time-consuming, painting and painting techniques use much manual labor from artists. The painting price still does not reflect the labor time spent on a painting. The preservation of paintings and their release to the world is also another difficulty. Over time, paintings can fade and be challenging to maintain. From here, it enhances that the question of a new method to preserve DHFP is an urgent and essential issue for the Vietnamese state and the artists attempting to maintain its existence.

RQ2 *What is the new method of exhibiting traditional folk art in Vietnam from now and shortly?*

From the difficulties in preserving DHFP answered to RQ1, this study continues to find solutions for promoting Dong Ho paintings through the form of exhibitions. Even though DHFP is a line of paintings more than 600 years old, it should not be assumed that this line of paintings is simply for the elderly or has a tendency to nostalgia. The State should fight to promote the preservation of paintings and adore paintings in ancient and outdated forms. The above promotion methods make most of the public different and bored with traditional national artistic values. This prejudice will entice the whole thing belonging to the national tradition, which is not an area of concern for young people.

According to the author, the image represents the Dong Ho folk painting line as a decisive key for orienting the trend of aesthetic development of the young generation in a country. Typically exhibitions at museums, galleries, graphic publications. For large exhibitions with capital investment from the government, careful preparation is required before being officially opened to the public. The preparation here includes relevant factors to marketing and PR that have long been forgotten. Those critical factors include: understanding market needs, understanding the public's art tastes, understanding art development trends in the community, finding out about accessibility, and attracting the public's attention.

After careful research, it is necessary to consider and carry out abundant surveys to initially evaluate the judgments about folk painting art and find out the preferences of the masses. This survey will provide standards and reasonable reasons for designing the basic concepts for the museum following aesthetic tastes, updating trends to keep up with the times while still smoothly intersecting between classic and modern. Presentation, arrangement, and lighting are always the keys to success for any art exhibition. DHFP are not an exception. The suitable

investment in research, survey, and design will gradually change the public's perception of the nation's art organization. From these initial impressions, although diminutive, the author believes that with many efforts to improve the way the exhibition is displayed, it will assist to change people's old prejudices at the same time. People will impression the beauty and value of their country's traditional folk painting art and be proud that their country owns that treasure. Doing this is not leisurely in a short time, the authorities ought to show their interest and develop a long-term plan with specific goals.

The artisan Nguyen Dang Che said that his son opened a gallery in Hanoi, accessing foreign markets. Despite his advanced age, artist Nguyen Dang Che even actively participates in activities to promote and introduce Dong Ho folk paintings. He combined with groups of young artists to create folk-inspired paintings to bring out his traditionally more flexible approach to young people. He added that recently, a group of young people passionate about value communication had implemented the idea of gathering and digitizing folklore to preserve and experiment with Hang Trong paintings. Accordingly, the graphic details will be processed by computer software to store in a digitized environment, avoiding any risk of damage or loss during operation time. Over time, folk painting patterns will have conditional applications in fashion design, graphics, furniture, and handicrafts to deepen the media. If this application is being tested with a DHFP, people can actively contribute to the story of preserving and promoting the valuable cultural system.

RQ3 *How to apply virtual reality exhibitions to traditional ways of folk painting exhibition in Vietnam?*

This question is also at the main point of the research methodology of this thesis. While researching the thesis, the author has read many documents, researched, analyzed, and participated in the design with a team of 3D modeling studios to bring the most optimal design process. This process is time-consuming and capital intensive in the production process.

This process is studied and described in great detail in sections 4 and 5 of the study. In addition, the author lists in detail the jobs of producing 3D models, converting 3D environments into VR, and producing videos, which are also presented in detail in Table 2.

Subtracting the research step is the first step of the process. The following steps in costume and character design ideas, virtual museum space design, and environmental design occur in the paintings (precisely, Dong Ho communal house), taking place almost parallel the work of many designers and artists at the same time. These steps take a lot of time and effort of the performer, editing many times to reach perfection according to the original requirements. The step of transforming the museum environment into a painting into a virtual reality (VR) environment does not take too much time. Notwithstanding, it will give the most overview of the entire process. At this time, the editing allows merely limited performance, and it is difficult to change the drawn models. The last step is the video editing part as the author's purpose is to show the video for a broad audience to see and participate in the survey. Conditions for viewing in a virtual reality environment require a computer system with a high-configuration processor and graphics card. In addition, the requirement for a VR headset is an obstacle for all audiences. The author decided to render the exhibition footage in 1080HD video clip format shown on a

link from his personal Youtube channel. While it is the last stage, this stage of editing requires careful selection of music and subtitles, scenes, and scripts.

RQ4 *Does the exhibition by the traditional method attract viewers, especially young people? How do they feel that the presentation of folk paintings in virtual reality is different from the conventional exhibition-style?*

Based on the survey results in Tables 7 to 12, the age group who is willing to participate in viewing the link of Dong Ho painting exhibition space accounts for the majority of the age group from 15 to 20 (62.5%), and the age from 15 to 20 years old. 21 to 30 years old (17.5%). These ages also showed a positive attitude towards the exhibition environment of Dong Ho folk paintings in virtual reality. According to the survey scale from low to high (level 1-5), more than 55 people chose level 4, and 51 people chose level 5 out of 120 survey participants. The number of less excited people is only 14 people (accounting for 11.6%). Among them, there were still 13 people who reached the average level of excitement (level 3).

When asked about the difference between the traditional painting exhibition method and the method of jumping into the picture (VR environment), the participants almost unanimously agreed that the exhibition method applied VR creates a feeling of more vivid and visually stimulating (62.2% level 4 and level 5).

The above survey results show us a positive trend in accepting the new exhibition method among young Vietnamese. Although there are some negative feedbacks, they account for a negligible percentage and are usually in the age group of 41-60. Men also accounted for a low rate of their willingness to participate in the survey and responded less positively than women in different age groups. This response also opens the door to a future audience for museums and galleries, as women tend to devote more time and attention to art and exhibitions than men. In addition, the sensitivity of women through the survey also shows more openness and ease than the other gender.

When submitting the survey link, we had to take the extra step of instructing viewers how to install Steam and VRchat software to be able to access the exhibition space link. This software is also quite popular and easy to install for those who play games or use desktop computers and Windows operating systems—restricted to users of Macbook and iOS operating systems. That is also why the number of people participating in the second survey did not reach the same number as the first time.

However, the second survey again shows the ease of receptiveness to the exhibition trend in the VR environment. Although this exhibition concept model is incomplete with a small number of paintings, the survey results show that participants experience the desire to see more Dong Ho folk paintings in virtual reality. After seeing the exhibition, they also wanted to learn more about Vietnamese folk paintings, with 60% of people choosing level 4 and 22.5% of survey respondents choosing level 5.

6.2 CONTRIBUTIONS OF THE DOCTORAL THESIS

This section discusses the theoretical and practical contributions of this research to science. This research is entirely new in Vietnam. It is also one of the most in-depth studies and has factors in developing the form of preserving traditional Vietnamese folk paintings. The study

aims to provide a realistic view of the aesthetic tastes of young Vietnamese people toward the country's traditional art. The study assists to explore another aspect of the traditional folk painting exhibition by applying modern technology and graphic software. This research can open a different view of Vietnamese people about folk painting, specifically Dong Ho folk painting.

Recap the Research Goals of the thesis

RG1 Study the historical value and artistic value of Dong Ho folk paintings

RG2 Research and determine measures to preserve Dong Ho folk paintings in the form of 2D paintings in a virtual reality environment

RG3 Conduct experiments and compare the differences between traditional folk painting exhibition environments and virtual reality environments.

RG4 Evaluate the experimental results and draw new methods to preserve traditional folk paintings

RG5 Study on the difference between the visual effects and the attitudes of the viewers between the traditional painting exhibition and the folk painting exhibition in the virtual reality format

6.2.1 Theoretical implications

In researching documents on Vietnamese folk paintings, the author found that there are very few valuable and updated sources of new information. The field of VR exhibitions in Vietnam is also not yet widespread. Arguably, this study is a pioneer of research to find new methods in the exhibition folk paintings in Vietnam. The culture of Vietnam inherently has the interference of Western cultures (France, America) and Chinese culture. The development of art in general and art museums is still undeveloped and has not received extremely government attention. In terms of cultural awareness, the aesthetic and artistic sense of the majority of the population is still limited. For those who do not have much knowledge about Dong Ho folk paintings, the content of chapter 4 of this study contributes to providing the most general knowledge about the history and production process of folk paintings. In terms of historical research along with artistic value from RG1 and the restoration of Dong Ho paintings from 2D version to virtual reality environment (RG2) is entirely possible.

This study, therefore, suggests a direction for the Dong Ho folk painting exhibition to be more accessible to the general public of all ages. The study challenges the application and adaptation of 2D folk painting digitization methods to the VR environment. This process takes much time to research, create ideas, build contexts, draw the modeling and edit modeling. The study applies quantitative methods and application design methods in a single study, so the survey numbers from users are close to reality and social needs for future studies to consider using two methods instead of individually.

6.2.2 Practical implications

In terms of research application, this can be said to be the first virtual reality video and link in Vietnam to introduce DHFP. The study will be a valuable reference source for the competent authorities related to cultural preservation and the museums and Dong Ho painting villages in Bac Ninh to create other aspects of painting presentation of traditional folk. In addition, the work state and steps to make a clip for the exhibition in the VRE are also systematized by the

author. These steps will be a practical example for organizations and competent authorities to continue developing other painting themes of DHFP or other lines of folk painting in front of their risk of transmission loss.

Research has shown that young people (15-30 years old) are entirely interested in the country's folk art, not indifferent and indifferent. They are willing to visit the VR exhibition in real life for research purposes and introduce to international friends Vietnamese folk paintings. Of course, these needs can only happen when museums and cultural agencies pay attention to and update the trends in understanding the folk art of Vietnamese youth. Therefore, this study will be a wake-up call for policymakers of cultural conservation in the future, suggesting potential audiences that will contribute to the conservation of folk art culture in Vietnam.

The study is an ideal reference example of the budget to implement the digitization process and build 3D models for the relevant organizations. In order to create a complete archive of more than 200 paintings (including Dong Ho folk paintings), the competent authorities will have to solve an economic problem and propose the necessary funding sources from the bank national and independent donors. The study results also lead to the goal of understanding the difference between the viewer experience from the traditional exhibition method to the new method of applying virtual reality technology (RG3 & RG5). Based on the research process of the thesis, we can also draw steps in the process of restoring a folk painting work. This contribution deserves to be a typical example for FAM in Vietnam to refer to and study further in the future (RG4).

7. CONCLUSION, LIMITATION, AND FUTURE RESEARCH

This section entails the concluding remarks of the author in respect of the study and highlights the restrictions furthermore as provides areas needing further research attention.

7.1 Conclusion

Dong Ho folk paintings with more than five centuries of vitality have left bold imprints and distinct nuances in Vietnamese folklore. Preserving, honoring, and developing the profession of making Dong Ho folk paintings is now an essential issue. The line of Dong Ho folk paintings has long entered the subconscious of many generations of Vietnamese people with images of the wedding of mice, chickens, honor, and wealth, combining the quintessence of plastic arts, paper making, and color mixing. However, in Dong Ho Village, Song Ho commune, Thuan Thanh district, Bac Ninh province, only four households are making traditional paintings, which still preserve the oldest way of making paintings of Kinh Bac land. The story of preserving the Dong Ho painting profession has been mentioned a lot. The process of making documents is also relatively complete. However, the most important thing is how to make the heritage live sustainably in the heart of the community, which is not at all easy. Many restoration and conservation activities by dedicated units and individuals have been implemented after the disappearance, loss, and challenges of folk paintings in contemporary life contribute to honoring the value and bringing folk paintings closer to the public. However, many argue that it is necessary to have a synchronous solution for this activity to be effective and sustainable. The State needs an active support policy to preserve this heritage.

Assoc. Prof. Trang Thanh Hien, Lecturer at the Vietnam University of Fine Arts, said since the 15th and 16th centuries, Vietnamese people have enjoyed painting not only during Tet, but Vietnamese paintings also play an essential role in their live spirituality, for example in ancestral worship or temples and pagodas. Therefore, reviving the Vietnamese tradition of painting and returning to the traditional folk aesthetic should be done and preserved, thereby encouraging Vietnamese people not only to play modern paintings but also to play traditional art. folk paintings to enrich spiritual life. The transmission, profession, and succession of artisans have been and will still be significant challenges in conserving cultural heritage, including folk paintings. From now on, it is necessary to promote the collection and preservation of folk painting techniques and have a special treatment for living artisans to pass on their craft to the younger generation (TITC, 2016).

Vietnamese folk paintings have been studied, preserved, and promoted from the last decades of the twentieth century. Many museums still store and display folk paintings, such as the Vietnam Fine Arts Museum, the Museum of Ethnology, the Museum of Vietnamese Ethnic Cultures, and the Hanoi Museum. However, in the increasingly modern socio-economic context, the need to play and use paintings is no longer as popular as before, so there is less demand for products in large quantities, leading to folk paintings being in danger of being lost or lost. In addition, some households producing wood-printed paintings have chiseled out parts of Chinese and Nom characters on many printed boards, which has affected the meaning of folk paintings, reducing their originality and uniqueness originality of folk paintings (TITC,

2016). The change in the use of paper-making materials and industrial paints in recent years has also created qualitative changes to traditional folk paintings.

There are many opinions that we also need to change our thinking about painting restoration to go deeper into the core of humanistic culture and beliefs that people place in each picture. As Assoc. Prof Phan Thanh Binh, former Rector of the Hue University of Arts: The preservation and development of folk paintings cannot be done superficially in a seasonal fashion, such as organizing a festival or a festival no one checks continues to maintain. Therefore, it is crucial to find people dedicated to doing it. It is impossible to urge the youth to learn folklore and tradition, and the form cannot exist.

In order to preserve and promote the values of folk paintings, the State should step up the promotion, promotion, and publication of specialized books on folk paintings. The development of policies to honor artisans and folk artists; training, vocational training, and vocational training for the next generation is necessary. Building cultural and tourist centers, taking the production of folk paintings to attract tourists and creating conditions for tourists to experience the printing and production of paintings are needed. The authorities have promoted the collection of historical documents on folk paintings, restored the printed boards according to the archetypes of newly found paintings, and restored the previously chiseled Chinese and Nom characters. Increasing the introduction of folk paintings at museums and implementing the preserving Dong Ho painting village project would promote international cooperation activities on folk paintings (Bac, 2020).

This research project is one of the author's passions, hoping to contribute to preserving national folk paintings. The project is studying the steps of restoring folk paintings from the traditional 2D version to the 3D model and transforming it into a virtual reality environment. To be able to achieve the main objective, three specific goals were set for implementation: RG1 Study the historical value and artistic value of Dong Ho folk paintings, RG2 Research and determine measures to preserve Dong Ho folk paintings in the form of 2D paintings in virtual reality environment, RG3 Conduct experiments and compare the differences between traditional folk painting exhibition and virtual reality environments, RG4 Evaluate the experimental results and draw new methods to preserve traditional folk, RG5 Study on the difference between the visual effects and the paintings of the viewers between the traditional painting exhibition and the folk painting exhibition in the virtual reality format. The research was conducted according to researching documents about the museum, the types of exhibitions in the museum, the history of Dong Ho folk paintings and the steps of making folk paintings, and researching virtual reality technology applied to the field exhibition model. Then research picture information, a small survey to choose the required painting, and 3D modeling reconstruction from two selected paintings. Finally, the drawn 3D modelings are integrated with the VR virtual reality environment. The author also downloads a link on the free Steam and VR chat platforms for users to experience at home (with or without VR glasses) and a clip of people's experiences in the art exhibition's virtual reality environment (VRE). From here, after sending clips and links for users to experience and filling out a survey on user perception, the author draws statistical tables and synthesizes parameters to answer the research questions from the beginning.

Along with the country's changes, some lines of paintings flourish, but some paintings quickly fade out. The historical and cultural values in folk paintings reflect the rich and

distinctive spiritual and cultural lifetime of the Vietnamese nation. With the unique and meaningful content and artistic value, we expect that the Dong Ho folk painting profession will soon be recognized as an intangible cultural heritage of humanity. Revitalizing folk painting villages in contemporary life may be a complex story that cannot be done overnight. The author supposes that beyond the involvement of the State, functional units, within the local craft villages, with the keenness of the artisans, the mobilization of socialization activities is additionally necessary to form the revival of people's paintings simpler and more sustainable. Today, although time has passed, fading, folk paintings are not any longer at their peak, but the good values of every line of paintings are still there and can forever be the heritage of the Vietnamese people.

7.2 Limitation of the study

Although the study was written and conducted over nearly three years, it was not without its shortcomings and limitations throughout its implementation. First, the limited budget makes it impossible to pay for the restoration of more Dong Ho folk paintings so that the virtual reality exhibition environment can achieve a higher visual effect. In this study, only the two paintings voted the most by the survey participants were used to be included in the exhibition.

The covid-19 epidemic has been brought under control but is not entirely over yet when writing this thesis. The process of designing and restoring Dong Ho folk paintings took place when the epidemic in Vietnam entered the most intense period of lockdown. In this situation, the author, designers, and artists do not meet directly to develop ideas. Nonetheless, they have to work through the social networking platforms of Facebook messenger, Drive, and Gmail of Google, Discord, and Teamviewer to exchange jobs. It is a big obstacle for the design process because the interaction via the internet makes the idea review process late. The two sides do not understand each other or misunderstand each other, describing the design by words or messages must go through. Many steps are sometimes incorrect. The internet in Vietnam sometimes loses connection because of using outdated transmission lines.

7.3 Future research

The formation and development of each line of folk painting have their achievements and meanings that affect the minds of the beholder. From the formation of the working environment, the function of the painting line and the service of the painting line have created an aesthetic value, reflecting the thinking of agriculture and rural Vietnam. Each line of folk painting has a distinct philosophical value from the formation and development of ideology and regional and regional labor thinking. This research needs more attention from the authorities, the culture, and the museum to further perfect the testing methods of painting exhibitions suitable to the times. The research also needs more support from designers and artists to further edit the character models in the picture to be animated and moveable in the future. Funding implementation for similar field research is also a challenge. In the future, other studies should also pay attention to the configuration of the computer system and the use of virtual reality glasses for the final output. The form for the viewer to experience the photo-realistic exhibition and the experiential space is also important to researchers. The author also expects other folk painting collectors, such as Kim Hoang folk paintings, Hang Trong

paintings, and Lang Sinh paintings, to consider this study as a typical example to promote the conservation of Vietnamese folk paintings further.

REFERENCES

Adler, D. (2007). *Planning and Design Data Second Edition*, 1-13.

Ahmad, S., Abbas, M. Y., Yusof, W. Z., & Taib, M. Z. . (2013). Museum learning: Using research as best practice in creating future Museum exhibition. *Procedia - Social and Behavioral Sciences, 105*, 370-382.

Alan B. Craig et al. (June 2, 2009). Introduction to Virtual Reality. In W. R. Alan B. Craig, *Developing Virtual Reality Applications Foundations of Effective Design* (pp. 1-32). Netherlands: Elsiever.

Anh, C. (2019, February 3). *Làng tranh Đông Hồ xưa và nay*. Retrieved March 2021, from baodansinh.vn: https://baodansinh.vn/lang-tranh-dong-ho--xua-va-nay-89931.htm

Art Institute, C. C. (1973). *Về tính dân tộc của nghệ thuật tạo hình*. Hà Nội: Nxb Văn Hoá thông tin.

Bài, A. P. (2017, 01 29). *50 năm Bảo tàng Mỹ thuật Việt Nam: Suy nghĩ và dự cảm*. Retrieved from Toquoc.com.vn: https://toquoc.vn/50-nam-bao-tang-my-thuat-viet-nam-suy-nghi-va-du-cam-99206523.htm

Bac, H. (2020, 07 10). *Làm gì để tranh dân gian hồi sinh*. Retrieved from vov.vn: https://vov.vn/van-hoa-giai-tri/lam-gi-de-tranh-dan-gian-hoi-sinh-1068454.vov

Barry Lord, Gail Dexter Lord. (2001). *The manual of museum exhibitions*. Walnut Creek, CA: AltaMira Press.

C. Lang, et al. (2006). *The Responsive Museum: Working with Audiences in the Twenty-First Century*. Aldershot: Ashgate.

Chipangura, N., & Marufu, H. . (2019). Museums as public forums for 21st century societies. *Museum Activism*, 164-173.

Cho, H. (2013). Fermentation of intangible cultural heritage: interpretation of kimchi in museums. *Museum Management and Curatorship*, 209-227.

Christopher D. Wickens, Diane L. Sandry, Michael Vidulich. (1983). Compatibility and Resource Competition between Modalities of Input, Central Processing, and Output. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, 227-248.

Chuong, A. (2010). *Tranh dân gian Đông Hồ*. Hà Nội: Ncb Mỹ Thuật.

Corey, P. N. (2014, March 11). *A Biography of a Building: The Ho Chi Minh City Museum of Fine Arts*. Retrieved from www.guggenheim.org: https://www.guggenheim.org/blogs/map/biography-building-ho-chi-minh-city-museum-fine-arts

cdn.britannica.com [Photograph]. (n.d.). cdn.britannica.com. https://cdn.britannica.com/71/121071-050-944E222E/Gallery-Prado-Museum-Madrid.jpg

D. Tsichritzis, S. Gibbs. (1991). Virtual Museums and Virtual Realities. *Computer Science*, 17-25.

Dung, K. (2013). *Tranh dân gian Đông Hồ*. Retrieved from svh.gov.vn: http://dsvh.gov.vn/tranh-dan-gian-dong-ho-

3151#:~:text=Về%20nội%20dung%2C%20tranh%20dân,hội%20công%20bằng%2C%20tốt%20đẹp

Dung, N. D. (2018). *Nghệ nhân hoạ sĩ Nguyễn Đăng Sần và dòng tranh dân gian Đông Hồ.* Hà Nội: Nxb Mỹ Thuật.

Eye tracking in virtual reality. (2019, April 5). ResearchGate. https://www.researchgate.net/publication/332780872_Eye_Tracking_in_Virtual_Reality/figures?lo=1

G. Lepouras, A. Katifori, C. Vassilakis & D. Charitos . (2004). Real exhibitions in a virtual museum. *Virtual Reality volume*, 120-128.

G. Lidstone and T. Doling. (2000). *Arts Management in Vietnam: Towards a Market Economy.* Research Report. Visiting Arts. .

Grigore Burdea, Paul Richard, Philippe Coiffet. (1996). Multimodal Virtual Reality: Input-Output Devices, System Integration, and Human Factors. *International Journal of Human-Computer Interaction*, 5-24.

Hang, T. M. (2006). *Làng nghề thủ công mỹ nghệ miền Bắc.* Hà Nội: Mxb Mỹ thuật.

HoaLT. (2019, May 6). *5 Lý do tại sao các bảo tàng nên sử dụng công nghệ thực tế tăng cường AR.* Retrieved from tourzy.vn: https://tourzy.vn/tin-tuc-chung/Ung-dung-AR-vao-bao-tang

Hoang, T. Q. (1993). *Dau Tu Ngan Sach Nha Nuoc cho Van Hoa trong Dieu Kien Chuyen Sang Nen Kinh Te Thi Truong [The Government Budget for Culture in a Transition of Market Economy in Vietnam].* Unpublished PhD. The National Economics University.

Hooper-Greenhill, E. (1994). *Museums and Their Visitors.* Routledge.

Hooper-Greenhill, E. (2000). Changing values in the Art Museum: rethinking communication and learning. *International Journal of Heritage Studies, 6*(1), 9-31.

Huy, N. V. (2015). *Đa dạng hóa các hoạt động của bảo tàng hiện đại (từ kinh nghiệm của Bảo tàng Dân tộc học Việt Nam).* Retrieved May 2021, from baotang.hcmussh.edu.vn: https://baotang.hcmussh.edu.vn/?ArticleId=72c81976-661c-4835-b1db-76d96b5ff6f8

Khue, P. N. (2015). *Tranh dân gian Hàng Trống.* Hà Nội: Nxb Hà Nội.

Le, H. (2007). Major case study: Vietnam Museum of Ethnology. In R. R. Hede, *Museum Marketing: Competing in the Global Market* (p. Chapter 2). Routledge.

Lewis, G. D. (2021, March 11). *Museum | Definition, history, types, & operation.* Retrieved May 2021, from Encyclopedia Britannica: https://www.britannica.com/topic/museum-cultural-institution

Library, S. S. (2018). *Exhibition gallery.* Retrieved May 2021, from Smithsodia Institute Library: https://www.sil.si.edu/Exhibitions/wonderbound/crocodiles.htm?_ga=2.18851387.326413959.1524861961-383214391.1501707185

Lord, B. (2014). *Manual of Museum Exhibitions.*

Lu, M. (2018, 12 08). Khó khăn trong bảo tồn nghề tranh Đông Hồ. *Nhan Dan* , p. nhandan.vn. Retrieved from https://nhandan.vn/dong-chay/kho-khan-trong-bao-ton-nghe-tranh-ong-ho-332269

M. Nguyet, B. Van. (2019, October 14). *Tranh Đông Hồ - Hơi thở của làng Việt.* Retrieved from vietnam.vnanet.vn: https://vietnam.vnanet.vn/vietnamese/tranh-dong-ho---hoi-tho-cua-lang-viet/427969.html

Macdonald, S. (2006). *A Companion to Museum Studies.* (S. Macdonald, Ed.) Wiley-Blackwell.

Malraux, A. (1978). *The Voices of Silence: Man and his Art.* (S. Gilbert, Ed.) United Kingdom: Princeton University Press.

McKercher, B. (2002). Towards a classification of cultural tourists. *International Journal of Tourrism Research*, 29-38.

Minh, H. (2020, April 4). Retrieved from baodantoc.vn: https://baodantoc.vn/de-tranh-dong-ho-khong-tro-thanh-ky-uc-1585924946986.htm

Minh, H. (2020, 01 13). Tranh Đám cưới chuột - tác phẩm nghệ thuật nóng hổi tính thời sự. *Suc khoe va doi song.* Retrieved from https://suckhoedoisong.vn/tranh-dam-cuoi-chuot-tac-pham-nghe-thuat-nong-hoi-tinh-thoi-su-169167762.htm

Nguyen T. Thu et al. (2019). Làng Đong Hồ. In N. T. Hoa, *Dòng tranh dân gian Đông Hồ* (pp. 10-28). Hà Nội: Nhà xuất bản thế giới.

Paul Capriotti, HugoPardo Kuklinsk. (2012). Assessing dialogic communication through the Internet in Spanish museums. *Public Relations Review*, 619-626.

Phuc, H. M. (2015). *Đồ hoạ in khắc gỗ hiện đại Việt Nam.* Hà Nội: Nxb Thế giới.

Rodini, D. E. (2018). *A brief history of the art museum.* Retrieved May 2021, from khanacademy: https://www.khanacademy.org/humanities/approaches-to-art-history/tools-for-understanding-museums/museums-in-history/a/a-brief-history-of-the-art-museum-edit

Sandell, R. (2012). *Museums, Society, Inequality.* New York: Routledge.

Virtual reality's real health benefits – ISU helping stroke sufferers gain mobility. (n.d.). Idaho State University. https://www.isu.edu/news/2019-fall/virtual-realitys-real-health-benefits--isu-helping-stroke-sufferers-gain-mobility-.html

Tam, S. (2021). *Tranh To Nu.* Retrieved from sieuthitranhdep.vn: https://sieuthitranhdep.vn/tranh-dan-gian-dong-ho-tn04-bo-nu/

TITC. (2016, 08 19). *Bảo tồn và phát huy giá trị tranh dân gian Việt Nam.* Retrieved from vietnamtourism.gov.vn: https://vietnamtourism.gov.vn/index.php/items/21237

Tran Lam, Trinh Sinh. (2011). *Thế giới biểu tượng trong di sản văn hoá Thăng Long, Hà Nội* . Hà Nội: Nxb Hà Nội .

VNFAM. (2011). *Vietnam national fine arts museum About us.* Retrieved from www.vnfam.vn: https://www.vnfam.vn/en/about

Weil, S. E. (1997). The Museum and the Public. *Museum Management and Curatorship, 16*(3), 257-271.

Weil, S. E. (2002). *Making Museum Matter.* London: Smithsonian Institution Press.

What Is Virtual Reality And How Does It Work . (2022, March 03). Retrieved from www.softwaretestinghelp.com: https://www.softwaretestinghelp.com/what-is-virtual-reality/

What is VR? The devices and apps that turn the real world virtual. (2018, March 15). NBC News. https://www.nbcnews.com/mach/science/what-vr-devices-apps-turn-real-world-virtual-ncna857001

XVII, C. H. (1993). *Đại Việt Sử Ký.* Hà nội : Nxb Khoa học Xã hội.

SCIENTIFIC PUBLICATION ACTIVITIES BY THE AUTHOR

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Research Gate: https://www.researchgate.net/profile/Ngoc-Quynh-Giao-Pham-2
Google Scholar: https://scholar.google.com/citations?authuser=3&user=k5Zxs80AAAAJ

Indexed in ISI/SSCI/Web of Science, Scopus etc.

A. *Journal publications*

1) **Pham, N. Q. G.,** Han, Seung Hoon.The structure Particularity with Habitability Factors and Performance of VE Process for The Construction New Hanok Village Evolvement in Korea, *2015, ASET conference, Bangkok, Thailand.*
2) **Pham, N. Q. G.,** Han, Seung Hoon. Reconstructive analyses on architectural design performance for the spatial sustainability by interactive shape grammars, *2017, ISER International Conference Vienna, Austria.*
3) **Pham, N. Q. G.,** Pham, P. Phuong, & Stanicky, P. Change in urban planning and proposed solutions in the current context of Ho Chi Minh City, Chapter 10, Urban and Transit Planning, Towards Liveable Communities: Urban places and Design Spaces, ISBN978-3-030-97045-1, DOI: 10.1007/978-3-030-97046-8
4) Pham, P. Phuong, **Pham, N. Q. Giao,** Spatial configuration of traditional houses and apartment unit plans in Ho Chi Minh city, Vietnam: A comparative study, *SPATIUM, No. 45, pp 34-45, June 2021*
5) Pham, P. Phuong, **Pham, N. Q. Giao,** A Comparative Study of a Difference in the Spatial Structure of Vietnam Village, *EUROPEAN ACADEMIC RESEARCH Vol. VIII, Issue 10/ January 2021*
6) **Pham, N. Q. G.,** Le, T. H. A., Nguyen, M. H., Adzovie, D. E., & Stanicky, P. Application of Virtual Reality to enhance the interpretation Dong Ho folk paintings in Museums of Fine Arts in Ho Chi Minh City, *AET conference December 2021*

B. *Conference proceedings*

1) **Pham, N. Q. G.,** Han, Seung Hoon.The structure Particularity with Habitability Factors and Performance of VE Process for The Construction New Hanok Village Evolvement in Korea, *2015, ASET conference, Bangkok, Thailand.*
2) **Pham, N. Q. G.,** Design Suggestions for Concurrent Urban Transformation in Ho Chi Minh City, Vietnam, *2016, SOHUM conference, Kota Kina Balu, Malaysia.*
3) **Pham, N. Q. G.,** Study of Production systems of Microalgal Biomass and Harvesting Microalgae, *2016, European Advanced Materials Congress, Stockholm, Sweden.*
4) **Pham, N. Q. G.,** Pham, P. Phuong, & Stanisky, P. Change in urban planning and proposed solutions in the current context of Ho Chi Minh City, *2020, the International Conference on Urban Planning and Architectural Design for Sustainable Development, Florence university, Italy.*
5) **Pham, N. Q. G.,** Le, T. H. A., Nguyen, M. H., Adzovie, D. E., & Stanicky, P. Application of Virtual Reality to enhance the interpretation Dong Ho folk paintings in Museums of Fine Arts in Ho Chi Minh City, *AET conference December 2021*

6) Sandeep K. Dey, Vo, V. Hung, Huynh,T. Hoc, **Pham, N. Q. Giao**, Estimating factors towards adoption of AR apps for housekeeping training in 5-star hotels: COVID-19 perspective. Conference: AIRSI2021 Technologies 4.0 in Tourism, Services and Marketing At: Universidad Zaragoza. Project: Junior Grants of UTB in Zlín

7) Adzovie, D. E., Adzovie, R. H., Jibril, A. B., & **Pham, N. Q. Giao** (2021, July). Gender, Teenagers and the Motivations behind Identity Construction on Social Media: A Conceptual Study from the Perspective of Czech Republic and Ghana. In *ECSM 2021 8th European Conference on Social Media (p. 8)*. Academic Conferences Inter.

8) Sandeep K. Dey, Vo Viet Hung, **Pham, N. Q. Giao**, Huynh,T. Hoc. Engaging virtual reality technology to determine pro-environmental behavior traits among eco-tourists, May 2021, Conference: TOURMAN 2021 Restarting tourism, travel, and hospitality: The day after, International Hellenic University, Zayed University and Aristotle University of Thessaloniki, ISBN: 978-618-84798-9-0

C. Exhibition

- Online exhibition: The other side of SPACE. (2018). INTERNATIONAL, 104. https://www.dbpia.co.kr/journal/articleDetail?nodeId=NODE07577376, 2018, Korea.
- DOT exhibition, Colab exhibition, Hall B, Faculty of Industrial of Fine Art, Ton Duc Thang University, 2018, Vietnam.
- DEEP-NUTRITIONAL MOMENTS, Colab Glass studio exhibition, Photogether Gallery, 2020, Czech Republic.

D. Ongoing projects

Engaging virtual reality technology to determine pro-environmental behaviour traits among eco-tourists (JUNG project 2021-2023)

APPENDICES

Appendix A

AUTHOR'S CURRICULUM VITAE

GIAO PHAM

Interior & Architecture Design

1988 - 2021
Vietnam

EXPERTISE

- Interior design
- Architectural methodology
- Creative thinking
- Design project supevisor
- Research

ABOUT ME

D.O.B   29.10.1988   Vietnamese   Female

During my study abroad and teaching process, I pursued the "Less is more" style and applied designs. I think a designer will leave their legacy not only through projects but also through training young designers. The principle of my work is to be proactive, dynamic and responsible in any environment.

EDUCATION

2006 - 2010

Ton Duc Thang University, HCMC
Bachelor of Interior Design

2011 - 2013

Shu-te university, Kaoshiung, Taiwan
Master of Architecture

2015 - 2016

Chonnam National university, Gwangju, Korea
Candidates of Ph.D Architecture and Engineering

2019 - now

Tomas Bata university, Zlin, Czech Republic
Ph.D course
Faculty of Multimedia communication

WORK-STUDY EXPERIENCES

2010 - 2011   **INTERIOR DESIGNER**
CAO GIA PHAT Co.

2013 - 2014   **MANAGER OF INTERIOR DESIGN** at Netviet co.
LEADER OF DECORATION at Hanh phuc bakery

2013 - 2015   **LECTURER - full time**
Interior Design Department, Faculty of Industrial fine art,
Ton Duc Thang University, HCM city, Vietnam
LECTURER - part time
Interior Design Department
ADS Design institute, HCM city, Vietnam

2015 - 2016   **PH.D RESEARCHER**
Lab Architecture Engineering Department
Chonnam National University
Gwangju, South Korea

2017 - now   **LECTURER - full time**
Interior Design Department
Faculty of Industrial fine art
Ton Duc Thang University
HCM city, Vietnam

2019 - now   **PH.D RESEARCHER**
Glass studio
Faculty of Multimedia Communications
Tomas Bata University, Czech Republic

PERSONAL SKILLS

Presentation

Organization/Management

Team work

Hands Drawing

Teaching/Trainning

Research

TECHNICAL SKILLS

Microsoft office ● ● ● ● ●

Autocad ● ● ● ○ ○

3DMax ● ● ● ○ ○

Sketchup ● ● ● ○ ○

Indesign ● ● ● ● ○

LANGUAGE

Vietnamese	fluent
English	fluent
Chinese	basic
Korean	basic
Swedish	basic

CONFERENCE-PUBLISHING

- **The structure Particularity with Habitability Factors and Performance of VE Process for The Construction New-Hanok Village Evolvement in Korea,** 2015, ASET conference, Bangkok, Thailand.
- **Design Suggestions for Concurrent Urban Transformation in Ho Chi Minh City, Vietnam**, 2016, SOHUM conference, Kota Kina Balu, Malaysia.
- **Study of Production systems of Microalgal Biomass and Harvesting Microalgae,** 2016, European Advanced Materials Congress, Stockholm, Sweden.
- **Reconstructive analyses on architectural design performance for the spatial sustainability by interactive shape grammars,** 2017, ISER International Conference Vienna, Austria
- **Change in urban planning and proposed solutions in the current context of Ho Chi Minh City**, 2020, the International Conference on Urban Planning and Architectural Design for Sustainable Development, Florence university, Italy.
- **Spatial configuration of traditional houses and apartment unit plans in Ho Chi Minh city, Vietnam: A comparative study,** SPATIUM, No. 45, pp 34-45, June 2021
- **Application of Virtual Reality to enhance the interpretation Dong Ho folk paintings in Museums of Fine Arts in Ho Chi Minh City,** AET conference December 2021
- **A Comparative Study of a Difference in the Spatial Structure of Vietnam Village,** EUROPEAN ACADEMIC RESEARCH Vol. VIII, Issue 10/ January 2021
- **Estimating factors towards adoption of AR apps for housekeeping training in 5-star hotels: COVID-19 perspective**. Conference: AIRSI2021 Technologies 4.0 in Tourism, Services and Marketing At: Universidad Zaragoza. Project: Junior Grants of UTB in Zlín

AWARD

First Prize
HOAMAI Design of interior wooden 2014
Designer   Pham Ngoc Quynh Giao, Tran Trung Hau
Product   REGEN DESK

CONTACTS

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Position: Vice Dean of Architecture Faculty

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2) **MA. Hoang Le Duy**

Head of Interior design

Department Industrial of Fine Art

Ton Duc Thang University, HCM city, Vietnam

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3) **Associate Prof. Yuru Wang**

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Shute University, Kaohsung, Taiwan

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4) **Prof. MgA. Petr Stanický**

Glass studio, U16

Faculty Multimedia of Communications

Tomas Bata University, Zlín, Czech Republic

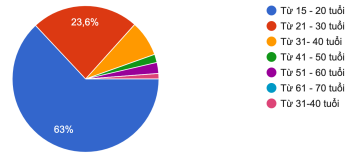Cell Phone No. (+420) 724 206 833

Email: stanicky@utb.cz

Vietnamese survey question of the 1st survey

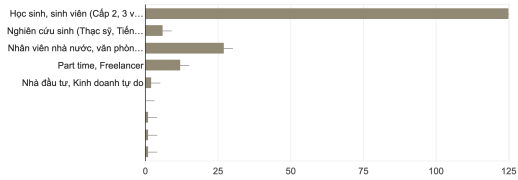Source https://tinyurl.com/mr2mj3y9

Bạn có thể vui lòng cho biết giới tính của bạn?
165 câu trả lời

- Nam
- Nữ
- Giới tính khác

69,7%
30,3%

Bạn vui lòng cho biết bạn trong độ tuổi nào dưới đây?
165 câu trả lời

- Từ 15 - 20 tuổi
- Từ 21 - 30 tuổi
- Từ 31 - 40 tuổi
- Từ 41 - 50 tuổi
- Từ 51 - 60 tuổi
- Từ 61 - 70 tuổi
- Từ 31-40 tuổi

23,6%
63%
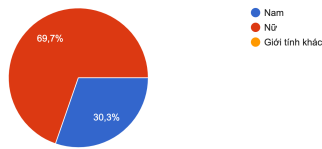
Bạn đang làm công việc gì?
164 câu trả lời

- Học sinh, sinh viên (Cấp 2, 3 v...)
- Nghiên cứu sinh (Thạc sỹ, Tiến...)
- Nhân viên nhà nước, văn phòn...
- Part time, Freelancer
- Nhà đầu tư, Kinh doanh tự do

Xin chào, bạn đang sống ở thành phố nào?
165 câu trả lời

- Tp Hồ Chí Minh
- Tp Nha Trang
- Tp Đà Lạt
- Tp Đà Nẵng
- Tp Huế
- Thủ đô Hà Nội
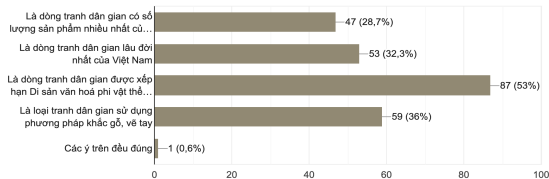- Thành phố Hồ Chí Minh
- Nam Định

29,1%
1/10
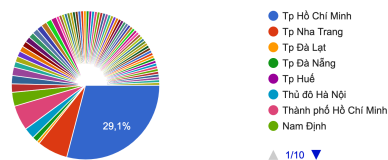
Trong các dòng tranh dân gian Việt Nam dưới đây, bạn thấy dòng tranh nào phổ biến nhất theo hiểu biết của bạn (hoặc bạn đã từng nghe nói đến)?
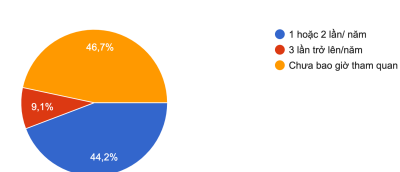165 câu trả lời

- Tranh dân gian Đông Hồ — 162 (98,2%)
- Tranh dân gian Kim Hoàng — 22 (13,3%)
- Tranh dân gian Hàng Trống — 61 (37%)
- Tranh kính Nam Bộ — 12 (7,3%)
- Tranh làng Sình — 16 (9,7%)
- Tôi chưa bao giờ nghe nói tới bất kỳ tranh nào trên đây — 1 (0,6%)
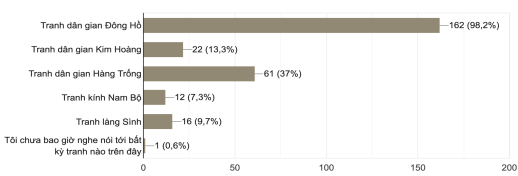
Bạn đã nghe nói đến tranh dân gian Việt Nam bao giờ chưa?
165 câu trả lời

- Chưa bao giờ nghe nói đến
- Tôi có nghe nói nhưng không có kiến thức lắm về dòng tranh này
- Tôi đã nghe nói đến và có hiểu biết đôi chút
- Không quan tâm

57,6%
41,2%
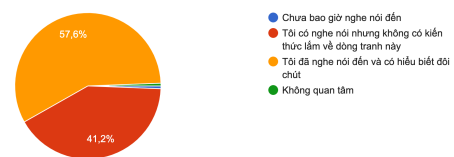
Theo bạn thông tin nào về tranh dân gian Đông Hồ bên dưới là chính xác?
164 câu trả lời

- Là dòng tranh dân gian có số lượng sản phẩm nhiều nhất củ... — 47 (28,7%)
- Là dòng tranh dân gian lâu đời nhất của Việt Nam — 53 (32,3%)
- Là dòng tranh dân gian được xếp hạn Di sản văn hoá phi vật thể... — 87 (53%)
- Là loại tranh dân gian sử dụng phương pháp khắc gỗ, vẽ tay — 59 (36%)
- Các ý trên đều đúng — 1 (0,6%)

Trước khi dịch bệnh Covid-19 xảy ra, bạn thường tham quan một triển lãm nghệ thuật tại Bảo tàng mỹ thuật hoặc gallery tại Việt Nam bao nhiêu lần trong một năm?
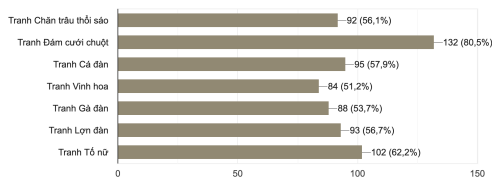165 câu trả lời

- 1 hoặc 2 lần/ năm
- 3 lần trở lên/năm
- Chưa bao giờ tham quan

46,7%
9,1%
44,2%

Bạn thấy ấn tượng nhất về tranh dân gian Đông Hồ ở những đặc điểm nào dưới đây?
165 câu trả lời

- Màu sắc tranh từ vật liệu tự nhi... — 101 (61,2%)
- Nội dung tranh sinh động (sự ki... — 105 (63,6%)
- Hình vẽ dễ hiểu, không phức tạp — 69 (41,8%)
- Vật liệu giấy dó mang tính đặc... — 72 (43,6%)
- Tất cả các ý trên — 2 (1,2%)
- Gần gũi với đời sống của nhân... — 1 (0,6%)
- Phản ánh nếp sống cùng hệ gi... — 1 (0,6%)
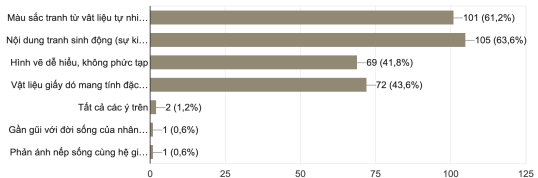
Bạn đã từng tham quan triển lãm nào về đề tài tranh dân gian Đông Hồ tại Việt Nam chưa?
165 câu trả lời
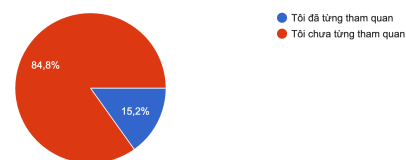
- Tôi đã từng tham quan
- Tôi chưa từng tham quan

84,8%
15,2%

Bạn có mong đợi được thấy tranh Đông Hồ nào dưới định dạng Thực tế ảo VR? (có thể chọn nhiều hơn 1 tranh)
164 câu trả lời

- Tranh Chăn trâu thổi sáo — 92 (56,1%)
- Tranh Đám cưới chuột — 132 (80,5%)
- Tranh Cá đàn — 95 (57,9%)
- Tranh Vinh hoa — 84 (51,2%)
- Tranh Gà đàn — 88 (53,7%)
- Tranh Lợn đàn — 93 (56,7%)
- Tranh Tố nữ — 102 (62,2%)

Bạn có muốn tham quan một triển lãm tranh dưới định dạng thực tế ảo (Virtual reality) không?
165 câu trả lời

- Tôi thấy tò mò và muốn được thưởng thức xem sao
- Không hào hứng lắm nhưng vẫn tham quan nếu có
- Tôi không muốn tham quan
- Tôi muốn

92,7%
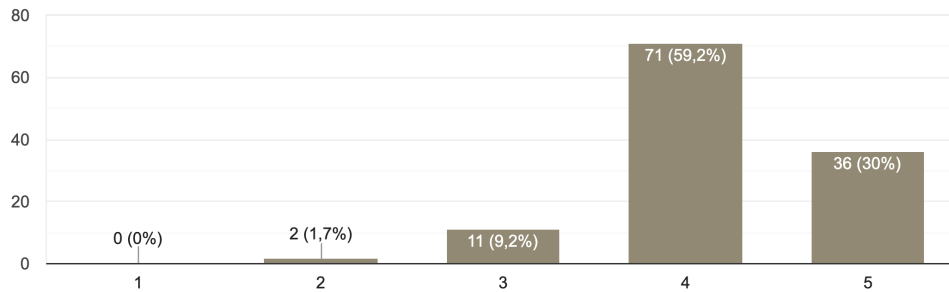
Appendix C

Source https://tinyurl.com/5x5t5sum
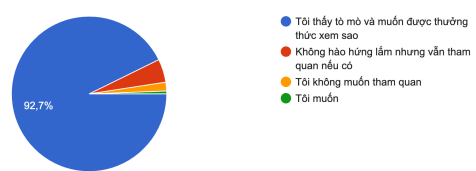
Mời bạn đánh giá mức độ yêu thích với trải nghiệm không gian triển lãm thực tế ảo Walk into Dong Ho painting (dạng concept) (Đánh giá mức độ từ 1 đến 5)
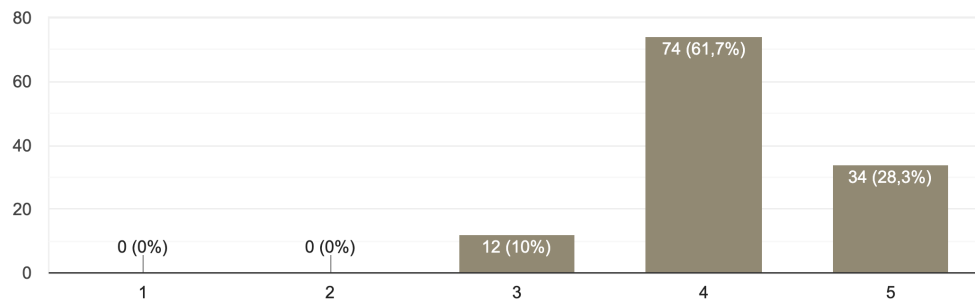120 câu trả lời
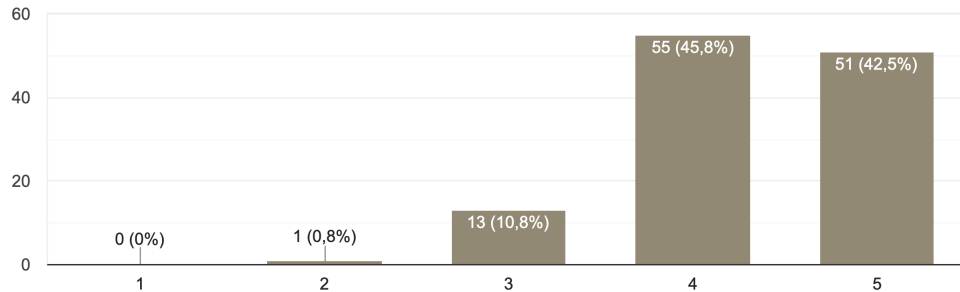
Bạn có thấy tranh Đông Hồ được trình bày ấn tượng và sống động hơn cách triển lãm tranh 2D truyền thống hay không? (Đánh giá mức độ từ 1 đến 5)
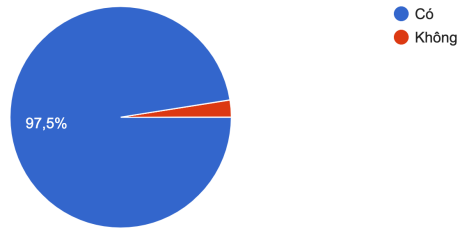120 câu trả lời

Bạn hãy đánh giá mức độ mong muốn của bạn để được xem nhiều tranh dân gian Đông Hồ hơn trong môi trường triển lãm thực tế ảo (VR) (Đánh giá mức độ từ 1 đến 5)
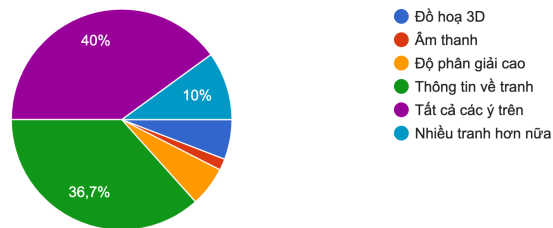120 câu trả lời

Bạn nghĩ trong tương lai loại hình triển lãm này ẫn tiếp tục được đầu tư và phát huy tại các viện bảo tàng về tranh dân gian Việt Nam không?
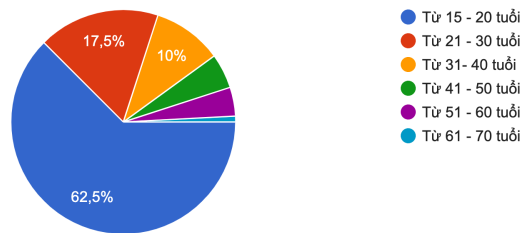
120 câu trả lời

- Có
- Không

97,5%

Theo bạn, triển lãm cần hoàn thiện thêm ở những điểm nào để đạt được độ hoàn hảo và hấp dẫn hơn?
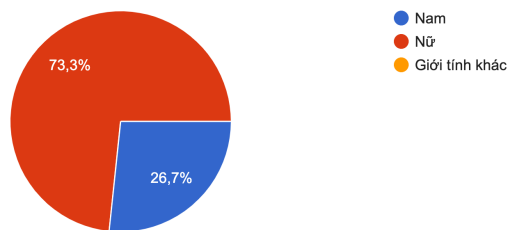
120 câu trả lời

- Đồ hoạ 3D
- Âm thanh
- Độ phân giải cao
- Thông tin về tranh
- Tất cả các ý trên
- Nhiều tranh hơn nữa

40%

10%

36,7%

Bạn vui lòng cho biết bạn trong độ tuổi nào dưới đây?

120 câu trả lời

- Từ 15 - 20 tuổi
- Từ 21 - 30 tuổi
- Từ 31- 40 tuổi
- Từ 41 - 50 tuổi
- Từ 51 - 60 tuổi
- Từ 61 - 70 tuổi

17,5%

10%

62,5%

Bạn có thể vui lòng cho biết giới tính của bạn?

120 câu trả lời

- Nam
- Nữ
- Giới tính khác

73,3%

26,7%

107

Another Vietnam folk painting lines

Hang Trong Folk Painting

Painting of the Queen of Heaven. Hang Trong paintings after drawing samples, woodcarving, stroke printing, and hand-painted. This is the most challenging stage, requiring the artisan to be highly skilled. The color scheme of this line of paintings, according to artist Le Dinh Nghien, is the principle of harmony between hot and cold colors, representing the harmony "with yin and yang."

Kim Hoang Folk Painting

The pair of Mr. Phuc - Mr. Tho is printed on threaded paper. Mr. Phuc holds a pomegranate ("Pomegranate declaration of death"), having many children and grandchildren. Mr. Tho holds a peach ("Dao donate Thien Xuan"), symbolizing longevity.

Southern Glass Folk Painting

A complete nameless glass painting needs to go through many stages. Glass panels of all sizes according to each picture are prepared by the artisans, then sketched with black paint, and then dried. When the paint dries, it continues to color in the order according to each painting but still must follow the complete opposite rule compared to ordinary paintings.

Sinh Village Folk Painting

Typical decorative calendar paintings of Sinh village folk paintings and carved by artist Ky Huu Phuoc

Pham Ngoc Quynh Giao, MA

Exhibition of Dong Ho paintings in a virtual reality environment at a Fine Art Museum, Vietnam

Výstava obrazů Dong Ho v prostředí virtuální reality v Muzeu výtvarného umění ve Vietnamu

Doctoral Thesis