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Augmented Reality Based Cultural and Natural Heritage Preservation of Quirino Province: A Proposed Developmental Framework

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Abstract: - As the province of Quirino is the melting pot of the Region 02 and nearby provinces, consolidation of the list of all cultural properties that are deemed significant to the province's cultural and natural heritage—both tangible and intangible is very encouraging. What people see now is the outcome of a centuries-long process of evolution, a method influenced by natural changes but was accelerated by human effort, adding, adapting, and replacing.

This study aims to design a developmental framework with augmented reality for the preservation of the cultural and natural heritage of Quirino. Design thinking methodology was used to understand the users, and to create innovative solutions to the problems derived. Systems modelling was used to represent a system based on notations from the Unified Modeling Language (UML). Survey and descriptive analysis were used to analyze results from Municipal Tourism officers and LGU employees. The proposed developmental framework promotes virtual tourism using AR, preserving the cultural and natural heritage. The province's diverse culture is safeguarded for future generations through heritage preservation and educating people on its importance in the nation's history.

Keywords: augmented reality; cultural and natural heritage; culture preservation.

I. BACKGROUND

As the need for technology arise especially during times of pandemic, there is a strong need to cope up and deal with the advancement of modern technology. With these technologies that exist at present, the impossible will become possible, the unknown will be known and the hidden will no longer be concealed.

Balcita and Palaoag (2020), agreed that today's technological advancements may benefit in variety of ways, both in research and in our daily lives. Existing multimedia displays are disconnected from the actual world, requiring the people in one province and even the tourists to obtain further information about their culture and natural heritages. If a province with existing rich culture and arts aims to reach a larger audience, they must provide appealing multimedia material that attracts not only its own people but tourists as well.

Quirino, while being a small province, is extremely important in the Region in terms of economic and environmental factors. Since parts of the province was carved from nearby provinces, it is where variety of people, culture, and individuals are found to assimilate to be interrelated with each other. Although the province is young, it possesses an abundance of unique cultural and natural heritages that will be exploited if they are not maintained.

The province's cultural history is unique, valuable, and irreplaceable. It is now up to today's generation to preserve culture for future generations. The identity of those who came before them must be preserved by the current generation and must also adhere to the same procedures and etiquette. Keeping heritage alive helps improve the environment. It is widely acknowledged that safeguarding heritage places benefits the entire globe. (TheLanguageDoctors, 2021)

Cultural tourism has been highlighted as a significant economic and social contribution across the world. Smartphone technology is advancing at a rapid pace. AR technology employs the camera of a phone to overlay digital information and content over the real world. Smartphones may now be used to learn about new things and to explore the world around them. Other augmented reality experiences allow users to utilize their smartphones'

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cameras to capture text and pictures from the outside world and interact with them in a more engaging way. Whether it is interpreting a menu from a foreign language into one's home tongue or identifying a picture. The primary motivators have been identified as an increased need for cultural knowledge, meaning creation, and learning (Han, et. al., 2019). Virtual and Augmented Reality (AR) is a new type of technology that is rapidly being employed in spaces that contains cultural and natural heritage. AR paves the way to developmental innovations which believed to be of help in preservation of the province's heritage. (Han, et. al., 2013)

Augmented Reality is emerging as a new ally for travelers. Within the tourist sector, AR has evolved as a valuable tool for companies, marketers, information, and experience channels, changing the way customers view their surroundings and reducing the obstacles and hassles of travelling (Palaoag, et. al., 2021). The latest generations of the province even the visitors will have simple access to the information of the province's heritage thanks to applications that are provided in a multimedia-rich style.

This study shall design a developmental framework for the preservation of the province's cultural and natural heritage. The study shall be assessing the extent of the heritage present in the province. The researcher aims to develop an AR framework to help maintain and conserve the beauty of Quirino province ready for the present and younger generations. The AR developmental framework may be utilized to increase Quirinians' understanding of their own province. This shall also assist the province's tourist destination gain recognition not just in neighboring provinces and regions, but also globally.

II. METHODOLOGY

To be able to pursue with the framework design of the AR based cultural and natural heritage preservation of Quirino province, the researcher used the design thinking methodology.
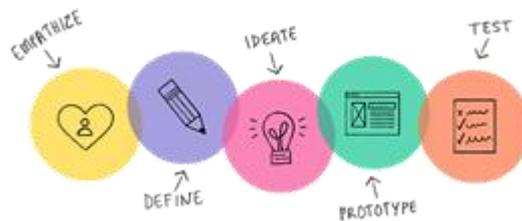

Figure 1. Design Thinking Methodology

Figure 1 is the design thinking methodology process, a mentality and an attitude, in addition to being an organized method to problem-solving. It all boils down to how you handle issues and difficulties, as well as how you identify solutions to them. The overarching goal is to come up with new ideas based on a thorough grasp of what people want and need. Throughout the process, the client or target group is constantly at the forefront. There are five stages of design thinking methodology: empathize, define, ideate, prototype and test. Three of which were utilized in the duration of the study since it proposes an AR architecture.

During the first stage, the researcher immersed with the different cultures that are existing around the province. A survey questionnaire were given to the individual tourism officers and the Indigenous People's officer in each municipality. The respondents were asked regarding their civil status and ethnicity. They were also asked to identify some cultural and natural heritages and were asked if they have already immersed and or seen these heritages. The questionnaire also inquired regarding the importance of every heritage the respondents mentioned. With these, the researcher was able to gain real insight and understand what they really need. The second stage accumulated the information and the gathered observations were analyzed and synthesized to define the importance of the cultural and natural heritages that have been identified by the respondents. In the third stage, the

researcher performed a brainwrite. This helped in generating ideas to identify how the AR framework will be designed.

As the overall plan is to design a developmental framework to help preserve the heritage of Quirino province, the researcher used the mixed method for the research design to be able to grasp well what is really needed. The Quirino province consists of six municipalities: Diffun, Cabarroguis, Saguday, Aglipay, Maddela and Nagtipunan. With these six municipalities, there are also six Municipal Tourism Offices and Indigenous Peoples' Offices. The researcher asked for assistance from these offices together with the Provincial Tourism Offices to become partners to help with the design of the proposed developmental framework. The IP Offices shall be the representative of the indigenous people of the barangays for the cultural heritage and the Municipal Tourism Office as the representative of the natural heritage.

4-point Likert scale as seen in Table 1, shall be used to determine if Quirino province is rich in cultural and natural heritages and that it is feasible to develop an AR based framework for the preservation of cultural and natural heritage of the province.

Table 1. Likert Scale Rating

Adjectival Rating	Mean Range
Strongly Agree	3.00 – 4.00
Agree	2.00 – 2.99
Disagree	1.00 – 1.99
Strongly Disagree	*UUUU. – 1.00*

### III. RESULTS AND DISCUSSIONS

This part presents the interpretation and analysis of data. There are total of 51 respondents from the various municipal tourism offices and IP offices. It deliberates the profile of the respondents in terms of civil status and ethnic affiliation. It displays the list of all the cultural and natural heritages that can be found in the province. It also shows the importance of the cultural and natural heritages mentioned by the respondents. The prominent issues that should be addressed in the preservation of our cultural and natural heritages were also revealed.

A. Distribution of Respondents as to Civil Status and Ethnic Affiliation
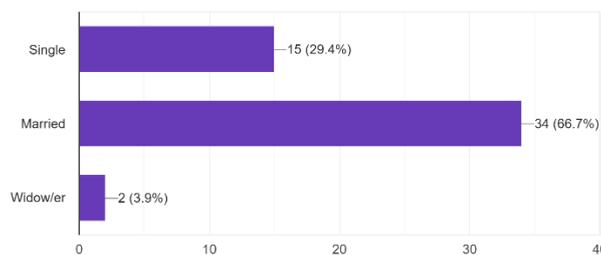
Figure 1. Distribution of the Respondents' Civil Status (n=51)

Figure 2 shows the distribution of the civil status of the respondents. Based on the data presented, out of 51 respondents, 2 or 3.90 percent of them are widower, which has the least number. There are also 15 or 29.40 percent single respondents. Moreover, majority of the respondents are married comprising 66.70 percent or 34 out of 51 respondents.
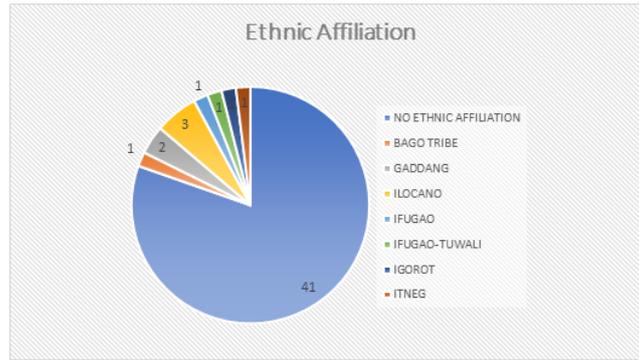
Figure 2. Distribution of the Respondents' Ethnic Affiliation (n=51)

Figure 3 depicts the Ethnic Affiliation of the respondents. There are 41 respondents who have no ethnic affiliation comprising 80.39 percent of the respondents. On the other hand, there are 10 respondents who have ethnic affiliation, namely, Bago Tribe (1), Gaddang (2), Ilocano (3), Ifugao (1), Ifugao-Tuwali (1), Igorot (1) and Itneg (1).

B.   List of the Cultural and Natural Heritages
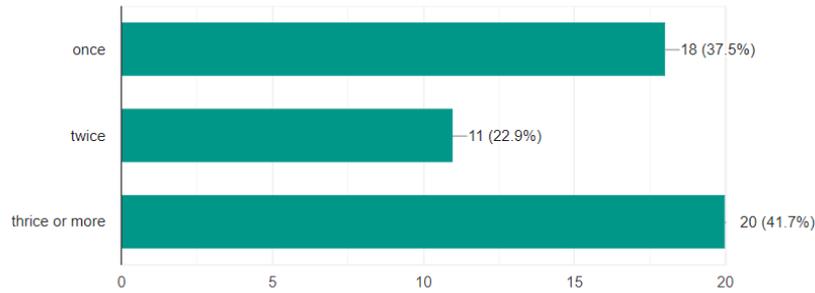

Figure 3. List of the Cultural Heritages

The respondents were asked to identify at least two cultural heritage around the province. There are 14 cultural heritages that were identified and all the rest were answered blank. Figure 4 presents the list of the cultural heritages that can be found in the province.
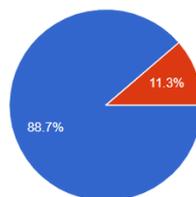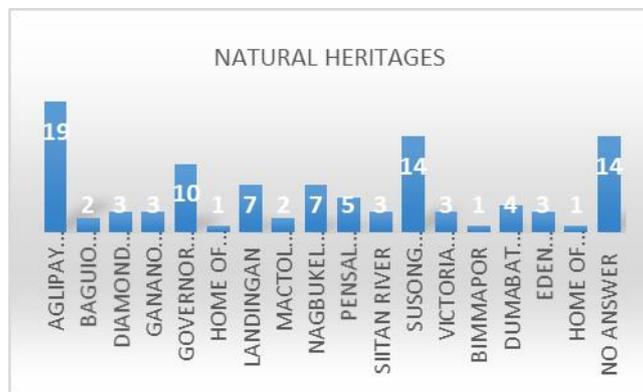

Figure 4. Cultural Heritage Immersion

The respondents were asked if they have immersed or have personally experienced these cultural heritages. Figure 5 shows that 88.7% answered Yes and 11.3% answered No.
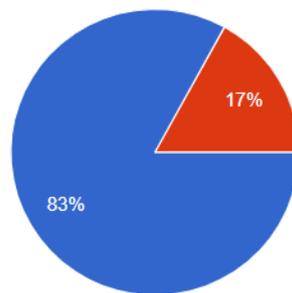
Figure 5. Number of Times of Immersion

Figure 6 presents how many times each respondent has personally experienced the cultural heritages they have listed. 37.5% for once, 22.9% for twice and 41.7% for thrice and more.


Figure 6. List of Natural Heritages

The respondents were also asked for two natural heritages around the province. There were 17 natural heritages listed by the respondents and there were 14 who has no answer. Figure 7 projects the list of the natural heritages found in the province.

Figure 7. Natural Heritage Immersion

As shown in Figure 8, there were 83% who answered Yes when asked if they have already immersed or have personally experienced the natural heritage they have listed. 17% have answered No.
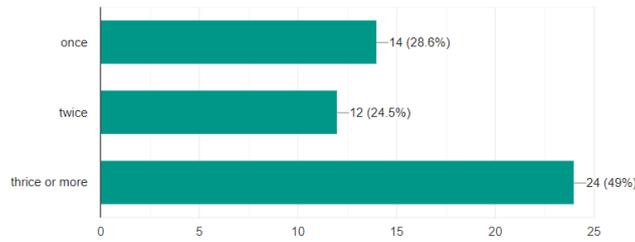
Figure 8. Number of Times of Immersion in Natural Heritage

Figure 9 presents that there were 28.6% of the respondents have personally experienced the natural resources once, 24.5% for twice and 49% thrice or more.

*C. Importance of the Cultural and Natural Heritages Mentioned by the Respondents*

Table 2. Mean Distribution of the Importance of the Cultural and Natural Heritages Mentioned

Importance of the Cultural and Natural Heritages Mentioned	Mean	Descriptive Rating
1. The places or cultures are important because of the aesthetic significance to the community.	3.76	Strongly Agree
2. The places or cultures are important in demonstrating the evolution or pattern of the province's history.	3.73	Strongly Agree
3. The places or cultures demonstrate rare, uncommon or endangered aspects of the province's cultural heritage.	3.53	Strongly Agree
4. The places or cultures have potential to yield information that will contribute to an understanding of the province's history.	3.78	Strongly Agree
5. The places or cultures are important in demonstrating the principal characteristics of a particular class of cultural places within the province.	3.57	Strongly Agree
6. The places or cultures are important in demonstrating a high degree of creative or technical achievement at a particular period.	3.61	Strongly Agree
7. The places or cultures have strong or special association with a particular community or cultural group for social, cultural or spiritual reasons.	3.73	Strongly Agree
8. The places or cultures have special association with the life or work of a particular person, group or organization of importance in the area's history.	3.63	Strongly Agree
GRAND MEAN	**3.67**	Strongly Agree

Legend: 3.26-4.00 Strongly Agree (SA)   2.51-3.25 Agree (A)
1.76-2.50 Disagree (D)   1.00-1.75 Strongly Disagree (SD)

Table 2 revealed the mean distribution of the importance of the cultural and natural heritages mentioned. It is shown on the table that the respondents strongly agreed for all the given statements. Hence, the grand mean of 3.67 which has a mean description of *Strongly Agree*.

3.4 The Prominent Issues that Should Be Addressed in the Preservation of Our Cultural and Natural Heritages
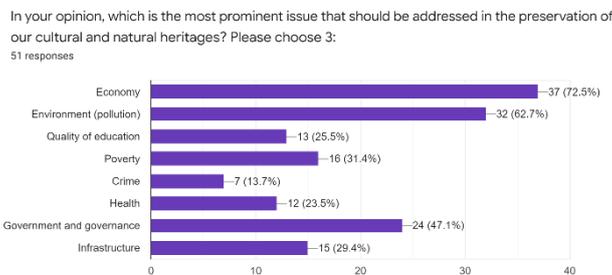
Figure 9. Prominent Issues that Should Be Addressed in the Preservation of Our Cultural and Natural Heritages

Figure 10 explains that among the prominent issues that should be addressed in the preservation of our cultural and natural heritages, majority of the respondents chose economy followed by environment (pollution) and Government and governance. Based from the result, crime can be noted as the least prominent issue.

E. The Proposed Developmental Framework using AR
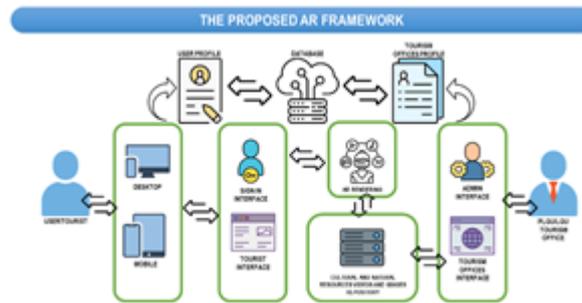
Figure 11. The Proposed AR Framework

Figure 11 presents the proposed AR Framework to aid in the preservation of the cultural and natural heritages of Quirino province. From the charts drawn from the questionnaires from the respondents, there are still local tourists who does not know some of the province's cultural and natural heritages. There were also some that did not yet personally experienced these heritages. It is for these reasons that an AR framework is designed so that the preservation of the heritages may be started not only for the local tourists to view and experience, but also to the coming generations.

In the proposed framework, the tourist, may it be local or foreign, is one of the main actors in the framework. The user can interact on either mobile devices or desktop. With that, the user can create a profile with a sign in interface and user interface respectively. With such, the user can view his/her visited places. Through the use of AR, the user may look into the various cultural and natural heritages of the province from the repository. The administrators then, from the different tourism offices of the province shall feed the images and videos of the different cultural and natural resources of the province.

With the use of the AR framework, not only the local tourists can virtually visit the rich cultural and natural heritages of the province but also the nearby tourists coming from other provinces.

IV. CONCLUSION

From the results and discussions, it was revealed that out of 51 respondents, widowers are least number of respondents and the majority of the respondents are married. There are 41 respondents who have no ethnic affiliation and 10 respondents who have ethnic affiliation which means that majority of the respondents has no ethnicity or have been affiliated with any of the ethnic tribes around the province.

According to the graphs derived from the respondents' surveys, there are still some local visitors who are unaware of the province's cultural and natural heritages. Some people had not yet had the opportunity to learn about these cultures.

The results also revealed that all the heritages mentioned by the respondents show the importance of the cultural and natural heritages. Amongst the prominent issues that should be addressed in the preservation of our cultural and natural heritages, majority of the respondents chose economy and crime is the least prominent issue.

The cultural and natural heritages of the province may be conserved and safeguarded for future generations with the help of the suggested framework employing AR.

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