

Sa Gugma Sa Atong Kultura: A Community – Driven Marketplace for Indigenous Artisans

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Abstract— Indigenous artisans of the Panay Bukidnon community continue to struggle with preserving their cultural heritage and promoting their handmade products due to limited market access, labor-intensive profiling processes, and the absence of digital tools that support fair pricing and broader cultural visibility. These challenges restrict their economic opportunities and hinder the passing down of traditional craftsmanship. To address this gap, this study developed Sa Gugma sa Atong Kultura, a community-driven marketplace for indigenous artisan designed to highlight Panay Bukidnon culture while enabling artisans to manage their profiles, showcase products, and engage in direct e-commerce transactions. Using an Agile development process, the system was built as a responsive web application with a React.js frontend, Node.js backend, and MySQL database. Twenty-six participants including Indigenous artisans, the Head of the Calinog Indigenous Peoples Office, customers, and IT experts were involved through interviews, surveys, observations, and system testing. The platform integrates key features such as artisan profiling, cultural content, messaging, and a machine learning-based dynamic pricing algorithm that adjusts product prices based on historical data, seasonal patterns, and local supply and demand. Results showed that the system is excellent with an overall mean score of 4.80 and received positive evaluations in functionality, usability, reliability, performance efficiency, maintainability, and portability based on an ISO/IEC 25010:2011-adapted assessment. Overall, the findings demonstrate that the platform not only promotes the cultural identity of the Panay Bukidnon community

but also expands artisans' market reach and strengthens sustainable livelihoods through data-driven pricing and reporting tools, showing how community-centered digital platforms can preserve culture while supporting economic empowerment.

Keywords— Community driven, marketplace, indigenous artisans, dynamic pricing

I. INTRODUCTION

The Philippines is home to a diverse array of Indigenous Peoples (IPs), each with unique cultural identities, traditions, and social structures. To safeguard their heritage and rights, various organizations have been established. The National Commission on Indigenous Peoples (NCIP), formed under the Indigenous Peoples' Rights Act (IPRA) of 1997, serves as the primary government agency dedicated to recognizing, protecting, and promoting the rights of IPs, including their rights to ancestral domains, self-governance, and cultural integrity [7]. Beyond governmental efforts, community-based organizations play a pivotal role in cultural preservation. For instance, the Schools of Living Traditions (SLTs), initiated by the National Commission for Culture and the Arts (NCCA), are community-managed centers where cultural masters impart traditional knowledge and skills to the youth, ensuring the transmission of intangible cultural heritage [15]. These

initiatives are crucial in maintaining the cultural legacy of Indigenous communities amidst the challenges posed by modernization and globalization. Beyond the national level, however, this commitment often extends to local government units. In Western Visayas, for instance, particularly in the municipality of Calinog, Iloilo, there exists an office dedicated to similar objectives, often referred to as the Indigenous Peoples Focal Person's Office or Calinog Indigenous Organization (IP) Office.

The municipality of Calinog is home to a significant population of the Panay Bukidnon, an indigenous group in the Visayas with a rich cultural heritage deeply connected to their ancestral lands. Their artistic traditions are evident in their intricate textile weaving, particularly the creation of panubok embroidery and habol. These handcrafted items are not only expressions of their cultural identity, with motifs often rooted in the Sugidanon epics and their natural environment [3] but also hold potential for sustainable livelihoods. Panay Bukidnon, face many challenges in keeping their traditions alive and selling their handmade products. One big problem is that many young people are more interested in modern ways of living and forget about their cultural roots. This makes it harder for traditions and skills to be passed down to the next generation. When it comes to selling their crafts, such as the traditional embroidery called "panubok," Panay Bukidnon artisans have a hard time reaching bigger markets because they live far from cities and do not have easy access to transportation or the internet [7]. Many artisans also do not have enough training in business or marketing, making it difficult for them to sell their products fairly. On top of that, when outsiders commercialize or misuse Indigenous culture just to make money, the true meaning and beauty of their traditions can be lost [10]. Currently, in the municipality of Calinog, Iloilo, same sentiments were also faced by the artisans and the office of IP in promoting their cultural heritage and marketing their products in a better infrastructure. Indigenous artisans have no formal profiling system, and their registration is done manually by recording their information in a book provided by the Securities and Exchange Commission (SEC). For record-keeping, details are simply written in a logbook and stored in a folder. Artisans typically sell their products either in local markets or during town events. There is no organized system to properly track or verify the specific artisan who created a particular product. To overcome these problems, there should be more support through education, community programs, and online platforms that help Indigenous people protect and share their culture with pride.

Developing a dedicated website that showcases Indigenous cultural heritage while integrating e-commerce functionalities offers numerous benefits. Such platforms provide Indigenous artisans with direct access to global markets, reducing reliance on intermediaries and ensuring fair compensation for their work. For instance, the Cojolyá Association in Guatemala successfully utilized an online store to connect Mayan weavers with ethical consumers worldwide, thereby preserving traditional weaving techniques and supporting artisans' livelihoods [17]. Digital platforms serve as vital tools for

cultural preservation. They enable communities to document and share traditional knowledge, languages, and practices, ensuring that these cultural elements are passed down to future generations. E-learning modules and virtual exhibitions can be tailored to include local languages and cultural references, making them more engaging and relevant for Indigenous audiences [5].

This study designs and develops a platform that promotes the cultural heritage of the Panay Bukidnon community, with an e-commerce feature that creates detailed profiles for artisans and allows them to sell their original products. The platform helps foster love and appreciation for their culture and expand the market reach of Indigenous Peoples (IP) products. It also includes a dynamic pricing algorithm using machine learning to calculate prices based on historical data, and adjusts prices based on seasonal factors, product elasticity, and the balance of local supply and demand to each artisan, helping them earn a steady and fair income. The platform generates monthly reports that show sales volumes and identify top-selling products to guide the artisans. In addition, the system is evaluated using the software quality standards of the ISO-based questionnaire. The study was conducted at the Calinog Indigenous Peoples' (IP) Office, with most participating artisans coming from Barangay Garangan, Calinog, Iloilo.

Adding e-commerce features to a website not only gives Indigenous communities more ways to earn money but also helps people around the world learn about and appreciate their culture. By using digital technology, Indigenous groups can share their unique traditions, support local businesses, and make sure their culture stays alive for future generations. Giving them these tools can help expand their market, promote their cultural heritage, and support long-term economic growth for their communities.

II. RELATED WORKS

The growing body of research on indigenous entrepreneurship and artisan-based enterprises underscores the interconnection between cultural preservation, innovation, sustainability, and digital transformation. Early studies emphasize structured entrepreneurial processes in indigenous communities. Tung [25] proposed a participatory entrepreneurial framework for indigenous craft revitalization in Taiwan, demonstrating how collaborative partnerships, craft-design integration, and long-term venture development contribute to sustainable business formation. The study highlighted the importance of opportunity recognition grounded in cultural identity. Similarly, Khumukcham [11] examined community-based business models through an ethnographic approach, showing how indigenous entrepreneurs adapt to market changes while preserving traditional knowledge systems. The findings suggest that innovation within indigenous enterprises often emerges from contextual awareness rather than radical transformation.

From a broader analytical perspective, Yi [31] conducted a bibliometric and visualization analysis of artisan

entrepreneurship, identifying research trends linking cultural industries to economic development and sustainability. The study emphasized the strategic positioning of artisans within competitive markets. Complementing this, Ramadani [20] revisited artisan entrepreneurship through a systematic literature review and introduced a dual-perspective conceptual framework positioning artisans as both cultural custodians and innovative actors in the global entrepreneurial ecosystem. The framework integrates culture, innovation, sustainability, territorial development, and policy alignment with the Sustainable Development Goals (SDGs), while acknowledging tensions between tradition and modernization.

Digital inclusion further shapes indigenous entrepreneurship. Rodriguez de Francisco [22] analyzed how indigenous artisans in Oaxaca leverage e-commerce platforms and social media to access broader markets. The study identified opportunities in global visibility but also challenges related to intellectual property protection and equitable compensation. These findings indicate that digital platforms must integrate protective and ethical mechanisms alongside commercial functionalities.

Local Philippine studies reinforce these global insights. Arcega [1] explored entrepreneurial leadership among the Ati (Aeta) community in Capiz, demonstrating how indigenous governance structures influence sustainable enterprise practices. Apritado [2] examined product innovation and marketing strategies in the Ilocos Region handicraft industry, emphasizing the role of digital marketing and local government support in enhancing artisan competitiveness. Inocian [9] investigated the indigenous art of “bakat” weaving, detailing its cultural and economic significance. Mirabuenos [14] analyzed sustainability practices among Filipino handcrafted enterprises, identifying strong connections between cultural values and business operations. Leynes [12] further examined how adaptive heritage interpretation in Paete, Laguna supports artisan livelihoods while preserving intangible cultural heritage.

In addition to academic literature, several digital platforms operationalize indigenous e-commerce systems. International initiatives such as The Folklore Connect, Biskane, Pow Wow Market, Nafiia, and Kalashilpa demonstrate scalable digital marketplaces that promote cultural products and provide secure transaction systems. These platforms support international market access and fair compensation mechanisms; however, they primarily focus on marketplace visibility rather than advanced data analytics.

Similarly, Philippine-based platforms including LIKHĀ, Pili Lokal, Panublix, Malingkat Enterprises, and HABI Community Virtual Marketplace integrate digital commerce with cultural promotion and artisan empowerment. While these systems provide secure and user-friendly e-commerce environments, transparent transactions, and support for indigenous branding, they lack integrated dynamic pricing mechanisms and automated monthly statistical reporting tools for data-driven decision-making.

A synthesis of the reviewed literature and systems reveals four dominant themes: (1) sustainability rooted in cultural

identity, (2) innovation as adaptive reinterpretation of tradition, (3) digital platforms as enablers of inclusive market access, and (4) the absence of integrated analytical and adaptive pricing tools in existing systems. Although current platforms successfully support artisan visibility and secure commerce, none incorporate dynamic pricing algorithms responsive to seasonal factors, market demand fluctuations, and product elasticity, nor do they provide structured monthly sales analytics to guide indigenous entrepreneurs.

These identified gaps justify the development of a community-based digital platform tailored to the Panay Bukidnon artisans of Brgy. Garangan, Calinog, Iloilo. By integrating cultural profiling, secure e-commerce functionality, direct artisan–customer communication, dynamic pricing based on local demand variables, and automated sales reporting, the proposed system advances a more comprehensive, data-informed, and culturally grounded approach to indigenous digital entrepreneurship.

III. METHODOLOGY

A. Research Design

This study utilized a developmental–descriptive type of research

design, which focuses on the systematic development of a technological product and the description of its characteristics and performance based on actual implementation and evaluation. Developmental research emphasizes the structured creation,

refinement, and validation of an innovative system through iterative processes, while the descriptive component allows the researcher to present and analyze the system’s features, usability, and effectiveness based on gathered data from target users.

B. Use Case Diagram

A use case diagram is a visual tool used in requirement analysis to represent the interactions between users (actors) and a system. It helps identify functional requirements by illustrating how users will use the system to achieve specific goals, ensuring a clear understanding of the system’s expected behavior. Figure 1 shows the Use Case diagram of the system. It illustrates the interactions of three primary actors within the system, the Admin (Calinog Indigenous People Organization), Indigenous Artisans, and Customers. The Admin acts as the system administrator and is responsible for user registration and verification, logging in, and managing system accounts. Administrative functions include adding, updating, and deleting customer accounts, artisan accounts, categories, and cultural information, as well as viewing the dashboard to monitor platform activities.

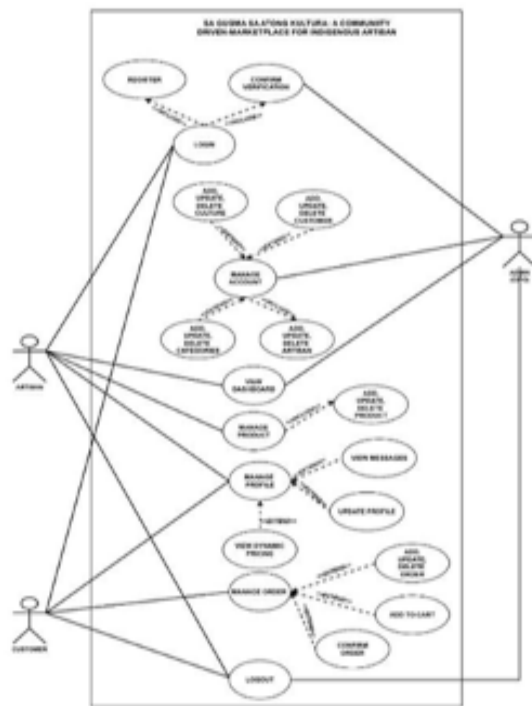


Fig. 1 Use Case Diagram of the System

C. System Design

The system adopted the Agile Methodology to ensure flexibility, continuous improvement, and user-centered development. This approach involves iterative phases, starting with planning to identify key features, followed by designing wireframes and prototypes. The development process was carried out in small, testable increments, allowing for regular feedback and improvements. Testing was conducted to refine functionalities before deployment, ensuring a smooth user experience. After launch, the system underwent continuous maintenance and updates to enhance performance and meet evolving user needs. This methodology enables a dynamic, efficient, and user-friendly platform for Indigenous artisans.

D. System Development

The system utilized node.js for front-end development to create a responsive and interactive user interface. React.js was used for the back end to handle server-side processes, while MySQL managed the database where all user, product, and transaction data will be stored. The development process followed the Agile methodology, allowing for iterative improvements and active collaboration with stakeholders. Features such as dynamic product listings, user authentication, and order processing were built and integrated in stages to ensure proper functionality at each phase.

In dynamic pricing algorithms, Fig 2 shows the detailed flow on how dynamic pricing was implemented within the system. The workflow begins when the pricing engine loads essential data from the platform's database. This includes sales records of handcrafted items, product details such as material type or artisan origin, and size-level stock information for example, available quantities of woven bags, handcrafted accessories, clothing pieces, or household crafts. These

datasets form the core foundation for understanding how each artisan product is performing on the marketplace. Using the collected sales data, the system identifies recurring seasonal trends that often influence interest in indigenous products. These trends may be linked to cultural events, local festivities, gift-giving seasons, or tourism cycles. The engine extracts monthly and day-of-week patterns that reveal when certain products such as handwoven textiles or traditional crafts experience stronger demand. These seasonal factors help the platform adjust prices in ways that reflect buyers' natural purchasing behavior while safeguarding artisans from undervaluation.



Fig. 2 System development workflow

E. Participants

The study included ten (10) Indigenous Artisans, who provided their profiles and products, along with one (1) head or focal person of IP Office, who was represented as an admin of the system. Additionally, ten (10) customers are the users of the system. Moreover, five (5) IT Experts ensured the technical feasibility and system quality. Purposive sampling was used in selecting these respondents to ensure that only individuals directly involved in the development, use, and evaluation of the system were included. In total, the study gathered responses from 26 individuals, ensuring a well-rounded perspective on the project's impact and effectiveness.

F. Research Instruments.

The researchers used the software evaluation tool adapted based on the ISO/IEC 25010: 2011 Standard questionnaire. The questionnaire consists of the following characteristics: Functional Suitability, Performance Efficiency, Compatibility, Usability, Security, Maintainability, Portability and Reliability.

G. Data Analysis

After the system was developed and meets its intended objectives, the researcher conducted system evaluation with a randomly selected group of respondents such as Head of Calinog Indigenous People Organization, Artisans, customers and IT Experts.

Quantitative data was obtained from the ISO-based questionnaire. Descriptive statistics including mean scores and standard deviation were used to determine the overall quality of the developed system.

H. Ethical Considerations

The study adhered to data privacy and ethical standards. Participation was voluntary, and informed consent was obtained. No sensitive health data were collected beyond general dietary preferences. All user information was anonymized prior to analysis, and system access logs were secured.

IV. RESULT AND DISCUSSION

The system entitled "Gugma sa Atong Kultura: A Community-Driven Marketplace for Indigenous Artisans" was successfully designed, developed, and evaluated to address the identified needs of the Panay Bukidnon community. The platform integrates cultural promotion, e-commerce functionality, dynamic pricing, and sales analytics into a unified web-based system. This section presents how the developed system achieved the objectives of the study, supported by system-generated outputs and functional modules.

A. Community-Based Cultural Promotion Platform

One of the primary objectives of the study was to develop a community-based digital platform that highlights the cultural heritage of the Panay Bukidnon while supporting artisan visibility. The system effectively implemented a dedicated "Culture & Heritage" module that presents cultural narratives, artisan stories, and visual representations of traditional identity. As shown in Fig. 3, the interface features a banner showcasing Panay Bukidnon artisans wearing traditional attire, reinforcing cultural representation and authenticity. The layout encourages users to appreciate indigenous heritage while navigating through curated cultural content. This module demonstrates how digital platforms can function not only as commercial tools but also as instruments of cultural preservation.



Fig. 3. The community-driven page

Furthermore, Fig. 4 presents the Indigenous Artisans Profile page, which includes structured profile cards containing artisan photographs, location details, product specialization, descriptive summaries, and identifying tags such as "Handcrafted" and "Traditional." The integration of a search functionality and rating mechanism enhances discoverability and credibility. This result confirms that the system successfully established a digital space that strengthens artisan identity and promotes community-based cultural appreciation.



Fig. 4. Indigenous Artisan profile page

B. Integrated E-Commerce and Communication System

To empower artisans economically, the system incorporated a fully functional e-commerce module. The marketplace interface, shown in Fig. 5, allows customers to browse indigenous products categorized into Handiwork, Embroidery, Woven Textiles (Hablon), and Tools. Each product card contains essential information, including image, description, pricing, and an "Add to Cart" feature. The structured filtering system improves user navigation and purchasing efficiency.

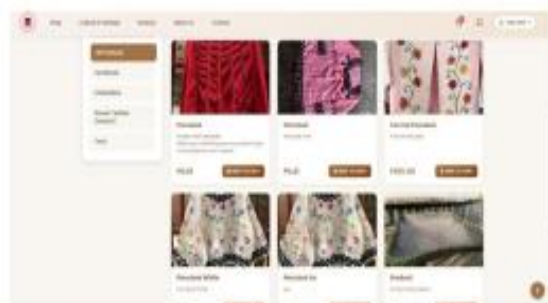


Fig. 5. E-commerce page

The implementation of direct communication between customers and artisans further strengthens the platform's community-driven approach. As illustrated in Fig. 6, the

messaging system enables real-time interaction through a chat interface. The module supports text messaging and location sharing, fostering transparency and trust between buyers and sellers. This feature reduces transactional barriers and enhances customer engagement, supporting the objective of direct artisan empowerment without reliance on intermediaries.



Fig. 6. Messaging Feature for Customer and Artisans

The successful integration of transactional and communication modules demonstrates that the platform effectively bridges cultural commerce and digital connectivity.

C. Dynamic Pricing Mechanism

A key innovation of the system is the implementation of a dynamic pricing algorithm tailored to indigenous marketplace conditions. The pricing engine considers multiple variables, including market demand, seasonal availability of raw materials, stock levels, demand-supply ratio, elasticity values, and predicted profit margins.

As shown in Fig. 7, the backend dynamic pricing interface displays computed pricing suggestions, percentage adjustments, and supporting variables used in the calculation. The system generates a structured table containing the current price, suggested price, stock availability, seasonal factor, elasticity coefficient, and predicted profit outcome. This transparency allows administrators to validate algorithmic recommendations before deployment.

Product Name	Current Price	Suggested Price	Stock Availability	Seasonal Factor	Elasticity Coefficient	Predicted Profit Outcome
Handmade Ceramic Bowl	120.00	135.00	150	1.2	0.8	15.00
Handwoven Cotton Scarf	80.00	90.00	200	1.1	0.7	10.00
Handcrafted Wooden Box	150.00	165.00	100	1.3	0.9	15.00
Handmade Leather Bag	200.00	220.00	80	1.4	1.0	20.00
Handwoven Jute Mat	60.00	70.00	300	1.0	0.6	10.00
Handcrafted Metal Pot	180.00	195.00	120	1.2	0.8	15.00
Handmade Silk Saree	250.00	275.00	60	1.5	1.1	25.00
Handwoven Bamboo Basket	40.00	45.00	400	0.9	0.5	5.00
Handcrafted Clay Figurine	90.00	100.00	180	1.1	0.7	10.00
Handmade Paper Book	30.00	35.00	250	0.8	0.4	5.00

Fig. 7. Dynamic Pricing interface

The integration of data-driven pricing ensures that artisans remain competitive while safeguarding profitability. Unlike static pricing strategies, the implemented algorithm adapts to

fluctuating market conditions, demonstrating the feasibility of intelligent pricing mechanisms within community-based indigenous marketplaces.

D. Sales Monitoring and Analytical Reporting

To support data-informed decision-making, the system provides automated statistical reporting and performance dashboards. The Sales Report module, illustrated in Fig. 8, presents registration trends, sales distribution by product category, monthly order volumes, and top-selling artisans. These visual analytics provide actionable insights into marketplace growth patterns and product performance.



Fig. 8. Statistical Sales Report page

Additionally, the Admin Dashboard, shown in Fig. 9, consolidates key operational metrics, including monthly order trends, artisan rankings, and detailed transaction logs. The Recent Orders section enables systematic monitoring of order status, while the Top Selling Artisans table highlights high-performing contributors. This reporting structure enhances transparency, accountability, and administrative efficiency.

The availability of analytical dashboards confirms that the system does not merely facilitate transactions but also supports sustainable marketplace management through continuous performance evaluation.



Fig. 9. Top Selling Artisans Page

The integration of cultural presentation, intelligent pricing, communication tools, and analytics demonstrates that digital innovation can effectively empower indigenous communities. The findings suggest that community-driven e-commerce systems, when combined with adaptive algorithms and transparent reporting mechanisms, can simultaneously

preserve cultural heritage and promote economic sustainability.

Overall, the system achieved its intended purpose of supporting cultural preservation while enhancing livelihood opportunities for Panay Bukidnon artisans through technology-enabled solutions.

System Evaluation Results

The developed system, "Gugma sa Atong Kultura: A Community-Driven Marketplace for Indigenous Artisans," was evaluated to determine its acceptability, functionality, and effectiveness in supporting Indigenous artisans and promoting cultural preservation. The evaluation assessed how well the platform enables Panay Bukidnon artisans to showcase their crafts, engage with customers, and manage online transactions. It also examined the effectiveness of key features such as e-commerce integration, dynamic pricing, and sales reporting in empowering artisans and sustaining their livelihood through technology.

A 5-point Likert scale (1 = Poor to 5 = Excellent) was used to measure responses. The results were analyzed using the mean and standard deviation, with descriptive interpretations as follows: 4.51–5.00 (Excellent), 3.51–4.50 (Very Good), 2.51–3.50 (Good), 1.51–2.50 (Fair), and 1.00–1.50 (Poor).

Table 1 presented the overall results of the system evaluation based on the ISO/IEC 25010 software quality standards. The system obtained a grand mean of 4.80 with a standard deviation of 0.27, which is described as "Excellent." This indicates that the respondents collectively perceived the system as highly effective, functional, and well-developed in meeting its intended purpose.

Table 1. Overall Evaluation Results Based on Software Quality Characteristics

Criteria	Overall Mean	Overall SD	Description
Functional Suitability	4.83	0.28	Excellent
Performance Efficiency	4.69	0.44	Excellent
Compatibility	4.79	0.38	Excellent
Usability	4.84	0.26	Excellent
Reliability	4.87	0.30	Excellent
Security	4.78	0.38	Excellent
Maintainability	4.83	0.38	Excellent
Portability	4.79	0.40	Excellent
Grand Mean	4.80	0.27	Excellent

V. CONCLUSION AND RECOMMENDATIONS

A. Conclusion

The results of the study show that the developed system, Gugma Sa Akong Kultura: A Community-Driven Marketplace for Indigenous Artisans, successfully created a community-based platform that highlights the cultural heritage of the Panay Bukidnon through detailed artisan profiles. This feature allows more people to appreciate their traditions and purchase culturally significant products. The platform also integrates an e-commerce system that empowers Panay Bukidnon artisans to directly sell their crafts while offering a messaging feature that enhances communication between artisans and customers.

A dynamic pricing algorithm was implemented to determine fair and competitive product prices by considering historical data, seasonal factors, product elasticity, and the balance between local supply and demand. Additionally, the system provides monthly reports that present sales summaries and identify top-selling products, helping indigenous artisans monitor performance and make informed decisions.

The evaluation results, based on the ISO/IEC 25010:2011 software quality model, revealed high levels of user satisfaction across all quality characteristics. The system obtained an overall grand mean rating of 4.80, interpreted as "Excellent," indicating that it is highly functional, reliable, compatible, secure, and user-friendly. Respondents including IT experts, CIPO, customers, and indigenous artisans rated the system positively, confirming that Gugma Sa Akong Kultura is an effective tool for promoting cultural sustainability and supporting economic empowerment in the Panay Bukidnon community. Overall, the findings affirm that the system meets software quality standards and has strong potential to enhance cultural visibility, appreciation, and livelihood opportunities for indigenous artisans.

B. Recommendations

Based on the conclusions, several recommendations are suggested. System enhancements should be considered to improve compatibility with different devices and ensure a smooth user experience for both artisans and customers. Proper documentation and training should be provided to Indigenous artisans and system administrators to strengthen system maintainability and ensure efficient management of the platform. Additional modules such as product inventory tracking, promotional campaigns, and cultural storytelling features may be integrated to further enhance user engagement and cultural appreciation. It is also recommended to expand the system's implementation to other Indigenous communities to assess its scalability and adaptability in promoting local craftsmanship.

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