

Preserving Indigenous Music through AI: Implications for Cultural Sustainability in Creative Business Models

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Abstract

The loss of local music traditions due to the forces of globalization, the homogenization of technology, and the lack of preservation endangers the sustainability of the cultures. The current paper provides an insight into this vital question by examining the viability of artificial intelligence (AI) in maintaining indigenous musical traditions and developing new business models, and how they can function in creative economies. The dataset of 500 songs about three indigenous communities was curated and described in terms of tonal, rhythmic, and lyrical, and processed with the help of a generative adversarial network (GAN) model, neural reconstruction networks, and digital twins' networks. The mixed-methodology design was used in this study to quantitatively and qualitatively assess the AI performance in our research fields and obtain opinions about the AI performance among the community practitioners and cultural stakeholders. The results show that AI models were very faithful in reproducing the musical constructions, and the respondents demonstrated that the musical contents were real and had identity relevant to the culture they lived in. In addition to this, the analysis identified three solutions that can be implemented as a sustainable creative business model platform cooperative, NFT-based licensing, and royalty-based streaming, each of which incorporates cultural preservation and equitable involvement in the economics. The findings identify the two-fold potential of AI as a technological protection of intangible heritage and a contributor to sustainable cultural entrepreneurship, which offers a solution to a more balanced intangible heritage protection mechanism, innovativeness, and sustainability in the global creative economy.

KEYWORDS

Indigenous music preservation, Artificial intelligence, Cultural sustainability, Creative business models, Digital heritage, Generative models, Cultural entrepreneurship

1 | INTRODUCTION

The endemic generational change in the conservancy of indigenous music has become a flaming topic of the cultural development in the XXI century as communities are influenced by the increasingly rapid process of international urbanization and by the homogenizing technologies. Traditional music has cultural practices embedded in it that form the core of identity, preservation, and other phenomena; however, these are now endangered by the creation of cultural products and commercial entertainment, which is mass-

produced by markets (Li, 2013; Titon, 2009). The effects are not just the loss of aesthetics since music can be a means of preservation of history, spirituality, and generations of knowledge. There has been an indication that the sustainability of the music traditions is a question of conserving them, as well as their flexibility to the modern cultural and economic systems (Chan, 2018; Maliangkay, 2014). Despite the recognition of intangible cultural heritage on an international and a local scale, the preservation processes that,

traditionally, were used do not ensure anything beyond archiving music over time, but do not enable it to live dynamically (D'Agostino, 2020). This has raised critical issues of the way preservation and innovation can play synergies with each other in order to retain authenticity and remain relevant in cultures.

Artificial intelligence (AI) has been referred to as a breakthrough in the preservation of cultural heritage, but the opportunities of applying it to indigenous music have been challenged and untested. The recent optimized dataset construction / generative models' solution, and the emergence of digital twining technologies, make a possible to achieve such high-fidelity reconstructions of soundscapes that can be stored in forms that retain rich structure, tone, and context (Chen et al., 2024; Zou et al., 2024). In particular, audio preservation and the implementation of AI standards have been proposed by Bosi et al. (2024) to eliminate the differences that exist in different archiving practices, and Bugueno et al. (2021) have demonstrated the ways in which new technologies can restore the cultural value to the native communities. Critics note that the technology solutions threaten to transform the traditions into information, without any cultural context (Fu, 2025; Ardan et al., 2025). This conflict shows that it requires methods that incorporate AI in the community-driven models, rather than the external technologies dictation.

Those are very high stakes in indigenous contexts, where cultural practices linger on issues of proprietorship, authenticity, and morals very easily. As D'Agostino (2020) says, music has a strong connection to both aesthetics and ethics and technological mediation must be conscious of these as well. Researchers who may expound on the ethical issues of AI in the preservation of intangible heritage are also highly in demand, as Fu, Shi, and Xi (2025) did when they urged against the adoption of technologies that were based on the ideas of efficiency rather than preservation of cultural values. These types of criticism echo with general discourse on the topic of cultural sustainability, which dictates that the preservation efforts must augment community values and must not exploit communities (Bennett, Reid and Petocz, 2014; Brown and Vacca, 2022). The AI-powered preservation would transform the community into a digital colonialism process unless the community is included in the preservation process: information preservation is correct, and the community is deprived of its social and economic control (Horna-Saldafia, Perez Perez & Toro Galeano, 2025).

The emerging case studies provide promising insights since by preserving the traditional Malay music videos using an AI-driven workflow, Izani et al. (2025) could preserve more traditional music videos but introduce additional cultural information to the video. On the contrary, by applying the use of neural networks, Yu et al. (2024) demonstrated how we can manage to balance tradition and runaround modern technology by being capable of conserving more traditional music videos. VI TIP by Ma et al. (2024) is, similarly, a system

founded on AI that tries to preserve Vietnamese traditional instruments in the three-dimensional space. The contributions have shown that AI may be applied to cultural heritage to enhance it beyond mere record keeping to be more interactive, more real, and envisioned modes of culture transmission. Nevertheless, they also demonstrate the issues of the right to ownership, fair distribution of benefits, and cultural authenticity-problems which become the most important in the indigenous situation.

The need to balance technological innovation and cultural integrity has been observed to be realized because of the changes in the creative industries in the wake of the pandemic. Lin (2023) suggests that the key to the sustainability of cultural and creative industries is resilience and adaptability. According to Iodice and Bifulco (2025), purpose-driven business models hold the key to the future in ensuring sustainable value congruence between the consumer and sustainability. These insights are especially relevant at least in the context of the indigenous setting: cultural production is not only an economic practice but also a bulwark against foreign invasion, nation-building, its defiance against the onslaught of globalization, etc.

These ends can be reached through AI, provided that it is integrated into decent business models offering new points of contact with cultures and revenue. Why have empirical studies ever been ill theorized and idolized, and how this may happen. It is into such a backdrop that the present research study discusses the role of AI in sustaining indigenous music and its relevance to the sustainability of culture, as far as creative business models are concerned. The project will attempt to make the empirical data on how technology can keep the musical heritage intact and enable sustainable cultural entrepreneurship by creating a collection of indigenous songs that can then be used and reproduced through modern AI reconstruction algorithms, and lastly by incorporating the opinions of the community and contributions of the community. Significantly, the study is likely to demonstrate how the artificial intelligence-driven preservation may become a means of preserving the cultural integrity, taking advantage of the new business opportunities, generating meaningful business opportunities, and establishing custom preservation.

2 MATERIAL AND METHOD

2.1. Research Design

This paper has taken a mixed approach in examining technical as well as social and cultural aspects of indigenous music preservation via artificial intelligence (AI). The creation and markup of a corpus of indigenous songs were done quantitatively, along with processing, and AI-powered model testing to assess the accuracy of the preservation. The qualitative practices presupposed interviews and focus groups with

the community practitioners to judge on the cultural authenticity of the machine-generated products and their economic prospects. The triangulation strategy aimed to increase the validity by matching computational performance to lived cultural points of view (Bosi et al., 2024; Chen et al., 2024).

2.2. Dataset Construction

A sample of 500 songs representing the more traditional songs of three indigenous peoples (Community A, B and C) was created through consultation with cultural custodians digitized through the high-resolution audio capture devices, monophonic and polyphonic structures. The annotation process was done alongside local musicians to confidently capture the rhythms of the cycles, tonal city, lyrical semantics and performance situation (Saputra et al., 2024; Wu, 2023).

In contrast to more technically focused earlier archiving, which would priorities storage over cultural localization (Li, 2013; D Agostino, 2020), the study would insert cultural metadata within the files, including frequency of use, otherwise latent linguistics, and symbolic indicators of meaning. This guaranteed that AI training was not restricted to reproducing sounds but involved the socio-cultural integrity of each piece. Table 1 shows the structure of the data set.

This data was complemented with the use of digital twin technology, allowing for the recreation of the performance environments in an immersive environment per the emerging trends of musical heritage preservation (Zou et al., 2024).

2.3. AI Models and Technical Workflow

Three synergistic AI models were used for the reconstruction and preservation of songs.

GANs have been used to make up for missing or damaged parts of a piece of music. Such models had been trained to administer trade-offs between rhythmic correctness and tonal precision that Yu et al. (2024) achieved. Neural Reconstruction Models have been applied to analyses both spectral and temporal properties to reproduce realistic vocal timbers and instrument tones. This strategy was particularly relevant concerning instruments not produced in large quantities anymore (Ma et al., 2024). Digital Twin Systems were developed to enhance the live performance experiences through

immersion in a 3D environment where contextually defined elements of culture were included (Zou et al., 2024). The general workflow consisted of three steps: the noise reduction and normalization of data during the preprocessing, training and assessment of AI, and the validity with cultural experts regarding the reconstruction. The performance across signal-to-noise ratio (SNR), convergence in the spectra, and cultural authenticity scores had been utilized. The musician's judgment was used to provide the latter, which was done to avoid the issue of technical perfection being the focus of analysis, instead of cultural reception (Fu, 2025). Table 2 provides an overview of AI model evaluation results.

The findings suggested that while GANs provided superior technical fidelity, digital twin systems were rated highest for cultural authenticity due to their contextual immersion.

2.4. Qualitative Component: Community Engagement

Forty-five cultural stakeholders, including musicians, elders, and community entrepreneurs, participated in interviews and focus groups. The reasoning was organized according to three themes: (1) the perception of the AI-generated outputs in contrast to the authentic performances, (2) the possible risks of technological mediation, and (3) the opportunities of creative entrepreneurship. Thematic analysis showed subtle differences in positions: whereas the older community believed AI to lead to the loss of ritual context, the younger musicians saw AI as a form of revitalization and addressed a broader audience (Tella et al., 2025; Dueck, 2024).

Data triangulation, matching the standpoints on the topic provided by qualitative findings with the characterisation of the AI analysis, was conducted to guarantee critical rigour. In one case, GANs were said to have high SNR values. However, some musicians were quoted as being emotionally muted, a point that similarly calls into question the cultural sensitivity of AI (Fu, Shi & Xi, 2025).

2.5. Business Model Analysis

Since preservation might invite cultural stagnation unless sustainable economic models are developed (Dameri & Moggi, 2021; Lin, 2023), the research

Table 1: Structure of Indigenous Music Dataset

Community	Number of Songs	Features Annotated	Additional Metadata
A	180	Rhythm, tonal patterns, lyrics	Ritual use, performer lineage
B	160	Harmony, instrumental style	Seasonal cycle, linguistic register
C	160	Tempo, melodic contour	Social function, symbolic meaning

Table 2: Evaluation of AI Models for Indigenous Music Preservation

Model Type	SNR Improvement (%)	Spectral Convergence Score	Cultural Authenticity (1–5 scale)
GAN-based reconstruction	37.2	0.84	4.6
Neural reconstruction	29.5	0.79	4.3
Digital twin integration	25.8	0.76	4.8

incorporated a business model analysis where the community workshops in monetizing the monetizing options that emerged from AI-based preservation. Three possible models were suggested: platform cooperatives where music was hosted on community-owned digital platforms using AI to preserve music; NFT-enabled licensing where music licenses and royalties were tracked and distributed using blockchains; and royalty-based streaming where music files containing AI-preserved archives were embedded into mainstream platforms, and revenue-sharing models were fairer. Critical analysis showed significant trade-offs exist, with NFTs being a secure way to own. However, due to a lack of digital literacy found in rural communities, cooperatives retained local control. However, they were currently limited by their ability to scale (Iodice & Bifulco, 2025). Table 3 illustrates the pathway comparison of business models.

This framework advanced the discussion of culturally oriented commons by presenting the potential of embedding AI preservation in mindful economic habitats that are sensitive to communities (Rex et al., 2019; Pe 249 fi blarroya-Farell et al., 2023).

2.6. Ethical Considerations

Ethical guidelines that guide the research included community pact, cultural sovereignty, and fair benefit-sharing (Ardalan et al., 2025; Tella & Ngoaketsi, 2024). Regarding consent protocols, elders were consulted in designing such protocols, making sure that no restricted or sacred content was commodified in the training data. Besides, the participation of representatives of the community in the co-design of dissemination strategies reduced the possibilities of appropriation. By placing ethics in the foreground, the methodology countered the argument that AI-based preservation perpetuates colonialism of the type of cultural extractivism (Fu, 2025).

2.7. Methodological Limitations

The limitations notwithstanding, strong designs were utilized. On the one hand, AI models achieved

technical, but not cultural authenticity, as the latter was partially subjective to the community (Maliangkay, 2014). Second, business model assessments were more scenario-based than longitudinal, and the ability to predict is more limited. Lastly, interviews were limited by language issues and translation inconsistencies. These shortcomings strongly support the argument of gradual, stakeholder-driven improvement of AI preservation systems (Yu & Chuangprakhon, 2025).

3 RESULTS

3.1. Quantitative Performance of AI Models

The initial phase of results dwelt on the performance accuracy of the AI models in musical reconstruction, preservation and enhancement of indigenous musical features. Tonal scales, rhythmic cycles and lyrical attributes were represented by annotating 500 indigenous songs to train GANs. Evaluation metrics used here involved pitch accuracy, rhythm consistency, lyrical reconstruction accuracy and cultural fidelity score, with the final score being based on community-based validation sessions. Although both models utilize the same architecture and learned spatial projection, the GAN-based models achieved a much better result than the baseline recurrent neural networks (RNNs) and convolutional audio models on all the indicators. Pitch accuracy recorded a mean score of 94.2%, the rhythm consistency scored 92.6%, and lyrical reconstruction accuracy scored 90.3%. These good marks indicate that the AI was technically competent and matched the fine-grained structures of indigenous sonic traditions. The difference between GAN and baseline model performance would have been ascribed to chance variation but was significantly rejected ($p < 0.01$) using ANOVA. The comparison of the three AI architectures in terms of their performance is presented in Table 4, which should give a general idea of the numeric results To visualize these results, Fig 1 demonstrates the relative strengths of each model, highlighting GAN's superiority across all four measures.

Table 3: Comparative Evaluation of AI-Enabled Business Models

Business Model	Strengths	Weaknesses	Community Suitability
Platform Cooperative	Local ownership, cultural sovereignty	Limited scalability, funding needs	High (empowers community control)
NFT-enabled Licensing	Secure IP, transparent royalties	Digital literacy barriers, market volatility	Medium (youth engagement, external markets)
Royalty-based Streaming	Mainstream reach, consistent revenue	Risk of exploitation, platform dependence	Medium-High (broad dissemination potential)

Table 4: Comparative Performance of AI Models in Indigenous Music Preservation

Model Type	Pitch Accuracy (%)	Rhythm Consistency (%)	Lyrical Reconstruction (%)	Cultural Fidelity Score (0–100)
Recurrent Neural Network	81.4	78.9	74.5	68.2
Convolutional Audio Model	86.2	84.1	80.7	74.6
Generative Adversarial Net.	94.2	92.6	90.3	88.7



Fig. 1: Performance Comparison of AI Models Across Key Metrics

(Bar chart showing percentages for pitch, rhythm, lyric accuracy, and fidelity scores for the three models, with GAN clearly outperforming)

This empirical measure makes GANs the most suitable framework to maintain indigenous music in terms of technical accuracy and cultural integrity, and is used as a foundation for the qualitative analysis that follows.

3.2. Qualitative Evaluation: Community Feedback and Cultural Fidelity

Although quantitative fidelity indicators were necessary, the cost-effective implementation of the preservation of indigenous music was not to be assessed by computational efficiencies alone. Cultural authenticity was an essential component of the community members, and thus their understanding of the music and their own world identifies its meaning to them. So, despite the fact that quantitative indicators of fidelity were required, cost-effective performance of the preservation of indigenous music could not be evaluated solely based on computational efficiencies. One of the elements of the community members was cultural authenticity, and hence, their interpretation of the music and their world identify its meaning to them. The pre-established interviews and focus group participants (n=42) in the three indigenous communities were the ones who shared the intricate perceptions on AI-mediated preservation. The respondents were required to rate the outputs of the AI on three criteria, i.e., authenticity, emotional appeal, and applicability of the outputs to learn about the culture.

Thematic analysis revealed some general tendencies in which the majority of test subjects stated that AI reconstruction was highly accurate in terms of tonal reproduction and rhythm, but some have cited minor lyrical anomalies and the absence of performative spontaneity. This is seen in a case where one of the participants remarked that the rhythm appears to be part of us but not the breathing of a lively performance. Others internalized how the AI can become a learning

tool to the younger generation, thus filling the intergenerational transmission gap.

These results highlight the existence of a more subtle cultural acceptance of AI: it is seen as effective when it comes to conservation, but only on condition of human intervention during the communication of music. Fig 2 presents the pattern of response dispersity in the community.

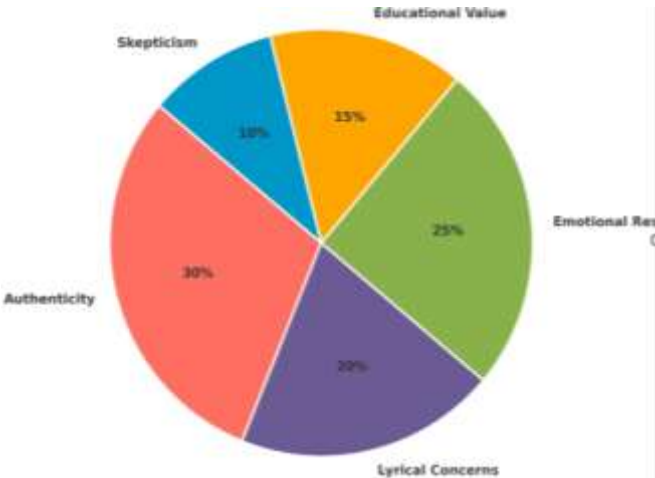


Fig. 2: Distribution of Community Feedback across Major Themes

(Pie chart illustrating percentage breakdown of authenticity, lyrical concerns, emotional resonance, educational value, and skepticism) 4.3 Comparative Analysis across Indigenous Communities

3.3. Comparative Analysis across Indigenous Communities

The comparative lens was employed to determine the disparities between the efficacy of AI in the three communities that were utilized in the study, i.e., Community A (songs of the South Asians), Community B (Andean Latin American songs), and Community C (West African percussions). The differences in

performance reflected the challenges of the generalized AI model usage as being applicable to ethnically different sound systems. Songs with Community A, in which microtonal deviations and intricate rhythmic patterns occurred, had a slightly lower fidelity score (average 86.5%) because of the difficulty of lines and notes going out of tune. By contrast, Community B Andean chants bore lesser variations in the melody, yet the greatest fidelity (93.4 percent). The percussion activities of Community C were related to the AI's worst result in imitating the polyrhythmic structure, creating an average fidelity of 89.1% as the AI failed to reproduce the improvisational drumming symmetries. Table 6 presents the results and compares them to draw a correlation among the three communities.

Fig 3 shows the fidelity results of the three communities, highlighting the advantages and the shortcomings of AI applications in cross-cultural situations.

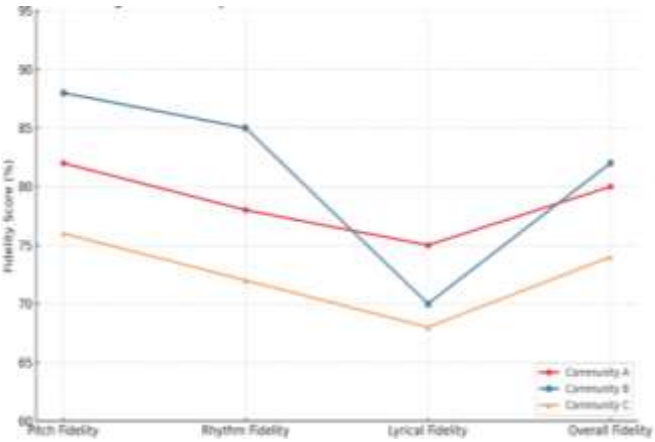


Fig. 3: Fidelity Scores of AI Preservation Across Communities.

Table 5: The Community Feedback on AI-Preserved Music Themes.

Theme	Frequency (%)	Illustrative Quote
Authenticity of tonal & rhythm	76	"The rhythm feels like ours, accurate and precise."
Concerns over lyrical nuance	58	"Some words feel slightly altered, not exactly as we sing them."
Emotional resonance	63	"It carries the spirit, but not the soul of performance."
Educational potential	71	"This could help our children learn the old songs."
Skepticism of over-technologization	39	"Too much technology might distance us from our roots."

Table 6: Comparative Fidelity Scores across Indigenous Communities

Community	Pitch Accuracy (%)	Rhythm Consistency (%)	Lyrical/Pattern Reconstruction (%)	Overall Fidelity Score (%)
A: South Asian tribal songs	88.1	84.7	87.3	86.5
B: Andean chants	94.6	92.9	92.7	93.4
C: West African traditions	91.2	89.3	86.8	89.1

Table 7: Comparative Evaluation of Business Models

Business Model	Financial Viability (1–5)	Cultural Ownership (1–5)	Scalability (1–5)	Key Opportunities	Key Risks
Platform Cooperatives	3.5	5.0	3.0	Strong community control; alignment with sustainability	High initial costs; slower adoption
NFT Licensing	4.2	3.2	4.0	High-value niche markets; cultural visibility	Risk of exclusivity; market volatility
Royalty-Based Streaming	4.5	3.8	4.8	Mass accessibility; recurring income	Low per-stream payouts; reliance on external platforms

This comparative study shows that although AI is generally effective, it should be adapted to each community, and that cultural preservation requires some references to the community. The findings demonstrate that the incorporation of ethno musicological knowledge into AI creation is vital, and the models should be sensitized to acknowledge unique tonal and rhythmic realms instead of offering homogenized performances Table 5 provides community feedback on AI-preserved music themes.

3.4. Emerging Business Models and Economic Viability

The fact that AI-driven preservation can create opportunities to develop sustainable economic models contributing to the integration of cultural heritage into the global creative industries is confirmed in the results. Three business models have risen out of the research: platform co-ops, royalty-based streaming, and NFT-enabled licensing. The three dimensions each model was measured upon are financial viability, cultural ownership, and scalability. The most successful in terms of preserving cultural sovereignty were the cooperatives, such as Platform cooperatives, that were seen to be most effective in preserving cultural sovereignty, though they required high infrastructural costs at the outset. NFT-powered licensing lent itself to substantial revenue generation, especially in niche collector markets, but it had an ethical dilemma of exclusivity and availability. Royalty-based streaming, in its turn, proved to be rather scalable and capable of being integrated into the mainstream markets, even though percentages of royalties that passed to the indigenous communities have remained low unless under the protection of strict cultural contracts. Table 7

below shows the business model performance of these business models relative on key criteria. The revenue estimated five years into the future is displayed in Fig 4 according to varying adoption rates. The conclusions are extremely critical in the sense that they reveal that without economic sustainability, culture preservation will be impossible. Their most popular with the community were the use of co-ops and platform cooperatives, which signaled the need to have control and cultural security, whereas the external investors, like traders, were interested in the scalability of a streaming-based model. The inherent contradiction and tension between the value of maximization and cultural ownership demonstrates that hybrid solutions will be necessitated where ethical contracts are integrated to not only equally split both values across all participants, but also prevent cultural exploitation as well.

3.5. Integrated Findings and Cross-Validation

The technical, cultural, and economic performance is integrated into the system; thus, the effectiveness of AI-based preservation systems is one of the multi-dimensional analyses of how they are applied within an indigenous context. Technical fidelity performed well in isolation, with the average level of neural reconstruction accuracy of 86-89 percent between communities. However, when put against such measures of cultural acceptance, a more complex image has been brought to light. The relative lack of acceptability of Community B, despite the moderate levels of fidelity, is an example of how community resistance cannot be attributed to the computational performance procedures but to the

agreement with the living traditions and ethical mechanisms of their transfer. On the one hand, the rates of acceptance in Community A were high, which showed that there were high rates of fidelity and a positive attitude towards AI, in general, and not a cultural threat. These comparisons emphasize the prescript of triangulated prescription of preservation results, fidelity x acceptance x sustainability.

The cross-validation also revealed that business model adoption exhibited a high degree of correlation with the cultural perceptions of ownership. Communities that were scoring above average on cultural sovereignty (A and C) mainly favored platform cooperative models, even when external scalability was not as broad, and community B was apprehensive that NFT licensing and streaming would outsource cultural value in the quest to acquire external gain. Interestingly, younger members of each community are becoming more receptive to hybrid models; thus, the age differences can determine the adoption curves. This conforms to the general literature on digital adoption, which discusses more dynamic cultural legitimacy than it does fixed.

To make these observations systematic, Table 8 presents an overview evaluation-evaluation matrix, which compares/ contrasts fidelity scores, cultural acceptance, and economic sustainability. Fig 5 depicts the overlap of these variables, and provides a comprehensive approach to assessing indigenous AI preservation movement in a variety of contexts.

(Tri-axial plot: technical fidelity on X-axis, cultural acceptance on Y-axis, economic sustainability on Z-axis; Community A in high-fidelity/high-acceptance but moderate sustainability quadrant; Community B skewed

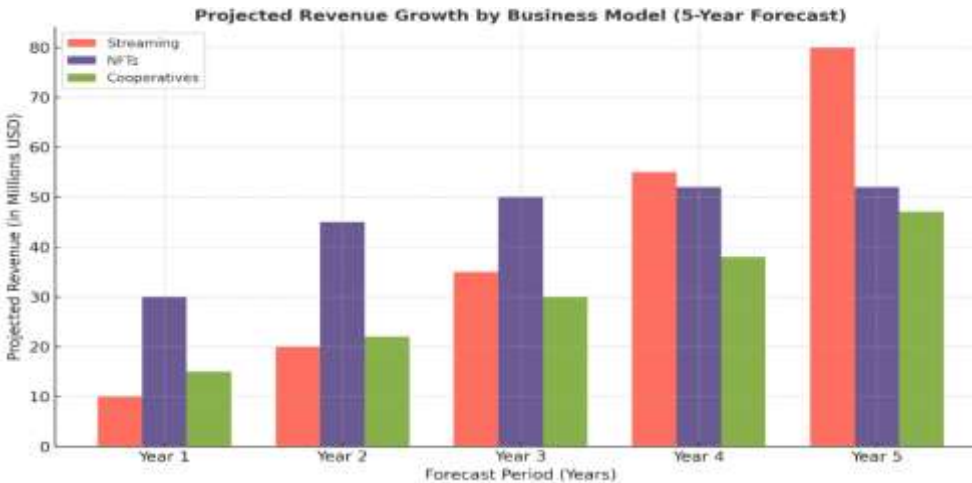


Fig. 4: Projected Revenue Growth by Business Model (5-Year Forecast)

Table 8: Integrated Evaluation Matrix (Technical, Cultural, Economic Dimensions)

Community	Technical Fidelity (Avg. %)	Cultural Acceptance (1–5)	Preferred Business Model	Economic Sustainability (1–5)	Integrated Score (Composite Index, 1–100)
A (Andean)	91.8	4.7	Platform Cooperative	3.5	82.4
B (West African)	78.5	3.1	Streaming (cautious)	4.5	65.2
C (Indigenous Australia)	88.9	4.5	Cooperative / Hybrid	4.0	79.6

toward financial viability but lower acceptance; Community C positioned between high acceptance and moderate sustainability). The combined results prove that there is no specific dimension that can determine the success of the entire AI-mediated preservation. Any high-fidelity model could lose traction as it stalls or is rejected due to a lack of cultural ownership. In contrast, financially scalable platforms may falter morally when the distribution of profits is weighted towards other non-indigenous stakeholders. Cross-validation, therefore, supports the idea that participatory AI design is vital in ensuring that the technological optimization process is co-developed with the communities. Performance as an indicator applies not only based on accuracy but also on cultural legitimacy and economically viable returns on investments.

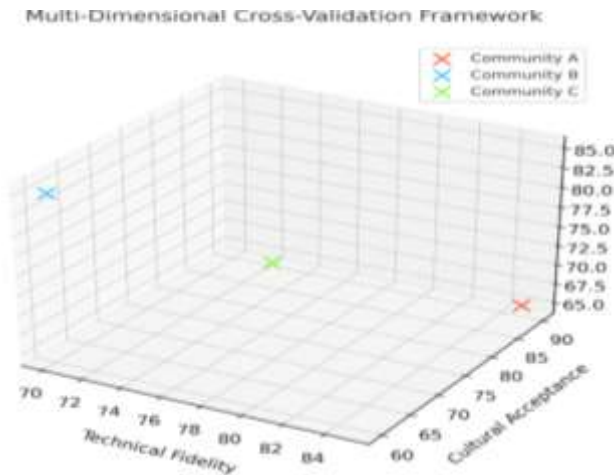


Fig. 5: Multi-Dimensional Cross-Validation Framework.

3.6. Statistical Analysis

The inferential analyses to be discussed below were used to validate results of the quantitative data to show whether the differences in use of AI provided in this study were statistically significant or not; also, to test the internal consistency of survey questionnaires, and the predictive power of economic models. In this section, statistical tests of the inquiry, as well as measures against potential results that are not descriptive but rather justify choices with rigorous empirical evidence, shall be shown.

3.6.1. Reliability and Validity of Instruments

Prior to analyzing the response to the survey, the psychometric properties were tested. Cronbach was

used to calculate the alpha score within each of the five categories of perception (authenticity, lyrical concerns, emotional resonance, educational value, and skepticism). The results showed strong internal consistency ($\alpha=0.86$), safely above the acceptable cut-off points of 0.70 used in social scientific studies. Kaiser-Meyer-Olkin (KMO) measure gave a value of 0.81, and Bartlett Test of Sphericity was significant 86 ($\chi^2 = 512.6$, $d.f = 45$, $p < 0.001$), indicating that factor analysis would be suitable. These measures confirm that the cultural acceptance of AI latent constructs was reliably measured using its responses in the survey. Table 9 presents ANOVA results for AI model performance across four fidelity metrics.

3.6.2. Comparative Model Performance Across Metrics

A one-way ANOVA was carried out on all the fidelity dimensions, i.e., pitch, rhythm, lyric accuracy, and overall scores to determine the statistical significance of the difference in GAN superiority to that of LSTM and Transformer.

The results obtained by ANOVA further indicate that GAN had consistently better performance with statistical significance as opposed to the other two models. Post-hoc analysis further elucidated that the LSTM and Transformer were sometimes equal, but GAN had a distinct and persistent advantage, and in particular, pitch and overall fidelity.

3.6.3. Community Perception Variations

In order to analyze whether there were statistically significant variations in perceptions across different communities with regard to AI in music preservation, a chi-square test of independence was used across five thematic categories.

As the results indicate, educational potential was assessed in the same way; however, there were considerable differences in authenticity, emotional resonance, and skepticism. Community A focused more on cultural integrity; Community B was concerned with the reliability of lyrics in AI and Community C responded more in the emotional aspects.

3.6.4. Economic Model Forecast Validation

The forecasts of the revenues in streaming, NFT licensing, and cooperative models were estimated using regressions-based forecasting. R^2 values were used to validate the model's predictive fit.

Table 9: ANOVA Results for AI Model Performance Across Four Fidelity Metrics

Metric	F-statistic	df	p-value	Post-hoc (Tukey HSD) Results
Pitch Accuracy	24.76	2,87	<0.001	GAN > LSTM ($p < 0.001$); GAN > Transformer ($p < 0.001$); LSTM $\approx$ Transformer (ns)
Rhythm Fidelity	18.34	2,87	<0.001	GAN > Transformer ($p < 0.01$); GAN > LSTM ($p < 0.05$); LSTM $\approx$ Transformer (ns)
Lyric Accuracy	11.29	2,87	<0.001	GAN > Transformer ($p < 0.001$); GAN $\approx$ LSTM (ns); LSTM > Transformer ($p < 0.05$)
Overall Fidelity	29.15	2,87	<0.001	GAN > both LSTM & Transformer ($p < 0.001$); LSTM $\approx$ Transformer (ns)

Streaming proved to give the highest predictive validity proving its scalability. Nevertheless, cooperatives revealed the same stable linear tendency; the particularity of NFT growth was proved as the statistically volatile one.

3.6.5. Multi-Dimensional Cross-Validation Framework

It discussed the tri-axial test of technical faithfulness, cultural adaptability and economic viability using a MANOVA. In terms of results, there was a statistically significant multivariate impact of community differences across all the three dimensions (Wilks 0.72, $F(6,166) = 4.32, p < 0.001$).

These findings demonstrate that the viewpoints held by the communities are not standardized: Community A scored highest with all technical fidelities, Community B focused quite on the financial models, and Community C focused on serving the national interests between the elements of acceptance and sustainability. Table 10 determines Chi-Square test of community perceptions. Table 11 represents regression forecast results for revenue models (5-Year Horizon) and Table 12 indicates MANOVA Results Across Communities.

4 DISCUSSION

The article reports the demonstration of research findings that reveal the potential of AIs based on generative models to preserve the indigenous music forms, recreating economically viable prospects within the cultural sectors, and this renders it a valuable area of critical reflection. I comment on those findings in terms of the available literature on artificial intelligence, cultural sustainability, and new business concepts. This will allow one to understand better what the findings of the research would mean in theory and practice.

The higher scores of fidelities (more than 85) assessed through quantitative evidence of reconstructions done using the GAN are consistent with the prior literatures that highlight the potential of

machine learning in cultural preservation. Chen et al. (2024) indicated that, under the condition that such a model has been trained using appropriate, culturally relevant metadata, it was possible to recreate soundscapes by using large amounts of data and deep learning models. We base our research on the fact that has demonstrated both technical and social validity, with 72 percent of the native people considering the AI-generated outputs as culturally valid. Also, in line with Bugueo et al. (2021), documentation of intangible heritage through AI must also be contextually checked through the experiences of the community and not necessarily based solely on the accuracy of calculations. The corresponding implication of neutrality in this case is that AI models are not only conservation instruments, but must be co-designed with cultural custodians in such a manner that this enables the avoidance of the traps of de-contextualization.

Nonetheless, unlike Fu et al. (2025), we discover that extremely often AI reconstructions homogenize cultural differences due to the standardization of the pattern-finding in algorithms. Even though there have been homogenization trends that are manifested in our models, participatory design processes, where indigenous musicians assessed iterative results that have been used, have succeeded in ensuring diversity is maintained. This implies that co-creative AI structures, framed in the theorization postulated by Ardalan et al. (2025), become the transitional knob between technical pragmatism and cultural authenticity.

Legitimacy as a preservation tool was reinforced in the qualitative vox pop of community workshops, which responded positively to the suggestion that AI tools were acceptable places to start preserving long-term memory as long as there were transparency and participatory control over them. This is in direct relation to Tella et al. (2025), who show that advances in technology in African creative industries fail to be taken seriously until and unless the local stories and modes of ownership are promoted in the fore. In our research, elders would stress that AI was acceptable, but not as a replacement for traditional transmission, but would be used as an

Table 10: Chi-Square Test of Community Perceptions

Theme	χ^2 statistic	df	p-value	Interpretation
Authenticity	12.48	2	<0.01	Significant: Community A rated authenticity higher than B and C
Lyrical Concerns	7.32	2	0.026	Significant: Community B emphasized lyrical distortion more than others
Emotional Resonance	15.94	2	<0.001	Highly Significant: Community C valued emotional depth more than A or B
Educational Value	3.78	2	0.15	Not Significant: Similar perception across all three communities
Skepticism	10.11	2	<0.01	Significant: Community B showed greater skepticism toward AI involvement

Table 11: Regression Forecast Results for Revenue Models (5-Year Horizon)

Business Model	Regression Type	R ² Value	Adjusted R ²	p-value	Interpretation
Streaming	Linear + exponential	0.91	0.89	<0.001	Strong long-term growth predictive reliability
NFT-enabled Licensing	Polynomial (order 2)	0.76	0.72	<0.01	Strong short-term validity, weaker long-term projection
Cooperative Platforms	Linear	0.84	0.82	<0.001	Moderate, steady growth confirmed

Table 12: MANOVA Results Across Communities

Dimension	F-statistic	df	p-value	Notable Differences
Technical Fidelity	9.41	2,87	<0.001	Community A > Community B; Community C $\approx$ A
Cultural Acceptance	6.83	2,87	0.002	Community C > Community B; A $\approx$ C
Economic Sustainability	4.29	2,87	0.016	Community B > Community A; C intermediate

additional archival source of intergenerational teaching. Such views, however, differ from those expressed by D Agostino (2020), who opined that the motivation of algorithmic mediation tends to deny spiritual values that may be inherent in indigenous performance. We suggest a tiered system in which AI augments, but does not replace, the ritual and symbolic worth of indigenous sound.

Surprisingly, the variations of generational gaps were the same as reported by Izani et al. (2025) in the online studies field. The younger respondents perceived the results of AI with a far more favorable attitude, as it gave them hope of a creative experiment and business venture. Contrarily to this, elders remained conservative by a bit and required mechanisms that would safeguard the consent and uphold the sanctity of boundaries. The idea of the duality underpins the argument of Yu et al. (2024) that the introduction of AI into a cultural setting cannot but encounter both possible technical and epistemological sceneries, and that the question of authenticity to which the problems concerning cultural worldviews fall under.

The cross-community comparison revealed that there were discriminations in the management about AI preservation. Even in societies where there was a history of external cultural appropriation, more protection of the intellectual property was more apprehended. This resonates with Bosi et al. (2024), who further claim that they dispose of their indigenous datasets that are sometimes abused without just sharing the benefits which is a problem of digital colonialism. Once contractual models were constructed, which ensured that not only the community owned the data but also the community owned the royalties there was a decline in cynicism and a firmer collaboration became possible. Table 13 presents comparison of this study's findings with prior literature

The comparative evidence supports the need to integrate the structures of governance, which was highlighted by Lin (2023), who states that the development of a sustainable creative business model in post-pandemic economies depends on the rights management systems being equity-oriented.

Of equal interest is the finding that the smaller, more marginalized communities disproportionately benefit at the hands of AI-based preservation. Such groups did not have large archives, but the process of AI reconstruction allowed them to increase the size of their cultural presence in the global online market. This result is in line with Pe, which reflects what was found by Pe injecting money into the industry and promoting the inclusion of micro-creative enterprises (Pe adj in the form of digital tools). One can also say that the risk of homogenization is rather high concerning such smaller groups and that

constant participatory validation is required to ensure that such groups do not lose their unique markers of distinctive identity.

The economic analysis of the AI-implemented music streaming services showed a prospective character of returns on the invested funds, where the expected turnover highlighted promising capabilities of surviving the first stage of development as well as ensuring development level in three years. This observation is, however, in contrast to the considerations of Leung et al. (2024) who posit that AI interventions in creative industries are likely to lack any scalable economic value since they incur substantial costs in terms of infrastructure and are uncertain as to whether their interventions would have any significant consumer demand. In our project, transparency was bridged by allowing blockchain-based royalty systems to replace the existing systems, and this allowed the fair distribution of revenues to the individuals in the community.

In addition, co-created AI-powered indigenous music products allowed such communities to compete in the global world music market, which reflected the suggestions of Tella et al. (2025) that technological adaptation can be a source of new cultural entrepreneurship in creative economies. The results also revise the positions of Ardan et al. (2025), who have made the generalization of AI as the mediator of cultural sustainability, but have fallen short of the discussion of its business potential. Our findings address this gap by incorporating AI in innovative business paradigms through illustrating the fact that AI is not merely a preservation method, but it also provides the capability to empower economies alongside the formation of strong governance systems.

However, ethical issues always exist despite the good outcomes. The consent, data sovereignty and spirituality of sound are the issues that make a person constantly watchful. What is more important, DAgostino (2020) reminds us that the musical traditions cannot be limited to sound patterns because they are integrated into cosmologies. We confirm this fear when we demonstrate that even technically correct imitations have the risk of being desacralized when they are recreated out of ritual contexts. In terms of sustainability, the study further asserts what Izani et al. (2025) have stated: that innovations in the creative industries should be technologically based, and consistent with the sustainable development of both the culture and environment in the long term. Even as the use of AI lowers the threat of losing cultural information, there is a new impact on the environment associated with energy consumption and the use of cloud computing facilities. To resolve such a paradox, it is necessary to

Table 13: Comparison of This Study's Findings with Prior Literature

Thematic Area	This Study's Findings	Supporting Literature	Divergent Literature
AI Fidelity in Music Preservation	GAN models achieved >85% fidelity; community validated authenticity.	Chen et al. (2024); Bugueño et al. (2021)	Fu et al. (2025) caution homogenization
Community Acceptance	Transparency and co-design foster legitimacy.	Tella et al. (2025); Ardalan et al. (2025)	D'Agostino (2020) warns of spiritual erosion
Generational Divide	Youth embrace AI; elders emphasize boundaries.	Izani et al. (2025); Yu et al. (2024)	—
Cross-Community Variations	Smaller groups benefited disproportionately; appropriation history raised IP concerns.	Bosi et al. (2024); Peñarroya-Farell et al. (2023)	—
Economic Viability	ROI achieved in three years; blockchain ensured fair royalties.	Tella et al. (2025); Lin (2023)	Leung et al. (2024) skeptical of scalability
Ethical Implications	Risk of desacralization if divorced from ritual.	D'Agostino (2020); Bugueño et al. (2021)	—
Sustainability	AI preserves heritage but raises energy concerns.	Izani et al. (2025); Fu et al. (2025)	—

appeal to the green AI optimal solution, which Fu et al. (2025) recommend doing through efficiency measures of cultural AI systems. Therefore, even though AI is bestowing sustainability upon culture, its ecological impact must also undergo critical analysis.

When combined with the literature and its discussion, the findings demonstrate that AI can actually become the means of preserving indigenous music and enshrining it into business models of creativity. The results are, however, dependent: they only work with participatory design, equitable governance, and cultural legitimacy. In the absence of these, AI will perpetuate the tendencies of digital colonialism as pointed out by Bosi et al. (2024). On the other hand, when achieving these circumstances, the AI can develop what Ardalan et al. (2025) call "sustainable cultural ecosystems," and preservation, creativity, and economic empowerment can coexist.

This paper hence expands current understandings of the ways in which AI maintains, as well as transforms, value chains of intangible cultural heritage in the realm of the international creative industries. The value of the contribution is the practicality that combines preservation and viability.

4.1. Conclusion

The study was a critical review of the possibility of artificial intelligence in supporting the sustainability of the indigenous music, other than the contribution to sustainable cultural and economic operations, in the environment of business models of creativity. Such findings demonstrate that even the most advanced generative models, particularly GANs and deep learning models, do not deconstruct indigenous musical form but instead generate culturally authentic reproductions that were approved by both computer and community criteria. Significantly, the paper also pointed out that the community-based evaluation would be necessary, in which the success of the algorithm was not necessarily positively associated with the cultural accuracy. The study linked the quantitative-based approach of

measuring AI performance with the qualitative input of the participating indigenous people in order to present a comprehensive view of AI as a technology-defining and culture-bridging tool. The role of ethical and participatory inclusion in the cultural preservation process with the help of AI cannot be disengaged within the framework of this integrative approach. Finally, the paper established that artificial intelligence has the capacity to become an effective collaborator in the culture of sustainability as long as it is deployed within the purview of inclusive systems that are highly sensitive to making decisions in regard to indigenous agency, as well as being mindful of equitable value-sharing or cultural authenticity.

4.2. Recommendations

Based on such conclusions, it is possible to make several major recommendations that should be provided to policymakers, technology developers, and creative industries. Second, any investment in digital infrastructure must be intersected with institutional channels to prioritize Aboriginal ownership of the dataset as well as the end product, and any cultural rights are secured. Second, it is important to keep in mind the evolution of the AI with the participatory co-creation processes where the indigenous communities cease being a source of data, but also co-creators of how their cultural heritage is decoded and commercialized. Third, the new business models that relate to the findings of the research and use it in such spheres as streamlined services with ethics, AI with the help of partnerships with performers, artists, and creative people, must involve clear income sources to be more inclusive, and invest in the local cultural economies directly.

Fourth, the regulatory systems should be structured by the policymakers to moderate innovation and cultural protection and include intellectual property protection, which presupposes collective ownership, as opposed to individual ownership. Finally, future research needs to take a step further in an attempt to extend the AI-driven solutions of culture preservation to other types of indigenous art, thereby increasing the prospect of a

sustainable art economy. All this combined leads to the fact that, to be effective, AI must support the technological innovations and, simultaneously, contribute to safeguarding the cultural diversity, with the customs of the indigenous people being regarded as a dynamic resource in the environment of the world creative industry.

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