

Bridging Education and Commerce: The Preliminary Market Feasibility of Nyastra as a Digital Transliteration Tool in Bali

I Wayan Mulyawan

Faculty of Humanities, Udayana University, Indonesia

E-mail: moelya01@gmail.com

I Wayan Suardiana

Faculty of Humanities, Udayana University, Indonesia

I Gede Santi Astawa

Faculty of Mathematics and Natural Sciences, Udayana University, Indonesia

I Ketut Ngurah Sulibra

Faculty of Humanities, Udayana University, Indonesia

Received: February 24, 2025 Accepted: March 3, 2025 Published: September 30, 2025

doi:10.5296/jebi.v13i1.24026 URL: <https://doi.org/10.5296/jebi.v13i1.24026>

Abstract

This study evaluates the educational outcomes and preliminary market feasibility of Nyastra (<https://nyastra.co.id/>), an innovative rule-based digital transliteration platform designed to revitalise Balinese script (Aksara Bali) and address commercial compliance challenges under Governor Regulation Bali No. 80 of 2018. Utilising a mixed-methods research design, the investigation combines a quasi-experimental pretest-posttest trial among 22 eighth-grade students at State Junior High School (SMP N) 1 Kuta with a comprehensive dual-target preliminary market feasibility survey. Quantitative results demonstrate a statistically significant improvement in student transliteration accuracy, with class average scores rising from 42.35% to 74.12% following the digital intervention. Qualitative observations revealed high student satisfaction (rated 10/10), increased classroom participation, and unexpected cross-linguistic benefits in English pronunciation. While algorithmic limitations in rendering complex script rules highlight Nyastra's role as a complementary pedagogical tool alongside

teacher instruction, empirical market evaluations underscore its substantial commercial potential. A user feasibility survey ($n = 500$) confirmed strong academic utility, with students representing 97.8% of users and 98.6% expressing positive overall satisfaction. Concurrently, the preliminary advertiser market survey ($n = 524$) identified a prime commercial demographic dominated by tourism (31.1%), culinary (21.6%), and non-formal education (21.6%), with 91.4% of respondents demonstrating high receptivity to native advertising formats. This finding confirmed Nyastra's prospective roadmap rather than an already fully implemented business infrastructure, harmonising indigenous language preservation with modern digital platforms.

Keywords: Nyastra, Transliteration, Balinese script, Digital literacy, Commercial viability

1. Background and Policy Context

The linguistic landscape of any geographic region visually manifests power dynamics, sociolinguistic hierarchies, and cultural priorities. In contemporary Bali, this landscape has become a critical site of semiotic contestation, characterised by the tension between rapid, market-driven globalisation and efforts to preserve regional ethnolinguistic vitality (Artawa et al., 2020). As one of the world's premier international tourism destinations, Bali has undergone intensive commercialisation over the past several decades. This economic shift has left a profound mark on the island's visual and communicative environment, particularly in high-density commercial corridors such as Kuta, Seminyak, and Sanur (Mulyawan, 2017b).

Historically, outdoor signage in these tourism enclaves reflected the overwhelming dominance of global English and Latin scripts, systematically excluding the Balinese language and its traditional writing system, *Aksara Bali*. English was deployed as a prestige language, indexing modernity, international sophistication, and economic utility, while the local tongue was relegated to private or strictly ritual spheres (Artawa et al., 2020). This systematic exclusion created a visual environment in which Bali's prime commercial zones became semiotically indistinguishable from globalised retail spaces worldwide, raising concerns about the erosion of Balinese identity and the marginalisation of its unique linguistic heritage (Mulyawan, 2017a).

The Balinese script is an indigenous writing system of historical and aesthetic significance, classified as an abugida in which consonant characters carry an inherent vowel sound modified through diacritical marks (Sudiarta, 2013). For centuries, *Aksara Bali* served as the primary medium for transcribing religious scriptures (*lontar*), classical literature, and administrative decrees, establishing a deep, sacred connection between the script and Balinese spiritual life (Putra & Paramarta, 2023). However, the modernisation of education, the shift to the Indonesian national language in formal administration, and the visual hegemony of Latin-dominated commercial signage pushed *Aksara Bali* to the brink of practical obsolescence.

In response to the diminishing visibility of Balinese linguistic markers, the Provincial Government of Bali enacted a far-reaching language planning policy. On September 26, 2018, the Governor of Bali signed Governor Regulation (*Peraturan Gubernur / Pergub*) Bali No.

80 of 2018 concerning the use of Balinese script in public spaces. This regulatory intervention sought to fundamentally restructure the province's visual linguistic hierarchy. Under Chapter IV, Article 6, all outdoor public signage in Bali—including government, commercial, street, and landmark signage—was mandated to place *Aksara Bali* directly above the Latin script.

This legislative action was designed to create a visual "Balinization" of the public space, reclaiming the linguistic landscape as an expression of local identity. The policy represents a form of defensive language planning, utilising the coercive power of the state to enforce the visual representation of a threatened minority script. According to regional authorities, placing the Balinese script at the top of the typographic hierarchy symbolises the primacy of regional heritage and cosmological harmony, while the Latin script beneath serves as a practical, secondary guide for non-local readers.

However, implementing Pergub Bali No. 80 of 2018 immediately triggered complex legal and jurisdictional debates (Mulyawan, 2021). Critics pointed out that the provincial mandate appeared to clash with Indonesian National Law No. 24 of 2009 concerning the National Flag, Language, State Emblem, and National Anthem, which stipulates that the Indonesian national language (written in Latin script) must hold the primary position on public signage. Despite these jurisdictional tensions, provincial authorities in Bali aggressively pursued enforcement, asserting that regional autonomy laws granted them the statutory right to safeguard intangible cultural heritage. Consequently, businesses faced a complex regulatory matrix where failing to display correct Balinese script above Latin titles could result in administrative non-compliance, public scrutiny, and commercial friction (Darmayasa et al., 2020).

While Pergub Bali No. 80 of 2018 quickly generated a visual presence for *Aksara Bali* on signboards, its hasty enforcement exposed deep systemic pathologies within the commercial sign-making and business ecosystem. Research examining the linguistic landscape of high-density tourism corridors revealed a massive discrepancy between the legal mandate and the orthographic accuracy of the signs produced (Erawati et al., 2023). The comprehensive empirical study analysed 1,455 public and commercial signs in Kuta and documented an exceptionally low script compliance rate. Their quantitative aggregate revealed that only 9.9% (144 signs) of the catalogued signage successfully integrated the Balinese script, while 90.1% (1,311 signs) remained strictly in the Latin script, directly violating the provincial mandate. By industry sector, the compliance pathology became even more pronounced. In the primary tourism facilities category (including hotels, villas, spas, bars, and resorts), out of 1,099 signs evaluated, only 82 signs (7.46%) featured the mandated Balinese script. This quantitative reality shows that despite the threat of administrative penalties, most of the commercial sector remained hesitant to alter its visual identity, a reluctance rooted in a lack of technical expertise and the absence of standardised, accessible transliteration tools (Darmayasa et al., 2020).

Beyond the quantitative deficit, qualitative analysis of the compliant signs revealed severe orthographic and sociolinguistic distortions. Balinese orthography distinguishes rigorously between functional script registers: *Aksara Wreasta* (general script for everyday

communication), *Aksara Swalalita* (classical characters for Sanskrit or Kawi loanwords), and *Aksara Modre* (sacred symbols reserved exclusively for mantras and temple epigraphy). Lacking formal training, commercial signwriters frequently selected characters indiscriminately. Linguistic evaluations documented numerous instances where profane commercial storefronts—such as tourist bars, seafood restaurants, and foreign currency exchange kiosks—displayed sacred *Aksara Modre* characters or liturgical introductory symbols (*pemada*) on their signage (Erawati et al., 2023).

Furthermore, transcribing global commercial vocabularies into Balinese script presented massive phonetic hurdles. Standard Balinese lacks native characters for Latin phonemes such as f, q, v, x, and z. Although orthographic guidelines dictate phonological substitution principles—such as mapping *v* to *aksara p*—untrained designers produced arbitrary transliterations. When transcribing brand names with complex consonant clusters (e.g., "Quest," "Chicken"), signs exhibited fatal errors like vowel distortion, diacritic omission (*pangangge*), and incorrect conjunct construction (*gantungan*), altering semantic meanings. Sociological surveys confirmed that local merchants' compliance failures stemmed from an orthographic literacy gap and the absence of a reliable, automated digital medium capable of executing these complex rules (Darmayasa et al., 2020).

The orthographic crisis in the commercial landscape mirrors a parallel educational crisis among Bali's younger generation. While older generations maintained a functional relationship with *Aksara Bali* through rituals, the contemporary digital-native generation has become disconnected from its indigenous writing system (Mulyawan et al., 2026). In modern Balinese schools, students widely perceive learning Balinese script as tedious and difficult. Traditional pedagogical methods rely on rote memorisation, repetitive manual copying, and static textbooks, which fail to engage students immersed in mobile, interactive digital environments.

This disengagement of Balinese youth poses a severe threat to the script's survival. Without ancestral code literacy among younger generations, public script displays become merely tourist-facing, superficial commodities devoid of genuine meaning, necessitating modern educational delivery systems to prevent *Aksara Bali* from becoming obsolete. This bottleneck highlights the digital imperative of developing interactive educational technologies that translate linguistic rules into computational structures (Asroni et al., 2025). Mobile-Assisted Language Learning (MALL) and transliteration software show immense potential to revitalise minoritised writing systems, turning script learning into an interactive experience that demystifies grammar, provides instant feedback, and encourages student agency (Meighan, 2021).

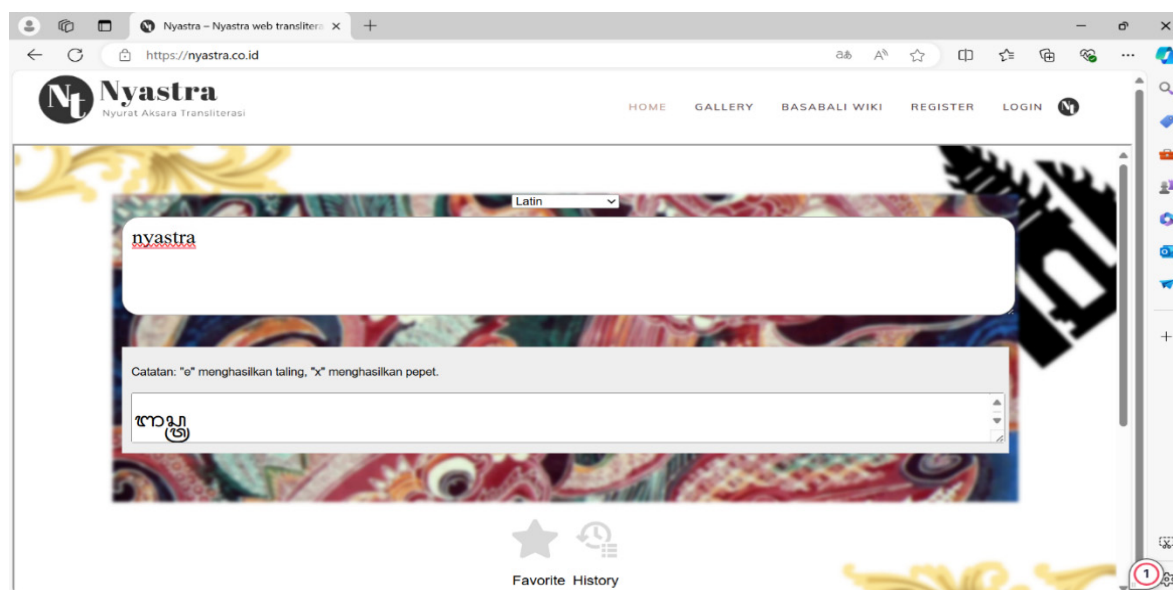


Figure 1. Nyastra Front Page

Within this challenging sociolinguistic, regulatory, and pedagogical climate, developing the Nyastra (Nyurat Aksara Transliterasi) application represents a critical, multi-dimensional innovation (see Figure 1). Conceived by an interdisciplinary research team at Universitas Udayana, Nyastra (<https://nyastra.co.id/>) was engineered to serve a dual purpose: first, as a user-friendly, scientifically validated digital literacy tool to revitalise script learning among school-aged youth, and second, as an enterprise-grade compliance engine to resolve the massive orthographic errors plaguing Balinese business signage (Laksmi et al., 2024). By embedding the rigorous rules of Balinese orthography into an automated computational parser, Nyastra bridges the historical gap between ancient calligraphic traditions and the modern digital economy, laying the groundwork for a sustainable, culturally compliant, and commercially viable platform in contemporary Bali.

2. Materials and Methods: Computational Architecture and Preliminary Market-Feasibility Framework

The development and subsequent commercialisation of the Nyastra platform represent a rigorous, interdisciplinary effort designed to bridge the gap between traditional humanities and modern computer science. During subsequent development phases, the platform achieved full operational status through live web hosting of the functional transliteration engine at <https://nyastra.co.id/> and rigorous field testing in authentic educational and commercial environments.

At the core of the Nyastra platform is a rule-based computational transliteration engine designed to handle the complex, non-linear orthography of the Balinese script. Unlike alphabetic systems, *Aksara Bali* is an abugida in which each consonant symbol has an inherent neutral vowel sound (/a/). Modifying this inherent vowel requires the application of

specific diacritical marks (*pangangge*). These diacritics are positioned multi-directionally relative to the base consonant: upper diacritics include the *ulu* (modifying the vowel to /i/) and *pepet* (modifying the vowel to the schwa /ə/); lower diacritics include the *suku* (modifying the vowel to /u/); while pre-positioned and post-positioned diacritics include the *taleng* (/e/) and *tedong* (/o/). Furthermore, when two consonants occur adjacent to each other without an intervening vowel sound (consonant clusters), the second consonant must be written as a sub-base or post-base conjunct, traditionally designated as *gantungan* and *gempelan*, respectively, which effectively mutes the inherent vowel of the preceding base consonant.

A critical innovation of Nyastra's engine is its ability to handle modern, foreign loanwords—particularly English commercial vocabulary—which lack direct orthographic equivalents in classical Balinese script. Standard Balinese script lacks native characters for the Latin phonemes *f*, *q*, *v*, *x*, and *z*. To address this, Nyastra applies standardised phonological substitution rules. Foreign phonemes are systematically mapped to phonetically compatible Balinese characters: *f* and *v* are converted to *aksara pa*; *q* is substituted with *ka*; *x* is rendered as *ék*; and *z* is mapped to *sa*.

Furthermore, Nyastra's algorithm performs complex phonological adaptations rather than simple alphabetical mapping. While other transliteration systems execute static character-by-character conversions (translating the word "Mall" literally as m-a-l-l, resulting in an orthographic mistake), Nyastra identifies "Mall" as a foreign word, adapts its pronunciation to the phonetically standardised loan form "Mol," and outputs the correct corresponding Balinese script. Similarly, words containing vowel shifts such as "Book" are systematically converted to "Buk". Finally, the engine acts as a cultural gatekeeper by incorporating a negative lookup database that prevents the insertion of sacred *Aksara Modre* registers or liturgical signs on secular commercial signboards, ensuring complete cultural and religious compliance.

In terms of commercial viability, this study is used as a preliminary market feasibility study. It refers to evidence that Nyastra has identifiable user segments, a relevant market problem, positive stakeholder receptivity, and plausible monetisation pathways. It does not yet demonstrate actual revenue generation, willingness to pay, customer conversion, long-term retention, or profitability. Accordingly, interpret the findings as evidence of market feasibility and commercial potential, not yet as proof of a fully validated, sustainable business model.

The current platform maintains foundational educational features, including basic Latin-to-Balinese-script transliteration, as freely accessible functions. This approach is consistent with Nyastra's primary social objective of supporting Balinese-script literacy among students and the wider community. The user-feasibility survey indicates that Nyastra's current users are predominantly students and that most use the platform for school-related tasks. Free access may help maintain educational inclusion, support wider community engagement, and generate feedback to improve the platform's transliteration accuracy and usability.

Potential future premium or institutional features may include automated handwriting

feedback, expanded resources for Kawi or Old Javanese materials, optical character recognition support for selected *lontar* manuscripts, teacher dashboards, individual learning portfolios, and institutional digital badges. These features are presented as potential developments rather than established subscription products. Although the user survey indicates high satisfaction, perceived usability, and intention to recommend, it did not assess whether students, teachers, schools, or cultural learners would pay for premium functions.

A second potential pathway concerns business-to-business services for commercial actors affected by the signage requirements of *Pergub Bali No. 80/2018*. Signmakers, graphic-design agencies, architecture firms, hospitality businesses, restaurants, spas, tourism operators, and retail enterprises may require accurate, scalable, and culturally appropriate Balinese-script outputs. This need is especially relevant for signage containing foreign brand names or phonemes that have no direct equivalents in standard Balinese script.

3. Results and Discussion: Educational Outcomes and Preliminary Market Receptivity

The empirical validation of Nyastra (<https://nyastra.co.id/>) was established through a quasi-experimental study at State Junior High School (SMP N) 1 Kuta, Bali (Mulyawan et al., 2026). The trial involved 22 eighth-grade students (11 collaborative pairs) who used the app during Balinese language lessons under teacher supervision. This cohort represents a critical stage when script literacy is formally taught, yet student interest has historically been low (Asroni et al., 2025).

Furthermore, the quantitative results demonstrate a statistically significant improvement in transliteration accuracy. The pretest required students to manually transliterate sentences containing English, Indonesian, and Balinese terms without digital aids, yielding a low class average of 42.35%. Following the Nyastra intervention, the posttest of equivalent difficulty achieved an average accuracy of 74.12%—a substantial gain of 31.76 percentage points.

Table 1. Pre-Test vs. Post-Test Accuracy Scores at SMP N 1 Kuta

Student Pairs	Pre-Test Accuracy (%)	Post-Test Accuracy (%)	Net Improvement (%)
S1 Dealova & Tiara	10.00%	60.00%	50.00%
S2 Aulia & Alisya	20.00%	60.00%	40.00%
S3 Pandu & Prana	40.00%	70.00%	30.00%
S4 Khansa & Chika	30.00%	70.00%	40.00%
S5 Ona & Bintang	40.00%	70.00%	30.00%
S6 Rofif & Daren	40.00%	80.00%	40.00%
S7 Gung Tu & Randa	80.00%	100.00%	20.00%
S8 Adit & Vino	0.00%	60.00%	60.00%

Student Pairs	Pre-Test Accuracy (%)	Post-Test Accuracy (%)	Net Improvement (%)
S9 Echa & Rahita	80.00%	100.00%	20.00%
S10 Githasa & Yunda	70.00%	90.00%	20.00%
S11 Satria & Artha	80.00%	80.00%	0.00%
Class Average	42.35%	74.12%	31.76%

Source: Mulyawan et al., 2026.

As shown in Table 1, Nyastra effectively scaffolded lower-performing students. Pair S8 (Adit & Vino) rose from a baseline of 0.00% to 60.00% (a 60-point gain), and pair S1 (Dealova & Tiara) rose from 10.00% to 60.00%. High-achieving student pairs either maintained high performance or achieved perfect marks (e.g., S7 Gung Tu & Randa, and S9 Echa & Rahita both advanced from 80.00% to 100.00%). This shows that Nyastra acts as an effective equaliser, providing the clear visual structures low-performing students need to overcome early learning hurdles.

Qualitatively, students exhibited high motivation, as shown by active questioning and diligent completion of remark columns. Students rated user satisfaction as 10/10, reflecting an engaging experience that demystified a subject traditionally perceived as abstract. The study also documented an unexpected cross-linguistic benefit. Because Nyastra requires students to correctly segment English sounds to find corresponding Balinese characters, the intervention improved students' metalinguistic awareness and supported English pronunciation, proving that local language technology can foster broader linguistic competence.

Despite its educational efficacy, the trials exposed technical challenges and algorithmic limitations within Nyastra's rule-based engine. Observers documented several recurring error types (Mulyawan et al., 2026): (1) failure to generate the sub-base semi-vowel conjunct *nania* (/ya/) when parsing complex consonant clusters; (2) vowel diacritics (*pangangge*) attaching incorrectly to preceding or succeeding consonants instead of aligning with the target base character; (3) errors in the automated positioning of *taleng* (/e/) and *tedong* (/o/) diacritics; and (4) visual overlap errors in double-stacked post-base conjuncts (*gempelan*) and the incorrect placement of the syllable-killing diacritic (*adeg-adeg*) in the middle of sentences instead of terminal closures.

These visual layout errors affected legibility. However, rather than undermining the platform, these limitations provide a critical "teachable moment" in Computer-Assisted Language Learning (CALL). Under Vygotsky's Zone of Proximal Development, digital tools are conceptualised as scaffolding mechanisms—mediators of learning rather than complete replacements (Mulyawan et al., 2026). Nyastra's errors required active human intervention, forcing students to consult their teacher, analyse grammatical rules, and manually correct the digital output. This shows that successfully revitalising *Aksara Bali* must combine technology

with human agency. Nyastra must operate as a complementary pedagogical tool in a blended learning environment, where the teacher remains irreplaceable in explaining linguistic rules and navigating exceptions.

To assess broader scalability, the research team conducted a feasibility study analysing the perceptions of 500 active users (Mulyawan et al., 2025). The socio-demographic composition confirmed that Nyastra has established its primary foothold within the academic sector: students comprised 96.4% (482 respondents) of the sample, higher education students (mahasiswa) accounted for 3.0% (15 respondents), and educators made up 0.6% (3 respondents).

The platform's functional utility is strongly linked to education: 70.2% (351 respondents) utilised the website primarily to complete academic school or university assignments. Within this segment, 35.6% used it purely for school tasks, 23.2% integrated it with typing tasks, and 11.4% combined it with general script learning. In contrast, only 5.0% accessed the site solely for self-paced cultural learning, demonstrating that regional language platforms achieve the highest adoption density when directly integrated into formal educational curricula (Mulyawan, 2025b).

Table 2. Quantitative User Perceptions of the Nyastra Platform (n = 500)

Survey Metric	Positive Response Category	Number of Respondents	Percentage (%)
User Satisfaction	Satisfied (<i>Puas</i>)	404 / 500	81.00%
	Quite Satisfied (<i>Cukup Puas</i>)	88 / 500	17.60%
Ease of Use (Usability)	Very Easy (<i>Sangat Mudah</i>)	439 / 500	87.80%
	Quite Easy (<i>Cukup Mudah</i>)	61 / 500	12.20%
Visual Aesthetics (UI/UX)	Attractive (<i>Menarik</i>)	426 / 500	85.20%
	Quite Attractive (<i>Cukup Menarik</i>)	68 / 500	13.60%
Perceived Accuracy	Highly Accurate (<i>Sangat Akurat</i>)	381 / 500	76.40%
	Quite Accurate (<i>Cukup Akurat</i>)	96 / 500	19.20%
Recommendation Intent	Yes (Will Recommend)	448 / 500	89.80%
	Maybe	51 / 500	10.20%

Source. Mulyawan et al., 2025.

Quantitative feedback on user experience was highly positive (Table 2). A cumulative 98.6% of users expressed high satisfaction, with 81.00% fully satisfied and 17.60% quite satisfied. This positive sentiment is further supported by users' behavioural intentions, as 89.80% said

they would recommend Nyastra to peers, highlighting strong potential for organic, *word-of-mouth* user acquisition. In terms of usability, 87.80% rated the website as "very easy to use," and 12.20% as "quite easy," indicating that the system's layout has successfully minimised cognitive barriers and made digital transliteration highly intuitive. Furthermore, 85.20% rated the visual aesthetics as "attractive," and 76.40% perceived the automated transliteration results as "highly accurate".

To assess Nyastra's commercial viability as a localised advertising medium, the research team surveyed 524 local businesses in Bali (Mulyawan et al., 2025). The industry demographic of the prospective advertisers aligned with Bali's regional economic makeup: the largest sector represented was Tourism at 31.1% (163 respondents), followed by Non-Formal Educational Institutions at 21.6% (113 respondents), Culinary / F&B Enterprises at 21.6% (113 respondents), and Non-Formal Vocational Training Centres at 19.7% (103 respondents). This confirms that Nyastra has successfully captured a target market of local, service-oriented businesses and SMEs with a strong interest in reaching local youth and culturally engaged consumers.

The survey explored the advertisers' perceptions of Nyastra's visual branding and their specific advertising format preferences:

- **Visual/Branding Perception:** 59.3% evaluated Nyastra's visual design as highly professional and attractive, while 33.2% rated it as quite attractive, and 7.4% deemed it less attractive.
- **Banner Position Preference:** Advertisers expressed a clear preference for prominent, top-of-screen real estate, with 72.3% selecting the upper header banner as their preferred placement, compared to 27.7% who chose the right-hand sidebar.
- **Pop-up Position Preference:** Consumer tolerance for pop-up ads was relatively balanced, with 52.9% preferring centre-screen pop-ups and 47.1% choosing bottom-screen pop-ups.
- **Receptivity to Native Advertising:** The most striking finding was the overwhelming interest in native advertising formats. A cumulative 91.4% of prospective advertisers expressed interest or high interest in Native Ads, with 51.9% rating themselves as "highly interested" and 39.5% as "interested".

This strong receptivity to native ads aligns with modern digital marketing literature, which shows that native formats—such as sponsored vocabulary content or localised maps—generate significantly higher consumer engagement and lower ad fatigue than aggressive programmatic pop-ups (Scherer et al., 2019). This data shows Nyastra's potential strategy to operate as a dual-sided platform, using high educational engagement to monetise non-intrusive, hyper-localised native marketing.

Nyastra's core strength is its scientifically validated transliteration engine, backed by strong intellectual property protections. This technical credibility has enabled the research team to establish a formal Cooperation Agreement (*Perjanjian Kerja Sama* / PKS) with partner

schools like SMP N 1 Kuta. Under this cooperation, Nyastra is officially integrated as a core learning module within the school's Balinese language syllabus. This educational integration is the key to unlocking Nyastra's commercial viability. By securing a guaranteed, highly active student user base, the preliminary feasibility study shows that Nyastra creates a valuable marketing channel for the 91.4% of local advertisers interested in native ads (Mulyawan et al., 2025).

3. Conclusion

The development, trial, and feasibility evaluation of the Nyastra platform (<https://nyastra.co.id/>) demonstrate its profound capability to bridge the historical divide between cultural preservation and commercial utility in contemporary Bali. As a digital transliteration tool, Nyastra has empirically proven its pedagogical value. The quasi-experimental trial at SMP N 1 Kuta demonstrated a statistically significant increase in Balinese script transliteration accuracy, with the class average rising from 42.35% to 74.12%. Qualitatively, the platform reduced student disengagement, achieved perfect user satisfaction scores (10/10), and fostered metalinguistic awareness that supported English phonetic pronunciation. Although the trials exposed minor technical and layout errors in rendering complex character conjuncts, these limitations served as active scaffolding, reinforcing the indispensable role of teachers within a blended Computer-Assisted Language Learning (CALL) framework.

Beyond its educational success, Nyastra possesses immense preliminary market feasibility as a dual-sided platform economy. The user feasibility study ($n = 500$) revealed high satisfaction (98.6% positive ratings) and strong viral potential (89.8% recommendation intent) driven by academic utility. Concurrently, the market feasibility study ($n = 524$) confirmed a robust target advertising demographic dominated by Tourism (31.1%), culinary enterprises (21.6%), and non-formal education (21.6%), with an overwhelming 91.4% of prospective advertisers expressing strong interest in Native Advertising. Ultimately, Nyastra provides a pioneering socio-technical model, illustrating that safeguarding intangible cultural heritage does not require rejecting the digital economy, but rather aligning cultural authenticity with market mechanics.

Acknowledgement

The corresponding author, on behalf of all authors, acknowledges all colleagues and students for their support, contributions, and assistance in the research and drafting of this manuscript. Their guidance, resources, and feedback were invaluable in completing this project.

Funding

The Institute for Research and Community Service of Udayana University funded this research. The institute had no role in study design, data collection, analysis, data interpretation, or manuscript writing.

Conflict of Interest

The corresponding author, on behalf of all authors, declares that there are no conflicts of

interest regarding the publication of this paper.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

The corresponding author, on behalf of all authors, declares that Gemini and Popai.pro were utilised in the writing process of this manuscript. These tools were employed for data analysis and language editing, and their contributions are acknowledged accordingly.

Author Contributions

All authors are part of a single research team that conducted the research and drafted the manuscript.

Ethics approval

This study did not involve any ethical procedures, as it used narrative and qualitative data collection and followed institutional guidelines that do not require ethical review for this type of research. Therefore, no formal ethics approval was necessary.

Data availability

The authors maintain the data supporting this study's findings and make them available upon reasonable request. Please contact the corresponding author for access to the data.

References

- Artawa, K., Mulyawan, I. W., Satyawati, M. S., & Erawati, N. K. R. (2020). Balinese in public spaces (A linguistic landscapes study in Kuta Village). *Journal of Critical Reviews*, 7(7), 6-10.
- Asroni, A., Pranata, P. A., Indrawan, G., Dewi, L. J. E., & Alexander, D. K. (2025). Utilizing mobile applications for 21st-century learning and digital preservation of Balinese script. *Sinkron*, 9(2), 788-799. <https://doi.org/10.33395/sinkron.v9i2.14676>
- Darmayasa, K. A., Bagus, R. I., & A, I. B. P. M. (2020). Penerimaan masyarakat Tejakula terhadap Pergub Bali No. 80 Tahun 2018 tentang penulisan aksara Bali pada papan nama. *Jurnal Pendidikan Bahasa Bali Undiksha*, 7(1), 1-10. <https://doi.org/10.23887/jpbb.v7i1.35959>
- Erawati, N. K. R., Mulyawan, I. W., & Sulibra, I. K. N. (2023). Balinese transliteration in public space: Error analysis in linguistics landscapes. *Forum for Linguistic Studies*, 5(2), 1788-1788. <https://doi.org/10.59400/FLS.v5i2.1788>
- Laksmi, L. P., Mulyawan, I. W., Sulibra, K. N., Erawati, N. K. R., & Astawa, G. S. (2024). Nyastra: Nyurat aksara transliterasi (a computer design of Balinese transliteration apps). *Multidisciplinary Science Journal*, 7(1), Article 2025035. <https://doi.org/10.31893/multiscience.2025035>
- Meighan, P. J. (2021). Decolonizing the digital landscape: The role of technology in Indigenous language revitalization. *AlterNative: An International Journal of Indigenous Peoples*, 17(3), 397-405. <https://doi.org/10.1177/11771801211037672>

- Mulyawan, I. W. (2017a). Glocalization of Balinese language as outdoor sign in Desa Adat Kuta, Bali. *International Journal of Education*, 10(1), 82-87. <https://doi.org/10.17509/ije.v10i1.5042>
- Mulyawan, I. W. (2017b). Linguistic landscapes: Commercial outdoor sign in Kuta, Bali. *International Journal of Linguistics*, 9(2), 1-9.
- Mulyawan, I. W. (2021). Maintaining and revitalising Balinese language in public space: A controversial language planning regulation. *Indonesia and the Malay World*, 49(145), 481-495. <https://doi.org/10.1080/13639811.2021.1910356>
- Mulyawan, I. W., Suardiana, I. W., Astawa, I. G. S., & Sulibra, I. K. N. (2025). *Laporan studi kelayakan website Nyastra* [Feasibility study report]. Universitas Udayana.
- Mulyawan, I. W., Suardiana, I. W., Sulibra, I. K. N., & Astawa, I. G. S. (2026). Nyastra: A digital tool for learning and preserving Balinese script. *International Journal of Learning and Development*, 16(2), 15-27. <https://doi.org/10.5296/ijld.v16i2.23780>
- Putra, I. B. M. A., & Paramarta, I. K. (2023). Types of Balinese script block structure using symbol block analysis. *Lingua Cultura*, 17(1), 121-130. <https://doi.org/10.21512/lc.v17i1.9188>
- Scherer, R., Siddiq, F., & Tondeur, J. (2019). The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education. *Computers & Education*, 128, 13-35. <https://doi.org/10.1016/j.compedu.2018.09.009>
- Sudiarta, I. N. (2013). *Bahasa Bali*. Catur Wangsa Mandiri.

Copyright Disclaimer

Copyright for this article is retained by the author (s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).