

The Transformation of Music Production in Indonesia: A Comparative Review of Conventional Studios, Home Studios, and Mobile Production

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ABSTRACT: The rapid advancement of digital technologies has transformed music production by reducing dependence on conventional recording studios and expanding opportunities for independent creators. This study comparatively examines conventional studios, home studios, and mobile production systems within the Indonesian context, focusing on technological infrastructure, economic investment, workflow, production quality, distribution, and monetization. A structured comparative review was conducted using peer-reviewed journal articles, conference proceedings, government publications, industry reports, and technical literature. The findings indicate that conventional studios remain superior in acoustic control, specialized expertise, multichannel recording, and professional production quality. Home studios have become increasingly dominant among independent musicians due to their affordability, flexibility, creative autonomy, and integration with digital distribution. Mobile production further enhances accessibility, portability, collaboration, and content publication, although technical limitations remain. Digital technologies have democratized music production while shifting greater creative, technical, administrative, and promotional responsibilities to independent creators. Indonesian music production is also increasingly integrated with streaming services, metadata management, online collaboration, and platform-based distribution. However, technological accessibility does not guarantee production quality or commercial success, which depend on competence, infrastructure, education, networks, and platform governance. The study concludes that Indonesia has developed a hybrid production ecosystem in which the three models function as complementary systems and provides a framework for future research, policy, and industry planning.

Keywords: Music Production, Digital Audio Workstation, Home Studio, Digital Music Ecosystem, Independent Music Production, Indonesia, Music Technology



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INTRODUCTION

Digital technologies have fundamentally transformed music production by reshaping how music is composed, recorded, edited, mixed, mastered, distributed, and monetized. The transition from

analog recording systems to software-based production environments has enabled music creators to perform increasingly complex production tasks using affordable computers, Digital Audio Workstations (DAWs), Virtual Studio Technology (VST) plug-ins, and internet-enabled collaboration platforms. Contemporary music production no longer depends exclusively on large recording studios equipped with expensive hardware; instead, production activities are increasingly decentralized and supported by flexible digital ecosystems that integrate creative, technical, and commercial functions. Recent developments such as cloud-based collaboration, online DAWs, and web-based production environments have further expanded production capabilities by allowing geographically dispersed creators to collaborate synchronously and asynchronously while sharing project files, stems, and production resources through internet platforms (Buffa et al., 2023; Fajar & Sukmayadi, 2021; Kjrus, 2024; Stickland et al., 2021).

The widespread availability of affordable digital technologies has significantly reduced barriers to music production, particularly in emerging economies where access to professional recording facilities has historically been limited. DAWs, VST instruments, MIDI sequencing, and software-based audio processing have democratized music creation by enabling independent musicians, home producers, and small studios to undertake recording and production processes that previously required substantial financial investment. Beyond reducing equipment costs, these technologies have facilitated broader participation in music production through online learning resources, digital communities, and information and communication technology (ICT)-supported music education. Consequently, digital production environments have fostered the emergence of bedroom producers, independent artists, and self-managed creators capable of producing commercially distributable recordings without relying exclusively on conventional studio infrastructures (Bontempi et al., 2023; Cipta et al., 2023; Parkita, 2021).

These technological developments have simultaneously transformed the organizational structure of the global music industry. Digital distribution platforms, streaming services, and platform-based production ecosystems have integrated production, distribution, promotion, and audience engagement into interconnected digital workflows. Rather than functioning solely as recording software, modern DAWs increasingly operate within broader platform ecosystems that support project management, cloud collaboration, metadata integration, and direct distribution to streaming services. Consequently, music production decisions are increasingly influenced by platform-specific considerations such as metadata quality, playlist inclusion, algorithmic recommendation systems, and audience analytics. This process of platformization has altered both creative practices and labor relations by encouraging producers to integrate artistic production with digital marketing, rights management, and continuous audience engagement throughout the production cycle (Buffa et al., 2023; Kusumaningrum & Sukistono, 2020).

Indonesia represents an important context for examining these global transformations because the country's music industry has experienced rapid adoption of digital recording technologies while simultaneously maintaining a diverse musical landscape rooted in local cultural traditions. The increasing availability of affordable recording equipment, DAWs, VST libraries, and online educational resources has accelerated the growth of independent music production throughout the country. Local recording studios, educational institutions, and independent communities have

incorporated digital production workflows into their creative practices, enabling musicians to produce, edit, and distribute music with considerably greater autonomy than in previous decades. Parallel to these technological developments, streaming platforms and digital distribution services have expanded opportunities for Indonesian musicians to reach domestic and international audiences without relying exclusively on conventional record-label infrastructures (Arévalo, 2023; Suharto & Ambarwangi, 2022).

An equally significant development is the integration of Indonesian musical heritage into contemporary digital production environments. Recent studies demonstrate that traditional instruments and regional musical knowledge are increasingly preserved and reinterpreted through sampling technologies, VST instrument libraries, and software-based performance systems. Digital representations of instruments such as the Sundanese flute and Kendang Jaipong illustrate how local cultural assets can be incorporated into global production workflows while maintaining their distinctive musical identities. These developments suggest that digital technologies not only facilitate technological modernization but also create new opportunities for preserving and disseminating Indonesia's musical diversity within international digital ecosystems (Gusmanto & Denada, 2023; Pramudita et al., 2024; Ramdani & Sukmayadi, 2023).

Despite these advances, important challenges remain. Existing studies generally examine individual aspects of music technology, including DAW implementation, recording techniques, streaming platforms, online collaboration, music education, or digital instrument development. Comparatively fewer studies evaluate how conventional recording studios, home studios, and mobile production systems coexist within Indonesia's contemporary music-production ecosystem. Moreover, publicly available national statistics remain limited regarding the number of recording studios, independent producers, Digital Audio Workstation adoption, production costs, regional production capacity, and the economic performance of music-production activities. Consequently, technological development has progressed considerably faster than the statistical documentation required to support comprehensive academic analysis and evidence-based policymaking.

The available literature nevertheless provides a strong conceptual foundation for understanding the transformation of music production. Collectively, previous research demonstrates that DAWs and VST technologies have become the technological core of modern music production, while web-based collaboration, streaming platforms, and digital distribution have expanded the scope of production beyond traditional recording activities. Studies conducted in Indonesia further reveal the emergence of active independent production communities, digital music education initiatives, and locally developed virtual instruments that integrate Indonesian musical traditions into contemporary production practices. These findings consistently indicate that digital technologies have reduced production costs, expanded participation, encouraged collaborative production models, and strengthened connections between local creativity and global digital infrastructures (Fajar & Sukmayadi, 2021; Parkita, 2021; Cipta et al., 2023).

Nevertheless, an important research gap remains regarding the comparative characteristics of Indonesia's principal production environments. Existing studies rarely integrate technological infrastructure, production workflows, investment requirements, production quality, digital

distribution, and monetization into a single analytical framework capable of comparing conventional studios, home studios, and mobile production systems. Furthermore, relatively little attention has been devoted to examining how these production models complement rather than replace one another within Indonesia's evolving music ecosystem. Addressing this gap is essential for developing a more comprehensive understanding of technological transformation in Indonesia's music industry while providing a stronger empirical foundation for future research and policy development.

Accordingly, this study aims to develop a comprehensive comparative review of conventional recording studios, home studios, and mobile music-production systems in Indonesia. Specifically, the study compares these production environments across five analytical dimensions: technological infrastructure, economic investment, production workflow, production quality, and digital distribution and monetization. It proposes that although digital technologies have substantially democratized access to music production by lowering financial and geographical barriers, they have not eliminated the continuing importance of professional recording studios for acoustically demanding and technically complex productions. Instead, Indonesia's music-production landscape has evolved into a hybrid ecosystem in which conventional studios, home studios, and mobile production each fulfill complementary artistic, technical, and commercial roles. By integrating technological, organizational, and industrial perspectives, this article contributes a multidimensional framework for understanding the ongoing transformation of music production in Indonesia and establishes a foundation for future empirical studies of the country's rapidly evolving digital music ecosystem.

METHOD

Research Design

This study employs a structured comparative review to examine the transformation of music production in Indonesia across three production environments: conventional recording studios, home studios, and mobile production systems. A comparative review is appropriate because the available literature is methodologically heterogeneous and encompasses technical studies, ethnographic observations, educational research, industry analyses, case studies, and conceptual discussions of digital platforms. Rather than estimating a single pooled effect, the study aims to identify recurring patterns, differences, and relationships across technologies, production practices, organizational arrangements, and user contexts.

Systematic and scoping review principles guide the research process. Systematic procedures improve transparency by defining the search scope, selection criteria, analytical categories, and synthesis process in advance. Scoping review principles are also necessary because music-production research covers a broad range of technologies, including Digital Audio Workstations, Virtual Studio Technology plug-ins, artificial intelligence tools, cloud-based platforms, online collaboration systems, and web-based production environments. The field additionally spans different genres, geographical settings, professional roles, and educational applications (Buffa et

al., 2023; Stickland et al., 2021). A scoping orientation therefore allows the study to map the breadth of available evidence while identifying areas where empirical research remains limited.

The design is not intended as a statistical meta-analysis. Quantitative synthesis is difficult because existing studies use different units of analysis, participant groups, technologies, and outcome measures. Although meta-analysis may be possible where standardized adoption rates, platform-use measures, or collaboration indicators are available, much of the present literature relies on qualitative, descriptive, ethnographic, or case-based methods (Cipta et al., 2023; Deacon & Barthet, 2022). The study therefore applies thematic and comparative synthesis while retaining the methodological context of individual sources.

Review Scope and Units of Analysis

The principal units of analysis are conventional studios, home studios, and mobile production systems. Conventional studios are defined as dedicated recording facilities with acoustically treated spaces, specialized equipment, and differentiated professional roles. Home studios refer to residential or semi-professional environments in which production is conducted primarily through personal computers, Digital Audio Workstations, compact audio interfaces, microphones, monitors, headphones, and software instruments. Mobile production refers to music creation conducted mainly through smartphones, tablets, portable interfaces, mobile applications, and lightweight recording equipment.

The review evaluates these production environments across five dimensions: technological infrastructure, economic requirements, production workflow, production quality, and digital distribution and monetization. These dimensions were selected because they capture both the material characteristics of production systems and the broader organizational changes associated with digitalization. The framework recognizes that technology adoption does not occur independently of training, professional practice, institutional support, platform governance, or economic conditions.

The study also distinguishes among professional, pro-amateur, amateur, and educational users. This distinction is important because adoption incentives and barriers differ across commercial studios, independent producers, teachers, students, and hobbyists. Educational studies frequently emphasize infrastructure, curriculum integration, teacher competency, and institutional support, whereas professional adoption is more strongly influenced by workflow efficiency, interoperability, sound quality, client expectations, and commercial sustainability (Angelo, 2020).

Literature Identification and Selection

Relevant literature is identified from peer-reviewed journal articles, conference proceedings, academic books, institutional reports, and documented case studies. The search focuses on combinations of terms associated with music-production technology, Digital Audio Workstations,

Virtual Studio Technology, online collaboration, home recording, mobile production, artificial intelligence in audio, platformization, digital distribution, technology adoption, music education, and Indonesian production practices.

Sources are included when they satisfy at least one of the following criteria: they examine production technologies or workflows; compare studio or production environments; analyze the adoption of digital music tools; investigate online or cloud-based collaboration; discuss educational integration of production technology; examine platformization or labor relations; or provide evidence concerning Indonesian music production. Sources are excluded when they are purely promotional, lack identifiable methods, make unsupported national claims, or do not provide sufficient detail for analytical classification.

Because the study addresses both technological practice and structural transformation, the review includes conceptual works on platformization alongside empirical studies of tool use. Platformization research is necessary because the diffusion of a technology does not fully explain how digital platforms restructure ownership, data flows, labor dependency, distribution, or market governance (Kjus, 2024). Accordingly, the selection process does not treat adoption frequency as the sole indicator of technological transformation.

Data Extraction

A structured extraction matrix is used to record bibliographic information, research setting, methodology, participants, technologies, production environment, analytical framework, principal findings, and stated limitations. Technical data include the use of Digital Audio Workstations, plug-ins, artificial intelligence tools, cloud services, mobile applications, interfaces, microphones, virtual instruments, and metadata systems.

Workflow data include recording, editing, sequencing, mixing, mastering, project sharing, remote collaboration, file management, distribution, and promotional activities. Organizational data include professional roles, collaboration structures, educational support, platform dependence, ownership, data provenance, and labor arrangements. Contextual information is also extracted to distinguish studies of commercial production, independent practice, education, and community-based creation.

Ethnographic and case-based evidence is coded in sufficient detail to retain the practical context of production. Such studies provide insight into how producers negotiate software, hardware, ownership, workflow continuity, data provenance, and collaborative responsibilities in actual production settings (Cheng & McGregor, 2024; Walzer, 2023). Semantic and ontological approaches are also considered when they clarify relationships among production stages, digital objects, contributors, and technical processes (Lefford et al., 2021).

Comparative Analytical Framework

The study applies thematic triangulation by combining three complementary theoretical perspectives: diffusion of innovations, platformization, and practice-based analysis. Diffusion-of-innovation theory is used to examine awareness, interest, evaluation, trial, adoption, and continued use of production technologies. It also directs attention to social networks, gatekeepers, peer communities, and institutional support that influence adoption across professional and educational settings (Deruty et al., 2022; Sadia & Carbon, 2023).

Platformization is used to analyze structural changes that extend beyond individual adoption. This perspective examines how Digital Audio Workstations, cloud services, and online production platforms influence data control, market access, collaboration, labor dependency, distribution, and monetization. The distinction between diffusion and platformization prevents the study from equating widespread tool use with broader structural democratization. A technology may be widely adopted while users remain dependent on proprietary ecosystems, subscription models, platform rules, and centralized distribution infrastructures (Kjus, 2024).

Practice-based analysis is applied to investigate how technologies are incorporated into everyday production routines. This includes the organization of sessions, creative decision-making, division of labor, file exchange, revision, metadata management, and ownership attribution. Ethnographic evidence is particularly valuable because adoption counts alone may fail to reveal changes in how producers understand authorship, responsibility, provenance, and collaboration (Jasau et al., 2024).

Evaluation of Technology Adoption

Technology adoption is evaluated through multiple indicators rather than a single measure. The first group includes access variables such as hardware availability, software availability, internet connectivity, licensing, training, and institutional support. The second group includes behavioral indicators such as frequency of use, integration into existing workflows, collaboration practices, and continued use after initial experimentation. The third group includes perceptual indicators such as usability, usefulness, creative control, trust in automation, and perceived sound quality.

User-centered studies are used to assess how interface design, automation, and user experience affect the acceptance of new production tools. Research on artificial intelligence compressors, automated production functions, and novel Digital Audio Workstation features demonstrates that adoption can vary according to technical expertise, perceived transparency, and the degree of control retained by users (Huang et al., 2021; Singh et al., 2021). These indicators are interpreted separately for professionals, independent producers, students, and educators.

Temporal factors are also considered. Studies of online Digital Audio Workstation use during the COVID-19 pandemic show that external constraints can accelerate adoption by making remote collaboration and distance learning necessary rather than optional (Knapp et al., 2023). Such evidence is treated carefully because emergency adoption may not represent stable long-term practice.

Data Synthesis

The extracted findings are coded thematically and organized into comparative matrices. Each production model is evaluated according to technology, cost, workflow, quality, distribution, and monetization. Convergences across studies are identified, while contradictory findings are retained and interpreted in relation to differences in users, genres, institutions, and research settings.

The synthesis proceeds in three stages. First, descriptive mapping identifies the technologies, practices, and contexts represented in the literature. Second, cross-case comparison evaluates similarities and differences among conventional studios, home studios, and mobile systems. Third, theoretical interpretation relates the findings to democratization, diffusion, platformization, decentralization, and changing labor arrangements.

Reliability, Validity, and Limitations

Reliability is strengthened through explicit selection criteria, standardized data extraction, consistent analytical dimensions, and separation of empirical findings from conceptual interpretation. Triangulation across technical, educational, ethnographic, and platform-oriented studies improves interpretive validity by reducing dependence on a single methodological tradition.

Several limitations remain. The evidence base is heterogeneous, and many Indonesian studies are localized rather than nationally representative. Public data on studio numbers, producer populations, software adoption, costs, and professional income remain incomplete. Educational studies cannot automatically be generalized to commercial practice, while case studies provide depth without statistical representativeness. Furthermore, platformization and diffusion measure different forms of change and must not be treated as interchangeable. These limitations are acknowledged throughout the analysis, and conclusions are restricted to patterns that can be supported by the available literature.

RESULT AND DISCUSSION

Indonesian Digital Music Environment

Internet-Enabled Production and Collaboration

The reviewed literature indicates that the expansion of internet access has contributed substantially to the development of Indonesia's digital music-production environment. Internet connectivity enables producers to obtain software, access tutorials, exchange project files, collaborate remotely, distribute recordings, and participate in online production communities. These functions have reduced dependence on location-bound facilities by allowing important stages of the production

process to occur through networked digital systems. In this environment, producers can create, edit, revise, and share music without requiring all collaborators to work in the same physical studio.

Studies of Indonesian production contexts document the growing use of Digital Audio Workstations and Virtual Studio Technology instruments as foundational components of contemporary workflows. These technologies facilitate multitrack recording, editing, sequencing, mixing, mastering, and software-based instrumentation within relatively compact production systems. Their availability supports both professional and independent practice, while internet-based communication expands access to technical knowledge and production resources (Arévalo, 2023; Parkita, 2021).

The literature also identifies online communities as important infrastructures of informal learning. Indonesian home-recording communities use social-media platforms and other online spaces to exchange tutorials, production experiences, samples, software information, troubleshooting advice, and feedback. This circulation of practical knowledge allows independent producers to acquire competencies outside formal studio apprenticeships or institutional education. The internet therefore functions not merely as a distribution channel but as a production infrastructure that supports learning, collaboration, and peer-based skill development (Suharto & Ambarwangi, 2022; Cipta et al., 2023; Parkita, 2021).

These findings suggest that internet expansion has enabled a more distributed production ecology. However, the literature does not establish a direct causal relationship between national internet penetration and the number of active music producers. Internet access should consequently be interpreted as an enabling condition rather than a direct measure of production participation.

Internet Literacy and Independent Production

Evidence from Indonesian home-recording communities provides a more specific connection between internet use and independent music production. Research on such communities demonstrates that members rely on online platforms to develop technical knowledge, maintain professional and peer networks, share production outcomes, and solve practical recording problems. Internet literacy therefore appears closely associated with the ability to participate in decentralized production environments (Suharto & Ambarwangi, 2022; Stevenson, 2023).

Independent production is also supported by the circulation of downloadable tools, software instruments, sample libraries, and educational content. Producers who lack access to formal studios can use these resources to build functional home-production systems. Internet-enabled access to mobile and desktop applications further allows music to be produced and disseminated from geographically diverse locations. Studies of locally developed virtual instruments and sampled traditional sounds demonstrate that online and software-based environments can also connect independent production with regional musical knowledge (Pramudita et al., 2024; Ramdani & Sukmayadi, 2023).

The findings nevertheless indicate an uneven ecosystem. Independent producers differ in access to reliable connectivity, suitable hardware, licensed software, technical training, and professional

networks. Internet access broadens opportunity, but it does not equalize production conditions. The effective use of online resources depends on the producer's prior knowledge, equipment, language competencies, available time, and capacity to evaluate the quality of information.

Streaming and the Recorded-Music Market

The literature describes a structural shift in Indonesia's recorded-music environment from physical and institutionally controlled distribution toward streaming and platform-based circulation. Digital platforms allow independent artists and producers to release music without relying exclusively on traditional record labels, physical retail systems, or geographically centralized distribution networks. This has increased the potential reach of Indonesian music and allowed recordings to circulate nationally and internationally through digital services (Arévalo, 2023; Parkita, 2021; Suharto & Ambarwangi, 2022).

Streaming has also strengthened the relationship between production and distribution. Contemporary producers must increasingly consider file formats, technical specifications, metadata, release schedules, online promotion, and platform visibility during the production process. Production is therefore no longer limited to the preparation of an audio master. It is connected to a wider chain that includes aggregation, platform submission, audience engagement, rights management, and monetization.

The reviewed studies further show that Indonesian producers use digital systems to combine local musical materials with globally circulating production practices. Sampling, software instruments, and virtual libraries have enabled traditional sounds to enter digital workflows and streaming environments. Research on regional instruments and local cultural materials indicates that digital tools can support both adaptation and preservation by making culturally specific sounds available within contemporary production systems (Ramdani & Sukmayadi, 2023; Pramudita et al., 2024).

This development reveals a hybrid market structure. Indonesian music production is increasingly integrated into global streaming systems, yet its content can remain locally distinctive. The transformation is therefore not simply a movement from local to global production but a process in which local musical knowledge is reformatted, circulated, and reinterpreted through digital platforms.

Contribution of the Creative Economy

The creative economy provides a broader institutional and economic context for the expansion of music production in Indonesia. Literature on Indonesia's creative sectors emphasizes the role of digital platforms, internet infrastructure, online marketplaces, and policy support in enabling creative activity. These conditions can encourage direct interaction between artists and audiences, support the sale or distribution of digital content, and create opportunities for education, freelance production, and creative entrepreneurship (Afifah et al., 2022; Chambers, 2021).

Music benefits from these developments through multiple channels. Producers can offer recording, arranging, mixing, mastering, sample development, educational, and content-production services. Musicians can distribute recordings directly, develop online audiences, and combine music releases with other forms of digital content. The wider creative economy therefore supports music not only as a recorded product but also as a field of technical services, cultural production, education, and digital labor.

The literature associated with Society 5.0 further presents digital technologies as mechanisms for strengthening collaboration and innovation in creative industries. Within this perspective, music production becomes part of a networked economy in which technical competence, cultural knowledge, entrepreneurship, and digital communication interact (Raharjo et al., 2023). However, the available evidence remains more effective at describing opportunities than measuring their distribution. It does not establish that all producers benefit equally from creative-economy growth.

Comparative Production Models

Conventional Studios and Home Studios

The clearest distinction between conventional and home studios concerns space, equipment, labor specialization, and operating structure. Conventional studios typically use purpose-built or professionally adapted rooms, acoustic treatment, multiple recording spaces, specialist microphones, high-quality monitoring systems, multichannel converters, and combinations of analog and digital processing. Their workflows often involve distinct professional roles, including producer, recording engineer, mixing engineer, mastering engineer, arranger, and session musician.

Home studios use a more compact, software-centered configuration. A typical setup may include a computer, Digital Audio Workstation, two- or four-channel audio interface, one or more microphones, headphones, compact studio monitors, MIDI controller, and software instruments. Digital Audio Workstations remain central to both studio types, but home production relies more heavily on virtual instruments, plug-ins, editing, overdubbing, and software emulation to compensate for limited physical space and hardware resources (Fajar & Sukmayadi, 2021; Kusumaningrum & Sukistono, 2020; Bontempi et al., 2023).

The emergence of web-based and portable production tools has reduced the technological separation between professional and domestic environments. Online Digital Audio Workstations, cloud collaboration, and software-based effects provide home producers with functions that were previously available only in larger facilities. Nevertheless, convergence at the software level does not eliminate differences in acoustics, monitoring accuracy, microphone selection, engineering expertise, or capacity for simultaneous ensemble recording (Buffa et al., 2023; Stickland et al., 2021; Kjus, 2024).

Advantages and Limitations of Home Studios

The principal advantages of home studios are lower costs, flexible schedules, geographic accessibility, and creative autonomy. Producers can work without hourly studio charges, revise material repeatedly, and organize sessions around personal schedules. Software instruments and plug-ins provide access to extensive sonic resources without requiring large physical collections of instruments and outboard processors. Remote collaboration also allows musicians, vocalists, engineers, and producers to participate from different locations (Fajar & Sukmayadi, 2021; Parkita, 2021; Bontempi et al., 2023).

Home studios are particularly compatible with independent production because they allow a single person to undertake multiple roles. A home producer may compose, arrange, perform, record, edit, mix, prepare metadata, and distribute the final recording. This integration can reduce coordination costs and increase creative control.

The limitations are equally significant. Residential spaces may have untreated reflections, environmental noise, poor isolation, and inaccurate low-frequency response. Monitoring decisions made in such environments may not translate consistently to other playback systems. Producers may also rely heavily on self-education, leading to uneven knowledge of gain staging, acoustics, editing, mixing, mastering, file management, and copyright. Educational and adoption studies therefore emphasize that affordable technology alone is insufficient; training, infrastructure, mentoring, and institutional support remain important determinants of effective use (Cipta et al., 2023; Deacon & Barthet, 2022; Angelo, 2020).

Mobile Music Production

Mobile music production extends decentralization beyond the home studio. Smartphones and tablets support beat-making, sequencing, vocal recording, sampling, editing, arrangement, and direct publication. Mobile-friendly and cloud-based platforms allow creators to begin projects in informal settings, exchange ideas quickly, and continue working across devices. This increases the geographic and temporal flexibility of independent production (Buffa et al., 2023; Stickland et al., 2021; Kusumaningrum & Sukistono, 2020).

Mobile systems are particularly valuable for capturing ideas, producing demonstrations, creating short-form content, and initiating collaborative projects. Their integration with social-media and communication applications can shorten the interval between creation, feedback, and publication. Mobile production therefore supports rapid iteration and platform-oriented workflows.

However, the reviewed literature does not provide extensive Indonesia-specific measurement of mobile production as a distinct category. Its significance is inferred primarily from broader evidence on online Digital Audio Workstations, portable technologies, internet-enabled collaboration, and independent production. Mobile devices also remain constrained by small interfaces, limited processing capacity, storage, battery dependence, reduced input and output options, and the frequent use of consumer headphones or earphones. Mobile production should therefore be understood as an accessible entry point and complementary workflow rather than an equivalent replacement for all studio functions.

Genre Suitability

The suitability of each production model varies by genre, instrumentation, and production objective. Conventional studios offer clear advantages for music requiring controlled acoustic capture, multiple performers, complex microphone arrangements, or high-volume acoustic instruments. Large ensembles, orchestral sessions, live bands, acoustic drums, gamelan, and some forms of film music may require dedicated rooms and specialist engineering.

Home studios are well suited to electronic, pop, hip-hop, lo-fi, sample-based, and overdub-oriented production. These genres often depend heavily on MIDI sequencing, virtual instruments, software synthesis, editing, and layered recording rather than simultaneous ensemble capture. Practice-based studies indicate that genre conventions influence microphone choices, room requirements, processing decisions, and equipment configurations (Herbst, 2021; O'Grady, 2021).

Research on digital representations of Indonesian instruments further demonstrates that home and hybrid systems can support culturally specific production. Sampled or virtual instruments allow regional sounds to be incorporated into electronic, popular, educational, and experimental projects without requiring the physical presence of every instrument during all production stages (Pramudita et al., 2024).

The findings do not support a single universally superior model. Instead, they indicate that production effectiveness depends on matching the technological environment to the musical task. Hybrid workflows are increasingly relevant: composition, sequencing, and editing may occur at home; difficult acoustic elements may be recorded in a professional studio; mixing may be conducted remotely; and promotional content may be produced on mobile devices.

Cross-Cutting Findings

Across the reviewed literature, production tools do not independently determine creative or professional outcomes. Infrastructure, education, organizational context, technical competence, and access to networks shape how technologies are adopted and used. Digital Audio Workstations can expand production access, but their broader effects depend on licensing, platform governance, data ownership, training, and labor arrangements (Kjus, 2024).

The Indonesian evidence indicates a transitional and uneven ecosystem. Conventional studios, home studios, educational institutions, online communities, mobile creators, and digital platforms coexist rather than forming a linear sequence in which one model replaces another. Active home-recording communities and locally developed virtual instruments demonstrate substantial innovation, while limitations in national statistics prevent precise measurement of studio distribution, producer populations, production costs, software use, and professional income (Arévalo, 2023; Suharto & Ambarwangi, 2022; Parkita, 2021).

The central result is therefore the emergence of a hybrid Indonesian music-production ecosystem. Digital technologies have widened access, strengthened independent production, and connected

local creative practices to streaming and online collaboration. At the same time, conventional studios retain important advantages in acoustic control, specialist labor, and complex recording. The transformation is best characterized as diversification and functional complementarity rather than complete technological substitution.

The findings indicate that digital technology has transformed music production through a dual process of democratization and redistribution. On the one hand, Digital Audio Workstations, Virtual Studio Technology plug-ins, affordable interfaces, and cloud-enabled tools have lowered the financial and spatial barriers that historically restricted access to recording and production. These technologies allow independent musicians, home producers, students, and semi-professional creators to perform tasks that previously required specialized studio facilities and substantial capital investment. In this sense, digital production has expanded participation across social and geographical boundaries and has made the initial stages of production more accessible (Fajar & Sukmayadi, 2021; Bontempi et al., 2023; Kjus, 2024). On the other hand, this transformation does not eliminate production labor. Instead, it redistributes technical, administrative, and promotional responsibilities toward independent creators, who increasingly manage recording, editing, mixing, file organization, collaboration, metadata, distribution, and audience engagement themselves. The democratization of access must therefore be distinguished from the democratization of professional outcomes, income, and market power.

This distinction is particularly important in platform-based production environments. As Digital Audio Workstations and online collaboration tools become integrated with cloud services and distribution systems, they do more than facilitate creative work; they also restructure how production labor is organized and how value is generated. Platformization expands opportunities for collaboration and circulation, but it may also increase dependence on proprietary ecosystems, subscription models, data governance systems, and platform-defined visibility mechanisms (Kjus, 2024). Independent creators may gain greater autonomy from conventional labels and studios while becoming more dependent on software vendors, aggregators, streaming services, and social-media platforms. Consequently, the contemporary producer occupies a more complex position as both creative practitioner and digital worker. This finding supports the view that technological change has produced a distributed ecosystem rather than a simple transfer of power from institutions to individuals.

The Indonesian case demonstrates this blended form of democratization. Independent producers, home-recording communities, formal studios, educational institutions, and online networks coexist within a transitional production landscape. Research on Indonesian home-recording communities shows that internet-based knowledge exchange, social-media interaction, and peer learning support the growth of independent production practices (Suharto & Ambarwangi, 2022). Studies of Digital Audio Workstation use and digital music education similarly indicate that affordable production technologies have expanded access to technical knowledge and practical experience (Arévalo, 2023; Parkita, 2021; Cipta et al., 2023). Nevertheless, participation remains uneven because access to reliable internet connections, licensed software, suitable hardware, acoustic spaces, formal training, and professional networks varies significantly across users and regions. Digital access therefore creates opportunity without automatically removing structural inequality.

The continued relevance of professional recording studios reinforces this conclusion. Conventional studios provide purpose-built acoustic environments, calibrated monitoring, specialist microphones, multichannel recording capacity, and experienced engineers. These resources remain difficult to reproduce in home environments, particularly for projects involving ensembles, acoustic drums, orchestral instruments, gamelan, film scoring, or other productions requiring controlled room response and complex microphone placement (Fajar & Sukmayadi, 2021; Kusumaningrum & Sukistono, 2020; Bontempi et al., 2023). Professional studios also provide forms of quality assurance, mentorship, role specialization, and client-facing organization that are not reducible to equipment alone. Their value lies not only in technical infrastructure but also in accumulated expertise and coordinated decision-making.

The findings therefore support a model of functional complementarity rather than technological replacement. Hybrid workflows increasingly distribute different stages of production across multiple environments. Composition, programming, editing, and pre-production may occur in a home studio; difficult acoustic elements may be recorded in a professional facility; mixing and mastering may be undertaken remotely by specialists; and promotional content may be produced using mobile devices. Practice-based studies confirm that such distributed arrangements are increasingly common and that purpose-built studios continue to provide role-specific advantages within broader digital workflows (Goold, 2022; McGarry et al., 2021). Cloud-enabled systems further blur the distinction between studio and non-studio work by enabling project exchange, simultaneous editing, and remote collaboration without eliminating the need for specialist spaces or human expertise (Buffa et al., 2023; Stickland et al., 2021).

These findings have direct implications for public policy in Indonesia and other emerging economies. Sustainable development requires coordinated support for infrastructure, education, governance, and intellectual property. Reliable broadband, affordable access to legal software, and regionally distributed production facilities would strengthen participation beyond major urban centers. ICT-enhanced music education should integrate Digital Audio Workstations, virtual instruments, cloud collaboration, critical listening, acoustics, metadata, and copyright administration. Existing educational studies show that access to tools alone is insufficient when teachers, students, and independent users lack training or institutional support (Cipta et al., 2023; Parkita, 2021; Deacon & Barthet, 2022). Policies should therefore focus on both equipment provision and competency development.

Governance is equally important. As production and distribution become platform-mediated, policymakers must address data ownership, interoperability, transparency, fair compensation, and creator dependence on proprietary infrastructures. Platformization research demonstrates that widespread adoption does not necessarily produce equitable labor relations or control over creative data (Kjus, 2024). Support for open standards and interoperable metadata systems could reduce technological lock-in and improve collaboration across production environments (Lefford et al., 2021). Copyright frameworks must also respond to remote collaboration, sample-based production, digital libraries, and increasingly fragmented chains of authorship and ownership (Ozelkan & Billias, 2024).

Future technological developments are likely to intensify these changes. Artificial intelligence is increasingly incorporated into mixing, mastering, compression, sound selection, and production decision-support. Such tools may improve efficiency and assist less experienced producers, but they also raise concerns about authorship, transparency, creative autonomy, and algorithmic bias (Deruty et al., 2022; Kumar et al., 2024). Cloud collaboration will further expand distributed production by enabling remote editing, high-resolution file exchange, and simultaneous project work across locations (Buffa et al., 2023). Immersive and spatial audio formats will introduce new creative possibilities while requiring additional expertise in spatial mixing, monitoring, room design, metadata, and delivery standards (Sadia & Carbon, 2023). Semantic and provenance-oriented systems may also become more important as complex projects generate larger volumes of stems, metadata, ownership records, and collaboration histories (Lefford et al., 2021; O'Grady, 2021).

Overall, the transformation of music production should not be interpreted as a linear movement from professional studios to individual digital production. It is better understood as the emergence of a hybrid ecosystem in which access has expanded, labor has been redistributed, and production environments have become more interconnected. Digital technologies have opened important opportunities for Indonesian creators, but their benefits remain conditioned by infrastructure, training, platform governance, and professional networks. The central policy and scholarly challenge is therefore not simply to promote technological adoption, but to ensure that access to production tools is accompanied by sustainable skills, fair labor conditions, cultural diversity, and meaningful opportunities for professional development.

CONCLUSION

This study examined the transformation of music production in Indonesia by comparing conventional recording studios, home studios, and mobile production systems within the broader context of digital technological development. The review demonstrates that Indonesia's music-production ecosystem has undergone a substantial structural transition driven by the widespread adoption of Digital Audio Workstations (DAWs), Virtual Studio Technology (VST), affordable recording hardware, internet connectivity, cloud-based collaboration, and digital distribution platforms. Rather than replacing conventional recording studios, these technological developments have diversified production practices and created a hybrid ecosystem in which multiple production models coexist and perform complementary functions.

The comparative analysis shows that conventional studios continue to provide significant advantages in projects requiring controlled acoustics, professional monitoring, multichannel recording, specialized engineering expertise, and coordinated production teams. These characteristics remain difficult to replicate in home-based environments, particularly for large ensembles, orchestral recording, film scoring, acoustic instruments, and other productions that demand high technical precision. Conversely, home studios have become the principal environment for many independent musicians because they offer lower investment costs, flexible workflows, creative autonomy, and direct integration with digital distribution platforms. Mobile

production further extends accessibility by enabling music creation, editing, collaboration, and content publication from portable devices, although it remains technically constrained when compared with dedicated studio systems.

The findings further indicate that digital technology has democratized access to music production by substantially reducing financial, spatial, and geographical barriers to entry. Affordable software and hardware have enabled independent creators to participate in recording, editing, mixing, mastering, and distribution without exclusive reliance on professional recording facilities. However, democratization should not be interpreted as the complete equalization of opportunities or outcomes. The review demonstrates that technological access alone does not guarantee production quality, commercial success, or sustainable professional careers. Infrastructure quality, technical competence, educational opportunities, acoustic conditions, platform governance, copyright literacy, metadata management, and professional networks remain critical factors shaping production outcomes.

A major contribution of this study is the recognition that digital transformation has redistributed production responsibilities rather than eliminating them. Independent producers increasingly undertake multiple roles, including songwriter, arranger, performer, recording engineer, mixing engineer, mastering engineer, distributor, promoter, and digital-content manager. Consequently, modern music production extends beyond technical recording to encompass metadata management, audience engagement, streaming optimization, rights administration, and digital entrepreneurship. This evolution reflects the broader platformization of music production, where creative practice is increasingly integrated with digital infrastructures and online services.

The Indonesian case also illustrates the productive interaction between technological innovation and local musical culture. The integration of traditional instruments, regional musical knowledge, and locally developed virtual instrument libraries demonstrates that digital production can support both technological modernization and cultural preservation. Rather than diminishing local musical identity, digital production technologies provide new mechanisms for documenting, reproducing, and disseminating Indonesia's diverse musical heritage through national and international digital platforms.

From a scientific perspective, this study contributes a multidimensional comparative framework that evaluates music-production models across five interconnected dimensions: technological infrastructure, economic investment, production workflow, production quality, and digital distribution and monetization. By integrating these dimensions, the study extends previous research that has often examined production technology, education, streaming, or independent production separately. The framework provides a foundation for future comparative analyses of music-production ecosystems in Indonesia and other emerging economies.

The review also identifies an important limitation in the current knowledge base. Although digital music production has expanded rapidly, publicly available national statistics remain insufficient to describe the industry's development comprehensively. Reliable data concerning the number of recording studios, independent producers, Digital Audio Workstation adoption, production costs,

regional infrastructure, software usage, and professional income remain fragmented or unavailable. This statistical gap limits evidence-based policymaking and restricts the ability of researchers to evaluate long-term technological and industrial trends.

Accordingly, future research should prioritize large-scale empirical investigations of Indonesia's music-production sector. National surveys of producers, recording studios, educational institutions, software adoption, regional production capacity, and digital distribution practices would provide a stronger empirical foundation for evaluating technological transformation. Comparative studies across provinces, musical genres, and creative-economy clusters would further clarify regional disparities and opportunities. Future work should also investigate the implications of artificial intelligence, cloud collaboration, immersive audio, spatial audio, and evolving platform governance for music production, creative labor, and copyright management.

In conclusion, Indonesia's music-production landscape has evolved into a hybrid digital ecosystem in which conventional studios, home studios, and mobile production systems coexist as complementary rather than competing models. Digital technologies have significantly broadened participation and transformed production workflows, while professional studios continue to provide specialized capabilities that remain essential for high-quality recording. The future sustainability of Indonesia's music industry will depend not only on continued technological innovation but also on investments in education, infrastructure, fair platform governance, intellectual property protection, and comprehensive statistical systems that can accurately capture the continuing evolution of the country's digital music-production ecosystem.

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