

Digital Ecosystem Model: Penta Helix Integration For Student Films

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ARTICLE INFO

ABSTRACT

Received: 20 Dec 2024
Revised: 22 Feb 2025
Accepted: 28 Feb 2025

Digital transformation in the creative industry requires a systematic approach to optimize the distribution and commercialization of vocational high school students' film works. This research aims to develop a digital ecosystem model for vocational high school students majoring in Broadcasting and Film through pentahelix collaboration integration. Using a qualitative case study approach, the research was conducted at two vocational high schools in Sukabumi, involving five key stakeholders: government, academia, business, community, and media. Data was collected through in-depth interviews with seven key informants, participatory observation over three months, and a documentary study. The research resulted in a "Digital Ecosystem for Vocational High School Film Students" model comprising three integrated components: Core Components (monetization, distribution, analytics, and collaboration systems), Implementation Phases (initiation, consolidation, and optimization), and Penta Helix Integration. This model offers a systematic framework for building a digital platform to support the distribution and commercialization of vocational high school students' film works while serving as a reference for developing a creative industry ecosystem based on vocational education.

Keywords: Digital ecosystem, Penta Helix collaboration, film education

Introduction

The digital era has transformed the creative industry landscape, particularly in film content production and distribution. Vocational high school students majoring in Broadcasting and Film face significant challenges in accessing markets and maximizing their works' commercial potential. Data from the Asosiasi Guru Broadcasting Indonesia (AGBI) shows 61 vocational high schools with Broadcasting and Film departments in West Java, with two schools in Sukabumi, indicating substantial untapped potential. Digitalization opens opportunities for developing more integrated and effective marketing strategies. Based on observations at two vocational high schools in Sukabumi and interviews with seven key informants, it was revealed that vocational high school graduates require 3-6 months of retraining to adapt to digital workflows, while the industry has already implemented integrated digital production systems that are not yet accommodated in the current vocational curriculum (Perdibrofi,2024).

This gap requires a systematic approach to building bridges between vocational high school graduates' competencies and current creative industry needs. Digital transformation in film vocational education requires integrating cutting-edge technology and cross-sector collaboration to create a learning ecosystem responsive to industry dynamics. Digital platforms can facilitate broader distribution and efficient commercialization processes (Wróbel et al., 2020). Implementing the Penta helix model, which involves collaboration between government, academia, business, community, and

media, offers a systematic approach to building an ecosystem that supports the commercialization of creative works. (Wahjudewantia et al., 2021).

This paradigm shift in the film industry requires a more comprehensive and integrated approach to optimize the potential of vocational high school students works (van de Kamp et al., 2022). Previous research indicates that an appropriate digital distribution platform can enhance film works' visibility and commercial value, particularly for emerging filmmakers (Iswahyuningtyas & Hidayat, 2021). Meanwhile, a study by Sudiana emphasizes the importance of building a sustainable digital ecosystem through multi-stakeholder collaboration to support local creative industry growth (Sudiana et al., 2020). The Penta helix model is a potential solution for integrating various stakeholders to create a compelling and sustainable distribution platform for vocational high school students' films.

Digital transformation in the film industry has altered content consumption and distribution patterns. Based on literature studies, there has been a shift in preferences toward streaming platforms, particularly in the post-pandemic era (Gupta & Singharia, 2021). Independent film marketing strategies in Indonesia remain limited to festivals and social media, indicating the need for a more structured distribution platform (Permana & Pupitasari, 2019). This condition demands innovation in developing distribution platforms that focus on technological aspects and involve various stakeholders within the educational film ecosystem (Khusnaeni, 2024). Sudiana emphasizes that the success of digital platforms in supporting creative content distribution heavily depends on the synergy between various actors within the pentahelix model, particularly in developing young talent in filmmaking (Sudiana et al., 2020). Based on these conditions, this research focuses on integrating the roles and contributions of pentahelix actors in creating an ecosystem that supports the commercialization of vocational high school students' films. Furthermore, this research will identify and analyze key factors determining the successful integration of the Penta helix model in developing digital platforms to commercialize student films.

Implementing the Penta helix model in developing digital platforms requires a comprehensive understanding of the roles and contributions of each actor. Kelvin asserts that the success of the pentahelix model depends on the clarity of functions and responsibilities of all stakeholders within the digital ecosystem (Kelvin et al., 2022). In line with this, previous researchers have emphasized the importance of establishing a structured and systematic framework to integrate various elements of the pentahelix model, aiming to optimize the potential for distribution and commercialization of film works. Effective collaboration among government, academia, businesses, communities, and media is key to creating a digital platform that serves as a distribution channel and acts as a catalyst for the growth of the creative industry based on vocational education (Sukarno et al., 2020).

Given this complexity, this study aims to comprehensively analyse the implementation of the Penta helix model in digital platform development, with a specific focus on identifying interaction patterns and contributions among stakeholders within the vocational education creative ecosystem. A review of previous studies conducted by Cozzolino highlights that developing an effective digital distribution platform requires a deep understanding of the roles and responsibilities of each actor within the ecosystem (Cozzolino et al., 2021). In line with the rapid digital transformation, Senthil emphasises the urgency of creating a collaborative model that facilitates the distribution and sustainable monetisation of creative works. This becomes increasingly critical given the importance of developing digital infrastructure to support the growth of the creative industry based on education, particularly in the context of film productions by vocational high school students (Senthil, 2018).

It is essential to review prior research conducted in this field to develop a more comprehensive understanding of the implementation of the Penta helix model in the context of vocational education. Kosterich, in his study, revealed that digital transformation has fundamentally reshaped how the creative industry operates, particularly in content distribution and monetization (Kosterich & Napoli, 2016). Meanwhile, Sutherland argues that the success of digital platforms in the creative industry

heavily depends on their ability to integrate stakeholders' diverse interests and needs (Sutherland & Jarrahi, 2018). These researchers' perspectives emphasize that the successful integration of digital elements and collaboration among various societal elements are key factors that must be considered in developing the Penta helix model for the vocational education sector. Thus, this provides an important foundation for understanding how the Penta helix model can be optimized in developing a digital platform for vocational high school students' films while identifying areas that still require further exploration.

The above literature review underscores the importance of digital integration and multi-stakeholder collaboration in the Penta helix model; however, the specific application of these principles in developing a digital platform for vocational high school students' films requires further elaboration. Based on the synthesis of these studies, this research presents a new perspective by integrating the Penta helix model into the development of a digital platform designed explicitly for vocational high school students' films, an area that remains largely unexplored in the literature on commercializing vocational education works in the digital era. This research is distinctive in its effort to combine three main aspects: vocational education, creative industry, and digital technology to produce an innovative and sustainable platform. The research findings are expected to contribute to developing an ecosystem that fosters vocational students' creativity and strengthens the synergy between education and the creative industry.

Method

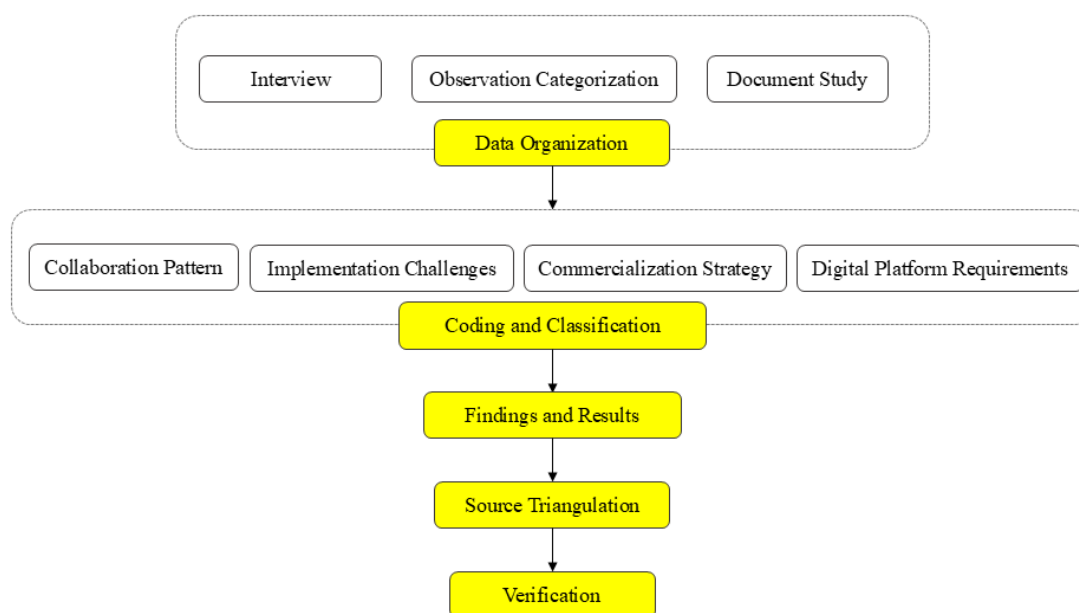


Figure 1: Stages of Data Analysis

Source: Processed by the Research Team, 2024

Result and Discussion

Analyzing film production potential among vocational high school students in Sukabumi reveals interesting dynamics in creative work development at the vocational secondary education level. The study of two vocational high schools with Broadcasting and Film departments demonstrates the implementation of structured efforts in promoting students' production capacity and creative expression in filmmaking. Based on observations and in-depth interviews with key stakeholders at both schools, several important findings were identified regarding production capacity and characteristics of

student-produced films. The data obtained from these two schools provides a comprehensive picture of the potential for film industry development at the vocational secondary education level in Sukabumi.

According to an interview with Hari Setiawan S.Sn., M.Pd (Head of Broadcasting Study Program at SMK N 1 Sukabumi), throughout 2023-2024, Broadcasting students have produced 12 short films across various genres. "Each year, we consistently encourage students to produce a minimum of 4-6 films, both fiction and documentary," he explained. This statement is corroborated by Agus Permana (Productive Subject Teacher at SMK Pasim Plus), who recorded the production of 6 films during the same period. Based on observations of student portfolios at both schools, it was identified that student films are predominantly in genres such as drama (fiction) and documentary.

These findings indicate significant production potential from both vocational high schools in Sukabumi, with 12 films produced within one year. The production consistency of 4-6 films annually at each school demonstrates a structured system of creative work development within the learning curriculum. The predominance of Drama (fiction films) and documentary genres reflects vocational students' tendency to address themes closely related to social and educational realities. This pattern of production and genre selection indicates that vocational students' films function as learning projects and have potential as a medium for conveying moral and social messages relevant to local contexts. This becomes crucial capital in developing a digital platform that focuses on commercialisation aspects and the educational and social values embedded in student films.

Despite the significant potential of student film production at vocational high schools, field data reveals a gap between production capabilities and existing distribution systems. The research identifies that limited access to professional distribution networks constitutes a significant constraint for the broader distribution of student films to wider audiences. These limitations not only affect viewer reach but also impact the potential development of the creative economy in the education sector. Observation of film distribution patterns among vocational students in Sukabumi reveals significant distribution and reach constraints. Rahmat Sukandar, Head of the Department of Communication and Information in Sukabumi, stated in his interview that most vocational student films still have limited distribution, with only a tiny portion successfully entering broader distribution platforms. In response to these conditions, his department plans to collaborate with local cinemas to expand distribution access, enabling Sukabumi's vocational student films to reach a wider audience (Syahidan, 2024).

Analysis of film distribution patterns among vocational high school students in Sukabumi reveals a significant gap between production volume and distribution effectiveness. Of the 12 films produced during the 2023-2024, only one film successfully achieved distribution beyond the school environment through local cinema screening. This figure indicates that only approximately 8.3% of total student films have penetrated broader distribution channels, suggesting the need for more effective distribution strategies to enhance the reach and accessibility of student films. Consequently, this condition further emphasizes the importance of building strategic collaborations with various stakeholders, mainly cinemas and digital platforms, to open more distribution channels for vocational students' films.

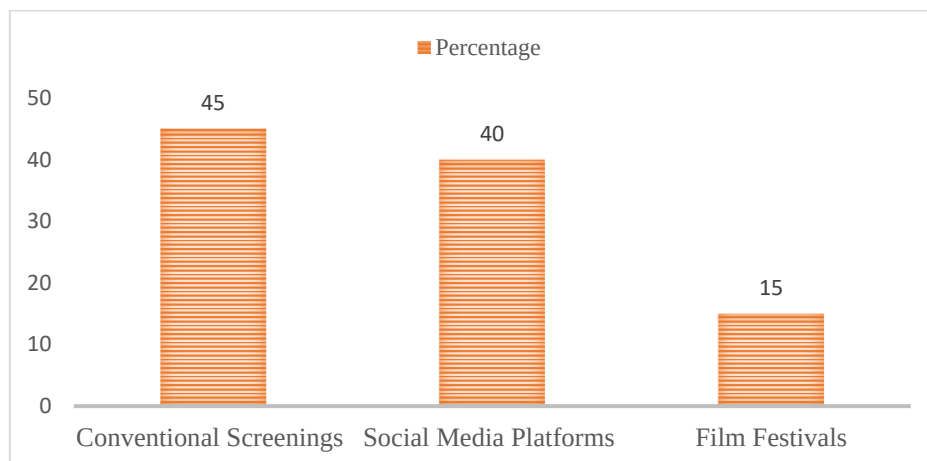
Further analysis of film distribution patterns among vocational high school students reveals a high dependence on conventional distribution channels. Of the 11 films that have not reached local cinemas, their distribution still relies on three leading platforms: conventional film screenings with communities dominating at 45%, social media platforms such as YouTube and Instagram at 40%, and film festivals at 15%. Although conventional film screenings remain the dominant platform, their reach is limited to community and school. Meanwhile, the significant presence on social media has not been matched with optimal promotion and engagement strategies to attract a broader audience. This distribution data can be visualized in the following table and graph:

Table 1: Distribution of Vocational High School Film Productions in Sukabumi

No	Distribution Platform	Number of Films	Percentage (%)
1	Conventional Screenings with Communities	5	45%
2	Social Media Platforms (YouTube, Instagram)	4	40%
3	Film Festivals	2	15%

Based on the analyzed distribution data of films created by vocational high school students, conventional film screenings through community platforms emerged as the most dominant distribution method, accounting for 45% or five films out of the total 11 films studied. Social media platforms, particularly YouTube and Instagram, ranked second with a contribution of 40% or four films, indicating the utilization of digital platforms in the distribution process. Film festivals represented the platform with the lowest percentage at 15% or two films, suggesting limited penetration of vocational high school students' films into the festival circuit. This percentage distribution shows that the distribution pattern of films produced by vocational high school students still relies predominantly on conventional methods. However, the use of digital platforms has begun to play a significant role in the distribution process.

Figure 2. Film Distribution Percentage Based on Platform



Implementing the Penta helix model in the production and distribution ecosystem of vocational high school students' films in Sukabumi demonstrates varied results, particularly evident from the film distribution patterns dominated by three major platforms. The compiled data indicates that conventional film screenings remain the most significant platform with a proportion of 45%, followed by social media platforms (YouTube and Instagram) at 40%, and film festivals at 15%. Analysis of the roles and contributions of each actor reveals significant variations in involvement, where the government maintains a strategic role. From the perspective of regional leadership, the Mayor of Sukabumi, Ayep Zaki, S.E., M.M., emphasizes that the limitations in natural resources and large industries in Sukabumi City create opportunities to maximize the potential of creative industries as drivers of the regional economy. As a concrete step in implementing this vision, the local government

has initiated strategic collaboration programs in the film sector that connect national artists with the local creative ecosystem, particularly in efforts to develop and enhance the quality of films produced by vocational high school students.

Analysis of the penta helix model implementation reveals diverse dynamics of stakeholder involvement. The local government plays a significant role through various strategic policies and development programs, as reflected in the Department of Communication and Information's initiatives in facilitating the creative ecosystem. This aligns with the regional leadership vision articulated by the Mayor of Sukabumi to maximize the potential of creative industries as economic drivers. The business sector, involving film industry players and digital platforms, contributes through the development of monetization channels and market expansion, as revealed in interviews with local film industry practitioners. Meanwhile, based on observations, local film communities play an active role in distributing and promoting works, reinforced by conventional film screening activities that account for nearly half of the total work distribution. Although not yet optimal, the role of media support through publication and audience reach expansion is reflected in the utilization of social media platforms to distribute student films.

Integrating pentahelix elements represents a key factor in developing a sustainable ecosystem. This statement is reinforced by the initiative to establish PT Ruang Film Sukabumi as a strategic collaboration platform among stakeholders in developing the film industry in Sukabumi. Nevertheless, Agus Permana, as a vocational teacher and founder of Sukabumi Film, explains that collaborative effectiveness still needs improvement, as among the total distributed films, only a tiny portion received comprehensive support from all five Penta helix elements. The presence of PT Ruang Film Sukabumi is expected to bridge the coordination gaps between stakeholders that have been a constraint thus far. In response to these challenges, this research proposes a digital platform design that vocational high school students can implement; this platform is designed to strengthen synergy and collaboration within Sukabumi's film industry ecosystem, particularly in the development and distribution of vocational high school students' films. The platform is designed to strengthen synergy and collaboration within Sukabumi's film industry ecosystem, specifically in developing and distributing vocational high school students' films.

Based on the analysis of coordination gaps in film development in Sukabumi, this research proposes developing an integrated Penta helix model through a digital platform. Regular coordination forums between vocational high school students and stakeholders will be facilitated through virtual meeting features and focused discussions to optimize collaboration in film production. An integrated film project management system will enable real-time monitoring of vocational students' film production progress, from pre-production to distribution. Industry mentorship programs and joint evaluation monitoring systems will ensure film output quality meets industry standards through structured feedback mechanisms from film professionals.

Implementing the Penta helix model in the vocational high school film ecosystem in Sukabumi is conducted through three strategic phases designed based on stakeholder needs analysis. The initiation phase focuses on establishing the basic structure of a digital platform that integrates multi-channel distribution systems to expand film reach, transparent monetization systems to ensure revenue fairness, performance analytics to measure impact, and stakeholder feedback mechanisms for continuous improvement. In the consolidation phase, strengthening collaboration among stakeholders will be facilitated through an integrated project management system that enables real-time monitoring of film production processes from pre-production to distribution, supported by mentorship programs from industry practitioners to ensure work quality meets standards. Subsequently, the optimization phase will develop periodic evaluation mechanisms to ensure improved film distribution effectiveness, expanded reach beyond conventional platforms, and strengthened collaboration levels among Penta helix elements as indicators of successful model implementation.

Referring to the Penta helix model's initiation phase, the digital platform design for distributing vocational high school students' films is developed considering four main components. The first component is a structured monetization system that serves as the foundation for transparency in managing revenue from film distribution. This system is designed based on principles of fairness with a revenue-sharing mechanism involving students as creators, schools as facilitators, and the platform as a distributor. This aligns with the collaborative vision of Penta helix, as expressed by the Head of Broadcasting Study Program at SMK N 1 Sukabumi, indicating that monetization system transparency is key in building trust between creators and platforms as the basis for ecosystem sustainability.

The second component of the digital platform is developing an integrated distribution network that aligns with the multi-channel system in the Penta helix model's initiation phase. This network is designed to systematically connect various distribution channels, encompassing streaming platforms, mini cinemas, and film festivals, which have historically posed challenges in student work distribution. Observational findings indicate that this integrated approach has the potential to significantly expand the reach of student films compared to the currently dominant conventional distribution methods. To support this system, the platform has a comprehensive database connecting film festival organizers, independent cinema networks, and verified streaming platforms to strengthen stakeholder collaboration.

The third component of the digital platform is the development of content performance analytics features that integrate analytics systems and stakeholder feedback as part of the Penta helix model's initiation phase. This system is designed to provide comprehensive real-time data, including viewer counts, watch duration, audience demographics, and viewer feedback, supporting periodic evaluation processes in the optimization phase. The Head of the Sukabumi Film Community emphasizes that analytics data is crucial in helping students and teachers understand viewer preferences and optimize distribution strategies, aligning with the integrated monitoring system implemented in the consolidation phase. This data-driven approach is supported by Ananda and Nama's (2024) research, which emphasizes the importance of data-driven decision-making in improving digital content distribution effectiveness.

The fourth component of the digital platform focuses on strengthening multi-stakeholder collaboration systems that align with the consolidation phase in the Penta helix model. This system facilitates integrated interaction among all Penta helix elements, from students and teachers as creators and industry practitioners as mentors to film communities and other stakeholders as distribution partners. Its implementation is realized by developing focused discussion forums, structured online mentoring systems, and film production collaboration marketplaces that support real-time monitoring processes. This collaborative approach strengthens industry mentorship programs in the consolidation phase while building the foundation for periodic evaluation in the optimization phase to ensure distribution effectiveness and sustainability of the vocational student film ecosystem.

The development of the digital platform is reinforced with integrated security and quality control systems as a foundation for implementing the Penta helix model. In supporting the initiation phase, the platform is equipped with content verification systems, copyright protection, and dispute resolution mechanisms to ensure transparency and fairness in work distribution. The Head of Sukabumi's Communication and Information Office emphasizes the importance of legal aspects and work protection in platform development, which becomes an integral part of the joint evaluation monitoring system. Aligned with the three strategic phases of the Penta helix model, platform implementation will begin with pilot projects at two vocational high schools in Sukabumi that have established track records in film production before expanding to the provincial level. The periodic evaluation process, part of the optimization phase, will measure platform effectiveness in strengthening collaboration among stakeholders, increasing distribution reach, and developing the commercialization potential of student films as a basis for sustainable development.

Based on the analysis and research findings above, the researcher presents a conceptual framework in a 'Digital Ecosystem for Vocational High School Film Students' model that represents system integration in distributing and developing vocational high school students' films. This model consists of three main components that are systematically interconnected. First, Core Components encompass four integrated systems: monetization for revenue management, distribution for work dissemination, analytics for performance measurement, and collaboration for inter-sector interaction. Second, Implementation Phases depict development stages from initiation as the initial foundation, consolidation for system strengthening, and optimization for sustainability. Third, Pentahelix Integration shows the involvement of five key elements: government as a regulator, business as an industry partner, academia representing educational institutions, community as ecosystem supporter, and media as distribution channels. This model is designed to facilitate the development of a sustainable digital ecosystem that supports the distribution and commercialization of vocational high school students' films.

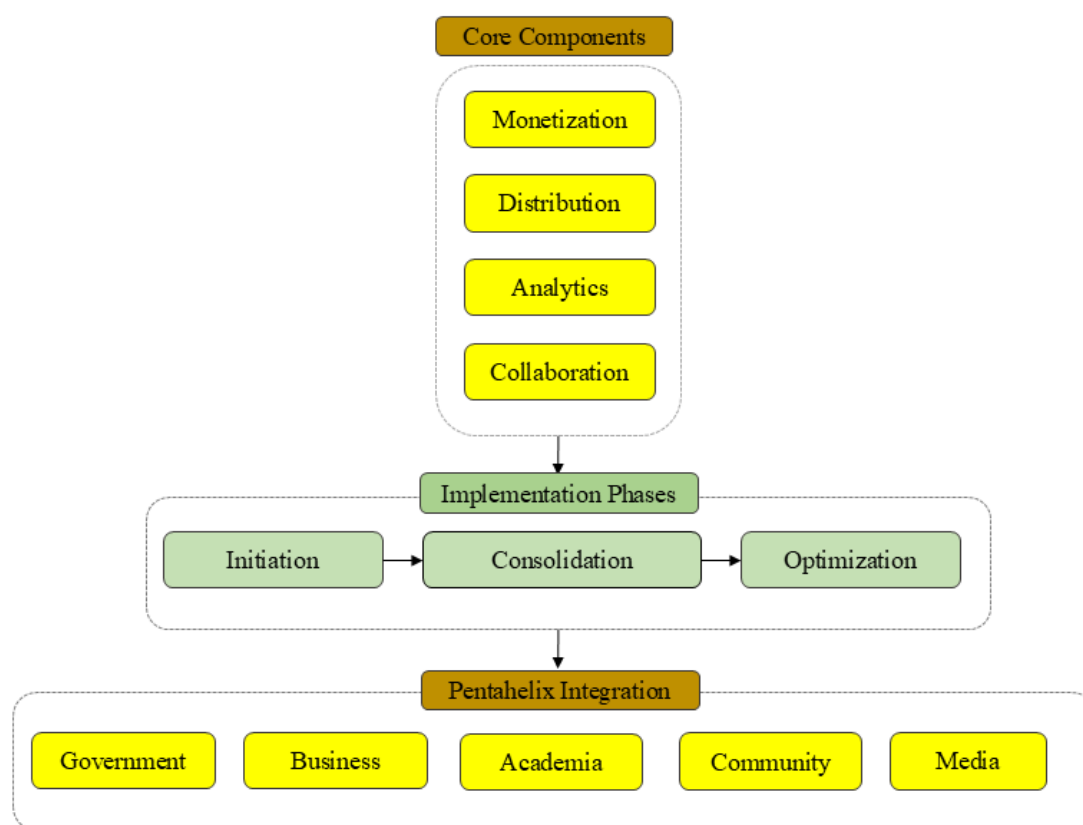


Figure 3: Digital Ecosystem Model for Vocational High School Film Students

Source: Research Team Analysis, 2024

Based on the model elaboration above, it can be concluded that the Digital Ecosystem for Vocational High School Film Students conceptual framework offers a comprehensive solution in integrating various components and stakeholders to support the development of vocational high school students' films. This model comprehensively integrates technical aspects of distribution and monetization while strengthening the system through systematic implementation phases involving active collaboration from various sectors within the Penta helix approach. Through structured integration between Core Components, Implementation Phases, and Pentahelix Integration, this model has the potential to create a sustainable ecosystem that supports the creativity and productivity of vocational high school students in the film sector. This conceptual framework also provides a strong

foundation for developing a digital platform that can facilitate the distribution, collaboration, and monetization of vocational high school students' films effectively and efficiently. Thus, this model is expected to serve as a reference in developing a digital ecosystem that supports film industry growth at the vocational education level.

Acknowledgment

The authors thank SMK N 1 Sukabumi and SMK Pasim Plus for their cooperation and support during this research. They also thank the Department of Communication and Information of Sukabumi City, PT Ruang Film Sukabumi, and the Sukabumi Film Community for their valuable insights and collaboration. We also appreciate the constructive feedback from the expert reviewers, who helped enhance the quality of this research. The Research and Community Service Institute of Telkom University supported this work.

Conclusion

Based on the analysis and discussion, this research yields several significant conclusions regarding developing a digital ecosystem for vocational high school students' films based on the Penta helix model. The developed model consists of three main integrated components: Core Components for operational systems, Implementation Phases for development stages, and Pentahelix Integration for cross-sector collaboration. This model structure offers a systematic approach to building a digital platform that supports distributing and commercializing vocational high school students' films. This demonstrates that implementing the Penta helix model can foster student creativity while enhancing local creative industry competitiveness through optimal utilization of digital technology.

Implementing the Penta helix model reveals diverse stakeholder involvement dynamics, where local government plays a significant role through strategic policies, the business sector contributes to monetization channel development, film communities are active in distribution and promotion, and media supports audience reach expansion. The existence of PT Ruang Film Sukabumi as a strategic collaboration platform catalyzes strengthening synergy among stakeholders. However, collaborative effectiveness still needs improvement, considering the limited number of films receiving comprehensive support from all five Penta helix elements. This indicates that the successful implementation of this model heavily depends on communication consistency, mutual commitment, and sustained support from all Penta helix elements to ensure the ecosystem can develop inclusively and sustainably.

The planned digital platform will be designed to integrate four main components: a transparent monetization system, a coordinated distribution network, analytics features for performance monitoring, and effective cross-sector collaboration mechanisms. Platform implementation through three strategic phases (initiation, consolidation, and optimization) provides a structured framework for developing a sustainable digital ecosystem to support vocational high school students' films. This integration and implementation opens opportunities for further research in developing impact evaluation models of the platform on improving the quality and distribution reach of student films. Additionally, the established framework enables comparative studies to analyze the effectiveness of model implementation across regions with different creative industry characteristics..

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