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# Development of a Course and Training Information System Integrating SCM and DSS for Non-Formal Education Providers

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**Abstract:** Non-formal education providers, particularly course and training institutions, face major challenges in adapting to digital technology. To date, data management and public information dissemination have often been partial, manual, or reliant on limited platforms. The urgency is amplified by weak public information management by both providers and government. Existing systems remain fragmented and largely confined to administrative operations, lacking supply-chain integration and strategic decision support. This study aims to: produce a design of a course and training information system named sikapin.id that integrates Supply Chain Management (SCM) and a Decision Support System (DSS); analyze the system's feasibility; and analyze its practicality for users. The study used a Research and Development (R&D) approach, adapting the Borg & Gall model. Participants included administrators of Course and Training Institutions (LKP), Job Training Institutions (LPK), and prospective trainees in Semarang City, Indonesia. A limited-scale trial involved 30 respondents. Data were analyzed using descriptive statistics. The findings show that: (1) sikapin.id was successfully developed with an architecture that supports operational, tactical (DSS), and strategic (SCM) levels; (2) the system was rated "Highly Feasible" by design experts (87.5%), media experts (87.5%), and practitioners (94.1%); and (3) the system demonstrated high practicality for prospective trainees (mean = 3.44) and was "very practical" for providers (mean = 3.64). The novelty of this study is the integrated synergy of SCM and DSS within the non-formal education ecosystem, shifting the information system paradigm from passive administrative record-keeping to an interactive knowledge-management system that systematically connects market demand with training supply.

**Keywords**: Decision Support System; Non-Formal Education; Information System; sikapin.id; Supply Chain Management.

## 1. Introduction

Non-Formal Education (NFE) providers such as Course and Training Institutions (LKP) and Job Training Institutions (LPK) play a crucial role in producing job-ready human resources (Pamungkas et al., 2018; Blaak et al., 2013; Mayombe & Lombard, 2015). In the modern era, digital technology integration is no longer optional; it is a fundamental requirement to ensure accessibility and operational sustainability (Rahman & Hossain, 2025; Huda, 2024). Semarang City, one of Central Java's education and employment development hubs, hosts a significant number of LKP and LPK. However, most NFE providers remain at a basic level of ICT adoption. Many rely primarily on conventional social media for promotion, which provides limited capabilities for structured participant data management and strategic analytics.

A review of existing systems, such as portals managed by the Ministry of Education and the local manpower office, reveals operational gaps (Noor, 2019). Government information systems are generally closed or limited to administrative operations (Office Automation Systems) (Cahill et al., 1990; Liu et al., 2016). These portals offer minimal comprehensive information for the public and often contain only institutional identity data. In contrast, the public needs interactive data access to select courses, compare fees, and evaluate outputs (Chaturapruek et al., 2021). In the Semarang region, there is no third-party digital ecosystem (startups or platforms) in the training sector that functions like retail e-commerce in systematically connecting prospective trainees (demand) with training providers (supply).

Addressing this gap, the novelty of this research is the design and development of sikapin.id, a prototype integrated management information system that elevates NFE information systems from mere operational automation to the tactical level through a Decision Support System (DSS) and to the strategic level through Supply Chain Management (SCM). An educational supply chain approach is adopted to ensure uninterrupted information flow from upstream (providers) to downstream (trainees and industry) (Sahadevudu, 2024; Ashraf et al., 2025). DSS capabilities are embedded so institutions can monitor applicant interest trends (traffic analysis) to formulate policies, open new training programs, or develop evidence-based marketing strategies (Wahid et al., 2022; Ernawati & Wening, 2022; Li et al., 2025).

This study aims to design and develop an SCM- and DSS-based course and training information system (sikapin.id) for NFE, measure feasibility based on expert and practitioner evaluations, and analyze system practicality (perceived ease of use and perceived usefulness) for LKP/LPK managers and prospective trainees.

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## 2. Method

### 1) Research Design

This study employed a Research and Development (R&D) approach by adapting the procedural model of Borg and Gall (Gall et al., 2003). This method was chosen because it is product-oriented and emphasizes the creation of a validated technology product tested for field feasibility. Given the breadth of the original Borg and Gall model (10 stages), this article focuses and limits the reported work to the limited-scale practicality trial stage. This limitation ensures that the integrated management information system prototype is sufficiently mature, expert-validated, and practical for end users before proceeding to large-scale effectiveness testing.

Overall, the R&D stages in this study were reduced into four comprehensive phases (Gall et al., 2006): (1) Preliminary Study and Needs Analysis; (2) Product Design and Development (System Design); (3) Expert Validation and Revision; and (4) Limited Trial (Practicality Testing).

### 2) Participants / Subjects

The population and sample were focused in Semarang City. Participants represented key stakeholders in the NFE ecosystem, including LPK/LKP managers and prospective trainees.

a) Expert validation involved one design expert, one media expert from educational technology academia, and one practitioner from a non-formal education provider.
b) Practicality testing involved approximately 30 respondents.

### 3) Data Collection

Data were collected using structured questionnaires (closed-ended) employing a Likert rating scale. The instrument was designed based on software evaluation principles and adapted from UTAUT (Unified Theory of Acceptance and Use of Technology) indicators (Andreas, 2012; Shachak et al., 2019; Nasir, 2013), covering functionality, perceived usefulness, perceived ease of use, and managerial effectiveness.

### 4) Data Analysis

Expert validation data and practicality testing results were analyzed using quantitative descriptive statistics (Chu & Chang, 2017). Questionnaire scores were converted into feasibility percentages and mean values. The resulting percentages were classified into the criteria of “Highly Feasible”, “Feasible”, “Very Practical”, or “Practical” to draw conclusions regarding the feasibility and operational practicality of sikapin.id.

## 3. Results and Discussion

### 1) Results

#### a) Course and Training Information System Design (sikapin.id)

The Course and Training Information System (sikapin.id) was designed as an integrated platform for managing the delivery of non-formal education in Indonesia. By combining Supply Chain Management (SCM) and a Decision Support System (DSS), the system aims to improve process efficiency, optimize resource management, and expand public access to course information. Development was preceded by comprehensive needs analysis, including stakeholder mapping, business process evaluation, and Key Performance Indicator (KPI) determination before implementation and testing.

Structurally, system implementation is divided into four interconnected levels that supply data from operational to strategic use:

a. Operational Level: Office Automation System (OAS)

At this basic level, the system supports daily task automation for three main user groups. Web administrators operate the back-end to manage institutional data and automate news publishing. LKP/LPK providers use an institutional dashboard for self-service legality registration and program publication. Prospective trainees access the front-end to search information using filters and manage communication and notifications through personal accounts.

b. Managerial Level: Management Information System (MIS)

Daily transactional data from the operational level are fed to MIS as aggregated reports essential for management, including statistics on active providers, demographic analytics of prospective trainees, user interaction logs with content, and information navigation structure management. This ensures synchronized, monitorable data for central administrators.

c. Tactical Level: Decision Support System (DSS)

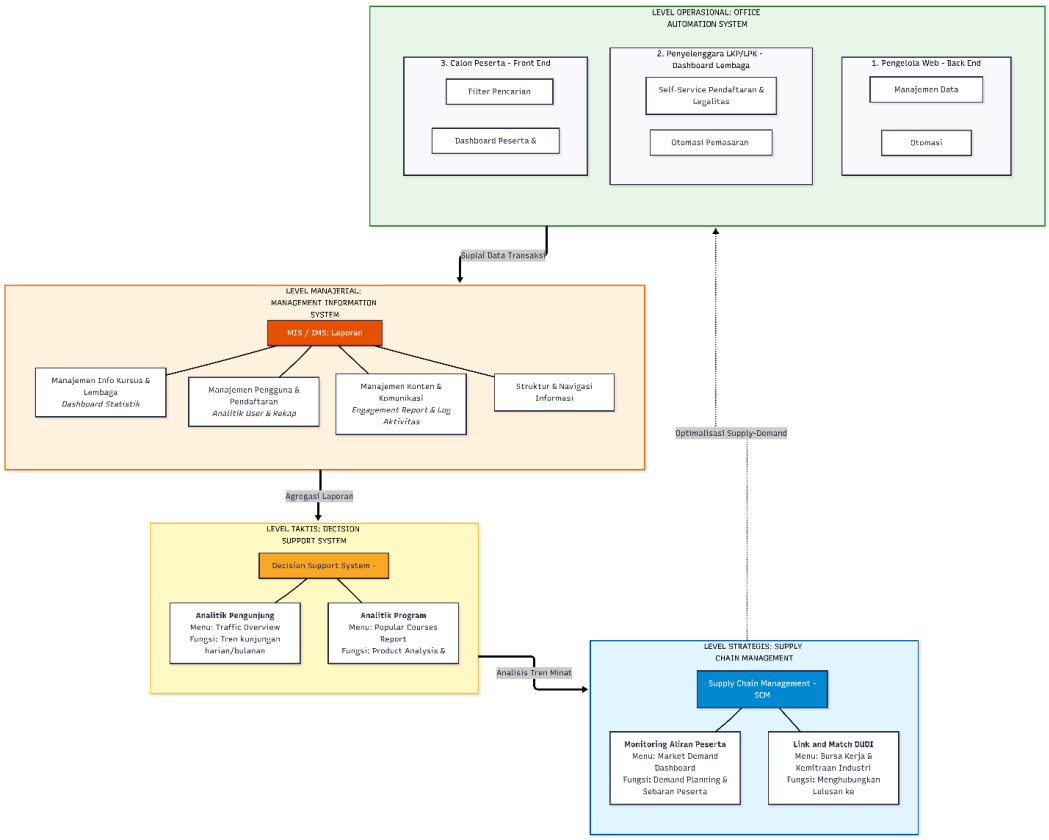
Aggregated MIS reports are forwarded to the tactical level for decision support. The DSS focuses on two primary analytics: (a) Visitor Analytics (Traffic Overview) to monitor daily-to-monthly visit trends and understand audiences; and (b) Program Analytics (Popular Courses Report) to evaluate market interest in course types based on interaction counts. Historical data enable forecasting of future education program demand.

d. Strategic Level: Supply Chain Management (SCM)

Using interest-trend analysis from the tactical level, information flow culminates at the strategic level integrating SCM. This level focuses on demand planning by monitoring participant origins and their distribution across providers to balance supply and demand (preventing concentration in a single provider). Further, the system serves as a strategic link-and-match connector between training graduates and the business/industry sector (DUDI), creating a sustainable value chain from learning to real labor market absorption.

Developing sikapin.id required careful integration from database design to end-user training. The synergy among OAS operations, MIS reporting, DSS predictive analytics, and SCM strategic integration is expected to enable NFE governance that is more effective, measurable, and adaptive to Indonesia’s industrial needs.

**Figure 1.** System Design of the Course and Training Information System (sikapin.id)




### b) System Feasibility

The developed system was then evaluated through validation using a closed-ended instrument combined with open-ended feedback to obtain suggestions. The validation instrument covered design/display and media/content aspects within the system. Both design and media validations used a rating scale based on evaluated indicators. Validation involved three validators: a design expert, a media/content expert, and a practitioner. Their assessments determined whether the system was feasible for trial use.

**Table 1. Design Expert Validation Results**

| No. | Component/Indicator | Score | Qualification |
|---|---|---|---|
| 1 | Initial interface of sikapin.id | 4 | Highly Feasible |
| 2 | Information presentation interface | 3 | Feasible |
| 3 | Menu (icon) interface | 3 | Feasible |
| 4 | Content display | 3 | Feasible |
| 5 | Color suitability | 4 | Highly Feasible |
| 6 | Color collaboration | 4 | Highly Feasible |
| 7 | Text color | 3 | Feasible |
| 8 | Base/background color | 3 | Feasible |
| 9 | Font size used | 4 | Highly Feasible |
| 10 | Image clarity | 4 | Highly Feasible |
| 11 | Font type used | 4 | Highly Feasible |
| 12 | Font size used (consistency) | 4 | Highly Feasible |
| 13 | Text clarity | 4 | Highly Feasible |
| 14 | Menu size | 3 | Feasible |
| 15 | Naming/labels in the system | 3 | Feasible |
| 16 | System arrangement/order | 3 | Feasible |

Total score: 56; Percentage: 87.5%.

Based on the design expert validation results, the feasibility percentage was 87.5%. Using a 4-point conversion scale, this falls under the "Highly Feasible" category with a note that minor revisions are needed. Therefore, the system is feasible for limited trials with improvements.

**Table 2. Media Expert Validation Results**

| No. | Indicator/Component | Score | Qualification |
|---|---|---|---|
| 1 | Initial interface of sikapin.id | 3 | Feasible |
| 2 | Information presentation interface | 4 | Highly Feasible |
| 3 | Menu (icon) interface | 4 | Highly Feasible |
| 4 | Content display | 3 | Feasible |
| 5 | System flexibility | 4 | Highly Feasible |
| 6 | Color collaboration | 3 | Feasible |
| 7 | Effectiveness & efficiency | 3 | Feasible |
| 8 | Ease of running the system | 4 | Highly Feasible |
| 9 | Loading speed | 4 | Highly Feasible |
| 10 | Practicality | 4 | Highly Feasible |
| 11 | Language clarity | 3 | Feasible |
| 12 | Language appropriateness | 3 | Feasible |
| 13 | Attractiveness | 3 | Feasible |
| 14 | Image clarity | 4 | Highly Feasible |

Total score: 49; Percentage: 87.5%.

Based on the media expert validation results, the feasibility percentage was 87.5%. Using a 4-point conversion scale, this falls under the "Highly Feasible" category with no major revision required. Therefore, the system is feasible for trials.

**Table 3. Practitioner Validation Results**

| No. | Indicator/Component | Score | Qualification |
|---|---|---|---|
| 1 | User-friendly for course/training providers | 4 | Highly Feasible |
| 2 | Interface attractiveness | 4 | Highly Feasible |
| 3 | Menu suitability to course/training information needs | 3 | Feasible |
| 4 | Menu layout/order | 4 | Highly Feasible |
| 5 | Logo selection | 4 | Highly Feasible |
| 6 | Content suitability to each institution's website | 4 | Highly Feasible |
| 7 | Image quality in sikapin.id content | 4 | Highly Feasible |
| 8 | Language used in sikapin.id | 4 | Highly Feasible |
| 9 | Content neatness | 3 | Feasible |
| 10 | Loading speed | 4 | Highly Feasible |
| 11 | Ease of running on smartphones | 3 | Feasible |
| 12 | Practicality | 4 | Highly Feasible |
| 13 | Ease of understanding presented information | 4 | Highly Feasible |
| 14 | Usefulness for obtaining course/training information | 4 | Highly Feasible |
| 15 | Ease of obtaining course/training information | 4 | Highly Feasible |
| 16 | Effectiveness and efficiency | 4 | Highly Feasible |
| 17 | Information mobility regarding course/training delivery | 3 | Feasible |

Total score: 64; Percentage: 94.1%.

Based on practitioner validation, the feasibility percentage was 94.1%, categorized as "Highly Feasible" with no major revision required. Therefore, the system is feasible for trials.

**c) User Practicality (Prospective Trainees and Providers)**

After feasibility validation, the next step was practicality testing, which is essential to ensure that a product, model, or system can be used effectively in real-world settings. Practicality is assessed not by technological sophistication, but by how easily sikapin.id can be implemented, operated, and deliver tangible benefits to users.

**Table 4. Practicality Test Results (Prospective Trainees)**

| No. | Assessment Aspect | Mean Score | Total Score | Category |
|---|---|---|---|---|
| 1 | Perceived Usefulness | 3.60 | 18.00 | Very Practical |
| 2 | Perceived Ease of Use | 3.32 | 16.60 | Practical |
| 3 | Attitude Toward Using | 3.47 | 17.33 | Practical |
| 4 | Behavioral Intention to Use | 3.28 | 16.40 | Practical |
| 5 | Perceived Complexity Using | 3.53 | 17.67 | Practical |

Overall mean: 3.4 (Practical).

Overall, prospective trainees rated sikapin.id as practical with a mean score of 3.4. Perceived usefulness was the highest-rated aspect (3.60, very practical), indicating that trainees consider sikapin.id highly useful for obtaining effective and fast course and training information. Other aspects such as ease of use, attitude toward using, behavioral intention, and perceived complexity were also rated practical (means ranging from 3.28 to 3.53), suggesting the system is easy to operate, not complicated, and motivates continued use.

**Table 5. Practicality Test Results (Providers)**

| No. | Assessment Aspect | Mean Score | Total Score | Category |
|---|---|---|---|---|
| 1 | Instructions | 3.8 | 19 | Very Practical |
| 2 | Perceived Usefulness | 4.0 | 20 | Very Practical |
| 3 | Perceived Ease of Use | 3.4 | 17 | Practical |
| 4 | Attitude Toward Using | 3.6 | 18 | Very Practical |
| 5 | Behavioral Intention to Use | 4.0 | 20 | Very Practical |
| 6 | Perceived Complexity Using | 3.4 | 17 | Practical |
| 7 | Language | 3.7 | 18.5 | Very Practical |

Overall mean: 3.6 (Very Practical).

Providers rated sikapin.id as very practical overall (mean = 3.6). The most prominent aspects were perceived usefulness and behavioral intention to use (both 4.0), indicating that providers find the system highly beneficial and intend to continue using it. Instructions, attitude toward using, and language were also rated very practical, while ease of use and perceived complexity were rated practical (3.4). Overall, sikapin.id is well accepted by providers, considered useful, understandable, and supportive of operations.

## 2) Discussion

The preliminary study indicates that Semarang's NFE ecosystem remains dominated by fragmented, manual, and closed information management, both at institutional and government portal levels, leading to information asymmetry and managerial inefficiency. This aligns with research on SCM-based information systems in non-formal education business, which concludes that information system management is crucial for ensuring educational outputs match needs, yet many providers lack sufficient awareness for adequate information system governance (Stamenkov & Zhaku-Hani, 2023; Ibrahim et al., 2025). Other work on digital supply chain operations for NFE management shows that integrating supplier components, the "manufacturer" (institution), product (graduates/courses), and customer feedback yields a model considered highly suitable for NFE contexts (Rahabav & Souisa, 2021). Accordingly, sikapin.id as a third-party platform connecting prospective trainees with LKP/LPK systematically can be positioned as a direct response to identified gaps and consistent with prior recommendations advocating SCM-based information systems for NFE.

The sikapin.id architecture mapping four levels (OAS, MIS, DSS, and SCM) reflects an effort to integrate the educational supply chain from upstream (institutional and program data) to downstream (graduate placement into industry) within a

continuous information flow. SCM studies in NFE emphasize that supply-chain-based systems enable providers and participants to access NFE services closer to their needs and location, and are relevant for reducing gaps between supply and demand (Teniwut & Hasyim, 2020). Digital supply chain operation models for NFE also highlight suppliers, processes, products, customers, and feedback as key elements, conceptually paralleling sikapin.id functions in managing provider data, programs, participant interactions, and user satisfaction (Salinas-Navarro et al., 2024; Mat Ishah et al., 2023). Thus, the novelty here is not merely applying SCM in NFE but explicitly integrating MIS, DSS, and SCM within a local course-system design (Semarang) that operates like an "education marketplace", a form relatively rarely explored empirically in international literature.

Validation by design experts, media experts, and practitioners yielded "Highly Feasible" results (87.5%, 87.5%, and 94.1%, respectively), indicating that interface, content, and usability meet functional and aesthetic standards for trials. Research on SCM information system implementation in NFE business found significant effectiveness of SCM-based systems as NFE information systems (Kisworo et al., 2022; O'Brien & Deans, 1996), reinforcing that an SCM-framed platform like sikapin.id has strong theoretical and empirical grounding (Lau, 2007). The validation results also support that the proposed SCM–DSS integration is not only conceptual but positively received by key users, consistent with international trends in education supply chain digitalization.

From the user perspective, practicality testing shows prospective trainees reported a mean of 3.4 (practical), with perceived usefulness rated highest (3.60, very practical), while providers reported a mean of 3.6 (very practical) with perfect 4.0 scores for perceived usefulness and behavioral intention to use. In UTAUT/UTAUT2 frameworks, perceived usefulness or performance expectancy is a main predictor of behavioral intention and actual system use across learning management and e-learning contexts (Alshehri et al., 2020; Abbad, 2021). Therefore, the strong usefulness scores and solid ease-of-use ratings in sikapin.id align with global patterns of technology acceptance in education. Moreover, studies on UTAUT2 for adopting edtech platforms in non-formal education suggest UTAUT constructs effectively explain intention to use educational platforms, supporting the suitability of UTAUT-based indicators used in sikapin.id questionnaires (Dewanda et al., 2025).

## 4. Conclusion

Based on the R&D process, it can be synthesized that the design of sikapin.id successfully integrates Supply Chain Management (SCM) and a Decision Support System (DSS) within a single, coherent platform ecosystem for the non-formal education sector. Empirically, the system was validated as "Highly Feasible" by experts and practitioners. In application, sikapin.id is categorized as practical, with user-perceived usefulness reaching very high scores. The system provides substantial administrative efficiency, reduces promotion costs, and shortens reporting time. LKP organizations gain competitiveness through improved digital exposure comparable with larger institutions. This research contributes to the literature on applying UTAUT frameworks in the specific context of informal/non-formal education and skills courses, indicating that performance expectancy operates strongly when administrative pain points are addressed. The system also supports the vision of public information transparency and is recommended for adoption by structural policy stakeholders (e.g., local manpower and education offices) to overcome data fragmentation and plan holistic regional employment strategies.

Limitations include the study locus being concentrated in Semarang City, so generalization to regions with lower ICT infrastructure requires caution. Technically, the product remains web-responsive and has not been incubated into a mobile-native application (APK/iOS) that may better fit Generation Z usage habits. In addition, this article limits evaluation to design feasibility and early user practicality, leaving opportunities for future research to incorporate Artificial Intelligence for personalized career pathway recommendations for NFE learners.

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