Inovasi Kurikulum

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University-business collaboration perspective in logistics management curriculum design

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ABSTRACT

The study explores the integration of industry-relevant competencies into logistics management education, emphasizing the alignment between professional demands and curriculum structure. The purpose of this study is to design a logistics management curriculum grounded in graduate competencies to prepare graduates to work and adapt in the future logistics industry. The study employed a quantitative approach within the Design and Development Research (DDR) phase three. The 3rd phase involved designing the curriculum after analyzing needs (the 1st phase) and selecting the competencies required of logistics management graduates (the 2nd phase). The curriculum was designed using 5 components: competencies, learning objectives, content, learning strategies, and evaluation. The curriculum template was adapted from the "Pedoman Pendidikan Tinggi" in Indonesia and aligned with the institution's guidance. The results show that two competencies, business logistics and interpersonal skills, both have higher values than logistics management competencies due to the abilities needed to adapt to the world of the future logistics industry, which is always challenging. The study is expected to inform logistics education by emphasizing business logistics and interpersonal skills, while strengthening regulation-based logistics management competencies.

ABSTRAK

Studi ini mengeksplorasi integrasi kompetensi yang relevan dengan industri ke dalam pendidikan manajemen logistik, menekankan keselarasan antara tuntutan profesional dan struktur kurikulum. Tujuan penelitian ini adalah untuk merancang kurikulum manajemen logistik berdasarkan kompetensi lulusan yang dibutuhkan agar mampu bekerja dan beradaptasi di masa depan, terutama dalam industri logistik. Studi ini menggunakan metode kuantitatif dengan fase ketiga Penelitian Desain dan Pengembangan (DDR) sebagai pendekatan. Fase ketiga adalah merancang kurikulum setelah menganalisis kebutuhan (fase pertama) dan memilih kompetensi yang dibutuhkan untuk lulusan manajemen logistik (fase kedua). Kurikulum dirancang menggunakan 5 komponen sebagai berikut: kompetensi, tujuan pembelajaran, isi materi, strategi pembelajaran, dan evaluasi. Template kurikulum menggunakan "Pedoman Pendidikan Tinggi" di Indonesia dan disesuaikan dengan pedoman institusi. Hasil penelitian menunjukkan bahwa dua kompetensi, yaitu logistik bisnis dan keterampilan interpersonal, keduanya memiliki nilai lebih tinggi dibandingkan kompetensi manajemen logistik karena kemampuan yang dibutuhkan untuk beradaptasi dengan dunia industri logistik masa depan yang selalu menantang. Diharapkan hasil penelitian ini dapat menghasilkan kurikulum bagi logisticians dengan lebih fokus pada kompetensi logistik bisnis dan keterampilan interpersonal (secara praktis dan teoretis) sambil meningkatkan kompetensi manajemen logistik (melalui regulasi).

Kata Kunci: *desain kurikulum; kolaborasi universitas dan bisnis; kompetensi; manajemen logistik; pendidikan tinggi*

INTRODUCTION

Logistics, as defined by the Council of Supply Chain Management Professionals (CSCMP), involves a range of services, including the flow of information and the distribution and transportation of raw materials to final destinations, transforming them into goods for trade and consumption (Mohamed & Huynh, 2023). Logistics serves as a crucial link between the supply base and the market, and its contribution to national competitiveness is reflected in indicators such as the Logistics Performance Index (LPI). Logistics operations function efficiently when skilled and well-trained personnel manage the distribution of finished goods and the processing of raw materials (Sergi et al., 2021; Fitri & Atho'illah, 2025). Logistics management aims to plan and coordinate all related activities to achieve the necessary level of delivery service and quality at the lowest possible cost. Logistics management helps meet customer expectations by planning the flow of goods and information from the market to suppliers through corporate operations. Logistics and logistics management are not synonymous, even though they are closely related. Logistics refers to the movement and storage of goods within a supply chain. In contrast, logistics management is a more comprehensive concept that encompasses procedures that integrate the movement of goods, services, information, and other resources. Logistics management encompasses the procurement, production, and delivery of products. However, supply chain management (SCM), which concerns the efficient management of products, encompasses both (Nagy-Bota & Moldovan, 2022).

According to the Ministry of Finance of the Republic of Indonesia website post (see at: https://anggaran. kemenkeu.go.id/in/post/indeks-kinerja-logistik-indonesia-2023:-kinerja-kepabeanan-meningkat,-infrastruktur-terjaga,-layanan-distribusi-masih-tersendat-), Indonesia's logistics performance continues to face significant challenges, as reflected in the World Bank's 2023 Logistics Performance Index (LPI). In the latest assessment, Indonesia scored 3.0. It ranked 61st, a decline from its 2018 position of 46th, indicating that national logistics competitiveness remains below that of regional peers such as Singapore, Malaysia, China, and Thailand. The LPI evaluates key dimensions, including customs efficiency, infrastructure quality, international shipments, logistics competence, tracking and tracing, and timeliness, making it an essential tool for measuring efficiency and sustainability within a country's logistics system. These performance gaps are further compounded by Indonesia's unique context as a vast archipelago, where the development of reliable and integrated logistics infrastructure is critical to ensuring regional connectivity and supporting long-term economic growth (Iskandar & Arifin, 2023).

Studies consistently highlight a persistent gap between the skills taught in logistics education and the competencies demanded by industry, particularly for entry-level workers. To address this mismatch, researchers and policy reports recommend curriculum modernization, stronger industry-university partnerships, and expanded vocational training focused on emerging competencies. Focused training, such as adaptability, digital literacy, and flexibility. In Indonesia, structural challenges in the logistics sector further underscore the need to strengthen domestic workforce capabilities through intensive training and supportive policy reforms to ensure graduates meet real industry requirements (Abdillah & Wahyuilahi, 2025; Benayoune et al., 2022; Wagner et al., 2020).

Strengthening Indonesia's educational system is one essential approach to achieving this goal. Curriculum design and development must be aligned with the needs of the logistics sector, supported by human resource preparation through training and educational institutions, and reinforced by strong collaboration between industry and academia (Darmawan et al., 2025; Juliadi et al., 2021). The curriculum in higher education has attracted considerable attention in the past ten years. Because scientific foundations can be embedded into everyday practice through well-designed curricula, higher

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education must ensure its programs remain aligned with labor-market and industry needs (Damanik & Hamdani, 2025). In higher education, curriculum is understood in multiple ways as product, process, and praxis, reflecting the diverse meanings attached to it and the tendency of research to focus on curriculum development and implementation. Consequently, curriculum innovation procedures emphasize the need for regular updates to keep pace with technological advances and labor-market demands, requiring universities to continually adjust their curriculum content, delivery methods, and assessment so that educational outputs and outcomes remain aligned with industry needs (Cantika, 2022; Lorente-Echeverría et al., 2022; Yusrie et al., 2021). The concept of curriculum carries varied definitions, with its meaning shaped by the specific program context. Curriculum studies in this sector tend to be pragmatic, focusing less on theoretical definitions and more on developing context-relevant curricula that respond to local needs and labor-market demands (Mahardhani et al., 2023; Posillico et al., 2022).

Research indicates that a common theme in research articles is the development of logistics curricula in higher education. This is especially true if the theme is related to 1) meeting the needs of the industrial world, which requires university graduates with the skills needed by the business world (Akhtar et al., 2024; Li & Jia, 2024); 2) the distribution of logistics college graduates in the business world (Malka & Austin, 2024); or 3) the manager-practitioner or recruiter's perspective on the skills that logistics college graduates should possess (Cantoni et al., 2024; Li & Jia, 2024). A competency-based curriculum design in higher education emphasizes the development of industry-relevant capacities and workplace-applicable competencies, making it the most appropriate approach for constructing a logistics curriculum that aligns with the real demands of the logistics sector (Cravero et al., 2024).

Logistics trends driven by rising demand, technological advancements, and shifting consumption patterns pose challenges, including congestion and pollution, underscoring the need for more precise and effective logistics management (Letnik et al., 2022). The performance of transportation systems strongly influences environmental externalities and urban quality of life because it is closely tied to a city's economic well-being and overall functioning (Patier & Routhier, 2020). Heineke et al also state in their report called "*The future of mobility",* as population growth and evolving mobility needs continue, transforming logistics and transportation systems becomes increasingly essential to ensure urban sustainability.

Transportation and logistics are key enablers of the global economy, as they ensure the smooth flow of international trade, cross-border distribution, and the movement of essential goods (Francis, 2020). When disruptions occur in logistics and supply chain systems, these distribution functions are hindered, preventing the effective delivery of critical items. Consequently, without well-functioning logistics and transportation systems, the distribution of essential goods and the stability of the global economy would be significantly affected (Chodakowska et al., 2024; Illahi & Mir, 2021).

Higher education institutions need to continuously design and evaluate their curricula to ensure alignment with industry needs, particularly by equipping graduates with the skills required in the workforce and preparing them to navigate rapid industry change (Karyanto et al., 2023). Curriculum relevance is essential for producing competent, job-ready graduates who can contribute to industrial innovation in an increasingly dynamic global environment. To achieve this, relevant and contextual learning experiences are crucial, enabling students to develop competencies that truly match the demands of modern industry (Mahardhani et al., 2023; Salinas-Navarro et al., 2022).

As a result, higher education institutions must collaborate with the business and industrial sectors through initiatives such as work-while-study programs, internships, and collaborative research. At the same time, businesses need to develop creative strategies to maintain a competitive advantage in an increasingly globalized market (Evans et al., 2023; Zhang & Chen, 2023). This is closely related to the

university's status; beyond regular students, there is a substantial demand for additional revenue sources (Shah & Gillen, 2024). University-industry collaboration requires changes to the academic curriculum and program structure (including the credit system), policies and procedures related to On-the-Job Training (OJT), and even teaching methodologies (Rossoni et al., 2024; Bermejo et al., 2022). Educational institutions, particularly those offering logistics or supply chain programs, must enhance the quality of their curricula and graduates to align with industry demands (Li & Jia, 2024). There is an urgent need for logistics study programs to reform their curriculum by updating course content, strengthening practice-based and industry-linked learning, and producing talent that meets the competencies required by the logistics sector (Chen & Liu, 2025). The delivery and course content of educational institutions that offer logistics study programs are regularly criticized for the difficulties businesses face in obtaining graduates with a range of critical employability skills (Darmawan et al., 2025; Li & Jia, 2024). Therefore, this study aims to develop a logistics management curriculum grounded in the competencies required for graduates to work and adapt in the future, particularly within the logistics industry.

LITERATURE REVIEW

Curriculum Design

Higher education curricula are fundamental in shaping students' learning experiences and must remain relevant and responsive to industrial demands and evolving global changes. From conceptual design to practical implementation, the curriculum plays a critical role in directing education, guiding instructional processes, and determining learning outcomes. As the foundation of teaching and learning, the effectiveness of an educational system depends heavily on the implementation of a well-designed, contextually appropriate curriculum (Arifa & Agustini, 2025; Mahardhani et al., 2023). Ali and Susilana, in their book titled "*Perancangan Kurikulum Mikro: Profesionalisme Guru untuk Pendidikan Berkualitas*" state that the process of creating a plan for content, required study materials, and methods of instruction is known as curriculum development. The curriculum's content is crucial for helping students meet the competency standards and fundamental skills they need to acquire. The knowledge, abilities, attitudes, and values that students should acquire are contained in the curriculum.

Curriculum development is a systematic process aimed at producing a curriculum that is relevant, effective, and responsive to contemporary needs. The curriculum is a critical component of the education system, serving as both a means of achieving educational goals and a guide for instructional practices across all levels. Effective curriculum management, which includes planning, implementation, and evaluation, plays a significant role in improving the quality of education. When curriculum processes are carried out systematically, including syllabus design, lesson planning, assessment, and monitoring, the learning experience is optimized. In the era of the Fourth Industrial Revolution, the curriculum must also be designed proactively by integrating both technical and non-technical competencies and adapting to ongoing changes to remain relevant and to produce graduates who are prepared to face global challenges (Azalia et al., 2023; Sumarsi et al., 2025; Yuliandi et al., 2020).

The most crucial component of the curriculum for accomplishing learning objectives is its components. Curriculum components comprise both core and supporting elements that work together to achieve learning objectives. Learning objectives, content, learning methodologies, and learning evaluation are examples of core components of the curriculum. Administrative and supervisory systems, guidance and counseling systems, and assessment systems are examples of components that support the curriculum. The curriculum design for logistics management is sourced from the classical education stream, which is oriented toward the past. The educational philosophies used in the logistics management curriculum are

essentialism, progressivism, and reconstructionism. The curriculum design model uses a subject-based, relevant, and integrated curriculum (Azizah et al., 2025).

Logistics Management Curriculum Development

Location, facilities, transportation, inventory, communication, handling, and storage are all part of logistics management (Ding, 2023; Liu et al., 2022). Logistics management is a key component of Supply Chain Management (SCM), responsible for planning, implementing, and controlling the efficient and effective flow of goods, services, and related information, as well as their storage. It integrates activities from suppliers to customers, including material transformation and distribution of finished products, ensuring that goods and information move seamlessly from the point of origin to the point of consumption to meet customer requirements (Fang et al., 2022).

A curriculum comprises fundamental components, including objectives, content, instructional methods, strategies, and assessment. The effectiveness of an education system depends on the consistent and integrated design and implementation of these components. In practice, curriculum updates review and refine these elements to ensure education remains adequate and contextually relevant (Hasanah et al., 2025; Maryati et al., 2024; Widhiasti et al., 2022). Ali and Susilana, in their book titled "*Perancangan Kurikulum Mikro: Profesionalisme Guru untuk Pendidikan Berkualitas*" state that a curriculum capable of accommodating students' future needs includes competencies among its components. Competence, according to Ramasamy and Pilz in their book called *"The Standing of Vocational Education and the Occupations it Serves"*, is the sufficiency of knowledge and skills that enables a person to act in various situations they encounter. Competency is a combination of knowledge, skills, and attitudes that can be observed and measured, contributing to improved employee performance and success. The curriculum comprises competencies, learning objectives, instructional content, learning strategies, and evaluation. Developing a competency-based curriculum requires collaboration among teachers, subject-matter experts, and other stakeholders. The curriculum must also be constantly updated and adapted to developments in society and the world of work.

University-Business Collaboration

To develop competencies, business and higher education must collaborate. Specialized occupations, such as logistics specialists, require skills relevant to Industry 4.0. Currently, there is a gap between the competencies taught in logistics programs and those demanded by modern industries, highlighting the need for strong industry-education partnerships (Darmawan et al., 2025). Developing a responsive curriculum that integrates digital technologies, updating course content, and providing practical training are key strategies for preparing graduates who are competent and work-ready (Zuo et al., 2024). Logistics competencies encompass not only technical knowledge but also soft skills, adaptability, and understanding of modern logistics systems in accordance with global industry requirements (Juliadi et al., 2021; Sodikin & Susilowati, 2024).

METHODS

This research employed a quantitative method, with Design and Development Research (DDR) as the approach. The foundation of evidence-based decision-making is quantitative research. Its significance cannot be overstated: quantitative approaches offer empirical rigor, enabling policymakers (government; the 3Ps), practitioners (business), and preachers (academics) to derive valuable insights from data (Lim,

2025). DDR is a systematic study of the design, development, and evaluation processes aimed at establishing an empirical foundation for creating new or improved instructional and non-instructional products and tools (Govindasamy et al., 2023). Drawing on data on industry demand and the Logistics Performance Index (LPI), this study examined the issue of higher-education graduates who do not meet industry requirements upon entering the commercial and industrial sectors. This may result from limited exposure to the business world or from a lack of alignment and relevance between Higher Education (HE) instruction and DU/DI (*Dunia Usaha/Dunia Industri*) activities (similar to Industry World). Thus, using the Indonesian National Qualifications Framework (Kerangka Kualifikasi Nasional Indonesia (KKNI)) at level 6 and the Indonesian National Work Competency Standards (Standar Kompetensi Kerja Nasional Indonesia (SKKNI)), this study identified the competencies that graduates should acquire to work and create in logistics management. The focus of this research was the design of a logistics management curriculum grounded in managerial competencies to enhance the development of logistics managerial competencies among graduates of logistics higher education institutions who will pursue careers in the logistics industry. After finishing the first and second steps of collecting data using a questionnaire of 229 samples of respondents and identifying and selecting the competencies needed for logistics based on the results using SPSS, this research focused on the third step, which was designing the curriculum for logistics management. The third step of DDR involved designing the curriculum by decomposing the competencies into components. The components are competencies, learning objectives, content of the materials, learning strategies, and evaluation (Fayezi, 2022). The curriculum template was adapted from the "*Pedoman Pendidikan Tinggi*" in Indonesia and aligned with institutional guidance and SKKNI & KKNI Level 6. The proposed curriculum was an enhancement of the existing curriculum, informed by researchers' modifications and related documents.

RESULTS AND DISCUSSION

Logistics Management Competencies

The competency analysis reveals a nuanced understanding of what is deemed crucial for logistics professionals. The consistent high importance of logistics operation management and supply chain management (mean scores 3.28-3.61) is expected, as these are the core pillars of the field, as seen in **Table 1.** This reaffirms their central role in any logistics curriculum and should anchor the curriculum as capstone subjects, supported by real-world case studies and industry simulations.

Classifying strategic sourcing and procurement as both cognitive (knowledge-based) and psychomotor (skill-based) competencies underscores their practical, hands-on nature. This implies that teaching these areas requires not just lectures but also simulations, case studies, or practical exercises. These two suggest a hybrid teaching approach that combines theoretical instruction with hands-on labs, procurement simulations, and supplier-negotiation role-plays.

The lowest mean score for the Triple Bottom Line (3.28) and its relatively low percentage (42.8%) suggest that, although sustainability is acknowledged, its integrated financial, social, and environmental dimensions are not yet fully prioritized by respondents. This could indicate a gap in current industry practice or awareness, making its deliberate inclusion in the curriculum crucial for future-proofing graduates.

The difference in perceived importance between sustainability in logistics activities (64.6%) and the ethics of sustainability (56.8%) is noteworthy. While respondents acknowledge the functional importance of sustainable practices, the deeper ethical considerations seem to be less emphasized. This suggests the curriculum should actively integrate ethical frameworks within sustainability topics, rather than

treating sustainability purely as an operational concern. It means that embedding ethical dilemmas and stakeholder impact analysis into coursework can cultivate deeper moral awareness.

This study concludes that six subjects are needed for students of logistics management to perform well in their jobs as logisticians. The subjects, as seen in **Figure 1**, are Logistics Operation Management, Supply Chain Management, Supply Chain Analysis, Logistics Sustainability, Risk Management in Logistics, and Freight Forwarding. These subjects should be scaffolded to build from foundational knowledge to strategic application.

Figure 1. Logistics Management Competencies are contained in 6 Subjects
Source: Data Analysed by the Researchers 2025

The figure depicts six competencies that logistics management students should develop.

Table 1. Competency Needs Analysis for Logistics Professionals

No	Subject	Logistics Management Competency Needs	Mean ± SD
1	Supply Chain Management	Able to understand the Supply Chain Management (SCM) concept	3.61 ± 0.690
2	Logistics Operation Management	Able to get the knowledge of Logistics Operation Management (LOM)	3.61 ± 0.696
3		Able to differentiate modes of transportation	3.59 ± 0.698
4		Able to analyze the distribution chain	3.57 ± 0.688
5	Supply Chain Management	Able to define Logistics Performance Indicator	3.55 ± 0.684
6	Logistics Sustainability	Able to understand the basic concept of sustainability in logistics activities.	3.55 ± 0.709
7	Risk Management in Logistics	Able to identify the risk in the supply chain	3.54 ± 0.728
8		Able to evaluate the risk in the supply chain	3.53 ± 0.679
9.	Freight Forwarding	Able to understand Freight Forwarding	3.53 ± 0.692
10.	Risk Management in Logistics	Able to mitigate the risk of the supply chain	3.51 ± 0.692

No	Subject	Logistics Management Competency Needs	Mean ± SD
11.	Logistics Operation Management	Able to understand and find out the modes of transportation	3.51 ± 0.692
12.	Supply Chain Analysis	Able to understand and have the knowledge of Supply Chain Analysis	3.50 ± 0.686

Source: Data Analysed by the Researchers 2025

The table above presents the results for the selected logistics management competencies required for students to adapt to the industry.

Logistics Business Competencies

The slight standard deviations (SDs) for business planning based on supply and demand (0.664) and collaboration management (0.715), with similar means (3.45 for collaboration management), indicate a high degree of consensus among respondents regarding the importance of these competencies. These should be emphasized through cross-functional projects and collaborative platforms, such as ERP simulations. This suggests that stakeholders largely agree on the necessity of these skills for effective logistics business operations.

Collaboration management, being a 21st-century skill, underscores the need for adaptability and teamwork in the modern supply chain. The data are presented in **Table 2.** Collaboration management aligns with global trends in agile supply chains. Embedding tools like Slack, Trello, or Microsoft Teams into coursework can mirror real-world collaboration and prepare students for digital teamwork.
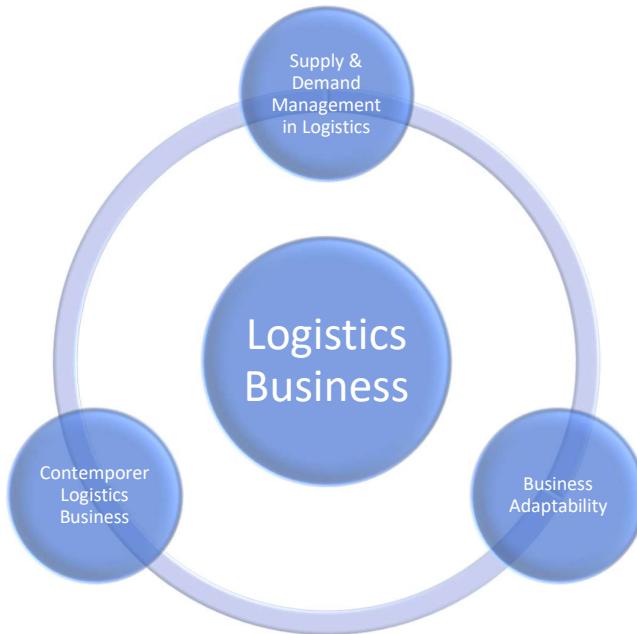
Figure 2. Logistics Business Competencies are contained in 3 Subjects
Source: Data Analysed by the Researchers 2025

Figure 2 shows three areas in which logistics management students need to develop competencies.

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Table 2. Logistics Business Competency Needs

No	Subject	Logistics Business Competency	Mean ± SD
1	Supply & Demand Management in Logistics	Able to understand the business planning based on Supply and Demand.	3.55 ± 0.664
2	Business Adaptability	Able to adapt quickly to changes in the business environment.	3.55 ± 0.690
3		Able to adapt quickly to industry's needs.	3.54 ± 0.691
4	Contemporary Logistics Business	Able to understand the global perspective of rules in the logistics industry.	3.51 ± 0.698

Source: Data Analysed by the Researchers 2025

Table 2 presents the results for selected logistics management competencies relevant to the business needs of students competing in the industry.

Interpersonal Skill Competencies

The high valuation of effective communication (psychomotor) and decision-making (affective) demonstrates the critical role of soft skills. Logistics often involves coordinating diverse stakeholders, making clear communication and sound decision-making indispensable. Analytical Skill and the exploration of challenges and opportunities, both affective and psychomotor, highlight the need for a mindset that actively seeks out and analyzes problems, coupled with the practical ability to implement solutions—the dual classification of analytical skill and exploring challenge points to the need for iterative problem-solving. Incorporating design thinking and root cause analysis into logistics scenarios can sharpen these skills.
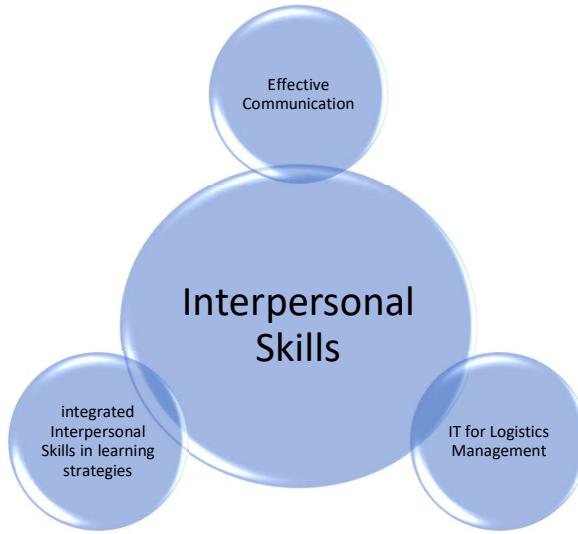
Figure 3. Interpersonal Skills Competencies contained in 3 Subjects
Source: Data Analysed by the Researchers, 2025

Figure 3 shows three subjects that are crucial for logistics management students to develop competencies in executing logistics activities.

Table 3. Interpersonal Skill Competencies Needs

No	Subject	Interpersonal Skills Competency	Mean ± SD
1	Effective Communication	Able to communicate effectively.	3.72 ± 0.623
2	Integrate teaching and learning methods.	Able to make decisions (decision-making).	3.67 ± 0.665
3		Able to solve the problems (problem-solving).	3.66 ± 0.667
4	IT for Logistics Management	Able to use technology.	3.63 ± 0.686
5	Integrate teaching and learning methods	Able to negotiate.	3.62 ± 0.643
6	IT for Logistics Management	Able to adapt to technology.	3.62 ± 0.663
7	Integrate teaching and learning methods	Able to lead or has the Leadership skill.	3.62 ± 0.648
8		Able to analyse or has the Analytical Skill.	3.53 ± 0.716
9		Able to explore the challenges and opportunities.	3.53 ± 0.672
10		Able to complete various tasks.	3.45 ± 0.690

Source: Data Analysed by the Researchers, 2025

Table 3 presents the results for the selected competencies in logistics management, in which students are required to perform logistics activities in industry.

Logistics Management Curriculum Design

The proposed curriculum design meticulously integrates findings from the needs analysis to produce well-rounded, industry-ready graduates. The stated profiles (continuation of studies, professional practitioners, entrepreneurs, and consultants) directly address the diverse career paths available to logistics graduates. The vision and mission strongly emphasize global competence, sustainability, and efficiency, reflecting modern industry demands and the identified importance of sustainability (even with its perceived sub-components). The goal to produce adaptable and technologically responsive graduates directly addresses the dynamic nature of the logistics sector. The explicit mention of philosophical (realism, idealism, pragmatism, reconstructionism), psychological, sociological, and juridical foundations provides a robust framework for the curriculum. This depth ensures that the curriculum is not merely a list of topics but a thoughtfully constructed educational program that considers the theoretical basis of management, student development, societal relevance, and legal compliance. For instance, the psychological foundation directly influences the emphasis on analytical, communication, negotiation, and adaptability skills, which were identified as key interpersonal competencies. The sociological foundation emphasizes collaboration and societal impact, aligning with the high importance of collaboration management. The juridical foundation ensures that the curriculum meets national education standards and aligns with relevant policies (e.g., Kurikulum Berdampak), thereby making graduates formally qualified within the national context.

The breakdown into professional, performance, adjustment, process, and subject components provides a detailed taxonomy of learning outcomes. This structured approach ensures that the curriculum addresses knowledge acquisition, practical application, personal adaptability, cognitive processes, and the capacity to integrate new knowledge, thereby offering a holistic developmental pathway for students.

The Standard Competencies for Graduates (*Standar Kelulusan* (SK)) further consolidate these components into measurable outcomes.

The comprehensive list of courses directly reflects the competencies identified in the needs analysis (e.g., Supply Chain & Logistics Management, Procurement & Strategic Sourcing, Sustainable Logistics & Transport). The inclusion of courses such as "Triple Bottom Line" (implicitly through "Sustainable Logistics & Transport" and "Policy and Principles of Sustainable Logistics"), despite its lower perceived importance in the needs analysis, signifies a forward-looking curriculum that aims to shape future industry practices rather than merely respond to current ones. The detailed course credit allocation guidelines ensure structured and consistent delivery of learning.

The emphasis on collaborative learning (PjBL, team-based, PBL, peer-based, and technology-based learning) is a critical strength. These strategies move beyond traditional lecturing to foster active learning, problem-solving, teamwork, and practical application, which are essential for developing the psychomotor and affective competencies identified earlier.

Project-based Learning (PjBL) and Problem-based Learning (PBL) are particularly well-suited to logistics, enabling students to address real-world challenges and develop practical solutions.

The University-Business Collaboration model for courses such as "Supply Chain Analysis" is a strong mechanism for experiential learning, providing students with direct industry exposure, access to real data, and feedback from professionals, thereby significantly enhancing their readiness for the workforce. The learning method using PjBL in this subject is provided in **Table 4.**

Table 4. Learning method using PjBL in Supply Chain Analysis class

Project-based Learning (PjBL) in Supply Chain Analysis class	
Collaboration Theme: Improving Supply Chain Efficiency at the Company Collaboration Responsible Parties: Supervising Lecturer and Institution	
Collaboration Steps	**Method**
Role in collaboration	The supervising lecturers and the institution identify the program's scope and objectives and recruit students to participate. Company N provides operational supply chain data.
Data collection and analysis	Students collect and analyze the available data using SCM and statistical tools under the guidance of their supervising lecturers. The company provides suggestions and feedback on the data analysis conducted, thereby helping students understand the real challenges of the workplace.
Development of solutions	Students developed strategies to optimize the supply chain, such as implementing a just-in-time inventory system, renegotiating supplier agreements, and optimizing transportation routes. The company reviews the proposed solutions and provides feedback on potential impacts.
Fourth stage	Implementation and Testing
Fifth stage	Evaluation and reporting are adjusted according to the form of agreement or collaboration between educational institutions and the logistics industry.

Source: Researchers, 2025

The detailed assessment criteria, including Criterion-Referenced Assessment (*Penilaian Acuan Patokan* (PAP)), grading scales, and specific requirements for final projects (thesis/scientific papers preferred for Logistics Management), ensure a robust evaluation of student learning. The higher minimum grade for the thesis and fieldwork practice (Praktik Kerja Lapangan (PKL)) compared with the general graduation criteria underscores the importance of applied research and practical experience, reinforcing the

curriculum's industry focus. The use of assessment rubrics tailored to collaborative learning strategies further ensures consistent and fair evaluation of the skills developed through these active learning methods. The PjBL assessment is provided in **Table 5**.

Table 5. Rubric Assessment for Project-based Learning (PjBL)

No.	Assessment Criteria	Scoring			
		4	3	2	1
1	Understanding of the concept				
2	Quality of the product/task				
3	Process of collecting the data				
4	Precise analysis of the data				
5	Teamwork				

Note: the criteria may be modified based on the Learning Objective for each task/project.

Source: Researchers, 2025

Discussion

The finding that Supply Chain Management (SCM) and Logistics Operation Management (LOM) received the highest scores is consistent with prior literature. Several observational and qualitative studies indicate that managerial competencies, such as planning, controlling logistics operations, and understanding end-to-end supply chains, remain essential to organizational performance and strategic decision-making (Koh & Yuen, 2022). Although SCM and LOM remain core competencies, recent studies on Logistics 4.0 and digital transformation indicate a shift in priority. Data literacy, analytical abilities such as big data processing and forecasting, digital twin applications, and automation are increasingly regarded as critical skills for future logistics operations. Reviews and empirical studies also show that digital skills can confer a competitive advantage and, in some cases, are as important as, or even more important than, traditional operational competencies (Cano et al., 2021; Helo & Thai, 2024). Based on this study's findings and current digital evidence, both perspectives are valid. SCM and LOM should remain core pillars, but the curriculum needs to integrate digital and data analytics modules into these courses (Abdillah & Wahyuilahi, 2025; Helo & Thai, 2024).

Practical competencies in procurement, sourcing, and freight forwarding continue to receive attention in recent studies on purchasing and supply management (PSM), which indicate that practical, cognitive, and social-relational competencies are equally important. Skills such as negotiation, supplier relationship management, and communication remain core professional capabilities (Schulze et al., 2022). These findings support classifying procurement and strategic sourcing as cognitive psychomotor competencies, as practical abilities such as negotiation, supplier evaluation, and supplier relations are central to modern competency models. This implies that procurement education requires not only theory but also hands-on practice through role-plays and simulations of evaluation or negotiation. However, opposing views in the literature emphasize that digitalization is reshaping PSM, with automation, e-procurement, and data-driven analytics becoming increasingly essential for future procurement work (Beske-Janssen et al., 2023).

Logistics business competencies, such as supply-and-demand-based business planning, adaptability, and collaboration management, are supported by the literature, which emphasizes the importance of agility, integration, and collaboration for improving firm performance (Ali, 2024). Research shows that logistics capabilities and supply chain collaboration strengthen organizational agility and help

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organizations respond to market changes. At the same time, studies of SMEs (small and medium-sized enterprises) report that supply chain integration, agility, and innovation positively affect both operational efficiency and financial performance (Faturrahman & Nursyamsiah, 2024). These insights reinforce the study's findings that flexibility, collaboration, and demand-based planning are critical competencies for sustaining competitiveness in modern logistics operations.

The finding that communication, decision-making, analytical ability, and problem-solving receive high ratings indicates that logistics curricula must explicitly develop soft skills to prepare graduates for complex and dynamic logistics environments. This need is supported by a meta-analysis of logistics and supply chain management literature, which shows that soft skills have become a central priority as industry complexity increases and demands greater collaboration, adaptability, and leadership (Cantoni et al., 2024). Additional evidence from organizational studies demonstrates that combining technical and interpersonal capabilities enhances operational flexibility and strengthens responses to supply-chain disruptions, ultimately improving resilience and overall performance (Mapanga, 2024).

The implications of these findings suggest that logistics education must balance traditional operational competencies with emerging digital and interpersonal skills to meet current industry expectations. The integration of SCM and LOM fundamentals with data analytics, automation, and collaborative problem-solving can help universities align their curricula with the demands of Logistics 4.0. These findings also imply that practical learning methods (simulations, role-plays, and digital collaboration tools) should be prioritized to strengthen students' readiness for real-world logistics environments. This study is limited because it relies on self-reported perceptions, which may not capture the full complexity of competency requirements across diverse logistics contexts. The sample scope may also restrict the generalizability of the findings to other industries or international settings.

CONCLUSION

The logistics management competencies identified in this research align closely with broader academic and industry perspectives reported in other studies. The curriculum design captures core operational, supply chain, and managerial skills, as well as crucial interpersonal abilities. Other research articles provide valuable amplification, particularly by emphasizing the growing importance of digital and data literacy, adaptability, and the nuanced dimensions of sustainability (beyond operations) in the rapidly evolving logistics landscape. While this curriculum implicitly addresses many of these through its forward-looking vision and learning strategies (e.g., technology-based learning, problem-based learning), the other literature highlights them as distinct and highly prioritized competencies. This comparison reinforces the validity of the competencies identified in the article. It suggests that the proposed curriculum is well-positioned to prepare graduates for the demands of the modern and future logistics industry, particularly given its emphasis on collaborative and applied learning.

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The Logistics Management course syllabus is provided in the Table below.

Course Syllabus of Logistics Management

Course Syllabus

Subject	: Logistics Operation Management
Credit	: 3
Course Description	: A course that focuses on the management and optimization of logistics operations within an organization. This course covers various important aspects of logistics, including planning, controlling, and supervising the flow of goods, services, and information from the point of origin to the point of consumption efficiently and effectively.
Main Reference	: Logistics Operations and Management, Concepts and Models Farahani et al./ Elsevier / 2011

Week	Learning Objectives	Teaching Materials	Learning Method	Evaluation	References
1	Students are introduced to basic concepts and terminology in Logistics Management and establish a learning contract.	Basic Principles of Logistics Management	Lecture and Discussion		Dasar-dasar Manajemen Logistik/Prof. Dr. Ir. H. Sutarman, M.Sc/PT. Refika Aditama/Bandung/2017
2	Students can understand and apply the basic principles of logistics management and identify its terms.	Basic Principles of Logistics Management	Peer-based Learning	Presentation	
3	Students receive explanations of techniques and strategies for inventory planning and control.	Inventory Management	Lecture and Discussion		Manajemen Persediaan/Richardus Eko Indrajit/Grasindo/2004
4	Students can explain the techniques and strategies used in inventory planning and control.	Inventory Management	Case-based method	Presentation	
5	Students receive an explanation of the Logistics Information System.	Logistics Information System	Lecture and Discussion		The Handbook of Logistics and Distribution Management 4th Edition/Alan Rushton et all/Kogan Page/UK/2010/part 6, no. 31, p.508
6	Students can create the System of Logistics Information.	Logistics Information System	Team-based method	Presentation	
7	Students can understand the distribution and transportation flows.	Distribution and Transportation	Lecture and Discussion		Pengantar Transportasi dan Logistik/Herry Gunawan, SE, MM/Raja Grafindo Persada
MID-TERM TEST					
8	Students can understand the trends in contemporary logistics.	Contemporary Logistics	Lecture and Discussion		Logistik Kontemporer di Masyarakat 5.0/Sitompul et all/Erlangga/2022/p. 29-68
9	Students can understand Warehouse Management.	Warehouse Management	Lecture and Discussion		Operasional Manajemen Pergudangan/Syarifuddin Pandiangan/Mitra Wacana Media/2017
10	Students can	Warehouse and Inventory	Project-based	Written	

Week	Learning Objectives	Teaching Materials	Learning Method	Evaluation	References
	understand and create a Warehouse and its Inventory.		Learning (industry)	report of the flow of Warehouse Inventory	
11	Students can understand and develop a Warehouse Management System.	Warehouse Management System	Project-based Learning (industry)	Written report of the flow of the Warehouse Management System	
12	Students are to obtain information on waste management directly from the industry.	*Waste Management*	Project-based Learning (industry)	Poster or Infographic	Logistics Operations and Management for Recycling and Reuse 1st edition/Golinska-Dawson/Springer/2020
13	Students can identify and develop plans for waste management in a company.	*Waste Management*	Project-based Learning (industry)	Poster or Infographic	
14	The completion of tasks/projects		Project-based Learning (industry)	Presentation	

Assessment taken from the Project-based Learning done by students as the FINAL TEST score

Source: Researchers, 2025