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Quadruple Helix Collaboration Model in Developing Local Potential-Based Entrepreneurship Education to Improve Student Competence at Vocational Colleges on Lombok Island

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Abstract
A Quadruple Helix Collaboration Model for Developing Local Potential-Based Entrepreneurship Education to Enhance Student Competencies in Vocational Higher Education in Lombok Island. This article develops a conceptual model of Quadruple Helix collaboration for local potential-based entrepreneurship education in vocational higher education institutions on Lombok Island. A structured literature review with thematic synthesis was conducted on purposively selected publications from Scopus- and SINTA-indexed journals published between 2021 and 2026, complemented by the author's earlier studies on village-owned enterprises, MSMEs, and the halal and Islamic economy in North Lombok. The synthesis shows that (1) the Quadruple Helix is widely applied to MSME and innovation development but rarely to curriculum and learning design; (2) the four actors play complementary roles, with village-owned enterprises (BUMDes) acting as local intermediaries; (3) local potential becomes pedagogically meaningful when it is converted into real business problems, project-based learning, market practice, and mentoring; and (4) entrepreneurial competencies are best framed through the EntreComp areas of ideas and opportunities, resources, and into action. Based on these findings, the article proposes the QH-LP model, which consists of five stages: local potential mapping, partnership governance, contextual curriculum and projects, market practice and mentoring, and competency assessment with feedback. The model is a conceptual product that requires expert validation and field testing before any empirical claim can be made. The article offers theoretical, practical, and contextual implications for vocational higher education institutions.

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1. INTRODUCTION

Vocational higher education institutions are required to produce graduates who are not only technically skilled but also able to identify business opportunities, innovate, and adapt to economic changes. Entrepreneurship education is one approach to strengthening these competencies. A systematic review of the impact of entrepreneurship education on higher education students indicates that educational outcomes depend on learning methods and program design, while measuring its impact still faces methodological challenges (Carpenter & Wilson, 2022). In the Indonesian context, a literature review of higher education entrepreneurship curricula mapped the implementation of learning and expected competencies in students (Elpisah et al., 2024), while a mapping study conducted in 2016–

2025 concluded that previous studies focused more on curriculum and learning outcomes (Samsudin et al., 2026).

Entrepreneurship learning needs to be grounded in practical experience, business projects, product development, marketing, and real-world problem-solving, not just theoretical mastery. Such a real-world context is difficult for universities to provide alone. This limitation creates space for cross-actor collaboration: the government with its policies and development programs, the business world with its market information and networks, and the community with its local knowledge and needs.

Lombok Island provides a rich context for such a model. Studies in North Lombok demonstrate widespread potential in coffee businesses (Kamarulah et al., 2023; Mahfuz, 2022), halal-labeled products (Mahfuz, 2022), Islamic boarding school economies based on cooperatives and sharia retail (Mahfuz, 2026b; Sari & Mahfuz, 2026), and village-owned enterprises (BUMDes) and micro, small, and medium enterprises (Mahfuz, 2026a; Mahfuz & Harianto, 2025). Data on regional economic dynamics, such as GRDP growth rates, should serve as a basis for selecting the most relevant potential (Mahfuz, 2025). However, this potential does not automatically become teaching material; it must be translated into concrete and measurable learning problems.

The Quadruple Helix extends the Triple Helix (university–industry–government) by positioning society or the public as the fourth helix. Cai and Lattu (2022) discuss the differences, assumptions, and rationale for selecting the Triple Helix model over the Quadruple Helix for empirical studies, while a bibliometric review by Zakaria et al. (2023) maps research on the helix model in education, including entrepreneurship education. Practically, Suyoto and Mas'ud (2022) demonstrate the division of roles between four actors in local potential-based businesses: entrepreneurs increasing production, academics assisting with product innovation, the government providing counseling and capital, and the community promoting products.

In the corpus reviewed by this article, the Quadruple Helix is more often used for MSME development and innovation, while entrepreneurship education studies tend to focus on curriculum and learning outcomes without an explicit framework of four-actor collaboration. This gap is treated as a hypothesis to be tested through review, not as a claim that similar research does not exist. The targeted novelty is the integration of three dimensions within a single framework: four-actor collaboration, learning that starts from local potential, and student entrepreneurial competency as an educational outcome. The objectives of this article are (1) to map and synthesize relevant literature; (2) to identify the roles and mechanisms of four-actor collaboration; (3) to identify forms of local potential integration and their relationship to student competency; and (4) to formulate a conceptual model of Quadruple Helix collaboration for vocational higher education institutions on Lombok Island.

2. RESEARCH METHOD

This research employed a qualitative approach, consisting of a structured literature review with thematic synthesis and conceptual model development. The methodological references adhered to the PRISMA 2020 reporting principles (Page et al., 2021) for transparency in the search and selection process, with limitations explained at the end of this method. The objective was to identify, select, assess, and synthesize publications relevant to the Quadruple Helix, entrepreneurship education, local potential, and student competencies.

The search was conducted in October 2026 through an online search of journal and publisher pages for Indonesian and English-language publications published between 2021 and 2026. The primary sources were journal articles indexed by Scopus and SINTA; the authors' own publications on village-owned enterprises (BUMDes), micro, small, and medium enterprises (MSMEs), and the halal and sharia economy in North Lombok were included as local contextual evidence. The search used keyword combinations, including TITLE-ABS-KEY (("quadruple helix" OR "university-industry-government-society collaboration") AND ("entrepreneurship education" OR "entrepreneurial learning") AND ("vocational higher education" OR "higher education" OR university) AND ("local potential" OR "local resources" OR "place-based learning" OR regional)), and their Indonesian equivalents. The search was broken down into separate topics to capture literature that did not include all terms simultaneously. The selection criteria are presented in Table 1.

Table 1. Inclusion and exclusion criteria

Criteria	Inclusion	Exclusion
Relevance	Discuss one or more key concepts	Not related to education, entrepreneurship, collaboration, or competence
Publication type	Journal articles, systematic reviews, and empirical studies	Editorial, opinion without scientific basis, duplication
Source quality	Complete bibliographic metadata and assessable methods or arguments	Unverifiable sources
Language and period	Indonesia and England; 2021–2026	Other languages; outside the period without significant contribution

This process yielded an analytical corpus of 17 documents, comprising eight external studies and nine author publications. Data were extracted for each document, including the year, context, research design, actors involved, type of education or business, how local potential was utilized, competencies or outcomes discussed, and limitations. Analysis was conducted through coding, grouping themes, comparing findings, and formulating relationships between concepts. Conflicting findings were noted as limits to generalization, and the coding results were re-examined during the writing stage.

This article acknowledges procedural limitations: the search was purposive and did not fully execute the search string on subscription databases, so the number of records per PRISMA stage is not reported and is not estimated. Full replication on Scopus and Web of Science is recommended as a next step before testing the model.

3. RESULTS AND DISCUSSION

3.1 Research Results

Corpus characteristics. The corpus was distributed in 2022 (four documents), 2023 (two), 2024 (three), 2025 (three), and 2026 (five). Most external studies were reviews, namely systematic reviews (Carpenter & Wilson, 2022; Bernadó & Bratzke, 2024; Elpisah et al., 2024; Samsudin et al., 2026) and bibliometric reviews (Zakaria et al., 2023), accompanied by one conceptual-comparative study (Cai & Lattu, 2022) and two Quadruple Helix-based business field studies (Suyoto & Mas'ud, 2022; Kamarulah et al., 2023). The authors' publications are in the context of North Lombok. A summary is presented in Table 2.

Table 2. Corpus characteristics and thematic focus

Aspect	Distribution	Synthesis notes
Type	Review (5), conceptual (1), business field study (2), author's local study (9)	Educational evidence is dominated by reviews, not collaborative design.
Context	International (4), national (3), North Lombok (10)	Lombok's evidence comes from business and village studies, not vocational curriculum studies.
Focus of theory	Quadruple/Triple Helix, EntreComp, entrepreneurship curriculum	Helix is rarely directly linked to competency assessment.
Results	Competence, business added value, governance, empowerment	Causal claims regarding student competencies are not yet available

The roles of four actors. The synthesis reveals complementary roles (Table 3). In local-potential-based businesses, academics support product innovation and marketing research, the government provides counseling, training, and capital, business actors maintain production, and the community promotes products (Suyoto & Mas'ud, 2022). A study in North Lombok illustrates similar roles, with a division of primary tasks for each party (Kamarulah et al., 2023). A distinctive finding from the authors' context is the role of Village-Owned Enterprises (BUMDes) as local intermediaries: BUMDes strengthen MSMEs through capital facilitation, marketing support, and human resource capacity building, using three integration models: direct partnerships, product clusters, and the village digital economy (Mahfuz, 2026a).

Table 3. Synthesis of actor roles and collaboration mechanisms in entrepreneurship education

Actor	Role in the corpus	Mechanisms in learning
Vocational college	Product innovation and marketing research assistance (Suyoto & Mas'ud, 2022)	Joint curriculum, business projects, competency assessment
Government	Extension, training, capital; local government support as supporting factors (Mahfuz, 2026a)	Access to coaching programs, regional partnerships, funding
Business world/BUMDes/ UMKM	Production, marketing, capital and human resource facilitation (Mahfuz, 2026a)	Real case studies, mentoring, market practice
Public	Product promotion and participation; participation as a supporting factor (Mahfuz, 2026a; Suyoto & Mas'ud, 2022)	Local knowledge, market testing, consumer feedback

Integration of local potential. In the corpus, local potential is utilized as a business basis, but rarely explicitly as a basis for learning. Patterns that can be drawn for learning are (1) mapping opportunities from regional resources, for example coffee (Kamarulah et al., 2023), halal products (Mahfuz, 2022), and Islamic boarding school businesses (Mahfuz, 2026b; Sari & Mahfuz, 2026); (2) village business financial management as practical material, for example the application of SAK ETAP in BUMDesa (Mahfuz & Harianto, 2025); (3) utilization of social funding, for example productive zakat for empowering

female-headed households (Mahfuz et al., 2026); and (4) inclusiveness of vulnerable groups in village development (Putri et al., 2024).

Student competencies. The EntreComp framework, as reviewed by Bernadó and Bratzke (2024), groups entrepreneurial competencies into three domains: ideas and opportunities, resources, and action. A review of the Indonesian curriculum indicates that student competencies are a key theme, but previous studies have focused more on curriculum and learning outcomes (Elpisah et al., 2024; Samsudin et al., 2026). Evidence of impact also requires careful interpretation due to methodological uncertainty (Carpenter & Wilson, 2022).

Supporting and inhibiting factors. A study of three villages showed that transparent governance, community participation, and local government support were supporting factors, while limited human resources and a suboptimal financial information system were the main obstacles (Mahfuz, 2026a).

3.2 Discussion

Quadruple Helix: from innovation framework to learning framework. The choice between the Triple and Quadruple Helix needs to be based on analytical assumptions, not simply the addition of actors (Cai & Lattu, 2022). In vocational entrepreneurship education, the argument for the Quadruple Helix is pedagogical: communities provide real-world problems, local knowledge, and consumer feedback that cannot be replaced by industry or government. The research map of the Quadruple Helix in education (Zakaria et al., 2023) shows that universities are typically the central actors; the model proposed here maintains the role of universities as learning designers but positions the other three actors as co-actors in planning, implementation, and evaluation.

From business collaboration to educational collaboration. The division of roles in local businesses (Suyoto & Mas'ud, 2022; Kamarulah et al., 2023) can be transformed into learning mechanisms: academic mentoring becomes project guidance, government training becomes access to coaching programs, business needs become case studies and mentoring, and community participation becomes market testing. Village-owned enterprises (BUMDes) and cooperatives are attractive partners because they simultaneously act as business actors and community institutions (Mahfuz, 2026a, 2026b). The implication is that the relationship between actors should not stop at administrative memorandums of understanding (MoUs) but must be integrated into curriculum development, project assignments, and assessments.

Dimensions of inclusion. Studies on gender disparities in employment in North Lombok (Arifin & Mahfuz, 2025) and inclusive villages (Putri et al., 2024) remind us that program design needs to ensure that female students and vulnerable groups have equal access to projects, mentoring, and business networks.

Model QH-LP. Based on the synthesis, this article proposes a Quadruple Helix Collaboration Model based on Local Potential (QH-LP), presented in Figure 1. The model contains five stages: (1) joint mapping of local potential based on official data, for example, sectoral GRDP (Mahfuz, 2025), and community input; (2) partnership governance that establishes role division, coordination, and resource commitment; (3) contextual curriculum and business projects; (4) market practices, mentoring, and accompaniment of local businesses; and (5) competency assessment based on the three EntreComp domains and feedback to improve the curriculum and partnership. The assessment needs to differentiate between knowledge, competencies applied in real contexts, and long-term outcomes such as business formation.

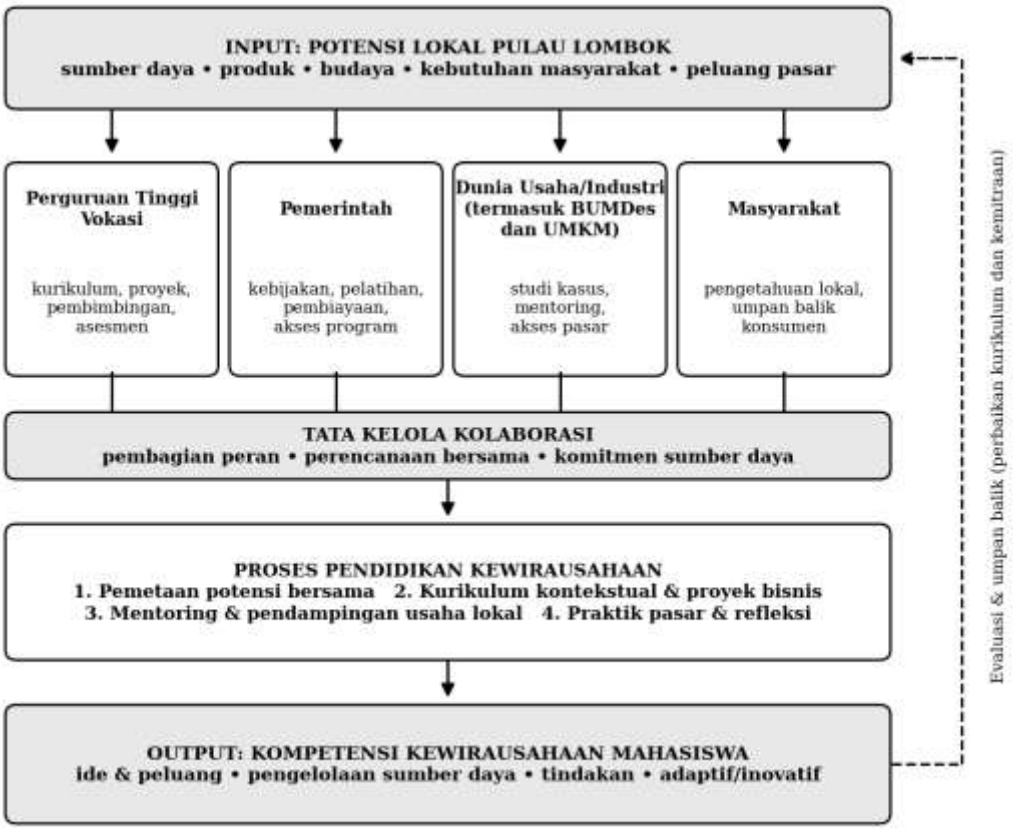


Figure 1. QH-LP conceptual model resulting from literature synthesis (author's design; not yet validated)

From this model, four propositions can be formulated to be tested in further research: (P1) the involvement of all four actors in the planning and evaluation stages, not just implementation, is related to the quality of the contextual curriculum; (P2) the more concrete the local business problem that is used as a project, the stronger the students' opportunity identification and action competencies; (P3) the quality of partnership governance, including transparency and managerial capacity, moderates the sustainability of the collaboration (Mahfuz, 2026a); and (P4) feedback from competency assessment results improves the partnership in the next cycle. These propositions are conceptual hypotheses, not empirical findings.

Implications for vocational colleges. First, local potential mapping should be conducted every academic cycle in collaboration with local governments, village-owned enterprises (BUMDes), and communities, so that project topics are not dependent on lecturers' preferences. Second, partnerships need to be outlined in agreements that specify roles, learning outcomes, and success indicators, not just general commitments. Third, lecturers' capacity as business project facilitators needs to be strengthened, as limited human resources are a recurring obstacle in local contexts (Mahfuz, 2026a). Fourth, financial literacy and business reporting can be core competencies trained through practical work in village businesses (Mahfuz & Harianto, 2025). Fifth, assessment rubrics need to assess processes (collaboration, decision-making), products (business plans, prototypes), and long-term outcomes (business sustainability) separately to ensure claims of competency improvement do not overshadow the evidence.

Evidence limits for Lombok. The available evidence in the corpus for Lombok comes from studies of businesses, villages, and the regional economy, not from evaluations of vocational curricula. Therefore, the relationship between collaboration between the four actors and improved student competency in Lombok remains a proposition. The selection of local potentials included in the model also needs to be tailored to study programs, such as accounting, business, tourism, or food technology, and verified using official regional data before adoption.

4. CONCLUSION

This review shows that the Quadruple Helix has been widely used to develop MSMEs and innovation, but in the reviewed corpus it has not been formulated as a framework for designing vocational entrepreneurship education. The four actors have complementary roles, and BUMDes and cooperatives can act as local intermediaries. Local potential is pedagogically meaningful when transformed into real business problems, projects, market practices, and mentoring, while student competencies can be structured through the three domains of EntreComp. The proposed QH-LP model connects local potential input, collaborative governance, learning processes, competencies, and evaluation feedback.

Theoretically, this article links the Quadruple Helix to local-potential-based entrepreneurship education. Practically, vocational college administrators are advised to establish a four-actor partnership forum, involve village-owned enterprises (BUMDes) and micro, small, and medium enterprises (MSMEs) as project partners, and develop a competency assessment rubric. Limitations include purposive research, a small corpus, the author's publications predominantly focusing on local evidence, and the lack of empirical validation. Further work includes full SLR replication in Scopus and Web of Science, model validation by experts, and field testing in vocational study programs in Lombok.

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