THE LANDSCAPE OF UNIVERSITY - INDUSTRY COLLABORATION FOR DEVELOPMENT AND FOR GRADUATES' PREPAREDNESS IN THE CURRENT TREND OF JOB MARKET'S NEEDS

BỐI CẢNH HỢP TÁC GIỮA ĐẠI HỌC VÀ DOANH NGHIỆP VÌ SỰ PHÁT TRIỂN VÀ SỰ CHUẨN BỊ CHO SINH VIÊN TỐT NGHIỆP TRONG XU HƯỚNG HIỆN NAY THEO NHU CẦU THỊ TRƯỜNG VIỆC LÀM

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Abstract - This research aims to explore the current landscape of UIC, its nature and then discusses possible solution to foster closer collaboration between businesses and universities. Secondary data from the literature were collected including both English and Vietnamese documents. The researcher employed content analysis as the methodological approach. The main themes have been focused, namely (1) the settings in different countries in different regions of the world, including America, Europe and Asia, (2) workable models or frameworks of UIC in developed countries as exemplars, and (3) possible solutions to identified issues in current landscape of UIC in Vietnam. The research is timely critical in the current agenda, the "era of rising" in Vietnam and in developing countries that share the similar contexts.

Key words - UIC; trends; models; job market relevancy; policies; program and curriculum design

Tóm tắt – Nghiên cứu này nhằm mục đích khám phá bối cảnh hiện tại của UIC, bản chất của nó và sau đó thảo luận về các giải pháp khả thi để thúc đẩy sự UIC. Dữ liệu thứ cấp từ các tài liệu đã được thu thập, bao gồm cả tài liệu tiếng Anh và tiếng Việt. Tác giả đã sử dụng phân tích nội dung làm phương pháp tiếp cận. Các chủ đề chính bao gồm (1) bối cảnh ở các quốc gia khác nhau, bao gồm Châu Mỹ, Châu Âu và Châu Á, (2) các mô hình hoặc khung lý thuyết của UIC ở các nước phát triển, và (3) các giải pháp khả thi cho các vấn đề đã được xác định trong bối cảnh Việt Nam. Nghiên cứu này là cần thiết và kịp thời trong bối cảnh phát triển kinh tế xã hội hiện nay, "kỷ nguyên vươn mình" ở Việt Nam và các quốc gia đang phát triển có bối cảnh tương tự.

Từ khóa – Đại học; doanh nghiệp; mô hình; thị trường việc làm; chính sách; thiết kế chương trình đào tạo

1. Introduction

In today's rapidly evolving digital economy, collaboration between universities and businesses in sectors including but not limited to manufacturing, logistics, trading, e-commerce, and hospitality has become essential to staying competitive and adaptive. The rise of advanced technologies - such as AI, and automation - along with increasingly short product and service life cycles, requires a better mutually beneficial relationship. Universities bring deep research capabilities, access to cutting-edge innovations, and a great source of skilled graduates, while businesses offer real-world challenges, practical insights, opportunities for applied innovations and for job seekers. In fields like e-commerce and customer service, for example, large language models (LLMs) and personalized AI tools can revolutionize user experiences, and collaboration enables faster problem solving. Amid global uncertainties, university-industry collaboration (UIC) ensures that academic programs remain relevant, while helping businesses with new human resources to adapt to changing markets, embrace digital transformation, and address societal challenges such as environmental impact, economic recession, and/or other social upheavals that we are not really able to control.

The absence of a strong collaboration between universities and industry can lead to significant disadvantages for both parties. For industry, one major consequence is the increased need to retrain newly recruited graduates who may lack the practical skills and competence required in the modern workplace. This gap between academic preparation and industry expectations often necessitates substantial investments in reskilling and upskilling, resulting in added time, cost, and resource burdens for companies. Furthermore, in fast-paced sectors such as, logistics, and customer service, this delay in achieving workforce readiness can hinder innovation and productivity. On the other hand, universities risk damaging their institutional reputation and competitiveness if graduates struggle to secure employment. In many educational systems, graduate employment rates are a key metric used by stakeholders - including prospective students, parents, and other related bodies - to evaluate the effectiveness and relevance of academic programs. A weak connection to industry not only undermines student outcomes but also limits opportunities for curriculum enhancement, practical training, and research commercialization. Therefore, fostering meaningful UIC is crucial to bridging the skills gap, enhancing graduate employability, and supporting industry innovation.

In the context of Vietnam, the government has enacted formal policies to promote UIC, with particular emphasis

on institutions involving in student training and professional development. However, the literature still shows fragmented bodies of research on the landscape of UIC for students' preparedness in the current trend of needs in job markets at the national level. This paper aims to explore related issues and to fill in the gap by seeking answers to the following questions:

1. How has UIC been done across different countries?

2: What models of UIC have been introduced worldwide?

3: What are possible solutions to identified issues in current landscape of UIC in Vietnam?

2. Methodological approach to data collection and analysis

2.1. Data collection

In this paper, the data were collected from existing literature, both in English and Vietnamese.

The framework for research suggested by Toye, Seers [1] was employed as a theoretical guide to this study. It is comprised of five steps, including (1) identification, (2) criteria and screening, (3) inclusion/exclusion, (4) reviewing, and (5) analysis and findings.

For data in English, peer-reviewed documents especially ones indexed in WoS, Scopus would be scrutinized. To ensure that high-quality publications written in English would be included, the author used the criteria as being tabulated in Table 1 below:

Table 1. *Criteria for data selection*

Inclusion	
Topics for searching	University industry collaboration; University business collaboration; University industry partnership; University business partnership; University industry co-operation; University business co-operation, Academic and industry collaboration Academic and business collaboration
Document types	Journal articles, proceeding papers, book chapters
Fields	Business, Management and Accounting Decision Sciences Psychology Social Sciences Economics, Econometrics and Finance Computer Science Energy Environmental Science Engineering Agricultural and Biological Sciences
Publishers	All
Data sources	ScienceDirect, Primo, other peer/blind reviewed documents
Time of publication	Preferably 2015 to May 2025;
Indexed by	WoS, Scopus, Google Scholar
Exclusion	
Abstract	Missing or incomplete
Language used in journals	Other than English or Vietnamese

The author applied Boolean search techniques (AND/OR/NOT) to increase the precision and appropriateness of the data. To be specific, the terms "University" could be replaced by "academic", academia", or "higher education institutions". Similarly, the terms "collaboration", "co-operation", and "partnership" were also alternatively searched. The time of publications was preferably in between 2015-2025. However, if the search results were limited or not found, the author would extend the option to any time (e.g. unticking the time or removing time custom range).

For articles in Vietnamese, the criteria for inclusion were papers published in peer-reviewed Vietnamese journals, and opinions found through interviews or discussions of scientists, educators, managers, policymakers, scholars, and other related stakeholders in governmental public media. In order to ensure the reliability of the data sources, these opinions were only included in the data when they were published or posted on government-authorized portals or websites (e.g. vneconomy.vn, giaoduc.net.vn, tapchitaichinh.vn/, kinhtevadubao.vn, …).

2.2. Data analysis

This research employed the content analysis method. This method is defined as "a research technique for making replicable and valid inferences texts (or other meaningful matter) to the contexts of their use" [2]. The author asserts that content analysis has developed into a comprehensive array of research methodologies designed to generate insights from diverse forms of verbal, visual, symbolic, and communicative materials. While its origins are grounded in journalism, the last hundred years have seen its integration into multiple academic disciplines and the resolution of numerous methodological concerns. Following a brief hiatus during the 1970s, content analysis has experienced rapid expansion, primarily driven by the broad adoption of computational tools for processing textual data [2].

In qualitative content analysis, the act of analysis is more intricately pertinent to the coding process than it is in quantitative content analysis. Although the principal aim is to respond to the research questions, the approach also remains open to revisions of the initial guiding questions and to the discovery of new themes or inquiries that may arise during the coding stage [2]. In this study, the author employed inductive coding techniques. The final outcome often takes the form of an integrated portrayal of the phenomenon under investigation. This portrayal thoughtfully includes the relevant context - such as the participants, the settings, and the conceptual framework. The objective is to present a holistic view of the topic, characterized by conceptual depth and supported by a carefully structured collection of rich, descriptive data [3]. The features of content analysis can be summarized as below.

Features	**Content Analysis**
Goal	Interpret and analyze content
Data Sources	Documents, media, texts, policies, interviews, published studies
Approach	Qualitative, conventional, and summative
Aims	Explore discourse or patterns in content and Aggregate findings across existing research
Output	Themes, patterns, frequency counts

[3]

The justification of methodological employment of the research is based on the guidelines by [4] who suggests that

"The overall decision involves which approach should be used to study a topic. Informing this decision should be the philosophical assumptions the researcher brings to the study; procedures of inquiry (called research designs); and specific research methods of data collection, analysis, and interpretation. The selection of a research approach is also based on the nature of the research problem or issue being addressed, the researchers' personal experiences, and the audiences for the study".

To be brief, the content analysis method was rationally employed in this research for the reasons that it is appropriate for exploring the answers to the research questions and the aims of the study.

3. Findings and discussion

After screening the titles and abstracts of 161 papers in English and 13 documents in Vietnamese, the author found 50 (See appendix 1) that could be included for the inductive coding and analysis.

RQ1: How has UIC been done across different countries?

UIC has a long history in developed countries. It has evolved differently across Europe, America, and Asia, shaped by political systems, economic strategies, technological progress, and cultural contexts.

United States

The roots of UIC in the U.S. began with land-grant universities established under the Morrill Acts in 1862 [5]. These acts helped to fucus on agriculture and engineering, fostering practical research and knowledge transfer to industry. Stakeholders also found the need for a new educational system to refresh curricula, focusing on practical approaches that are relevant to the working-class Americans. An example of strong UIC from foundation is the MIT which was founded in 1861 [6]. During the Post-WWII period (1945–1980), the Bayh-Dole Act was a turning point: it allowed universities to patent inventions developed from federally funded research. This led to a surge in university technology transfer offices and start-up activity [7, 8]. This act has been globalized and adopted by many countries or regions such as China [9], Europe [10]. Silicon Valley's rise is a prime example, with Stanford University playing a critical role in fostering tech companies like HP [11]. In this modern technology-driven era, formal technology transfer offices and university-affiliated incubators became common. UIC is now central to U.S. innovation policy, with emphasis on STEM, AI, biotech, clean energy and human resources [12].

Europe

In the Pre-20th Century – Mid-20th Century, in comparison to the case in the US, European universities, traditionally more focused on classical education, were slower to engage directly with industry [13]. Germany was an early leader, with the Humboldt model in early 19th century and institutions like Fraunhofer Society (founded in 1949), blending research with industrial application [14, 15]. In the UK, Redbrick universities (19th century) e.g. Birmingham, Manchester, or Leed had more vocational focus, linking with local industry. Redbrick universities are a group of older civic universities in England, historically located in major industrial cities [16]. These universities were founded in the late 19th and early 20th centuries, and were distinguished by their focus on science, technology, and engineering. The UK established polytechnics quite early, aiming to bridge practical knowledge with industry needs [17, 18]. In the Post-War Rebuilding and Innovation (1950s–1980s), European governments played a strong role in funding and directing UIC, especially in state-driven economies, e.g., France's Grands Écoles system, a network of elite, highly selective higher education institutions [19].

Since the 1980s, EU Integration and Policy has been working on The European Framework Programmes, starting in 1984, that boost transnational research collaboration, emphasizing UIC [20].

Germany's dual education system and Fraunhofer Institutes remain models for integrating research and application [21]. Founded in 1949, the Fraunhofer Institutes originally served an advisory and administrative function, directing public funding to researchers at tertiary institutions working on industry-relevant projects. The dual training principle forms the basis of many vocational education and training (VET) initiatives, involving joint responsibility between companies and training institutions. Typically, a company signs a training contract with an apprentice, outlining the learning activities to be carried out - most of which occur within the company itself, where the apprentice works 3 to 4 days per week. The remaining days are spent at a vocational school, where theoretical and practical lessons complement the hands-on experience gained at work. This system ensures that apprentices develop both firm-specific and industry-relevant skills. Its effectiveness is supported by ongoing input from employers and unions, who help shape and revise VET programs. Additionally, the Chambers of Industry and Commerce advise on training contracts and ensure that participating companies and trainers are qualified [21].

Asia

In Japan, during the post-Meiji Restoration (or Minh Trị duy tân in Vietnamese) in the late 19th century, strong state-driven modernization with technical universities like Tokyo Imperial University supporting industrialization [22]. Since the 20 century, especially in the period 1980s–1990s, Japan pushed university reforms to promote collaboration and commercialization of research [23].

In China, before the year 1970s, this country had a Soviet-style education system with clear separation between research institutes and universities [24, 25]. However, after this period, universities were integrated into the innovation system that put great emphasis on creating science parks and university-affiliated enterprises.

UIC in China is still boosting stakeholders' success [26] as well as making it a leading world-famous powerful nation regarding economic development and technology. This situation is similar to the settings in South Korea [27, 28], in India or other developing countries of similar contexts [29, 30]. These countries envisage the important role of UIC in sustainable development of stakeholders and their whole nations. Researchers [30] also advocate that UIC is a new way of educating future generations of engineers in India.

It is also found that the intervention and support provided through practical legal frameworks in countries worldwide, facilitated by laws, have significantly enhanced collaboration between businesses and educational institutions. This demonstrates that macroeconomic policies have a profound impact on the success of such collaborations, even though the government does not directly implement them but instead uses policy to regulate the process. This concept aligns with the central message in the renowned book entitled "*Why Nations Fail: The origins of power, prosperity, and poverty" by* Acemoglu and Robinson [31].

RQ2: What models of UIC have been introduced worldwide?

Before the presentation of notable worldwide models of UIC, it is necessary that the roles of UIC models are elaborated. While models of UIC vary across countries, the underlying principles of fostering strong partnerships among *academia, industry, and government* remain consistent. As global challenges evolve, these collaborations will continue to play a crucial role in driving sustainable economic growth and technological advancement. Models for UIC are important to all stakeholders because they provide structured, strategic, and mutually beneficial ways for academia and industry to work together. In fact, the micro, the meso, and macro levels (including stakeholders such as universities, businesses, the MOET, and the government) can benefit from applying a viable model of UIC. The development and implementation of formal models or frameworks for UIC are essential for ensuring that partnerships are effective, sustainable, and mutually beneficial. Such frameworks serve to clarify the roles, responsibilities, and expectations of all stakeholders involved, thus reducing the likelihood of misunderstandings or conflicts during collaboration. This not only enhances the efficiency and impact of joint initiatives but also fosters long-term relationships that contribute to innovation and socio-economic development.

Below are notable models that have been well-documented in the literature.

The Triple Helix model of university–industry–government collaboration represents a dynamic framework in which these three partners interact to drive innovation and economic development. Originally conceptualized by Leydesdorff and Etzkowitz [32], the model highlights the increasingly blurred boundaries or demarcation between universities, industry, and government, as each takes on overlapping roles beyond their traditional functions. Universities evolve into entrepreneurial entities actively engaged in knowledge commercialization, while industry participates directly in research and innovation processes. Meanwhile, governments provide essential policy support, funding, and regulatory frameworks that facilitate collaboration. Key features of this model include cross-sector collaboration, institutional transformation through the creation of hybrid organizations such as technology transfer offices and incubators, and the formation of innovation ecosystems that foster continuous interaction and knowledge exchange. The benefits of the Triple Helix approach are substantial, as it accelerates technological advancement and commercialization, strengthens national competitiveness, aligns academic research with societal and industrial needs, and ultimately contributes to sustainable economic growth.

The Knowledge Transfer Partnerships (KTPs) model [33] comprises of structured collaborative programs designed to facilitate the transfer of knowledge, skills, and technology between universities and industry. Although the original KTP scheme was pioneered in the UK, the US has similar models that promote close engagement between academic institutions and businesses to enhance innovation and economic growth. In the US, programs like the Industry-University Cooperative Research Centers (IUCRC) [34], and Small Business Technology Transfer (STTR) [35, 36] encourage companies to partner with universities to address specific research challenges. These partnerships typically involve placing skilled graduates or researchers within companies to work on targeted innovation projects, thereby fostering hands-on knowledge exchange and accelerating the commercialization of academic research. The KTP model's primary goal is to bridge the gap between theoretical research and practical application by aligning university expertise with industrial needs [33]. This collaboration not only helps businesses improve their competitiveness through access to cutting-edge or modern research and innovation but also provides universities with valuable funding, real-world problem contexts, and enhanced employability for their graduates. By facilitating sustained and formalized interaction between academia and industry, KTPs and similar programs contribute significantly to regional economic development, technology transfer, and the creation of high-skilled jobs, ultimately reinforcing the national innovation ecosystem [37].

The Academia-Industry Smart Synergy Model (AISSM) in Malaysia [38] represents a strategic framework designed to enhance collaboration between higher education institutions and the industrial sector, with the aim of fostering innovation, technology transfer, and economic growth. This model emphasizes the creation of a smart and adaptive partnership that integrates the strengths of both academia and industry through systematic knowledge exchange, joint research, and capacity building. Central to the model is the alignment of academic research priorities with industry needs, ensuring that outputs are not only scientifically robust but also commercially viable and socially relevant. In many countries including Vietnam, it is often criticized

that research is often far from real-life application. The AISSM model in Malaysia is supported by government policies and initiatives that incentivize collaboration, such as funding schemes, innovation hubs, and regulatory facilitation. Key components of the model include collaborative R&D projects, internship programs, technology commercialization platforms, and continuous skills development tailored to industry demands. By enticing a responsive and mutually beneficial partnership, the AISSM model aims to accelerate innovation, improve workforce readiness, and contribute to Malaysia's vision of becoming a knowledge-based economy.

The examination of the Triple Helix, KTP, and the AISSM model reveals several critical lessons about effective university–industry collaboration. First, all three frameworks emphasize the importance of *dynamic, multi-stakeholder engagement*, recognizing that innovation is enhanced when universities, industry, and government work in collaboration rather than in isolation. This highlights the value of *institutional flexibility and role changeability*, where each party adapts beyond traditional boundaries to co-create knowledge and solutions. Second, structured mechanisms - whether formal partnerships like KTPs or policy-supported AISSM - are essential for *facilitating trust, clear communication, and alignment of goals,* thereby reducing risks and enhancing collaboration efficiency. Third, these models collectively emphasize the necessity of *linking academic research to real-world applications*, ensuring that knowledge and skill transfer is purposeful and give impetus to economic and societal impact as well as the fostering the win-win values. Lastly, the importance of *government support and policy enablers* is an important theme, as sustained collaboration often depends on incentives, funding, and regulatory frameworks that nurture innovation ecosystems. Together, these findings advocate purposeful, adaptive, and well-supported collaboration frameworks that maximize the strengths of each stakeholder to drive innovation and development.

RQ3: What are possible solutions to identified issues in current landscape of UIC in Vietnam?

The literature shows that, in recent years, the Communist Party and the Government of Vietnam have been making great effort to issue laws and specific policies to enhance UIC. The significant documents are tabulated as in Table 2 below.

Table 2. *Active governmental documents to support and enhance UIC*

Document types	Time of issue	Tracking of UIC-Related emphasis – Key words
Laws on education	14 June 2019	Article 93: Agencies, organizations and individuals' responsibilities: Assisting and cooperating with schools in organizing educational and research activities; facilitating teachers and learners in visits, experiences, practice and scientific research
Resolution No. 29-NQ/TW on fundamental and comprehensive innovation in education, serving industrialization and modernization in a socialist-oriented market economy	14 November 2014	Part 3.1: Encouraging businesses and individuals to use labor to support training activities. Develop appropriate financial mechanisms and policies for all types of schools. Have preferential credit mechanisms for educational and training institutions.
Decree 19-NQ/TW on continuing to renovate organizational and management structure, enhance quality and efficiency of public non-business units	25 October 2016	Part 3-Section 2.4: There is a mechanism to strengthen links between scientific and technological organizations with universities and businesses to link scientific research with training and business production activities. Part 3-Section 4. Enterprises are allowed to participate in building a list of training industries and occupations, building training programs, training at educational institutions and evaluating the learning outcomes of students.
Decree 86/2018/NĐ-CP on foreign cooperation and investment in education	06 June 2018	The entire Decree
Decision No. 452/QĐ-TTg: Approving planning for higher education institution and pedagogy institution network of 2021 - 2030 period and vision to 2050	*27 February 2025*	Part 5-4c: "Strengthening links and cooperation in training and research between the network of higher education institutions and enterprises through forms of funding, ordering, investment, cooperation in training and research, and support for internships and employment."

The above documents have opened wide legal corridor for UIC.

Current picture of UIC in Vietnam

In recent years, Vietnam has witnessed a surge in partnerships between higher educational institutions and the private sector. For instance, the National Economics University has collaborated with hundreds of domestic and international businesses [39], providing thousands of internship opportunities for students. Similarly, VinFast has partnered with technical universities to develop practical training programs, offering scholarships and specialized technology courses to better prepare students for their careers [40]. It is found that almost all universities in Vietnam have established sub-organizations in forms of departments or offices for UIC. However, the levels of cooperation are diverse and especially in their field of research and development (R&D), universities related to science technology and manufacturing have more advantages in collaboration with business thanks to their

new market demands where life cycle of technological products seems shorter nowadays. They relentlessly need to improve their products in order to gain competitive edge in the market.

Universities that provide training programs on services, commerce and trading, or human resources in social science and humanity often show weaker bond with enterprises due to the abstract mutual benefits of stakeholders. In other words, the win-win values are not really clear.

Furthermore, the extent or level of collaboration is also diverse at different universities. Tran [41] finds that there are five levels of UIC as illustrated in the Figure 1 below:

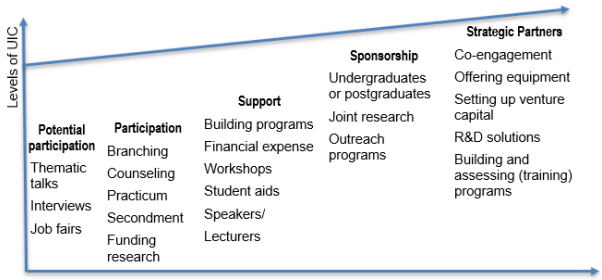

Figure 1. *Level of UIC and indicators*

The figure above shows that strategic UIC should not be limited to offering practicum environments or financial support/sponsorship at certain levels. Rather, universities businesses can collaborate in the fields of R&D and/or b*uilding and assessing training, outreach programs*. In other words, businesses can take part in program and curriculum designs, the actual training process and supporting the community. This suggestion is aligned with the policies at macro level as presented in Table 2 above.

Identified Challenges

Despite these advancements, several challenges persist:

Curriculum Relevance: A quite large number of businesses believe graduates still lack the necessary skills for their jobs and the need to be retrained. For example, a finding in a recent research shows that 53% of Vietnamese enterprises lack qualified and knowledgeable employees in logistics, 30% of enterprises have to retrain their employees and only 6.7% of enterprises are satisfied with the professional qualifications of their employees [42]. Although the reskilling or upskilling of newly recruited graduates is a worldwide common issue [43, 44], the current context in Vietnam accentuates the need for universities to update curricula based on the needs of businesses. In the era of ever fast changes in and creation of new knowledge especially with the help of AI in LLMs including but not limited to ChatGPT, Gemini, Copilot, Grok, Deepseek, the updating of curricula and assessment methods at universities is both challenging and urgent. This enables universities to be able to help students meet the requirements of job skills in the 21st century or at least not to be left far behind the current trends in the job markets.

Innovation Bottlenecks: Experts have pointed out that many Vietnamese universities focus primarily on general training, with inadequate attention paid to research, innovation, and startup support. This results in a gap between universities and the startup ecosystem and in the lack of students' hands-on experience or skills that a specific employer may need. According to The Ministry of Science and Technology [45], "while innovative support models in universities have become the norm in the world for half a century, it remains a new thing in Vietnamese tertiary education establishments. Experts said many bottlenecks, from mechanisms to resources and mindset, should be removed to promote innovation in universities" (para 1). Regarding the mindset of certain recruiters, there are somewhat differences between Vietnam and foreign companies, such as the ones in Japan [46].

Proposed Solutions

From the theoretical perspectives and practical lens underlying the contexts of Vietnam. It is suggested that there should be further involvement and clearer presence of businesses in program development, including the program development and training implementation process. Following guidelines in the governmental policies, businesses should be invited to co-teach at universities instead of just offering undergraduates environments for practicum. The more businesses are involved in the training progress of their partners' universities, the less time and expense they may have to invest in their future in-house upskilling and reskilling of their novices in the workplace. It is also suggested that universities find more specific solutions to increasing the win-win benefits with businesses. For example, universities can disseminate brand identities of their partners' enterprises in multiple channels of the university in the form of banners instead of on-shot published post on the website after each MOU or MOA signing event. They can co-operate in supporting community campaigns or events at the micro level. In addition, in the macro level, the current context of UIC necessitates stronger tax-incentive policies so that businesses are "happier" to engaging in investment on UIC activities such as R&D, startup projects, sponsorships or funding.

To further address these challenges, several strategies are recommended:

Curriculum Alignment: Universities should collaborate closely with industries to develop curricula that reflect current trends and requirements. Incorporating internships, practical training, and soft skills development into academic programs can significantly enhance graduates' employability. Beside job-related knowledge and technological skills, it is necessary in embed the training of communicative skills and interpersonal cultural communication competence in all training programs. It is known that knowledge, skills and attitude should not be mutually exclusive. The lack of one of these three values can lead to failures in business and the like.

Innovational Ecosystem Development: Creating innovation hubs within universities can bridge the gap between academic research and the startup ecosystem. These hubs can facilitate knowledge transfer, support startups, and foster a culture of innovation.

Digital Transformation Initiatives: Institutions should invest in digital infrastructure and training to enhance their digital capabilities. Collaborations with international partners can provide valuable insights and resources to support these initiatives.

At the micro level, it is necessary to delve more deeply into building training programs because curriculum design and redesign are vital to meet the job market trends and needs (see Table 3):

Table 3. *Types of market-oriented curriculum design*

Types	Features	Relevant researchers
Industry Alignment	Stronger collaboration with employers to shape curricula based on labor market needs	[47].
Skills-Based Learning	Emphasis on *hard skills* (e.g., coding, data analysis) and *soft skills* (e.g., communication, teamwork)	[48].
Work-Based Learning	Integration of internships, apprenticeships, and simulations	[49].
Micro-credentials and Badging:	Short, focused certifications for specific job-ready skills	[50].
STEM and Digital Literacy	Increasing focus on science, technology, engineering, and math, especially through blended learning	[51].
Lifelong Learning	Curricula designed for upskilling and reskilling at all ages	[43, 52].
Global Competence	Inclusion of cross-cultural and global perspectives to prepare for international workforces	[53, 54]

A comparative overview of models of designing toward job market oriented is tabulated in the tables 4 and 5 below.

While the summary in Table 4 offers a comprehensive overview of models for curriculum design, the Table 5 raise key issues that educators should avoid so that their training outcomes can be market-oriented and increase possibility of graduates' employability. In terms of curriculum design as a feasible solution to current issues of UIC, the current researcher calls for program designers' and lecturers' serious awareness of the precept and first tenet: teaching what employers and students need, not just what knowledge and/or skills that they have. For example, by reviewing the curriculum (applied in and prior to 2025) or the transcripts of our trilingual graduates, from the Faculty of ESP, The University of Danang - University of Foreign Language Studies, employers - as recruiters - can see that the program includes not only English language courses but also a strong focus on subject-specific content. We have proactively reduced the number of non-core courses, particularly theoretically linguistic ones, in order to gradually replace them with specialized subjects related to economics, commerce, e-commerce, tourism, travel services, hospitality, customer care, and other relevant service sectors. This adjustment may understandably raise concerns among faculty members who just specialize in language teaching, especially regarding potential reductions in teaching hours and resources of incomes. However, aligned with our institution's educational philosophy and long-term vision, we believe continuous reform is essential - particularly when it comes to updating and improving our training programs based on employer needs and labor market demands. Analysis of employers' needs can empower levels of UIC. Our full-time faculty play an active role in this process, but we also strongly value collaboration with employers during the training phase. Such cooperation helps foster mutual understanding between students and recruiters, and allows for earlier sharing and accumulation of work-related experience - starting right in the classroom.

Table 4. *Models of Curriculum Design*

Model	Description	Strengths	Possible weaknesses
Subject-Centered	Focuses on content and disciplines (e.g., math, science).	Deep subject knowledge; traditional; easy to organize.	Less flexible; not student- or job-market focused.
Learner-Centered	Focuses on student needs, interests, and learning styles.	Personal development; engagement.	May lack focus on marketable skills.
Problem-Centered	Organized around real-world problems or projects.	Promotes critical thinking and skills application.	Resource-intensive; may lack structure.
Outcomes-Based Education (OBE)	Focuses on learning outcomes and competencies.	Aligns well with job market skills; measurable goals.	Can be rigid; may reduce depth of learning.
Spiral Curriculum	Reintroduces key concepts at increasing levels of complexity.	Builds long-term mastery.	Planning-intensive; not always aligned to job roles.
Integrated Curriculum	Blends multiple subjects into thematic units.	Encourages interdisciplinary thinking.	Hard to assess; alignment with market needs varies.
Competency-Based Education (CBE)	Progress based on demonstrated mastery of skills.	Job-market aligned; personalized pace.	Requires clear assessment methods; tech-dependent. Rigorous market need analysis required.

Table 5. *Key issues in market-oriented curriculum design*

Issue	Description
Skill Gaps	Graduates often lack skills that employers seek. Curriculum needs frequent updates.
Curriculum Lag	Education systems are slower to adapt than the job market changes.
Assessment Challenges	Measuring competencies and soft skills remains complex.
Equity and Access	Not all learners have access to job-oriented programs (e.g., tech, internships).
Teacher Preparedness	Educators may lack up-to-date industry knowledge.
Over-Specialization	Focusing too narrowly can limit broader problem-solving skills.

4. Conclusion and recommendation

The paper has explored and discussed the landscape of UIC for students' preparedness in trends of market's needs in the global (America, Europe, Asia) and local context (Vietnam). Three research questions have been addressed. The findings are based on content analysis methods and discussion is based on the lens of the author and as well as alignment with the current literature. In general, UIC has been implemented strongly since the late 20 century in many developed countries. Although Vietnam has made commendable strides in fostering UIC in terms of policies, and implementation, the identified challenges need further dialogs among the micro, meso and macro levels (i.e., universities, businesses, the MOET, and the government) to maximize the potential of UIC.

The global trend of UIC is increasingly recognized as a vital driver of innovation, graduate employability, and long-term economic benefits. In many fields, including but not limited to services, tourism, logistics, trading or manufacturing - where success is shaped by rapid market changes, customer expectations, and operational agility - UIC is no longer an option but a necessity. UIC enhances the employability of graduates and serves as a powerful force for innovation, helping businesses stay competitive and responsive in increasingly complex environments. Universities serve as powerful partners as they are where new ideas are born; future staffs, leaders are trained, and breakthrough creation of new knowledge is nurtured. This helps companies stay aligned with emerging trends especially in the fields of R&D and newly created knowledge. Beyond tangible benefits, such collaborations also enhance the company's credibility, social reputation and branding. For universities, engaging with industry also ensures that research remains relevant and impactful, while enhancing student outcomes and preparing graduates for the complexities of the modern workforce. However, building effective partnerships is not without its challenges. Academia and industry often operate under different priorities, timelines, and cultural norms. For governments and policymakers, fostering robust UIC is a strategic priority with wide-reaching socio-economic implications and community serving. Such partnerships are instrumental in driving economic development by stimulating innovation, supporting entrepreneurship, and creating high-skilled employment opportunities. Stakeholders' sustainable development need collaborations. It can be the win-win enablers in Vietnam and in countries that share the similar contexts.

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APPENDIX 1

Sq	Topics	Author(s)/ Organization
1.	Why nations fail: The origins of power, prosperity, and poverty	[31]
2.	Industry-university cooperative research centers	[34]
3.	The Bayh-Dole act and scientist entrepreneurship. In Universities and the entrepreneurial ecosystem	[8]
4.	Germany's National Innovation System.	[2]
5.	The Bayh Dole Act, an American Patent Policy in Europe	[10]
6.	The small business technology transfer (STTR) program: Converting research into economic strength	[35]
7.	Centers of Learning: Britain, France, Germany, United States	[13]
8.	Developing global leadership competence: redefining higher education for interconnected economies	[54]
9.	The development of polytechnics in the United Kingdom	[17]
10.	Using the Knowledge Transfer Partnership model as a method of transferring BIM and Lean process related knowledge between academia and industry: A Case Study Approach.	[33]
11.	Do companies benefit from public research organizations? The impact of the Fraunhofer Society in Germany	[15]

12.	Skills-Based Curriculum is an Innovative Way to Respond to the Demands of Globalization	[48]
13.	How market-oriented is French higher education?	[19]
14.	Entrepreneurial university icon: Stanford and Silicon Valley as innovation and natural ecosystem	[11]
15.	Higher education and development in the People's Republic of China, 1958-1966	[25]
16.	Micro-credentials and badges in education: A historical overview	[50]
17.	The Globalization of the Bayh–Dole Act. Annals of Science and Technology Policy	[9]
18.	Gần 300 doanh nghiệp hợp tác đào tạo với Trường Đại học Kinh tế quốc dân.	[39]
19.	Bridging the cultural divide: Trust formation in university–industry research collaborations in the US, Japan, and South Korea	[28]
20.	Efficiency of university–industry collaboration and its determinants: Evidence from Chinese leading universities	[26]
21.	Piecing It All Together: An Examination of Land-Grant History and Contemporary Contexts	[5]
22.	Harnessing university-industry collaboration in Malaysia through industrial training	[38]
23.	University-industry collaboration: A new way of educating future generations of engineers in India	[30]
24.	Adapting industry based curriculum design for strengthening post graduate programs in Indian scenario	[47]
25.	The roadmap for enhancing university–industry research collaboration in India	[29]
26.	Đào tạo nhân lực để phát triển ngành Logistics tại Việt Nam	[42]
27.	Workforce upskilling: can universities meet the challenges of lifelong learning?	[52]
28.	The networks promoted by the framework programme and the questions they raise about its formulation and implementation	[20]
29.	Analyzing Economic Growth Within the Framework of the Knowledge Economy Ecosystem model.	[37]
30.	Student self-perception on digital literacy in STEM blended learning environments	[51]
31.	University–industry R&D collaboration in Korea’s national innovation system	[27]
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33.	Reskilling and upskilling the future-ready workforce for industry 4.0 and beyond	[43]
34.	Teaching global competence: Challenges and opportunities	[53]
35.	Reclaiming the Lost Century of Growth: Building Learning Economies in Latin America and the Caribbean	[12]
36.	Literature review on work-based learning	[49]
37.	Technology and industrial development in Japan: Building capabilities by learning, innovation, and public policy	[22]
38.	Upskilling and reskilling in the digital age: the way forward for higher educational institutions	[44]
39.	Công ty Nhật dốc tiền đào tạo tôi mới ra trường	[46]
40.	The Polytechnic Experiment: 1965-1992	[18]
41.	University-industry R&D collaboration in the United States, the United Kingdom, and Japan	[23]
42.	A Schizocartography of a Redbrick	[16]
43.	Interaction of universities and industrial enterprises in Germany and the United States-a comparison	[14]
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46.	Building innovative university faces many bottlenecks	[45]
47.	University licensing and the Bayh-Dole act	[7]
48.	Vấn đề đặt ra về hợp tác giữa trường đại học và doanh nghiệp	[41]
49.	Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program: Policy Directive	[36]
50	Promoting the Development of the Bridge Between Schools and Businesses	[40]