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Industrial involvement in UAE academic development

Abstract

This research investigates the role of local UAE public and private sector companies in the development of academic institutions. With the UAE's focus on a knowledge-based economy and innovation, collaboration between academia and industry is crucial for economic growth and workforce development. Using a quantitative survey, the study examines current industrial involvement in UAE academic development, including partnerships and initiatives aimed at bridging the gap between academia and industry. The findings offer valuable insights for policy makers, educators, and industry leaders, highlighting key drivers, challenges, and best practices to enhance and establish effective collaborations, ultimately driving socio-economic development and innovation in the UAE. The study used the quantitative methodology to test the hypotheses and to establish the conceptual model using the Integrated Multilevel theory and Technology Enhancement theory by designing the questionnaire to reflect the relationships between the constructs outlined in the conceptual model and emailed to 1080 respondents, including professionals, academics, students, and parents in the UAE.

Keywords: industrial involvement, industry-academia collaboration, academic development, United Arab Emirates (UAE), knowledge-based economy, innovation, partnerships, collaborations, socio-economic development, skills development

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Introduction

The United Arab Emirates (UAE) has experienced rapid economic growth and diversification in recent decades, fueled by strategic investments in various sectors, including industry. As the country continues to position itself as a global hub for innovation and knowledge-based industries, there is an increasing emphasis on strengthening the alignment between academic institutions and industrial stakeholders. This research study aims to investigate the extent and impact of industrial involvement in the academic development landscape of the UAE. By examining collaborative initiatives, partnerships, and engagement models between academia and industry, this study seeks to provide insights into the role of industrial participation in shaping educational outcomes and workforce readiness. The involvement of industry in the academic development of the United Arab Emirates (UAE) has been a cornerstone of the country's strategy to foster innovation, drive economic growth, and ensure the relevance of its education system to the demands of the job market.[1] The UAE government, recognizing the importance of collaboration between academia and industry, has actively promoted partnerships and initiatives aimed at bridging the gap between theory and practice. One of the key ways in which industry has contributed to academic development in the UAE is through collaborative research projects. Universities in the UAE often collaborate with industry partners on research initiatives that address real-world challenges and contribute to technological innovation. These collaborations not only provide valuable funding and resources for academic research but also offer students the opportunity to gain practical experience and engage with industry professionals. Furthermore, industry involvement extends to curriculum development and program accreditation. Many universities in the UAE work closely with industry experts to design curricula that are aligned with the needs of the job market. This ensures that graduates are equipped with the skills and knowledge required to succeed in their chosen fields. Additionally, industry accreditation bodies play a crucial role in ensuring the quality and relevance of academic programs, assuring students and employers alike.[2] Moreover, industry partnerships often extend beyond research and curriculum development to include internship programs, work placements, and industry-sponsored projects. These initiatives allow students to gain hands-on experience in real-world settings, develop industry-relevant skills, and build professional networks. By collaborating closely with industry partners, universities in the UAE can produce graduates who are not only academically proficient but also well-prepared for the workforce. The UAE government has played a central role in facilitating industry involvement in academic development through various policy initiatives and incentives. For example, the government has established funding programs to support collaborative research projects between universities and industry partners. Additionally, the UAE government has implemented policies to encourage private-sector investment in education and promote partnerships between academia and industry.[3] Furthermore, the UAE government has launched initiatives to enhance the employability of graduates and align academic programs with the needs of key industries. For instance, the National Agenda for Emiratization aims to increase the participation of UAE nationals in the workforce by equipping them with the skills and qualifications needed for high-demand sectors. Similarly, initiatives such as the National Innovation Strategy and the UAE Vision 2021 prioritize innovation and technology as key drivers of economic diversification and growth. Through collaboration with industry partners and government support, universities in the UAE are well-positioned to continue contributing to the country's economic development and prosperity. The UAE government has placed significant emphasis on advancing the nation's knowledge economy through initiatives such as Vision 2021 and Vision 2030.[4] Central to these visions is the development of a highly skilled workforce equipped with the competencies necessary to drive innovation and sustainable growth. In pursuit of this goal, there has been a growing recognition of the importance of fostering collaboration between academic institutions and industrial partners. By leveraging the expertise, resources, and real-world

insights of the private sector, educational institutions can enhance the relevance, quality, and practical applicability of their programs. Moreover, industrial involvement in academic development can create pathways for students to gain hands-on experience, access mentorship opportunities, and pursue research projects aligned with industry needs.[5]

Research scope

The research study will look at how UAE businesses work with schools and universities. It will examine existing partnerships and joint projects between academic institutions and industry leaders in the UAE. The study will investigate how these collaborations influence what is taught, how it is taught, and how well it meets industry needs. It will also assess the impact of these partnerships on students' practical skills, job readiness, and employability. Additionally, the research will explore how industry-academia collaborations support research, innovation, and knowledge sharing. Finally, it will analyze the policies and frameworks that guide these collaborations and suggest ways to improve them.

Research objectives

i. To identify and analyze how schools and businesses in the UAE collaborate.

ii. To examine how business involvement shapes curriculum content and teaching methods.

iii. To assess the impact of business participation on students' skill development, job readiness, and employability in the UAE.

Survey of literature

Industry diversity and academic development

The diverse range of industries in the UAE significantly impacts their involvement in academic development. Each sector, from oil and gas to technology and finance, has unique needs and opportunities shaping its engagement with educational institutions. Historically, the oil and gas sector has driven specialized programs and partnerships in fields like petroleum engineering. The tourism and hospitality sector requires programs in hospitality management, while the financial sector's growth fuels collaborations in finance and fintech. Government initiatives promoting a knowledge-based economy encourage partnerships in manufacturing, technology, and innovation. The emphasis on renewable energy has led to collaborations in sustainability and environmental sciences, enhancing educational programs and the UAE's economic competitiveness.[6]

Government policies and economic diversification

Government economic policies in the UAE play a crucial role in fostering industrial involvement in academia, aiming for economic diversification and innovation. These policies provide funding and incentives for research projects, encouraging university-industry partnerships, especially in strategic sectors like renewable energy and healthcare.[7] Policies also support curriculum alignment with industry needs, ensuring graduates are job-ready and fostering entrepreneurship and innovation by backing startups. Such initiatives enhance global competitiveness and attract talent, making the UAE an innovation hub.[7]

Regulatory and governance structures

The regulatory and governance frameworks in the UAE influence the extent and effectiveness of industry-academia collaborations.[8] These frameworks include policies, regulations, and organizational structures that govern the relationship between academia and industry. Clear regulations on intellectual property rights, technology transfer, and research commercialization encourage industry involvement by providing legal certainty and facilitating knowledge transfer.[9] Institutional frameworks also offer research funding and grants, incentivizing joint research initiatives and technological development.[10]

Technology transfer and institutional mechanisms

Many UAE academic institutions have established Technology Transfer Offices (TTOs) to commercialize research outcomes and facilitate technology transfer. These offices support research projects, negotiate licensing agreements, and assist startups. Institutional frameworks also promote industry involvement through mechanisms like industry advisory boards, formal partnerships, and Memoranda of Understanding (MoUs) that align academic programs with industry needs.[11] The collaborations between the Industrial sector and the Academia will ensure that employability skills are imparted to the students.

Academic leadership and strategic vision

Academic leadership is pivotal in fostering industrial involvement. Leaders set strategic visions, prioritize industry collaboration, and allocate resources to support these initiatives.[12] They establish research centers and industry advisory boards to facilitate dialogue and partnerships, encourage faculty engagement in collaborative projects, and drive curriculum innovation to align with industry needs. Academic leaders also advocate for industry-academia collaboration within the community, participating in policy discussions and public events to secure support.[13]

Industry partnerships and practical experience

Industry partnerships are essential for shaping academic development in the UAE. Collaborations between academic institutions and businesses lead to joint research projects, internships, and mentorship programs, fostering knowledge exchange and mutual benefits. These partnerships also inform curriculum development, ensuring alignment with industry needs and enhancing graduates' employability. Internships and industry-sponsored projects provide students with practical experience and professional networks, increasing their readiness for the workforce.[14]

Curriculum flexibility and industry demands

Adapting academic curricula to industry demands is crucial for preparing students for the workforce. Flexible curricula that integrate industry-relevant content and practical experiences ensure graduates possess the skills demanded by employers.[15] This adaptability allows institutions to quickly adjust to industry changes, introduce new courses and technologies, and promote interdisciplinary approaches, making graduates valuable assets to modern industries.[16]

Faculty expertise and engagement

Faculty expertise and involvement in industry-related research and consultancy are vital for successful academic-industry partnerships. Faculty members' knowledge and skills enable effective collaboration on applied research projects, curriculum development, and mentorship.[17] Their engagement with industry partners fosters mutual learning, secures funding, and facilitates technology transfer and commercialization efforts, contributing to innovation and economic growth.[18]

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Student engagement and employability

Experiential learning opportunities, internships, and industry-sponsored projects significantly enhance student's education and employability.[5] Active student involvement in collaborative projects and internships fosters innovation and entrepreneurship, providing practical skills, industry insights, and professional networks. These experiences make academic programs more relevant and strengthen industry-academia collaboration.[19]

Funding and resources

Access to funding sources, research grants, and industry-sponsored scholarships supports collaborative research and industry-aligned educational programs.[20] Adequate funding allows academic institutions to conduct research, develop innovative programs, and engage with industry partners.[21] This financial support enables joint research initiatives, technology transfer, and curriculum development aligned with industry needs, ensuring graduates are well-prepared for employment.[22]

Societal attitudes and cultural norms

Societal attitudes and cultural norms in the UAE, such as the emphasis on entrepreneurship and innovation, significantly influence industrial involvement in academia. Government initiatives like UAE Vision 2021 and the National Innovation Strategy promote collaboration, creativity, and cross-cultural engagement. Academic institutions prepare students for the workforce, while industries engage with academia for talent recruitment and development, driving economic diversification and societal progress.[23]

Global trends and technological advancements

Global trends and technological advancements impact industrial involvement in UAE academic development. Collaboration between academia and industry helps industries remain competitive by providing access to cutting-edge research, talent, and expertise.[24] Technological advances facilitate knowledge exchange and innovation, enabling the development of new products and services. Cross-border partnerships enrich academic programs and foster industry involvement, preparing students for digital transformation and contributing to the UAE's competitiveness and sustainability.[25]

Practical experiences and government initiatives

Globally, industrial involvement in academic development includes providing practical experiences like internships and industry-sponsored projects. These opportunities enhance students' employability and offer insights into their chosen fields. Governments support these collaborations through policy initiatives and incentives, fostering economic growth, and innovation, and addressing 21st-century challenges through education.[26]

Figure 1 displays the conceptual model suggested for this research study and based on which the hypotheses have been formulated.

Hypotheses

H1: There is a significant relationship between Individual factors and the Integrated UAE Industrial-Academic Platform's successful implementation

H2: There is a significant relationship between Organizational factors and the Integrated UAE Industrial-Academic Platform's successful implementation

H3: The National factors influence the Integrated UAE Industrial-Academic Platform's successful implementation

H4: There is a significant relationship between International factors and the Integrated UAE Industrial-Academic Platform's successful implementation

H5: The Technology factors influence the Integrated UAE Industrial-Academic Platform's successful implementation

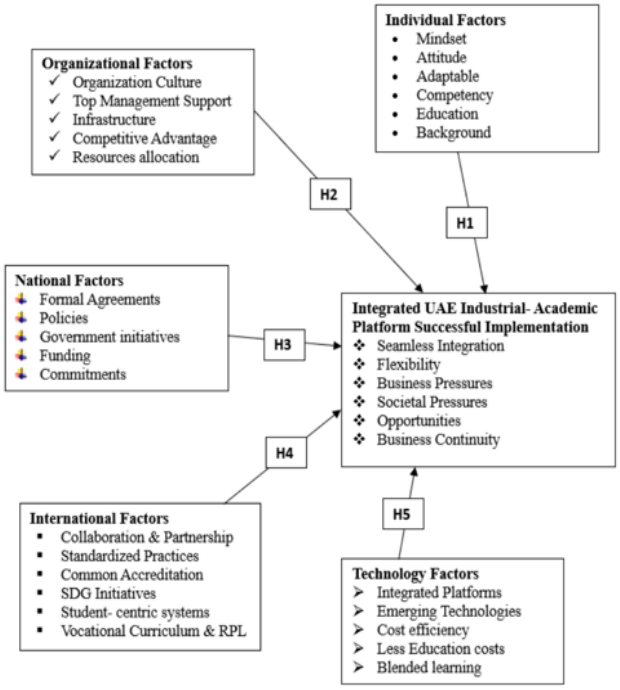

Figure 1 Conceptual model based on integrated multilevel theory and technology enhancement theory.

Source Developed by the Authors

Methodology

The quantitative methodology has been used for this research study as it gives the consensus or rejection on the relationship suggested by the constructs as shown by the hypotheses formulated. The questionnaire (Annexure) was designed to reflect the relationship between the constructs as per the conceptual model and emailed to 1080 respondents (professionals, Academia, students, and parents in the UAE), using the convenient random sampling strategy. The researchers used professional networks like LinkedIn, social media networks of professional groups, and survey groups. The academia, HE student community, and parents (due to the Researcher's connection in UAE HE education last 20 years as an education consultant) networks on ResearchGate, and Academia Studies, which give outreach to these groups using the random convenience sampling strategy. The 433 respondent's data has been collected by Google form and analyzed as tabulated in the section below in Table 1, indicating a response rate of 40%. The sample size would have been increased, across professionals and stratified sampling used, if the study time available would be more. Also, longitudinal sampling would confirm the continuity of these policies in the UAE which could not be attempted by the researchers.

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Table 1 Demographic profile of the participants

Age		
< 15 Years	3.55%	15
16-25 Years	25.83%	109
20-39 Years	35.56%	154
40-50 Years	22.86%	99
51-60 Years	16.16%	70
> 61 years	25.40%	110
Total	100%	433
Income level		
< 5000 AED	3.70%	16
5001 – 10000 AED	53.57%	232
10001– 20000 AED	24.71%	107
> 20001 AED	18.01%	78
Total	100%	433
Gender		
Male	58.43%	253
Female	40.41%	175
Don't want to reveal	1.15%	5
Total	100%	433
Education level		
Schooling	2.77%	12
Undergraduate	17.78%	77
Bachelors	21.24%	92
Masters	26.09%	113
Professional	21.24%	92
Doctorate	10.85%	47
Total	100%	433
Profession		
Self Employed	62	
Trader	109	
Salesman	131	
Entrepreneur	175	
Housewife	33	
Student	98	
Teacher	112	
Advertiser	73	
Social Media User	398	

Source from Google form output- primary data

Quantitative analysis using ADANCO output

Table 1 displays the demographic profile of the respondents who had participated in the survey, and it shows spread across the sections in terms of age group, gender, income level, education level, and profession to mitigate any bias involved in data collection.

Analysis of the measurement model

The analysis of the measurement model is a crucial step in validating the constructs used in the study, ensuring that the indicators accurately represent the underlying theoretical concepts. In this research, the construct validity was assessed using Dijkstra-Henseler's rho (ρA) coefficient. This coefficient is particularly suitable for Partial Least Squares (PLS) path modeling, offering a reliable measure of construct score reliability. A threshold of 0.70 for ρA indicates that the construct is reliable and that the indicators consistently measure the same concept. In this study, the ρA coefficient surpassed 0.75, demonstrating the strong reliability of the constructs, which is a positive indicator of the measurement model's robustness. To further validate the measurement model, convergent validity was assessed through outer loading indicators and the average variance extracted (AVE). Convergent validity refers to the extent to which a construct correlates positively with its associated indicators. Outer loadings represent the correlation between an indicator and its associated construct. In this study, the outer loadings were consistently high, suggesting that the indicators are well-aligned with the constructs they are intended to measure. The AVE is another critical metric for evaluating convergent validity. It represents the average amount of variance that a construct captures from its indicators relative to the amount of variance due to measurement error. An AVE value of 0.50 or higher is generally considered acceptable, as it implies that the construct explains more than 50% of the variance in its indicators. In this research, the AVE values for all constructs exceeded 0.50, indicating strong convergent validity. This means that the constructs in the study are well-represented by their respective indicators and that the model is effective in capturing the intended theoretical concepts. Overall, the measurement model in this study demonstrated robust construct validity and reliability, confirming that the model is well-suited for the subsequent analysis of relationships between constructs (Table 2).[27]

Regarding outer loading, it is recommended to aim for a standardized outer loading of 0.70 or above.[28] Consequently, in this investigation, the indicator variables were scrutinized, revealing outer loading values surpassing 0.7, as depicted in Table 3.

Table 2 Analysis of measurement model

	Convergent validity		**Construct reliability**	
Latent Variables	AVE >0.50	ρA reliability >0.70	Pc reliability >0.70	Cronbach's alpha(α) >0.70
Individual Factors (INDVF)	0.5145	0.7598	0.7431	0.8651
Organization Factors (ORGF)	0.5678	0.7765	0.7578	0.8327
National Factors (NATF)	0.5765	0.8161	0.8089	0.8435
International Factors (INTF)	0.5369	0.7573	0.8327	0.8236
Technological Factors (TF)				
Integrated UAE industrialacademic platform successful implementation (IUIAP)	0.6145	0.8367	0.8121	0.8145

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Table 3 shows the discriminant validity Heterotrait-Monotrait ratio

Construct	Individual factors	Organizational factors	National factors	International factors	Technological factors	Integrated UAE industrial-academic platform successful implementation
Individual Factors						
Organization Factors	0.7432					
National Factors	0.7276	0.7634				
International Factors	0.6871	0.7167	0.7762			
Technological Factors	0.6671	0.6337	0.7115	0.8213		
Integrated UAE Industrial- Academic Platform Successful Implementation	0.5892	0.6135	0.6423	0.7621	0.8422	

Source ADANCO results, 2023

All p-values well below 0.05 strongly confirm the validity of the relationships. The results comprehensively validate all hypotheses as indicated by the data (Table 4).[29]

Table 4 Direct effect interference

Effect	Original coefficient β	Standard bootstrap results		
		t-value	p-value (2-sided)	Supported
Individual Factors-(INDVF)> Integrated UAE Industrial- Academic Platform Successful Implementation (IUIAP) (H1)	0.235	5.8732	0	Yes
Organizational Factors (ORGF)-> Integrated UAE Industrial- Academic Platform Successful Implementation (IUIAP) (H2)	0.351	5.455	0	Yes
National Factors (NATF)-> Integrated UAE Industrial- Academic Platform Successful Implementation (IUIAP) (H3)	0.415	5.886	0	Yes
International Factors (INTF) -> Integrated UAE Industrial- Academic Platform Successful Implementation (IUIAP) (H4)	0.432	7.431	0	Yes
Technology Factors (TF)-> Integrated UAE Industrial- Academic Platform Successful Implementation (IUIAP) (H5)	0.478	6.578	0	Yes
Individual Factors (INDVF)-> Technology Factors (TF) (H6)	0.338	4.873	0	Yes
Technology Factors (TF) -> National Factors (NATF) (H7)	0.612	10.832	0.0211	Yes
National Factors (NATF)-> International Factors (INTF) (H8)	0.436	10.743	0	Yes
Technology Factors (TF)-> International Factors (INTF) (H9)	0.487	5.3213	0	Yes
Individual Factors (INDVF) -> Organizational Factors (ORGF) (H10)	0.445	9.831	0	Yes
Organizational Factors (ORGF) -> National Factors (NATF) (H11)	0.347	8.532	0	Yes

Source ADANCO results, 2023

Table 5 demonstrates that if all Average Variance Extracted (AVE) values are above 0.5, it indicates strong support for convergent validity. This implies that the latent variable being examined accounts for more than half of the variance in its corresponding indicators of belonging, while other latent variables explain less than half. In our study, all AVE values exceed 0.5 (0.5148 and 0.5879), confirming the existence of convergent validity.[28]

Table 5 Convergent validity

Construct	Average variance extracted (AVE)
Individual Factors	0.5456
Organizational Factors	0.5641
National Factors	0.5782
International Factors	0.5823
Technological Factors	0.5148
Integrated UAE Industrial- Academic Platform Successful Implementation (IUIAP)	0.5879

Table 6 displays the evaluations of discriminant validity, which gauges how much a variable correlates with others within the structural model. This assessment is conducted using the Fornell-Larcker criterion and cross-loadings. Notably, the bold figures along the diagonal signify the highest values in both rows and columns, affirming the achievement of discriminant validity, as validated by Adanco.[30]

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Table 6 Discriminant validity

Construct	Individual factors	Organizational factors	National factors	International factors	Technological factors	Integrated UAE Industrial-academic platform successful implementation (IUIAP)
Individual Factors	0.5756					
Organizational Factors	0.5654	0.6534				
National Factors	0.5345	0.6356	0.7786			
International Factors	0.4912	0.6126	0.7398	0.8345		
Technological Factors	0.4453	0.5266	0.6987	0.7564	0.8789	
Integrated UAE Industrial-Academic Platform Successful Implementation (IUIAP)	0.4324	0.4987	0.6375	0.7342	0.7568	0.8978

Table 7 exhibits the cross-loadings, demonstrating how variables influence each other. The Table 8 coefficient of determination (R2) clarifies the degree to which constructs are interconnected within the research. A minimum R2 threshold of 0.2 was established, indicating the relevance and significance of constructs surpassing this value.[28] The findings reveal that the R2 value for successful implementation reached 0.7741, indicating the construct's substantial relevance and significance in elucidating all variables in the study (Figure 2).

Table 7 Loadings of indicator loadings

Indicator	Individual factors	Organizational factors	National factors	International factors	Technology factors	Integrated UAE Industrial- Academic platform successful implementation factors
(INDVF1)	0.6981					
(INDVF2)	0.7045					
(INDVF3)	0.7132					
(INDVF4)	0.7893					
(INDVF5)	0.8156					
(INDVF6)	0.8189					
(ORGF1)		0.5345				
(ORGF 2)		0.5389				
(ORGF3)		0.5561				
(ORGF 4)		0.6459				
(ORGF 5)		0.6891				
(NATF1)			0.7239			
(NATF2)			0.7612			
(NATF3)			0.7439			
(NATF4)			0.6653			
(NATF5)			0.6654			
(INTF1)				0.5654		
(INTF2)				0.6684		
(INTF3)				0.8239		
(INTF4)				0.7564		
(INTSF5)				0.7812		
(INTF6)				0.7972		
(TF1)					0.5643	
(TF2)					0.6458	
(TF3)					0.7246	
(TF4)					0.6769	
(TF5)					0.7348	
(SIDSIF1)						0.6345
(SIDSIF2)						0.6873
(SIDSIF3)						0.6761
(SIDSIF4)						0.7097
(SIDSIF5)						0.7328

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Table 8 Predictive relevance (R2)

Construct	Coefficient of determination (R2)	Adjusted R2
Organizational Factors	0.411	0.375
National Factors	0.478	0.435
International Factors	0.523	0.492
Technology Factors	0.493	0.469
Integrated UAE Industrial-Academic Platform Successful Implementation	0.774	0.738

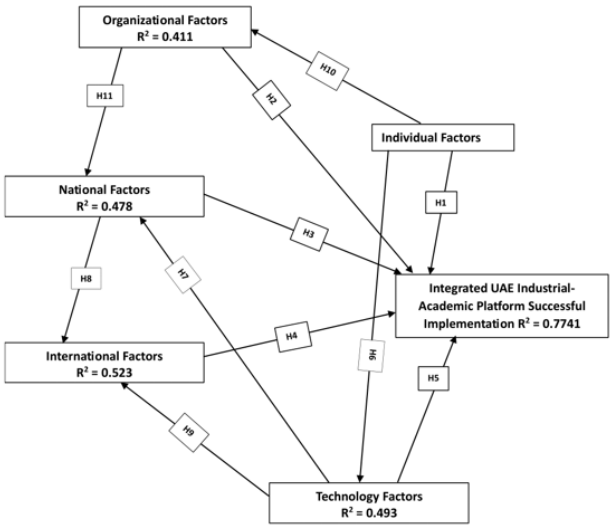

Figure 2 PLS-SEM Validation.

The research framework delineated above has undergone extensive validation and reliability testing utilizing PLS-SEM, marking a significant contribution to this research paper. Through insights gleaned from 433 respondents, who are stakeholders of the industrial and UAE academic integration, the framework has demonstrated its efficacy. This methodology not only addresses the scarcity of relevant data but also lays the groundwork for future researchers to either refine this model or devise similar ones. While established theories hold relevance in contexts characterized by stable economies and equitable access to education, they exhibit limitations during periods of economic downturns, COVID outbreaks, or under-sanction regimes. Consequently, the development of a robust, evidence-based research framework, as exemplified by Lim et al.,[31] becomes imperative to elucidate various factors in such circumstances, thereby facilitating further exploration (Figure 3).

Hypotheses

H1- Individual Factors-> Integrated UAE Industrial- Academic Platform's successful implementation (H1), βINDVF- IUIAP = 0.235, t=5.8732, indicates a strong relationship. A growth mindset fosters continuous learning and innovation, essential for bridging the gap between industry and academia. Positive attitudes towards collaboration and interdisciplinary work enhance cooperation between academic institutions and industrial partners, which is crucial for addressing complex challenges and achieving common goals. Adaptability allows individuals to effectively respond to the dynamic needs of both sectors, ensuring the platform remains relevant and effective. Competency in relevant fields ensures that individuals can contribute effectively by developing innovative solutions and maintaining high standards. A strong educational foundation provides the necessary knowledge and analytical skills to understand and solve industry-specific problems, promoting critical thinking and advanced research. Diverse backgrounds bring varied perspectives and approaches to problem-solving, fostering creativity and innovation. Together, these factors create a robust framework for the successful integration of industrial and academic efforts, promoting innovation, efficiency, and mutual growth in the UAE.

Quantitative Outcomes (All t > 2.59), All the hypotheses is supported based on t values

H1- Individual Factors-> Integrated UAE Industrial- Academic Platform Successful Implementation (H1), $\beta_{INDVF-IUIAP} = 0.235$, t=5.8732, indicates a Strong relationship
H2- Organizational Factors-> Integrated UAE Industrial- Academic Platform Successful Implementation (H2), $\beta_{ORGF-IUIAP} = 0.351$, t= 5.455, indicates a Strong relationship
H3- National Factors -> Integrated UAE Industrial- Academic Platform Successful Implementation (H3), $\beta_{NATGF-IUIAP} = 0.415$, t= 5.886, indicates a Strong relationship
H4- International Factors -> Integrated UAE Industrial- Academic Platform Successful Implementation (H4), $\beta_{INTF-IUIAP} = 0.432$, t= 7.431, indicates a Strong relationship
H5- Technology Factors -> Integrated UAE Industrial- Academic Platform Successful Implementation (H5), $\beta_{TF-IUIAP} = 0.478$, t= 6.578, indicates a Strong relationship
H6 - Individual Factors -> Technology Factors (H6), $\beta_{INDVF-TF} = 0.338$, t= 4.873, indicates a Strong relationship (t > 2.59)
H7- Technology Factors -> National Factors (H7), $\beta_{TF-NATF} = 0.612$, t= 10.832, indicates a Strong relationship (t > 2.59)
H8- National Factors -> International Factors (H8), $\beta_{NATF-INTF} = 0.436$, t= 10.743, indicates a Strong relationship
H9- Technology Factors -> International Factors (H9), $\beta_{TF-INTF} = 0.487$, t= 5.3213, indicates a Strong relationship
H10- Individual Factors -> Organizational Factors (H10), $\beta_{INDVF-ORGF} = 0.445$, t= 9.831, indicates a Strong relationship
H11- Organizational Factors -> National Factors (H11), $\beta_{ORGF-NATF} = 0.347$, t= 8.532, indicates a Strong relationship

Figure 3 Quantitative

H2- Organizational Factors-> Integrated UAE Industrial- Academic Platform's successful implementation (H2), βORGF- IUIAP = 0.351, t= 5.455, indicates a strong relationship. A collaborative and innovation-driven organizational culture facilitates seamless integration by encouraging open communication and idea-sharing between industrial and academic entities, while also promoting flexibility and addressing societal pressures through sustainability and social responsibility initiatives. Top management support ensures that the platform receives the necessary attention and resources, helping to overcome business pressures, seize growth opportunities, and maintain robust business continuity plans. Adequate infrastructure is essential for seamless integration and flexibility, enabling the platform to scale and adapt efficiently to new demands while ensuring consistent performance and stability. Focusing on competitive advantage drives innovation and the adoption of cutting-edge technologies, fostering continuous improvement and agility, which helps navigate business and societal pressures effectively. Proper resource allocation ensures the platform functions optimally by providing the necessary tools and personnel, supporting seamless integration, flexibility, and the ability to manage pressures and capitalize on opportunities, thereby ensuring long-term business continuity. Collectively, these organizational factors enhance the platform's ability to integrate seamlessly, remain flexible, respond to various pressures, seize opportunities, and ensure continuous operation in the dynamic UAE context.

H3- National Factors -> Integrated UAE Industrial- Academic Platform's successful implementation (H3), βNATGF- IUIAP = 0.415, t= 5.886, indicates a strong relationship. Formal agreements between industrial and academic entities establish clear frameworks for collaboration, ensuring mutual goals and expectations are aligned. Supportive policies create an enabling environment that fosters innovation and collaboration, while government initiatives drive strategic priorities and provide essential infrastructure and resources. Adequate funding from both public and private sectors ensures that the platform has the financial stability to invest in cutting-

edge technologies and research. Finally, strong commitments from all stakeholders, including government, industry, and academia, reinforce a shared vision and sustained effort towards achieving long-term goals, thereby enhancing the platform's ability to integrate seamlessly, adapt flexibly, respond to various pressures, capitalize on opportunities, and maintain continuous operations.

H4- International Factors -> Integrated UAE Industrial- Academic Platform's successful implementation (H4), βINTF- IUIAP = 0.432, t= 7.431, indicates a strong relationship. The successful implementation of the Integrated UAE Industrial-Academic Platform is significantly influenced by international factors such as collaboration and partnership, standardized practices, common accreditation, Sustainable Development Goals (SDG) initiatives, student-centric systems, and vocational curriculum with Recognition of Prior Learning (RPL). International collaboration and partnerships facilitate the exchange of knowledge, resources, and best practices, enhancing innovation and efficiency. Standardized practices and common accreditation ensure that the platform meets global benchmarks, fostering credibility and interoperability. Alignment with SDG initiatives ensures that the platform contributes to global sustainability goals, attracting international support and enhancing social responsibility. Student-centric systems and vocational curricula with RPL ensure that education and training are aligned with industry needs, promoting workforce readiness and lifelong learning. Together, these international factors enhance the platform's ability to integrate seamlessly, remain flexible, respond to global pressures, seize international opportunities, and ensure sustainable, long-term success.

H5- Technology Factors -> Integrated UAE Industrial- Academic Platform's successful implementation (H5), βTF- IUIAP = 0.478, t= 6.578, indicates a strong relationship. Integrated platforms streamline the collaboration between industry and academia by providing cohesive and user-friendly systems that enhance communication and resource sharing. The adoption of emerging technologies ensures that the platform remains at the forefront of innovation, enabling cutting-edge research and development. Cost efficiency and reduced education costs make the platform more accessible and sustainable, attracting a broader range of participants and stakeholders. Blended learning, which combines online and traditional face-to-face education, offers flexibility and adaptability, catering to diverse learning needs and schedules. Together, these technological factors support the platform's seamless integration, flexibility, ability to manage costs effectively, and commitment to providing high-quality, accessible education and training, ensuring its long-term success and resilience.

H6 - Individual Factors -> Technology Factors (H6), βINDVF-TF = 0.338, t= 4.873, indicates a strong relationship (t > 2.59). Individual factors significantly influence the technological factors of the Integrated UAE Industrial-Academic Platform through personal engagement, adaptability, skill levels, financial considerations, and learning preferences. The effectiveness of integrated platforms depends on users' engagement and proficiency, enhancing collaboration and resource sharing. The adoption of emerging technologies relies on participants' adaptability and willingness to learn, ensuring the platform stays at the cutting edge. Cost efficiency and reduced education costs are impacted by individuals' financial literacy and priorities, promoting financial sustainability and accessibility. Additionally, personal learning preferences and adaptability to blended learning environments maximize the benefits of combining online and face-to-face education, leading to more effective and personalized learning experiences. Thus, individual factors such as engagement, adaptability, skill levels, and financial considerations are crucial for optimizing the use and impact of technology within the platform.

H7- Technology Factors -> National Factors (H7), βTF-NATF = 0.612, t= 10.832, indicates a strong relationship (t > 2.59). Technology factors such as integrated platforms, emerging technologies, cost efficiency, reduced education costs, and blended learning significantly influence national factors including formal agreements, policies, government initiatives, funding, and commitments. Integrated platforms facilitate the creation of formal agreements by providing a robust infrastructure for collaboration and data sharing between industrial and academic entities. Emerging technologies drive the need for updated policies and regulations that support innovation and ensure the platform's alignment with global standards. The cost efficiency and reduced education costs associated with technological advancements make it easier for governments to justify funding and resource allocation, promoting broader access to education and training. Blended learning supports government initiatives aimed at improving educational outcomes and workforce readiness by offering flexible and scalable learning solutions. Collectively, these technological factors enable the effective implementation and sustainability of national strategies, fostering a supportive environment for the Integrated UAE Industrial-Academic Platform.

H8- National Factors -> International Factors (H8), βNATF-INTF = 0.436, t= 10.743, indicates a strong relationship. Formal agreements and robust policies create a conducive environment for international collaborations and partnerships by establishing clear frameworks and mutual trust. Government initiatives and funding ensure the platform meets global standards, supporting the adoption of standardized practices and common accreditation systems. National commitments to sustainability and education align with international Sustainable Development Goals (SDG) initiatives, enhancing global cooperation and support. Moreover, national support for student-centric systems and vocational curricula with RPL promotes international recognition and integration of diverse educational pathways, fostering a globally competitive and skilled workforce. Thus, national factors drive the alignment and effectiveness of international collaborations and standards, enhancing the global impact of the Integrated UAE Industrial-Academic Platform.

H9- Technology Factors -> International Factors (H9), βTF-INTF = 0.487, t= 5.3213, indicates a strong relationship. Integrated platforms facilitate seamless communication and resource sharing across borders, fostering collaboration and partnership between international entities. The adoption of emerging technologies drives the establishment of standardized practices and common accreditation systems, ensuring interoperability and global recognition. Cost efficiency and reduced education costs enable broader international participation and support the alignment of educational initiatives with SDG goals. Additionally, blended learning offers flexible and scalable solutions for international education delivery, accommodating diverse learning needs and enhancing accessibility. Thus, technology factors play a pivotal role in promoting international cooperation, standardization, and sustainability within the context of the Integrated UAE Industrial-Academic Platform.

H10- Individual Factors -> Organizational Factors (H10), βINDVF-ORGF = 0.445, t= 9.831, indicates a strong relationship. Personal engagement and adaptability shape organizational culture by fostering collaboration, innovation, and openness to change.

Individuals' skill levels and willingness to learn impact top management support, as a skilled and motivated workforce garners greater endorsement and investment from leadership. Financial considerations influence resource allocation decisions, determining the availability of funds for infrastructure development and strategic initiatives. Furthermore, an individual's learning preferences inform the design of educational programs and initiatives, influencing the organization's ability to remain competitive and adaptive in a rapidly evolving landscape. Therefore, individual factors play a crucial role in shaping the organizational environment, ultimately influencing the success of initiatives like the Integrated UAE Industrial-Academic Platform.

H11- Organizational Factors -> National Factors (H11), βORGF-NATF = 0.347, t= 8.532, indicates a strong relationship. A strong organizational culture characterized by collaboration and innovation fosters the development of formal agreements by promoting trust and mutual understanding between stakeholders. Top management support ensures alignment with national policies and government initiatives by prioritizing strategic objectives and providing resources for implementation. Adequate infrastructure supports the execution of government initiatives by providing the necessary technological and logistical capabilities. Competitive advantage drives the formulation of policies that support innovation and economic growth, encouraging investment and participation in national initiatives. Effective resource allocation ensures that funding is directed towards priority areas identified by national strategies, maximizing the impact of government initiatives. Therefore, organizational factors play a crucial role in shaping the national landscape, driving alignment, and contributing to the success of initiatives like the Integrated UAE Industrial-Academic Platform.

All the above findings accept the hypotheses, ensuring that the schools and businesses in the UAE collaborate and that business involvement shapes curriculum content and teaching methods. This would lead to business participation in student's skill development, job readiness, and employability in the UAE.

Scrutiny of industrial involvement in UAE academic development objectives

The research study effectively met its objectives by systematically exploring various aspects of industrial involvement in UAE academic development:

Objective 1: Identifying and analyzing collaborations between schools and businesses

The study investigated different collaborative models, such as partnerships, joint ventures, and internships, between academic institutions and industry stakeholders in the UAE. It highlighted examples across various sectors, including oil and gas, finance, and technology, demonstrating how these collaborations are tailored to meet specific industry needs. This analysis provided a comprehensive understanding of how businesses and schools work together to enhance educational outcomes.

Objective 2: Examining business influence on curriculum content and teaching methods

The study explored how industry involvement directly shapes the curriculum by integrating industry-relevant content, updating teaching methods, and ensuring alignment with current market demands. It looked into the role of industry advisory boards, partnerships in curriculum design, and the incorporation of practical experiences like internships and industry-led projects. This examination showed how curricula are continuously adapted to include the latest technological advancements and industry practices, ensuring students are prepared for real-world challenges.

Objective 3: Assessing the impact on skill development, job readiness, and employability

The research assessed how industrial participation influences students' practical skills and readiness for the workforce. By analyzing the outcomes of industry-sponsored programs and internships, the study demonstrated the positive effects on students' employability and the development of job-relevant skills. It also evaluated how these collaborations enhance graduates' readiness to meet the demands of the UAE job market, contributing to the nation's economic growth.

Overall, the study provided valuable insights into the multifaceted role of industrial involvement in shaping UAE academic development, meeting its objectives by offering a detailed analysis of collaboration, curriculum influence, and student outcomes. The study's results are strongly justified by the rigorous validation of the measurement model, which confirmed the reliability and validity of the constructs used. The Dijkstra-Henseler's rho (ρA) coefficient exceeded the threshold of 0.70, indicating consistent reliability across the constructs, while the convergent validity was established through high outer loadings and AVE values above 0.50, suggesting that the constructs effectively captured the intended theoretical concepts. These findings underscore the robustness of the measurement model, ensuring that the subsequent analysis of relationships between constructs is based on well-validated measures, thereby lending credibility to the study's conclusions regarding industrial involvement in UAE academic development.

Conclusion and recommendation

Implications of this research

The research demonstrates that closer collaboration between industries and schools in the UAE offers numerous advantages, including joint projects, internships, and research initiatives. This partnership equips students with skills that are in high demand, enhancing their job readiness and contributing to economic growth and competitiveness. The findings could inform policymakers on promoting such collaborations through curriculum adjustments, funding allocations, and regulatory changes.[32] Additionally, these partnerships can create tailored programs aligning with industry needs, thus improving employment rates and societal contributions. This collaborative approach fosters inclusivity and innovation, addressing significant issues like healthcare and urban development while strengthening community bonds and enhancing cultural diversity through international cooperation.[33] Managers in both sectors can leverage these insights to form beneficial partnerships, aligning educational content with industry requirements and efficiently utilizing resources. They should advocate for regulatory changes to facilitate collaboration, monitor progress through data, and foster a culture of shared goals and participation.[34]

Limitations and future research

The research findings might be specific to the UAE context and may not directly apply to other regions with differing socio-economic, cultural, or industrial settings. Limitations in sample size and representation could lead to biased results or incomplete insights into industry and academic perspectives. If more time had been available for the study, the sample size would have been increased, including

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more professionals, and stratified sampling would have been used. Additionally, constraints in data collection methods, such as surveys or interviews, might affect the reliability of findings due to potential self-reporting biases or incomplete datasets. Time limitations could hinder a comprehensive exploration of factors or the longitudinal analysis of industrial involvement's impact on academic development. Furthermore, the research might focus narrowly on certain aspects, potentially overlooking other influential factors. Future research avenues include conducting longitudinal studies to track industrial involvement's long-term impact, comparative analyses across regions for best practices, and qualitative research for deeper insights into partnership dynamics. Assessing the direct impact on outcomes like employability and innovation, exploring stakeholder perspectives, evaluating policy effectiveness, and studying emerging trends are essential for a more comprehensive understanding and informed policymaking in industrial involvement in academic development.

The contribution and originality

Value of the research

The research fills a gap in understanding industrial involvement in academic development within the UAE, offering original insights for future studies and policymaking. It empirically investigates the unique dynamics of this involvement, examining motivations, challenges, and outcomes. Contextualizing findings within the UAE's context, provides a nuanced understanding of industrial-academic partnerships, aiding in global comparisons. Stakeholders, including policymakers and industry leaders, benefit from informed decision-making on strategies to enhance collaboration. The research fosters dialogue between industries and academia, facilitating effective partnerships and driving innovation. It contributes to economic growth by strengthening linkages, promoting a skilled workforce, and supporting innovation and entrepreneurship. Additionally, it advances academic research, providing a foundation for further exploration and interdisciplinary collaborations in this area.

Conclusion

In summary, the Multi-level Integrated Process theory provides a comprehensive framework for understanding the drivers of industrial involvement in UAE Academic Development. This research sheds light on the complex dynamics of collaboration between industries and academic institutions in the UAE, offering valuable insights into their motivations, challenges, and outcomes. It underscores the significance of fostering closer ties between industries and academia to foster innovation, talent development, and economic growth. By identifying mutual areas of benefit and addressing challenges, stakeholders can forge more effective partnerships and capitalize on shared opportunities. Moreover, this study underscores the importance of considering the contextual factors shaping industrial-academic collaborations within the UAE's unique socio-economic and cultural landscape. This nuanced understanding not only contributes to the existing knowledge base but also facilitates comparisons with global trends and best practices. Ultimately, the findings of this research hold significant implications for policymakers, industry leaders, academic administrators, and educators, providing actionable insights to enhance industrial involvement in academic development. By implementing strategies aimed at strengthening these partnerships, the UAE can consolidate its position as a hub for innovation, entrepreneurship, and sustainable development, thereby enriching society as a whole. The findings highlighted the crucial role of collaboration between academia and industry in driving academic and industrial development in the UAE. The integration of industrial and academic sectors through platforms like the one discussed presents significant opportunities for knowledge exchange, innovation, and skills development, contributing to the growth of both sectors and enhancing the nation's competitiveness on a global scale. However, several challenges were identified, including cultural differences, resource constraints, and the need for policy alignment. To overcome these challenges and capitalize on opportunities, policymakers must prioritize the creation of supportive frameworks, incentives, and funding mechanisms to facilitate collaboration. Practical recommendations for stakeholders include fostering a culture of collaboration, investing in infrastructure and research facilities, and promoting industry-relevant education and training programs. Nonetheless, the study acknowledges limitations in data availability and generalizability, underscoring the need for further research to deepen understanding and refine strategies for effective collaboration between academia and industry in the UAE.

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Conflicts of interest

The authors declare that there is no conflict of interest.

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