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Exploring University-Industry Collaboration for Technological Innovation in Nigeria

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Abstract
University-industry collaboration (UIC) is a key driver of technological innovation and economic development. However, there are many challenges and barriers that hinder effective and sustainable UIC in developing countries, such as lack of trust due to skill gap, policies, finance/incentives and infrastructure. This paper aims to explore the existence of UIC that promotes technological innovations in Nigeria. A mixed-methods approach that combines quantitative and qualitative data from both university and industry was applied via online Google form questionnaires. Obtained results were analyzed using SPSS software. Results show that out of 185 respondents, 79.5% indicate that UIC exists in their establishments. Only 4.1% of the observed data was based on technological innovation while 38.4% was based on undergraduate students' industrial training (IT) attachments. There is no strong evidence of significant linkage between universities and industries that promotes research that would lead to technological innovation and solve existing industrial problems. Among other recommendations, a good working policy should be instituted and enforced to ensure proper and effective UIC to promote the Nation's technologically innovative research and development.
Keywords: University-Industry Collaboration (UIC), technological innovation, developing countries, R&D, Nigeria

1.0 Introduction
Technical Innovation is developing new ideas, products, services, and processes which make use of technology (Audrey Paul Ndesaulwa, and Jaraji Kikula, 2016). Technological advancement plays a vital role in stimulating economic growth, enhancing competitiveness, and advancing society. In today's fast-paced and ever-changing global environment, promoting innovation has become critical for countries, sectors, and organizations. Developed countries that are highly technological in the world invest so much in technological innovation through the collaboration of industry with academia (Bramwell, A. and Wolfe,2008). A crucial factor driving innovation is the cooperation between universities and industries, where academia and businesses come together to share knowledge, resources, and expertise.

University-industry collaboration is of great interest to researchers, policymakers, and industry leaders but little or no effort has been made on its impact on technological innovation, especially in developing countries like Nigeria. The three main catalysts for cultivating innovation within any organization include; the industry, which is acknowledged as a "creator of economic well-being," the university, also recognized as a "spring of innovative concepts," and the government, perceived as a "supervisor of public matters." The Government comes amidst the university and the industry (Sutrisna et al., 2021). The framework known as the "triple helix model" according to Leydesdorff in 2018, unites these three crucial stakeholders to clarify the structural progress within knowledge-based economies. This collaborative effort has gained considerable recognition as a way to bridge the divide between academic research and real-world implementation, expediting the transformation of scientific breakthroughs into marketable offerings.

Nevertheless, knowing the importance of collaboration, there has been an increasing inclination towards establishing alliances and joint ventures between universities and industries. This collaborative methodology strives to leverage the synergistic capabilities of both domains, fostering technological innovation, boosting competitiveness, and tackling practical obstacles. UIC can come in different forms and can be examined from different points of view as stated by Morufu Abolaji Ali and Joshua Oluwasuji Dada, 2011. Collaboration between universities and industries was categorized based on continuous learning, business undertakings, knowledge transmission, research, and education (Thune, 2011). It was established that one of the major causes of unemployment in developing countries like Nigeria is that most University graduates are unemployable due to the mismatch between university curricula and industrial needs (Segun Joshua et.al., 2015). One of the study's recommendations highlighted the significance of engaging industrialists in crafting curricula and enlisting their involvement in delivering hands-on courses, potentially in a part-time capacity, within Nigerian universities. When this is done, Nigerian graduates will acquire the essential skills for the industrial sector of the economy.

2.0 Literature Review

Multiple studies have explored the nature, mechanisms, and outcomes of University-Industry collaborations, striving to comprehend the factors that affect their effectiveness and the ways in which they contribute to innovation. However, nothing or little is known regarding the current condition of university-industry collaboration (UIC) in developing countries especially on Technological innovations. (Schiller & Lee 2015), did an analysis that compares University-Industry Collaboration (UIC) among different Asian emerging and developing economies. The industry and Universities collaboration is progressively seen as a means to enhance innovation by facilitating the exchange of knowledge (Samuel Ankrah and Omar AL-Tabbaa,2018). UIC is the motor for innovation (Lundberg and Oberg,2021). Universities are responsible for producing, transmitting, and diffusing knowledge (Sutrisna et al., 2021) while the industries are Regarded as the key factor in converting research and innovation into concrete products and services (Mirza et al., 2020). Discrepancy between academic curricula and the demands of the industrial sector in the economy are among the major factors contributing to an annual influx of graduates with uncertain employment prospects (Segun Joshua et al., 2015). Partnerships between academic institutions and industries, such as licensing and university-driven entrepreneurship, cultivate innovation in high-tech domains (Tian, M,2022). (Cudic et.al., 2022) examined the links between university-industry collaboration (UIC) predictors and the results of UIC cooperation.

The study concentrated on University-Industry Collaboration (UIC) within European Union member states and Western Balkan countries. By employing partial least squares structural equation modeling (PLS-SEM), the researchers analyzed data from three years, 2015 to 2018. The outcomes indicated that nations that invested in UIC displayed enhanced UIC performance. The statistical analysis performed in the study identified investments in knowledge, networking, and research and development (R&D) as the primary influential factors affecting UIC performance, as concluded by the authors. (Malik et.al., 2021) carried out an exploratory study to identify the latest barriers that impede University-Industry Collaboration (UIC) in Pakistan as well as outlining some recommendations to elevate such partnerships in developing countries, by introducing Empirical data gathered from Pakistan through a questionnaire survey encompassing twenty-four universities, conducting twenty-five interviews with industry managers, and extracting outcomes from a high-level workshop event. It was observed that a lack of synchronization between governmental bodies, universities, and industrial enterprises presented an obstacle to the successful transfer of knowledge between academia and industry. (Obanor and Kwasi-Effiah, 2013) conducted a survey to determine the issue of technology transfer between schools of engineering and sciences in universities and industries within the north-central, south-south, and western regions of Nigeria. Appropriate persons were asked a range of questions, and the investigation exposed a notably low level of technology exchange and collaboration between the predominant industries and universities in this particular geographic area. The factors contributing to this situation of UIC collaboration were underlined and recommendations were put forth to enhance technology transfer and collaboration effectively within Nigeria.

In a study conducted in 2010, Nieto and their team investigated how technological collaboration influenced the innovation efforts of technology-based firms (TBFs) (Nieto et.Al.,2010). They probed the effects of diverse technological partners on various facets of innovation results. Furthermore, they gave particular attention to the pivotal role played by universities in influencing the dynamics of technological partnerships. Their empirical research relied on the data from the Technological Innovation Panel (PITEC) spanning the period from 2004 to 2007. It was observed that the duty of universities is suitable for achieving findings from the exploration. Notwithstanding, the growing awareness of the importance of University-Industry collaboration, there is still a need for a deeper understanding of its impact on technological innovation as it plays a vital role in any country's economic growth and advancement. Existing research provides valuable insights, but there are gaps that need to be addressed. There is a need to examine the impact of this UIC on the technological innovation of a country.

Therefore, this research paper aims to add to the existing pool of information by examining the impact of University-Industry collaboration on technological innovation. Case studies, empirical data, and relevant literature will be analyzed, this study seeks to provide an extensive understanding of the end result, challenges, and good practices related to such collaborations. In this study, the term "industry" encompasses both private and government-owned companies, as well as governmental entities like Ministries, Departments, and Agencies (MDAs). On the other hand, the term "university" includes both traditional universities and research institutes. Technological Innovations play a significant role in the nation's economic landscape, as they allow the making of scientific discoveries, improving production, and creation of new products (Maxim Pasholikov and Georgy Dudakov,2020). The findings of this research can help policymakers, academic institutions, and industry management in designing powerful plans and policies that stimulate fruitful University-Industry collaborations and propel technological innovation for social and economic benefit.

Generally, investigating the impact of University-Industry collaboration on technological innovation is very important for improving our understanding of how the collaboration between academia and industry can be utilized to create a vibrant innovation ecosystem. By unraveling the dynamics and examining the various dimensions of these collaborations, we can unlock new opportunities for knowledge exchange, and technology transfer, and ultimately, shape a future where research and industry coalesce to drive transformative innovation.

Hence, this paper presents the outcomes of an investigation aimed at assessing the existence of UICs that impact technological innovation in Nigeria. The goal is to establish a basis for improvement and map out a forward trajectory. The paper begins with a review of relevant literature, followed by an explanation of the research methodology and the presentation of research findings. This is followed by an analysis and discussion of the results, culminating in a conclusion that includes recommendations.

Some of the Challenges of Universities and Industries Collaboration in the Country

1. Lack of policies on University-Industry collaboration: National policy and innovation systems linking universities and industries should be made and implemented.
2. Financial implications: lack of funding for research and development activities for both universities and industries.
3. Lack of sustainability: Once there is a change in government, some collaboration and innovations stop.
4. Knowledge transfer and skill gap: Inability to share or disseminate knowledge When people find it difficult to apply the skills they've gained through training or practice in real-life, practical situations
5. Over-dependence on foreign innovation and technologies: Industries felt that consumers rely more on foreign innovation and technologies and this hinders the development of university-industry collaboration.
6. Academic Autonomy/ industry influence.

The research objectives are to:

1. Evaluate the present condition or state of university-industry collaboration in Nigeria.

2. Identify the challenges of effective university-industry collaboration in Nigeria.

3. Assess the impact of collaboration on technological innovation in the country.

4. Analyze the socio-economic implications (generally) of university-industry collaboration in the country.

5. Develop strategies and recommendations for effective University-Industry collaboration in Nigeria.

3.0 Methodology

This research investigated the impact of UIC on technological innovation in Nigeria. The study employed a survey research methodology. Primary data was gathered by distributing a structured questionnaire to targeted and relevant stakeholders. A sample of 185 respondents was selected using a stratified random sample technique. Prior to this, essential information was gathered through an extensive literature search and review. This process laid the groundwork for defining the criteria and variables utilized in formulating the questionnaire. In the context of the research, the population under scrutiny pertains to a database of firms engaged in engineering and technology practices, academia in universities, and research institutes located in the study area. In this study, Engineering and technology-based firms (scattered all over the country) represent the industry/company while University /Research institutes (is the University or institutions scattered all over Nigeria) represent the university. The study area covered about 20 states out of the 36 states and the federal capital in Nigeria. These states include Lagos, Ondo, Osun, Enugu, Anambra, Imo, Abia, Bayelsa, Abuja, Niger, etc. These states were chosen on a random basis as there is no particular reason for the choice of these states. The universities used in this study were chosen based on those that offer Engineering and Technology related courses. And some of them are the University of Nig. Nsukka (UNN), Enugu State University of Science and Technology, Enugu (ESUT), Nnamdi Azikiwe University Awka, Federal University of Technology Owerri (FUTO), University of Lagos (UniLAG), Federal University of Technology, Akure (FUTA), Projects Development Institute (PRODA) among others.

A total of 124 Practicing firms in the 20 states were surveyed. A complete enumeration of the lecturers in the selected institution was utilized for the academia as a preliminary examination of the respective institutions, their combined count amounted to 59. The questionnaire was thoughtfully designed with the aim of supplying responses to the research questions and achieving the impact of university-industry collaboration on technological innovation in Nigeria's study objectives. The inclusion of a cover letter with the questionnaire ensured that all respondents were adequately informed about the study's necessity and rationale, thereby meeting ethical requirements. They were also guaranteed that the data given was strictly for research purposes only. The questionnaire which was developed for online responses using Google form comprises two segments. The first segment comprises general information about the respondents, while the second segment addresses issues related to the study's objectives. The options chosen by the participants comprise dichotomous questions (yes or No) and subjective questions (Questions that invite open responses). The data collected underwent analysis in SPSS, which involved methods like creating frequency distributions, calculating percentages, and determining mean scores, and conclusions were drawn. The analysis was done using SPSS (Statistical Package for the Social Sciences), also known as IBM SPSS Statistics, a software package used to analyze statistical data. Frequency was used in this research as it showed whether the observations were high or low and also whether they were concentrated in one area or spread out across. Numerous research endeavors have utilized similar statistical approaches when analyzing survey findings.

4.0 Results

4.1 Place of Work

Outcome of the section one of the questionnaire which exposes the respondent's personal information which qualifies them as suitable respondents to this study is shown in tables 1 – 4. The online, google form responses were analyzed using the SPSS.

Table 1: Place of work of respondents

Place of work		Frequency	Percent	valid Percent	Cumulative Percent
Valid	Industry	124	67.0	67.8	67.8
	University	59	31.9	32.2	100.0
	Total	183	98.9	100.0	
Missing	System	2	1.1		
Total		185	100.0		

From Table 1, it can be seen that a total of 185 respondents' information concerning the place of work was collected out of which, 67% are from industry, and 31.9% are from University/Research institutes. This gives a total of 183 valid responses from the targeted University and industry workers with only 2 invalid entries. This is an indication that the research questionnaire was localized to only the targeted respondents to avoid biased or irrelevant responses.

4.2 Qualification

The aim of seeking the qualification of respondents is to ensure that they have all passed through a higher institution and are knowledgeable enough both by education and experience to respond to the subject matter. The response gotten from the area of qualification are analyzed in Table 2.

Table 2: Highest qualification of participants.

Highest qualification		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	1.1	1.1	1.1
	Bsc/HND	69	37.3	37.3	38.4
	1;2	1	.5	.5	38.9
	Msc	73	39.5	39.5	78.4
	PhD	40	21.6	21.6	100.0
	Total	185	100.0	100.0	

The bulk of the respondents (39.5%) had a master's degree (M.Sc) in their various fields, followed by a Bachelor of Science B.Sc/HND (37.3%), then 21.6% had a Ph.D. Based on this background information, the participants were deemed eligible and capable of furnishing the required data for the study, and the information they supplied can be considered trustworthy.

4.3 Area of service

In other to determine if the respondents are technically inclined or not, the area of service was also collected, and results shown in Table 3.

Table 3: Area of Service.

Area of service		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Technical	146	78.9	80.7	80.7
	Non-technical	35	18.9	19.3	100.0
	Total	181	97.8	100.0	
Missing	System	4	2.2		
Total		185	100.0		

An analysis of the area of specialization of the participants (Table 3) shows that 78.9% of respondents have obtained technical training (Engineering/technologist) and also work in the technical department while only 18.9% work in the non-technical department/managerial positions. The interview revealed that these staff have at one time worked as technical staff and grown to managerial positions. Since the research focuses on technological innovation, the majority of the respondents come from technical backgrounds gives a better opportunity for deep insights into the subject matter.

4.4 Existence/Nonexistence of UIC

The first research question asked was aimed at ascertaining the existing/nonexistence of linkage between the University and Industry. This is a Yes or No question to know if there is any form of University-Industry Collaboration. Table 4 shows the responses gotten.

Table 4: The awareness of University-Industry collaboration in Nigeria.

Is there any form of University-Industry collaboration in your establishment		
		Frequency & Percentage
	Yes	147 (79.5%)
	No	36 (19.5%)
Missing	System	2 (1.1%)
Total		185

Summary of the response of Table 4 indicate that UIC exist because 79.5% of the respondents answered YES while 19% answered NO while 1.1% were silent.

4.5 Types of UIC

It was necessary to understand the type of collaboration that exists between the University and the Industry. This was why this question was raised to ensure a better evaluation of the case study. Table 5 shows the responses on the form of UIC that existed in the different institutions and industries used for this study. Ten different forms of UIC were considered and they include; Industrial Training (IT) which is a requirement by Nigerian Universities Commission (NUC) for Engineering students in their 4th year to have an experience working in the industries, Research and Development (R&D) which include the industry having a R&D unit which may or may not be linked to the University, Consultancy whereby qualified University staff who teach and supervise students also serve as consultants to the Industry, Industrial staff training whereby qualified staff of the industry also serve as visiting lecturers to the university, Tech transfer, whereby there is a technological transfer between the industry and the university, sponsored research which is situation where industry sponsor research that solves the problem existing in the industry, shared facilities where the industry share their facilities with the university for the purpose of students education and vice versa, scholarship which means the industry investing on the education of students, technological innovation which means industries taking their technological problems tom the university for innovative solution and finally, infrastructural development whereby the industry invest in development of infrastructures like laboratories for training students.

Table 5: Form of UIC

What form of UIC is existing in your institution/industry			
		Responses	
		N	Percent
Forms of UIC	IT	113	(38.4%)
	R& D	53	(18.0%)
	Consultancy	25	(8.5%)
	Industrial Staff Teaching	14	(4.8%)
	Tech. Transfer	20	(6.8%)
	sponsored Research	21	(7.1%)
	Shared facilities	9	(3.1%)
	Scholarship	12	(4.1%)
	Technological Innovation	12	(4.1%)
	Infrastructure development	15	(5.1%)
Total		294	(100.0%)

Result of Table 4 shows that majority of the collaboration between University and Industry (38.4%) is through Industrial attachment (IT) which not even up to 30% of the students from different Universities get placement in Engineering firms. The other 70% of student get attached to places like business centers and non-engineering outfits. Only 18% of respondents agreed that UIC existed in the area of research and development (R&D) while 4.8% is on industrial staff teaching in the university. The list of all forms of collaboration under study is on technological innovation with a value of 4.1% which shows an obvious weakest form of existing collaboration. This means that there is little or no form of linkage between the problems in the industry and the research going on in the university. This will make it very difficult for any innovative research that addresses the existing problem in the industry.

4.6 Challenges of University-Industry Collaboration

Some challenges of effective UIC in Nigeria were also considered and presented in Table 6

Table 6: Some of the challenges of effective UIC

What are some of the challenges of effective university-industry collaboration in the country?			
		Responses	
		N	Percent
Challenges of UIC	A policy of the Company/University	19	(33.9%)
	Over-dependence on foreign innovation and technologies:	5	(8.9%)
	Financial implication	11	(19.6%)
	Academic Autonomy/Industry Influence	3	(5.4%)
	Lack of sustainability	6	(10.7%)
	Knowledge transfer and skill gap	12	(21.4%)
Total		56	(100.0%)

It can be observed from Table 5 that the major challenge to effective UIC is University/industry policy, skill gap, and financial implication. To achieve effective university-industry collaboration, there is a need to have a policy for the linkage enforcing industries to contribute their quota in the areas of student education/training. There should be mandatory industrial posting from time to time during student training. Skill gap being the second highest challenge show that there is a wide gap between the teaching in the university and the required skill for the industrial workforce. This shows that even the industry may not be confident enough that the innovative solution to their industrial problems can be researched gotten from the university. Finance is another issue that may hinder UIC because for the industrial staff to teach in the university, payment may be required, and vice versa. These and more challenges are what may hinder an effective UIC in Nigeria but in all, if a good policy capturing this collaboration is put in place, it can be achieved.

4.7 Socio-economic implications of university-industry collaboration

The socio-economic implication of UIC was also tested and responses summarized in Table 7.

Table 7: The socio-economic implications of university-industry collaboration in Nigeria.

What are the socio-economic implications of university-industry collaboration on technological innovation in the country?			
		Responses	
		N	Percent
Socio-Economic implications	Knowledge Exchange	31	(18.3%)
	Research and Development	16	(9.5%)
	Technology Transfer	23	(13.6%)
	Industry relevance	32	(18.9%)
	Talent Development	43	(25.4%)
	Economic Growth and Development	10	(5.9%)
	Societal Impact	14	(8.3%)
Total		169	(100.0%)
a. Dichotomy group tabulated at value 1.			

Table 6 shows that the highest socio-economic impact that will be gotten from UIC was on talent development. The innovative ability of Nigerian youths will be developed and graduates will become better employable and relevant to the industry.

4.8 Impact of UIC on Technological Innovation

Respondents' opinion was sampled to determine if the university-industry collaboration has any impact on technological innovation and their responses are summarized in Table 8.

Table 8: Impact of UIC on Technological Innovation

Do you think the university- Industry Collaboration will have any impact on technological innovation?			
		Frequency	Percent
	Yes	180	(97.3)
	No	2	(1.1)
	System	3	(1.6)
Total		185	100.0

The result of Table 7 shows that 97.3% of 180 respondents believe that UIC has an impact on technological innovation.

5.0 Discussion

However, nothing or Limited information is available regarding the current condition of university-industry collaboration (UIC) in developing countries especially on Technological innovations. (Schiller & Lee,2015). However, there is a study that examined UIC's impact on firm innovation but with biased estimations as the inter-firm relationship was not considered (Mingyu Tian et al.,2021). This study investigated the impact of UIC on the technological innovation of university research as well as industrial solutions. The study result of Table 4 indicates that a significant proportion of the respondents, precisely 79.5%, reported the existence of University-Industry collaboration within their establishments. This finding suggests that collaboration between universities and industries is prevalent and actively taking place in the real world. The high percentage of respondents affirming its presence lends strong support to the notion that this collaborative relationship is a tangible and practical aspect of their respective organizations or institutions. The data provide empirical evidence that validates the existence and importance of University-Industry collaboration in fostering partnerships, knowledge exchange, and innovation between academic institutions and industrial sectors. Table 5 shows that the bulk of this collaboration between the university and industry is on industrial training placement occurring in the 4th year of engineering undergraduate study. This type of collaboration at this level, adds little or no value to technological innovation because real research occurs at the postgraduate level in Nigerian institutions.

The information presented in Table 6 highlights the distribution of challenges faced in University-Industry collaboration in Nigeria. According to the data, the most significant challenge is related to the policies of both companies and universities, accounting for 33% of the reported challenges. This suggests that the lack of aligned policies and practices between academic institutions and industrial organizations poses a considerable obstacle to effective collaboration. Insufficient government policies concerning University-Industry linkages is a big problem. It is essential to establish a national policy and innovative system that fosters strong connections between universities and industries. Moreover, there is a critical need for effective implementation of these policies to facilitate successful collaborations between the two sectors. The implications of these findings are substantial. The data suggests that addressing policy differences between universities and industries should be a top priority in fostering successful collaboration. Clear and coherent policies, regulations, and guidelines need to be established to facilitate smoother interactions and partnerships between the two sectors.

The second most prominent challenge, with a percentage of 21.4%, is related to knowledge and skill gaps. This indicates that there is a notable disparity in the expertise and competencies between universities and industries, making it challenging to bridge the gap and effectively collaborate on research and innovative projects.

The finding that 19.6% of the respondents identified financial implications as a challenge holds valuable insights regarding the perceptions and experiences of the participants in the study. This percentage suggests that a substantial proportion of the respondents recognize and acknowledge the presence of financial constraints as a critical obstacle in the context of University-Industry collaboration in Nigeria. The implications of this financial challenge are multifaceted. For universities and academic institutions, limited funding may hinder their capacity to invest in research and development activities, acquire state-of-the-art equipment, and attract talented researchers and industry collaborators. Insufficient financial resources can also curtail the ability of universities to offer relevant and innovative educational programs that align with the needs of industries and the job market. On the other hand, industries may face financial constraints that hinder their capacity to engage in research and development partnerships with universities. They might be less willing or unable to invest in collaborative projects, which can hinder the advancement of innovative solutions and the commercialization of research findings. Furthermore, the financial challenge may also affect the overall sustainability and longevity of University-Industry linkages. If the financial burden outweighs the perceived benefits of collaboration, institutions, and organizations may be less motivated to continue or initiate such partnerships. By recognizing and addressing the financial challenges associated with University-Industry collaboration, stakeholders can work towards creating a more supportive environment that fosters successful partnerships, knowledge exchange, and innovation, ultimately contributing to national development and economic growth in Nigeria.

The analysis of the socio-economic implications of university-industry collaboration on technological innovations in the country was conducted with a primary focus on the economy, recognizing its pivotal role in the overall development of any nation. A considerable percentage of respondents (25.4%) emphasized the importance of talent development as a result of university-industry collaboration. This finding suggests that such collaborations play a crucial role in nurturing and enhancing the skills and expertise of individuals, including students, researchers, and industry professionals. Nearly one-fifth of the respondents (18.9%) highlighted industry relevance as an essential implication of university-industry collaboration. This implies that collaborative efforts between academia and industries contribute to producing research and innovations that are directly applicable and beneficial to various industrial sectors. Such relevance enhances the practicality and real-world impact of research outcomes, leading to the development of products, services, and solutions that address industry challenges and societal needs.

A significant proportion of participants (18.3%) emphasized the importance of knowledge exchange resulting from university-industry collaboration. This implies that when universities and industries collaborate, there is a reciprocal sharing of expertise, information, and best practices between the two entities. Academic institutions can gain valuable insights into industry trends and challenges, while industries can access cutting-edge research and academic knowledge, fostering a symbiotic relationship that promotes mutual growth and advancement. The data revealed that technology transfer was identified by 13.6% of the respondents as an important implication of university-industry collaboration. This suggests that collaborative efforts facilitate the transfer of technological know-how and intellectual property from academic research to industrial applications. This transfer can lead to the commercialization of innovative technologies, creating new market opportunities, and driving economic growth. The implications of these findings are substantial and hold significant potential for national development. University-industry collaboration can foster a dynamic ecosystem that nurtures talent, encourages innovation, and accelerates technological advancements. By addressing industry needs and sharing knowledge, collaborative efforts can lead to practical solutions, boost economic competitiveness, and contribute to the overall progress and prosperity of the country. These implications highlight the importance of nurturing and supporting strong partnerships between academia and industries as a means of driving sustainable development and growth in the nation.

The data on developing strategies and recommendations for effective University-Industry collaboration in the country provides valuable insights into the perceptions of respondents regarding the potential impact of such collaborations on technological innovation. According to the findings, an overwhelming majority of

participants, precisely 97.3%, expressed a positive outlook on the influence of University-Industry collaboration (UIC) in driving technological innovation in the country. This high percentage indicates a strong vote of confidence from the respondents, suggesting that they firmly believe that fostering partnerships between academia and industries can have a substantial and positive effect on technological advancements in Nigeria. The implications of this data are highly encouraging. It signifies that key stakeholders, including researchers, industry professionals, policymakers, and educators, are enthusiastic about the prospects of collaborative efforts between universities and industries. This collective optimism bodes well for the future of technological innovation in Nigeria.

With such a strong consensus, there is a clear mandate for action and the development of strategic initiatives to promote and enhance University-Industry collaboration. Based on the data, it becomes evident that there is a strong appetite for strengthening these partnerships to capitalize on the vast potential for technological advancements and economic growth. Furthermore, establishing platforms for regular communication and collaboration between universities and industries can facilitate the exchange of ideas, expertise, and resources, leading to more effective partnerships and impactful outcomes.

6.0 Conclusion

This paper has investigated the existence of UIC that promotes technological innovations in developing countries using Nigeria as a case study. Results obtained have shown that there are different kinds of UIC in existence in Nigeria majority of which was on the industrial attachment of undergraduate students and the least was on technological innovation with a value of 4.1%. This means that there is little or no existing link between the University and the industry in solving existing industrial problems so as to promote technologically innovative research. The overwhelmingly positive response from the participants, with 97.3% acknowledging the potential impact of University-Industry collaboration on technological innovation in Nigeria, provides a solid foundation for future endeavors. By harnessing this positive outlook and channeling it into actionable strategies, Nigeria can pave the way for a thriving ecosystem of research, innovation, and economic progress driven by effective University-Industry collaboration. Future work would include a UIC implementation framework that would promote technological innovation in developing countries.

7.0 Recommendations

1. Moving forward, it is imperative for stakeholders, including governments, academic institutions, and industries, to work together to establish a conducive environment for University-Industry collaboration. This involves creating supportive policies, promoting knowledge exchange platforms, and providing financial support to foster research and innovation.
2. Addressing the financial implications of University-Industry collaboration requires strategic efforts from various stakeholders. Governments and policymakers could play a crucial role in creating funding mechanisms and incentives that encourage both universities and industries to collaborate. This may include grants, tax incentives, or public-private partnership initiatives aimed at promoting research and innovation. Moreover, fostering a culture of innovation and entrepreneurship within academic institutions and industries can help diversify funding sources through research grants, industry-sponsored projects, and technology commercialization.
3. By working together, universities and industries should create tailored educational and training programs that align with the needs of the job market, ensuring a workforce equipped with relevant and up-to-date knowledge and skills.
4. In light of these findings, stakeholders should focus on developing comprehensive strategies and recommendations that address the challenges identified in the study while building on the existing positive sentiment. Creating an environment that fosters knowledge exchange, talent development, and technology transfer becomes imperative to maximize the benefits of UIC.
5. Government bodies should take a proactive role in formulating policies that incentivize collaborative research and technological innovation projects.

6. Academic institutions should work towards aligning their curriculum with industry needs to produce graduates who are well-equipped with relevant skills and knowledge. Industries, on the other hand, can actively engage with academia to identify research opportunities and drive technology commercialization.

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