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The Need for Partnership Between the University and Industry: Nigerian Perspective

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Abstract:

Background: Partnership between the university and the industry is now seen as an inevitable vehicle for the modern world's knowledge-driven innovative and competitive socio-economic and technological milieu.

Description: The traditional role and stereotyping of the university as only academic and the industry as profit-based is no longer sustainable in light of the emergence of a worldwide knowledge-based economy driven by world-leading research universities in symbiosis with an industrial sector that thrives on innovative knowledge exchange.

Lessons learned: The world's developed economies have increasingly sustained university-industry collaborations for socio-economic growth, but the same cannot be said of West African countries, especially Nigeria. Myriads of developmental challenges currently facing Nigeria, not least of which is unemployment, especially the issue of unemployable university graduates and the depletion of the manufacturing/industrial sector.

Conclusion: This paper aims to identify the developmental issues that call for the urgent need for university-industry partnership, as a socio-economic and technological development vehicle.

Keywords- University-Industry partnership, co-production of valuable commercial knowledge, associated challenges, Nigerian Perspective, future agenda,

I. Introduction

A partnership is an established relationship between two or more parties, working together to achieve a shared goal. The shared objectives are clearly outlined to ensure all parties agree and align with the common purpose (Leal Filho *et al.*, 2024). University-Industry Partnership (UIP) comprises interactive collaborations between the university and industry to encourage the transfer or exchange of knowledge and technology. It also refers to any type of cooperation between universities and industries to jointly develop new products, processes/methods, and services or to improve on existing ones (Ankrah and Al-Tabbaa, 2015). The university's traditional role is to enrich knowledge and develop human capital. The industry, on the other hand, is interested in profit-making through socio-economic development. The dynamic nature of the world dictates that knowledge is not static and that profit-making is driven by competitiveness. These global tendencies have, therefore, imposed some pressures on both the university and the industry towards enhancing innovation, as the basis for rapid growth and competitiveness (Oyelaran-Oyeyinka and Adebowale, 2012).

On the part of the universities, such pressures include the emergence of discoveries or knowledge, increasing running costs and funding needs, and societal expectations. For the industry, some pressures are intense competition in the business world, changing customer's needs and preferences, and an increased rate of technological advancement (Ankrah and Al-Tabbaa, 2015). The pressures on both university and industry that have led to the parties embracing innovation have also led to the need for strategic partnership between the parties. In many developed countries in Europe, America, and Asia, UIP has considerably increased, with attendant positive impacts on socio-economic development. Except in South Africa, the level of UIPs in African countries, including Nigeria, is still weak (Siyanbola *et al.*, 2012; Mgonja, 2017).

II. The University and the Industry: Focus

A. Focus of the University

The university is regarded as a center of academic excellence, primarily dedicated to advancing theoretical knowledge. The university traditionally focuses on human capital production through education and knowledge generation. It embarks on this role through teaching and learning processes, research, workshops, seminars, conferences etc. The university is traditionally knowledge-based in its traditional role, universities through open knowledge transfer or exchange, have made positive impacts on the industrial

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sector through the discovery of new products and processes, improvements on existing products and processes, provision of human capital as graduates that are employed in the industry and in addition through the permanent movement of personnel from university to the industry or temporary movement like sabbaticals, secondments, etc. The increasing demand for the practical application of acquired knowledge highlights the vital role of research in addressing real-world challenges. This research is essential for driving innovation, enhancing student learning through hands-on experience, and contributing to economic growth by transforming academic insights into marketable solutions. This shift highlights the importance of fostering partnerships between universities and industry (Ankrah and Al-Tabbaa, 2015; Mgonja, 2017, Wang, 2023). The need for research funding, sustainability, and the quest to produce human capital trained for specific industrial demands, as well as the increasing societal expectations that the university should drive the socioeconomic advancement of a nation have necessitated UIP (Ankrah and Al-Tabbaa, 2015; Mgonja, 2017).

B. Focus of the Industry

The industry focuses primarily on innovation, efficiency, and cost-effectiveness. Industries are inspired by the need to create new products, improve processes, and offer value to consumers while staying ahead of the competition. This often encompasses adopting cutting-edge technologies, optimizing supply chains, and responding quickly to market demands. Furthermore, industries prioritize workforce development and collaboration with academic institutions to ensure a steady channel of skilled professionals and relevant research that can be translated into practical applications. The industry is profit-oriented. It, however, aims at this goal through socio-economic development and social responsibility. These include employment of human capital, including university graduates, endowment in university, student scholarships, research grants, students industrial training, etc. However, due to the increasing level of competitiveness in the industrial sector, changing customer's preferences and needs, increasing new products with innovative appeals, the unemployment rate particularly in developing countries, including Nigeria, and the so-called unemployable graduates among others, the need for UIP is now compelling (Ankrah and Al-Tabbaa, 2015; Mgonja, 2017).

Figure 1 illustrates the relationship between the University and the Industry as a synergistic partnership to yield innovative discoveries and products. In developing countries, like Nigeria, there still exists some gap between the universities and the industry as shown in Table 1.

Skill gaps in the job performance of university graduates indicate a mismatch between university output and labour market needs. A synergistic relationship known as UIP is a collaboration between institutions and industries. The UIP can achieve university goals through research, industrial training for students, support for development projects, joint curriculum development, and enhancing students' interactions with industry professionals thereby improving their employability (Joshua *et al*., 2015; Eniola-Arigbe, 2022).

Collaboration between university and industry can be drawn back to the 1800s that has significantly enthused novelty research, industry development, and economic growth since 1970, and studies on the academy-industry relationship have been focused on for the past two decades (Etzkowitz *et al*., 2000; OECD, 2002). More so University and industry collaboration advances technologically, at a lower cost and with less inherent risk. It also provides access to a greater breadth and depth of knowledge and technologies than would usually be possible through internal development. However, for universities, the benefits include additional public and private funding, and increasingly, licensing and patenting income, due to technology transfer activities (Tina-Barnes *et al*., 2002).

III. Importance of University-Industry Partnership

The UIP creates opportunities for the development of new ideas, products, and technologies that drive economic growth. Through UIP, academic knowledge can be effectively merged with industrial problem-solving, leading to the co-production of valuable commercial knowledge (Edmondson *et al*., 2012; Siyanbola *et al*., 2012). Similarly, new challenges are evolving every day, as a result of changes in the society and dynamicity of the world, increasing the complexity of challenges faced daily, necessitating the need for well-developed research concepts in keeping up with the pace of this fast-changing world. Partnership with industries opens the university to complex problems faced by the industries. The positive mix of industrial knowledge with an academic curriculum spanned through UIP enables students, faculty, and industry personnel to co-produce new knowledge having commercial value (Edmondson *et al*., 2012). Researchers are aligned with the evolving demands of the global market by UIP, ensuring that the university contributes relevant solutions to emerging challenges. The panacea to the problem of graduate unemployment, particularly in Nigeria and other developing countries is UIP. Through UIPs, degree courses in universities are exposed to competition in the industrial sector through increased student mobility and the interaction of students with industrial personnel. These interactions and networks are useful in making employment easy for students after graduation (Ankrah and Al-Tabbaa, 2015).

In conclusion, the university-industrial partnership is vital for fostering innovation and building a skilled workforce, equipping graduates with the competencies to meet industry needs. The UIP offers mutual benefits to universities and industries, contributing significantly to societal advancement (Table 2).

IV. Challenges Associated with University-Industry Partnership

Several challenges or drawbacks have been identified by many authors that could mar the success of a UIP. It is generally accepted that the benefits derivable from UIP by far outweigh the challenges. Nonetheless, it is still imperative for both the university and

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industry to take cognizance of these challenges to make adequate administrative and legal arrangements to forestall them or mitigate any loss (Rybnicek and Konigsgruber, 2019). The following are some of the challenges associated with UIP:

1. **Trust building among all the stakeholders is "sine qua non" to the success of collaborative research initiatives**

Prospective partners need to create sufficient time to establish mutual trust because mistrust can lead to suspicion and breakdown of the partnership. Previous experiences of working together, and past collaborative credentials among other considerations can go a long way in establishing mutual trust (Rybnicek and Konigsgruber, 2019).

2. Raising awareness of the added value of UIP

In most developing countries, particularly Nigeria, the Government is the greatest financier of universities and the most important influential body in the industry. It is, therefore, important that sufficient awareness be created for the Government and also the public to appreciate the benefits and added value of UIP. This is pertinent because generally in Nigeria and most other developing countries, governmental support is often required to establish a partnership between the university and the industry (Hemmert *et al*., 2014)

3. Managing expectations among all the stakeholders and finding common ground

Partners in UIP may, sometimes, have different or unrealistic expectations. It is, therefore, important that partners harmonize their respective expectations before signing the UIP agreement to prevent any future disagreement that may hamper the success of the UIP (Rybnicek and Konigsgruber, 2019).

5. Developing comprehensive collaborative research strategies at the institutional level

The involvement and active interest of the top managerial levels in the respective partner organizational structure is vital to the success of UIP. This is because the required funding, policy framework, and enabling environment will have to be provided by the top decision-makers (Rybnicek and Konigsgruber, 2019).

6. Finding the right people

Having highly and suitably qualified personnel for the implementation of the UIP project is another important challenge that must be well-considered before embarking on UIP. Prospective partners must ascertain their human resource capabilities as suitable for the accomplishment of the objectives of the planned UIP before embarking on the agreement (Myoken, 2013).

7. Finding the required infrastructure

Access to the required facilities, such as laboratories and equipment, libraries, etc is necessary for the achievement of the objectives of the UIP. Some equipment is expensive and the partners may have to agree to a shared-use equipment arrangement (Bychkova, 2016).

8. Dealing with intellectual property rights

There must be a contract (or legal agreement) between the parties to a UIP, which clearly explains the arrangement, roles, responsibilities, and ownership. This contract will assist in reducing future conflicts, establish mutual trust, and prove useful in measuring the success of the UIP. The problems regarding patents, project ownership, royalties, etc can also be solved by a proper legal agreement before the commencement of the UIP (Xu *et al*., 2014; Ankrah and Al-Tabbaa, 2015).

9. Dealing with administrative procedures and negotiating agreements

The bureaucratic and inflexible structure of the universities as opposed to the flat hierarchical organization in the industry could hamper the success of UIP, if not properly harmonized. To overcome this barrier, it is advocated that researchers should feel personally responsible for the UIP project (Franco and Haase, 2015). Also, project management experts can be hired to enhance the coordination and communication between partners (Rajalo and Vadi, 2017).

10. The problem of commitment

Commitment has to do with how well individuals in the contracting parties identify with the partnership and its goals and their willingness to put in sufficient effort and time in accomplishing the success of the UIP. It is important to have a mutual commitment to achieve the success of UIP (Rybnicek and Konigsgruber, 2019).

11. Access to resources

Resource is an important requirement for the success of UIP. Resources include funding, equipment, staff, and time made available for the UIP. It is generally agreed that the quality and success of UIP are greatly influenced by the amount of resources a partner (usually the industry partner) can provide (Rybnicek and Konigsgruber, 2019). Timing can be a challenge when the partners have different ideas of time issues, or when the short–term orientation of industry research is not adequately addressed and readjusted to suit the purpose of the UIP.

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V. Gaps Between University and Industry in Nigeria

Graduate Unemployment

According to the National Bureau of Statistics (NBS) (2018), Nigeria's unemployment rate has been increasing in recent years from 5.0% in the fourth quarter of 2010 to 23.5% in the third quarter of 2018 (See Fig 2). The situation of under-employment looks even gloomier. A current dimension of the unemployment problem in Nigeria is ex-student unemployment, which refers to the unemployment of graduates of universities and other higher institutions. The NBS has made post-secondary education's unemployment rate synonymous with graduate unemployment. It has always been higher than the national unemployment rate and in addition higher than that of any other educational group since 2012 (National Bureau of Statistics, 2018) (Table 3). Factors that have been identified as responsible for graduate unemployment include inadequate manpower planning, the proliferation of universities (both public and private), availability of cheap or free labour through the National Youth Service Corps (NYSC) scheme, economic problems, the declining number of manufacturing industries and the fact that some Nigerian graduates are half baked and thus unemployable (Aminu, 2019). Also, there are some opinions that some of the course curricula in Nigerian universities are no longer relevant to (or are out of tune with) the needs of the industrial sector and therefore not able to address the Nigerian economic challenges (Joshua *et al*., 2015). Largely, there is inadequate connection and interaction between academics and industry players. This also contributes to the problem of graduate unemployment. The National University Commission posited that the disequilibrium between labour market demands and skill of graduates is an important factor responsible for the problem of graduate unemployment in Nigeria. Joshua *et al*. (2015) suggested UIP as a solution to the problem of graduate unemployment as well as a way of improving research and innovation, teaching and learning, and knowledge transfer.

The UIP promises to be bridging the gap between the university and the industry. The UIP provides an appropriate interface between the university and industry, which involves interactive and collaborative arrangements between the parties for the achievement of certain mutually inclusive goals and objectives.

VI. Formation of University-Industry Partnership

Several models or frameworks for the formation of UIP have been reported by different authors. The prospective parties would have to choose a model best suited to their peculiar needs and the nature and purpose of the collaboration. The simplicity or complexity of the organizational form of a particular partnership will determine the number of steps or stages (Table 4) that the partnership formation will undergo (Ankrah and Al-Tabbaa, 2015). For this review, the model by Ankrah and Al-Tabbaa (2015) will be used to explain UIP. This model was adapted from the Mitsuhashi model for business-business alliance formation. This model is presented in Table 4.

Furthermore, for the formation of UIP, it is necessary for the university to do the following, among other important considerations:

1. Identify promising areas of opportunities for partnership with the industry;
2. Make provision for both long-term and short-term strategic partnerships that will be flexible enough to address the changing interests/needs of both parties;
3. Make clear agreement on the intellectual property rights or ownership of the patent to avoid any acrimony; and
4. Make provision for regular dialogues through meetings, seminars, workshops, lectures, etc to facilitate cordial relationships and regular review of achievements.

VII. Partnerships and Sustainable Growth

A. University-Industry Partnership: the case of the Lagos State University

The Lagos State University (LASU) is a public university established in 1984 and owned by the Lagos State Government. The university, sometime in 2016 started a partnership/collaboration with industries, called "ready-set work". The collaboration was funded by the Lagos State Government. The goal of the partnership was to expose the university students to industrial skills and to help them develop an entrepreneurial spirit. Toward the end of their program, the students were made to develop innovative business ideas and proposals which were defended. The best ten proposals were selected and students who wrote the successful proposals, on graduation, were given grants to develop the proposals for business enterprises. This partnership made employment in the industry easier for the students due to the interaction and network they had developed during the UIP program. Many of the students also turned out to establish individual businesses.

On the part of the academics, those who served as resource persons on the "ready-set work" program was able to make additional income as honoraria. The university and industries involved in the program received grants to procure the necessary infrastructure for the program.

B. University-Industry Partnership: the case of the University of Ibadan

University of Ibadan is Nigeria's oldest university founded in 1948 and *soaring highest* amongst other universities in Nigeria and, perhaps, in the sub-region. The university is the First and maintains the Best tertiary education in the country due to its antecedent of excellence in community engagements, teaching, and research and by the distinction of its people – students, faculty, the alumni

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community, and friends (individuals and corporate) – all of whom have contributed immensely to greatness over the years. The University of Ibadan invested in research on food including fish, animals, and crops to help promote food security in Nigeria. Additionally, with help from the university's Endowment Fund and the Nigerian government's Tertiary Education Trust Fund, UI built an International Conference Center and upgraded its maternal program (Adapted from UI Document).

The University of Ibadan signed a Memorandum of Understanding with Zucchini Fashion Center on July 19, 2021, to foster collaboration between the academia and the fashion community to advance industry development and facilitate economic prosperity. The Industrial and Production Engineering Department, University of Ibadan established and equipped a garment laboratory to support its research work in garment production with an overall view of providing practical solutions for the fashion industry. To ensure a handshake with the fashion business community, and the continued sustenance of the Garment Lab. a commercial contract was signed with Zucchini Fashion Center, as managing partner and administrator of the Lab. The contract of engagement stipulates that Zucchini Fashion Center shall collaborate with the Industrial & Production Engineering Department for the utilization of the Lab. to support students' training in garment production and technology; support research work in garment and clothing accessories design and production; support in-house capacity building; promotion of the University in the garment and fashion industry (Adapted from UI Document). Table 5 shows other world-leading universities in partnership with the industry.

VIII. Operation of University-Industry Partnership

When a UIP agreement has been formed, there are some important operational activities necessary to make the partnership effective and actualize its set objectives. These operational activities are interactive and they facilitate cordial relationships between the partners. Communication is a key element during the operation of a UIP and the frequency is an important factor in creating a common understanding (Rybnicek and Konigsgruber, 2019). Contacts and actions should not be limited to the managerial level but should extend to the operational level as well through regular interactions, continuous feedback mechanisms, mutual information exchange, and updates on new developments (Wu, 2017). These can be achieved through regular meetings, electronic communications, seminars, conferences, workshops, etc. Table 6 gives the summary of major activities during the operation of a UIP.

IX. Future Agenda of Collaboration Between the University and Industry in Nigeria

Partnerships between the university and industry can be planned in many ways such as (i) Contract Research, in which the university will conduct research in an IT-related area where they have expertise but the effort is focused, and funded, by the industrial partner; (ii) Collaborative Research, in which the university and industrial sector make an active contribution to the research activity; (iii) Sponsored Research, in which the industrial partner does not necessarily feed creatively into the research, but is expected to fund the project; (iv) Graduate Fellowships/ Studentships, in which the industries may help shape the student's research goals for the award of a degree; (v) Student Projects and Placements, in which students from the university spend some time in the company on gainful activity and benefit in terms of getting first-hand experience on real-life issues affecting the industries and even enhancing their employability; (vi) Sponsored and Honorary Posts and Secondments, in which students can diffuse knowledge into companies and business people can do the same into universities; (vii) University Consultancy and Associated Commercial Services, in which universities academic staff devote a proportion of their time to external work to provide consultancy services for external customers; (viii) Clubs and Networks set up by an individual university or by an outside agency to help shape the direction of the research carried out by academics; and (ix) Job security, in which companies and universities develop close relations which makes it possible for graduates to secure jobs with ease in such companies (Adapted from Ankrah and Al-Tabbaa 2015; Rybnicek and Konigsgruber, 2019; Chiemeke and Ukaoha 2023).

X. Quantitative Data on the Outcomes of Existing Partnerships Between Nigerian Universities and Industries

Quantity surveying operations and activities are knowledge-based and fit well into the so-called "knowledge society" or "knowledge economy" (Sutrisna *et al.,* 2021). The findings of Alli and Dada (2023) show university-industry collaboration (UIC) in the quantity surveying profession in Nigeria to ascertain the situation and chat the way forward. One hundred and twenty-six (126) respondents were sampled in their research: 52 university lecturers and 74 quantity surveying firms. Of these, 32 university lecturers (61.54%) and 34 quantity surveying firms (45.95%) provided valid responses. The result of this study as indicated in Table 7 shows that collaboration was very strong in student industrial placement and research cooperation between industrialists and academic researchers. However, collaboration in funding and staff exchange was found to be poor. This indicated the areas where efforts should be concentrated in maximizing the benefit of UIC.

Based on these findings, the following recommendations are put forward by Alli and Dada (2023). Foremost, there is need for sustenance and perfection in the documented areas of strength. The current policy of students' industrial placement, in the teaching curriculum, should be sustained and the industry should continue to fortify the cordial research collaboration with the students and academic researchers. Furthermore, the funding assistance agenda (from the industry) should be well encapsulated to assist the universities in their research pursuit. In this regard, the government can make a devoted funding assistance policy with the industry, whereby any business enterprise taking a contract from the government can be made to pay a certain percentage of their annual turnover to a "trust fund" dedicated to research sponsorship in universities. Finally, the issue of staff exchanges and transfer of knowledge, between the industry practitioners and academic staff, should be critically looked into. On the part of the university, there can be a policy such as "Teacher Industrial Works Experience (TIWES)" as it obtains for the students which is yielding

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positive results. The same can be endorsed and inculcated as part of staff continuous professional development and re-training initiatives for the teachers (academic staff). On the part of the industry, the practitioners can synergize with the university by creating a platform for them to periodically teach in the academic institution. With this, they will be able to contribute to the training of the students on the basis of the strength of industrial experience. The University and Industry should create a conducive atmosphere for this arrangement to flourish for their mutual benefit and the good of the society at large.

XI. Contribution to Curriculum Development and Student Training

Regarding curriculum development and student training, the work of Osei-Poku and his co-workers (2018) which focused on teamwork between clothing and textile industry and the academia, provides a sound insight. A purposive sampling technique was used for their study and data were collected using interviews with semi-structured interview guides and observation. The qualitative sample size for their study was twenty-two (22), made up of academia and industry. The respondents considered industrial attachment as the main and beneficial means of collaboration between the clothing and textile industry and the academia, focusing on student training. Standard practices or models do not guide current efforts to establish cooperation between the two bodies around student training. The industry is expected to employ people with skills, proficiencies, and knowledge that can be useful for industry. The training institutions are also anticipated to train graduates that will fit into the industry's requirements. Therefore, training students should be the reciprocated concern of both parties. Lack of one party's involvement will create a gap in students' training. Institutions should regularly invite the industry to make an input whenever there is a curriculum review. Industry's involvement would also enhance collaboration between the two bodies based on a certain model. The perception of a lack of a model in the system calls for the discovery of a model to support the establishment of such collaborations in our context.

The existing understanding and relationship between the two bodies can serve as the basis for further collaboration, particularly in the areas of curriculum development and programme planning. Osei-Poku *et al.* (2018) affirmed the positive impact between the clothing and textile industry and the academia, with reference to curriculum development and student industrial training. The curricula of the training institutions need to be able to respond adequately to the new skills/competencies that the industry requires. Incorporation of new skills into the curriculum would enable the products of the institutions to meet contemporary expectations. For this reason, there is a need for the industry and the training institutions to see themselves as one body training students for a common goal. There should be a committee from institutions with representatives from industry to be in charge of planning and organization of collaboration between curriculum development and student training institutions and industry to consider possible up-front challenges that can affect the success of collaborative effort by the two bodies.

XII. International Comparisons of Successful University-Industry Collaboration Models in Developing Countries

Universities are frequently designated as engines for growth, creating skills and research outputs that are significant sources of innovation for the industries, particularly in some industrial parks. This justify the need for different countries to practice University-Industry Collaboration (UIC) and which can be adopted by developing countries to hasten economic growth.

United States legislation permits universities to license their patents to industry, wholly or non-wholly. Royalties, received by the universities for such licensing, are used for supplementary research and education as well as for rewarding the inventor(s) (Mowery, 1999; Demain, 2001; Mowery and Sampat, 2005; Maldonado *et al.*, 2010). This has revolutionized the relationship between academia and industry. By comparison with those of Germany, Japan, France, and the United Kingdom, the U.S. higher education system has been much larger throughout this century. Almost any international comparative analysis shows that the number of students and the number of institutions is much greater than in these other industrial economies. The U.S. government's major policy innovation of the 1980s is the establishment of the National Science Foundation's (NCF) Engineering Research Centres (ERCs) programme which fosters improved university-industry research and development collaboration. The engineering research centres stand out among other university-industry research and development programs for the breadth of their objectives related to changing the conduct of academic engineering research and education with an emphasis on pre-competitive generic research (Feller *et al*., 2002).

The growing interest in patenting and licensing inventions by Canada promote "spin-off" companies, which undertake contractual research for industry, and explore other means of enhancing communication and collaboration with industrial researchers in important projects in a few large companies with university-industry agreements. It is important to point out that during the 1990s federal and provincial agencies were introduced to meet the needs of high-technology for small and medium enterprises, marking a reference that the support would not only be for major industries (Branscomb *et al*.,1999; Liévana, 2010). Current debates around university–industry collaborations in Canada are engrained in the longstanding perception that Canadian industry lacks in innovation, and fails to exploit the country's scientific achievements. Such concerns have become a repeated theme in federal science and technology policy since the 1980s. Even though the participation of business in the national research and development effort has expanded since the 1980s, it is still regarded as weak in contrast with other leading economies such as the USA, Japan, South Korea, and the UK.

China began its University-industry partnership in 1950"s (Neru, 2005). China's research and development expenditure has been growing steadily in the last decade in spite of their yet strong use of imported technologies. This has led to an improvement on their university and research systems, producing about 350,000 engineers every year. The patenting system is, however, still lacking in a number of areas, which might prevent further investment (Neru, 2005; Maldonado 2010; Zhao and Wu, 2017).

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According to Sá (2013) little is known about the associations between universities and industry in Africa. Universities in developing countries, and Africa in particular, are thought to lack the ability to engage more actively with industries.

XIII. Conclusion

This paper has identified certain pressures on university and industry as well as societal issues, particularly graduate unemployment in Nigeria that compel the need for UIP. The challenges associated with UIPs are also identified but the position remains that the benefits of UIP far outweigh the challenges and that UIP is a veritable solution to many developmental issues confronting Nigeria and other developing countries.

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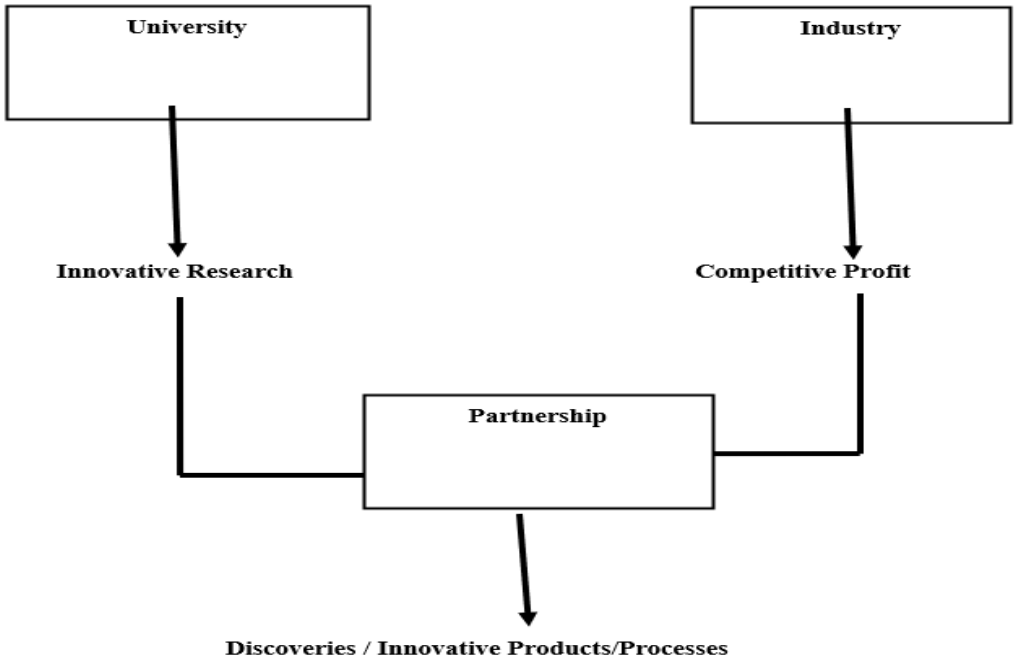

Fig 1: University-Industry Partnership

Adapted from Siyanbola *et al*. (2012); Rybnicek and Konigsgruber (2019)

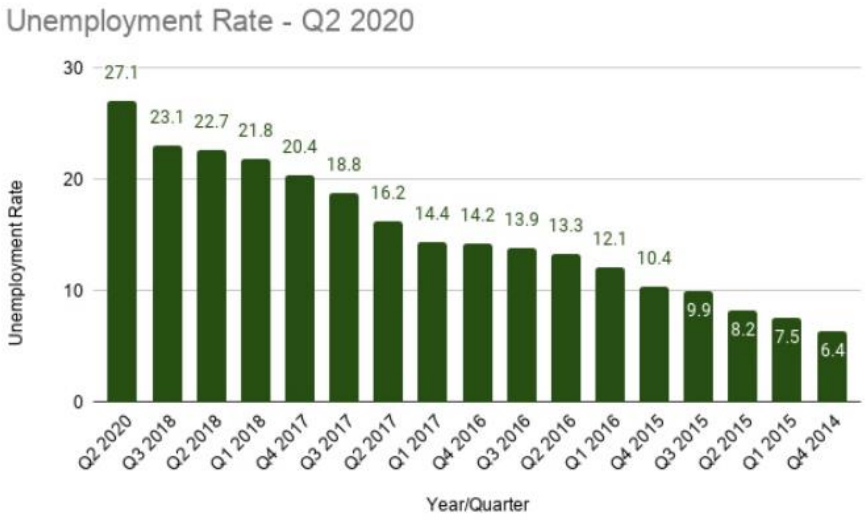

Fig 2: Nigeria unemployment rate from 4th quarter, 2014 to 2nd quarter, 2020.

Source: National Bureau of Statistics (2020)

Table 1: Gap between the university and industry

University	Industry
Aims at best solution to maximise their recognition to minimise their risk	Aims at the economic solution
Willing to take the highest risk to create new solution with high innovation rate with minimal risk	Interested only in proven solution
Has a long perspective	Interested in short term goals
Knowledge-driven	profit-oriented
Strives for peer recognition and excellence satisfaction	Strives for survival through customer

Adapted from Ankrah and Tabbaa (2015); Rybnicek and Konigsgruber (2019)

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Table 2: Benefits of university-industry partnerships to the contracting parties

University	Industry
New discoveries and addition to body of knowledge	Development of innovative products, technology and processes
Enrichment of teaching and research	Increased profitability
Increased funding and improved financial resources	Risk sharing for innovative and problem solving research
Enhancement of excellence and Reputation	Enhancement of reputation and brand
Improved service to the community	Improved social responsibility
Contribution to the national economic growth	Promotion of economic development of the nation and enhancement of wealth creation
Training and employment opportunities for students	Employment of more skilled graduates with greater added value
Joint publications with industry	Joint publications with university
Opportunities for industries to influence the development of particular lines of University researches	Creation of access to specialized consultancy, identification of specific problems and provision of relevant solutions
Building of credibility, trust and Reputation for university researchers among peers	Provision of legitimacy for industry products
Patents, licensing incomes	Patents, prototypes etc
Improvement in laboratory infrastructure, additional income to university researchers	Access to cutting edge technologies and research expertise and infrastructure

Adapted from Ankrah and Al-Tabbaa (2015); Joshua *et al*. (2015); Mgonja (2017)

Table 3: Nigeria unemployment and graduate unemployment statistics from 2015 to 3rd quarter 2018

Period	Unemployment Rate (%)	Rate of Quarterly change (%)	Post Secondary or Graduate Unemployment Rate (%)	Rate of Quarterly Change (%)
2015q1	7.54		8.6	
Q2	8.19	0.66	9.72	1.12
Q3	9.9	1.71	11.71	1.99
Q4	10.44	0.54	12.37	0.66
2016q1	12.09	1.64	14.18	1.81
Q2	13.32	1.24	23.2	9.02
Q3	13.88	0.56	23.28	0.09
Q4	14.23	0.35	23.67	0.39
2017q1	14.44	0.21	16.66	-7.02
Q2	16.18	1.74	27.96	11.3
Q3	18.8	2.62	31.78	3.82
Q4	20.42	1.62	25.65	-6.13
2018q1	21.83	1.41	30.3	4.65
Q2	22.73	0.9	32.45	2.15
Q3	23.13	0.4	29.75	-2.7

Source: Nigeria Bureau of Statistics (2018)

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Table 4: Formation process for University-Industry Partnership

Stages	**Steps**
Stage 1: Partnership Identification	- Establish the purpose - Obtain general knowledge of the capabilities of potential partners - Consider pre-existent relationships
Stage 2: Make Contact	- Identify prospective partners
Stage 3: Partner Assessment and Selection	- Objectively assess the strategic interests of the potential partners - Analyze actual versus professed capabilities of potential partners - Determine and organize the appropriate mix of partners - Choose the partners
Stage 4: Partnership Negotiation	- Define the partnership - Define and agree on the partnership's documented purpose or mission/vision - Determine the specific common goals/objectives for the particular effort - Define the organizational structure of the partnership - Define the management and administration of the partnership with clearly defined responsibilities - Agree on the plan - Specify the milestones - Identify the measures/indicators for success - Specify the interim and/or final deliverables
Stage 5: Agreement Signing	- Preparation and signing of collaboration agreement and/or intellectual property agreement

Source: Ankrah and Al-Tabbaa (2015)

Table 5: Some world-leading universities in partnership with the industry

University	**Partnering Industry**
University of Melbourne	Microsoft, Cisco, and Intel
AALTO University	IDBM projects with Helsinki Airport, Finnish and Vietnamese companies
AALTO University	Nokia
Technical University of Munich	Audi Motor Company
University of California and University of Illinois	Lawrence Berkeley National Laboratory
University of California	Nokia
Clemson University	US-based biomedical companies
Imperial College, London	Imperial Innovations Group
Imperial College, London	IBM
University of Waterloo	Applied Brain Research
University of Cambridge	SKF Group
Technical University of Berlin	Siemens
Technical University of Munich	Siemens

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Adapted from Edmondson *et al*. (2012)

Table 6: Operational activities during University-Industry Partnership

Operational activities	**Forms**
Communication	- By voice, mail, e-mail, conference calls - Publications or co-publications of research papers, reports, newsletters, bulletins, books, booklets, pamphlets
Meetings and Networking	- Meetings (often formal) - Conferences, seminars, workshops, symposia, fora - Expositions, trade shows, fairs, exhibitions - Informal social gatherings (e.g. get-together, break- fast meetings - Networking activities, such as regular contacts and maintaining cordial relationship
Training	- Tailor-type educational programmes for industry personnel - Industrial training for students - Industrial internships for students - Industrial fellowships for faculty members - Students' involvement in industrial projects - Joint supervision of Master degree dissertations and Ph.D. theses by academics and industry personnel - Industry involvement in curriculum development
Personnel mobility	- Exchange of research personnel e.g. sabbaticals, exchange programmes - Lectures by industry members at universities and vice versa
Employment	- Employment of graduates; especially, those related to the UIP projects - Employment of university researchers in the business sector -Representation on Industry Boards or University Committees

Adapted from Ankrah and Al-Tabbaa (2015); Rybnicek and Konigsgruber (2019)

Table 7: Areas of university-industry collaboration in the quantity surveying profession

Scope/Area of Collaboration	**QS firms**		**Academic staff**		**Overall**		**Mann Whitney**	**p-value**
Funding	3.23	3	2.73	5	3.00	5	-0.965	0.503
Staffing/Academic Mobility (Staff Exchange)	2.87	6	2.96	4	2.91	6	-1.074	0.412
Research and Development	3.14	4	3.76	2	3.45	2	0.140	0.413
Industrial Training/Placement for students	4.28	1	4.39	1	4.34	1	0.421	0.669
Infrastructural Development	3.04	5	3.32	3	3.18	3	-0.167	0.663
Scholarship	3.51	2	2.68	6	3.09	4	0.144	0.164

Note(s): Significant @ 5% M -Mean; R- Rank, Adapted from Alli and Dada (2023).