

Understanding Perceived Barriers to University-Industry Collaborations among Academics: Evidence from University of Lagos

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Abstract

There is a growing consensus among politicians, scholars, and industry professionals in the country that university-industry collaboration has a significant role to play in Nigeria's pursuit of a diversified economy. While several discussions focus on the potential gains of university-industry collaborations, little has been said about the sensitivity of the academics to extant barriers to collaboration with the industry. . This study, therefore, examines the perceived barriers to collaboration among the academics. Drawing on a cross-sectional survey administered among 38 Heads of Departments and 201 academics sampled across the faculties of Arts, Business Administration, Engineering, Law, Sciences, and Social Sciences in the University of Lagos, the study uses the Pearson Chi-Squared test of independence to test the hypothesis that there is no association between perceived barriers to university-industry collaboration and the faculty of the academics. The findings show that: (i) the academic members across the faculties surveyed pay little or no attention to commercialization, licensing of patents, and establishment of spin-off companies; (ii) perceived barriers to university-industry collaboration is independent of the faculties of each academic , whether Arts/Humanities or Sciences/Engineering; (iii) funding and pressure on academic time lead the pack of perceived barriers to university-industry collaboration among the academics in the University of Lagos. The implications of the findings for pro-university-industry policy designs are discussed.

Keywords: Academics; Barriers to collaboration; Innovation; and University-industry collaboration

Introduction

At present, policy-makers, especially in the Federal Ministries of Education, Labour and Productivity, as well as Science and Technology, and the industry professionals have a strong belief that university-industry collaboration is the key

to unlock the door to industrialization and economic diversification in Nigeria. While resilience, stability, competitiveness, and sustainability are notable benefits of economic diversification (Rodney, 2005; Felipe & Hidalgo, 2015; Koryakina, Sarrico, & Teixeira, 2015; Johnson, 2016), poor legislations, limited emphasis on mutual benefits, and limited policy actions are a few of the factors inhibiting the potentials of university-industry collaboration in this country (Falade & Ikponmwosa, 2002; Morakinyo, 2009; and Oyelaran-Oyeyinka & Adebowale, 2012). Interestingly, however, the need to boost indigenous capabilities, scientific productivity, as well as services, products, and technological innovations have reignited the call for enhanced university-industry collaborations.

The pervasive weak collaboration between the university and the industry in Nigeria is conspicuous. It is so much that the perceived enormity of this challenge, in the face of an emerging knowledge-driven economy, continues to attract the attention in both the private and public sectors. In 2007, for instance, the Goethe Institute hosted a roundtable discussion in Lagos to discuss the immediate impact of university-industry collaborations on the Nigerian university system. Recently, a guest speaker, at the 2016 edition of the Faculty of Science (University of Lagos) Annual Public Lecture Series, boldly called for a synergy between the academics and the industry. The need to foster a deeper understanding of the dynamics of collaboration between the academics and the industry in Nigeria is very glaring. Therefore, this paper explores the perceived barriers to university-industry collaboration from the perspective of the academics, especially in the University of Lagos.

This paper focuses on the academics because they play an important role in this partnership arrangement. Besides, our understanding of faculty's perspective of university-industry collaboration is quite shallow despite growing interests among the stakeholders (D'Este & Patel, 2007). In addition, faculty decisions to participate in this type of partnership vary for diverse reasons (Owen-Smith & Powell, 2001). These reasons remain blurred because they are neither well articulated nor backed with systematic evidences. Furthermore, there are very few studies that have attempted to measure and map perceived barriers in university-industry collaborations (Bruneel, D'Este, & Salter, 2010). Combined, these gaps provide opportunity for this paper to offer evidence on the perception of barriers to university-industry collaborations among the academics.

The choice of studying the perception of barriers to university-industry collaboration among the academics is also prompted by the findings of the 2014

Africa Innovation Outlook. Two specific findings are worth mentioning here. First, the report emphasises that Nigeria ranks among the leading producers of scientific publications in Africa but the level of outputs in the Social and Economic Sciences and in the Humanities are relatively low. If university-industry collaborations have the potency to boost scientific productivity, then this study wonders if faculty members in the Arts/Humanities are disadvantaged. Second, the report emphasises that faculty members in the Sciences and Engineering hardly collaborate with one another. Instead, they rank international partnerships above local collaborations.

Given the dynamic nature of collaboration as a construct, practitioners are left to wonder whether university-industry collaboration is a strategy or a mechanism for promoting institutional, as well as national objectives. To some, it is a strategy for exchanging new knowledge directly or indirectly (see Iskanius & Pohjola, 2016; Bstieler, Hemmert, & Barezak, 2015). For others, it is an important mechanism for either generating technological spillovers or appropriating new knowledge between the collaborating parties (D'Este & Patel, 2007; Dooley & Kirk, 2007; Huang & Chen, 2016).

Either way, this study supports the emerging view that university-industry collaboration is a strategic mechanism for the following reasons: (i) There is an increasing need for demand-driven research and solutions for societal and business challenges (De Cleyn, Coppen, & Gielen, 2014); (ii) the dynamic roles of innovation intermediaries can no longer be ignored (Melley, Karpe, Kothare, & Laing, 2014); (iii) there is an increasing demand for other stakeholders' engagement within an innovation ecosystem (Marmer, 2014); and (iv) the need to promote entrepreneurial mindsets among academic researchers and students, at large, is long overdue (Vidal-Giménez, Galiana-Lapera, & Torrecillas-Moreno, 2014). Combined, these require a blend of strategic partnerships, structural instruments, and operational activities between the university and the industry. Thus, this study strongly supports leading arguments that university-industry collaboration, as a strategic mechanism, seeks to foster entrepreneurial behaviour and regional culture of collaborative commercialization in this 21st century.

This study makes three significant contributions to knowledge. First, it reveals that the academics appreciate multiple areas of collaboration with the industry. Even though the evidences reveal that the academics of the selected faculties in the University of Lagos pays little attention to the development of new laboratory and the creation of university spin-off companies, two essential needs for

commercialization of research findings, this is not surprising at all. Previous studies have confirmed that fewer academic researchers are interested in licensing of patents and commercialization (see D'Este & Patel 2007). Second, this study demonstrates that there is little or no difference in the way faculty members in the Arts/Humanities and Sciences/Engineering perceives the barriers to university industry collaboration. Third, the study also demonstrates systematically that funding of university research is not the only barrier that is capable of discouraging academic researchers, in the University of Lagos, from collaborating with the industry. Other barriers are the pressure on academic time, the desire among academic staff to publish their own work, the University management buy-in and the research budget. These have implications for policy-making, as well as university research management at large.

The remaining part of this paper is further divided into four sections. The next section discusses the research methodology. This is followed by the presentation of results in section three. In section four, the findings and their respective implications are discussed. Section five is the conclusion of the study.

Methodology of the Research

The academic staff of the University of Lagos from six Faculties served as the study population. All together, these Faculties have thirty-eight Departments and seven hundred and seventy two members of academic staff (see Table I). Using a quota sampling technique (Moser, 1952; Kalton, 1983), we administered a total of 239 questionnaires among the sample of academic staff from the six faculties under consideration. These included 38 questionnaires, which were addressed specifically to the Heads of Departments. We received 76 completed questionnaires, which signify 36.8 percent response rate. The characteristics of the samples are reported in Table II.

In total, only 13 of the respondents are female and this represents 17.3 percent of the sample. In terms of ranking, 66 respondents are below the Professorial cadre (i.e. Senior Lecturers, Lecturers, and Assistant Lecturers). This represents 86.8 percent of the total respondents. In addition, 41 of the respondents have less than 10 years of teaching experience at the University of Lagos. They represent 53.9 percent of the total respondents.

Table I: Distribution of the study subjects

Faculty	Department	No. of Academic Staff	Proportion (%)	Questionnaires Distributed	Questionnaires Received
Arts	6	131	16.97	29	15
Business Administration	5	109	14.12	29	11
Engineering	7	158	20.07	45	18
Law	4	47	6.08	20	3
Sciences	10	212	27.46	50	22
Social Sciences	6	118	15.28	28	7
Total	38	772	100	201	74

(a) Figures quoted in the 2nd and 3rd columns were obtained from the UNILAG Staff Media Local Directory

Table II: Characteristics of the samples

Faculty	Gender		Ranking		Years of Experience	
	Female	Male	Professorial	Non-Professorial	< 10 yrs	> 10 yrs
Arts	2	13	3	12	11	4
Business Administration	0	10	3	8	7	4
Engineering	5	13	0	18	8	10
Law	0	3	0	3	2	1
Sciences	4	18	3	19	11	11
Social Sciences	2	5	1	6	2	5
Total	13	62	10	66	41	35

Findings

Areas of collaboration with the industry

Three broad areas of university-industry collaboration were identified and these were subsequently divided into 9 items in the questionnaire. Respondents were required to choose only one of the five options provided for the question, “*how frequently have you participated in the following activities in the calendar years 2013 to 2015?*” Table III reports the responses, particularly those who responded in favour of more than 1 time.

Table III: Areas of Collaboration with the industry among University of Lagos academic staff (% of academics who engaged at least once over the period 2013-2015 in any of the interaction activities)

Areas of Collaboration	Arts	Business Admin.	Engineer	Law	Sciences	Social Science
Develop new laboratory	25.0	9.1	27.8	0.0	18.2	0.0
Create a spin-off company	18.8	0.0	5.6	0.0	18.2	0.0
Industry-commissioned project	37.5	45.5	35.3	33.3	31.8	28.6
Consulting	43.8	63.6	33.3	33.3	31.8	28.6
Training	50.0	72.7	66.7	66.7	31.8	57.1
Industry sponsored conference	37.5	63.6	61.1	0.0	54.5	42.9
Industry sponsored meeting	37.5	72.7	72.2	33.3	54.5	85.7
Network of industry partners	37.5	81.8	77.8	66.7	59.1	85.7

Following D’Este and Patel (2007), we chose 40 percent as the benchmark. On the basis of this, we observe that there are only two Faculties with the least number of areas of collaboration: the Faculty of Arts and the Faculty of Law. While training is common to both faculties, the Faculty of Arts’ members embrace consulting and the Faculty of Law’s members embrace access to network of industry partners. This channel is, however, not peculiar to the Faculty of Law members only. Members from the Faculties of Business Administration, Engineering, Sciences and Social Sciences also explore the benefits of network of industry partners.

In a similar manner, the Faculty of Engineering and the Faculty of Social Sciences members have three other areas of collaboration with the industry in common. These include training, participation in industry-sponsored conferences and meetings. These latter two areas are also appreciated among members of the Faculty of Business Administration and the Faculty of Sciences. Interestingly, only members of the Faculty of Business Administration collaborate with the industry through industry-commissioned projects. Overall, 64.9 percent of the respondents have access to network of industry partners. This ranks number one, followed by industry-sponsored meetings, which is acknowledged by 59.7 percent of the respondents. The next in ranking is training opportunities and this is acknowledged by 53.2 percent of the respondents.

In addition, we observe that a few of the respondents from the Faculties of Arts, Business Administration, Engineering, and Sciences admit to the fact that they have developed new laboratories in collaboration with the industry between 2013 and 2015. Likewise, very few members from the Faculties of Arts, Engineering, and Sciences acknowledged that they have created a spin-off company while collaborating with the industry between 2013 and 2015. While this may not be a surprise, it is amazing that a spin-off can emerge from the Faculty of Arts. It is particularly worrisome that these two areas of collaboration are under-explored, given the vibrancy of the University of Lagos Research and Innovation Office and the zeal of the University Management to push University of Lagos towards the innovation frontier. These call for an urgent attention.

Perceived barriers to university-industry collaboration

Building on the existing literature on the barriers to university-industry collaboration, our questionnaire comprises 19 barriers and each respondent was required to choose how likely the barriers would discourage him/her from collaborating with the industry. Specifically, we chose a 7-point Likert Scale such that extremely unlikely = 1 and extremely likely = 7. Using this survey data, we test the null hypothesis that there is no association between perceived barriers to university-industry collaboration and the faculty of the academics. To achieve this, we use the Pearson Chi-Squared Test of Independence. The results are reported in Table IV (see Appendix I).

Do these barriers vary according to the Faculty of the academic staff of the University of Lagos? We use STATA 12.0 for the computation of the Pearson Chi-Squared Test of Independence between the perceived barriers and the faculty of the academic staff. Following the rule of thumb, which emphasizes that if χ^2 that is calculated is greater than the critical value of χ^2 at the respective degree of freedom (df), the null hypothesis of no association should be rejected at 5 percent significant level. For all the six barriers that are likely to discourage faculty members from engaging in university-industry collaboration, their degree of freedom (df) ranges between 30 and 45. At 5 percent significant level, the critical values of χ^2 is less than the calculated χ^2 of each barrier. As such, we accept the null hypothesis of no association between each barrier that is likely to discourage academic staff from collaborating with their respective faculties.

Beyond these, the respondents were required to identify five barriers, which they consider to be the most important among the 19 selected barriers. In this case, we ignored the categorization of the samples by faculties since it is irrelevant.

Instead, we developed a frequency distribution table for each barrier as identified by the respondents (see Table V). We observe that all the five barriers that are likely to discourage these faculty members from engaging in collaborative activities with the industry make the top 10 barriers.

Table V: Top 10 Perceived Barriers to University-Industry Collaboration among Academic Staff of the University of Lagos

Barriers	Obs	Freq	Percent	Ranking
Funding	78	54	69.23	1st
Pressure on academic time	78	38	48.72	2nd
University promotion metrics	78	32	41.03	3rd
University research budget	78	30	38.46	4th
Academic desire to publish own work	78	28	35.90	5th
Differences in university/industry timescales	78	21	26.93	6th
University senior management buy-in	78	21	26.93	6th
Resources for networking	78	20	25.64	8th
Contract negotiation skills	78	17	21.79	9th
Trusting personal relationships	78	17	21.79	10th

Funding remains the number one perceived barrier to university-industry collaboration. Earlier in this section, Table IV (see Appendix I) shows that 73 percent of the respondents perceive funding as a barrier that is likely to discourage them from engaging in university-industry collaboration. Pressure on academic time moves two steps up the ladder to the 2nd position. While university promotion metrics ranks 3rd, university research budget moves two steps downward to rank 4th. Academic desire to publish own work now ranks 5th position. University management buy-in as a barrier moves slightly to the 6th position and resources for networking moves 5 steps downward to the 8th position.

Finally, respondents were required to rank the selected barriers according to severity, where 1 = most severe and 5 = least severe. The findings are reported in Table VI. Again, 37.1 percent of the respondents rank funding as the most severe barrier to university-industry collaboration, 15.7 percent ranks pressure on academic time as the more severe barrier, and 20.3 percent of the respondents rank academic desire to publish own work as the severe barrier. While both university management buy-in and university research budget rank equal as the less severe barrier, resources for networking rank the least severe barrier to

university-industry collaboration. These findings are consistent with earlier findings as presented in Table V. Within the context of this study, these findings affirm that funding, pressure on academic time, academic desire to publish own work, university management buy-in, university research budget, as well as resources for networking are, indeed, the perceived barriers to university-industry collaboration.

Table VI: Top 5 Barriers to University-Industry Collaboration according to Severity

	Most Severe (%)	More Severe (%)	Severe (%)	Less Severe (%)	Least Severe (%)
University Promotion Metrics	=	11.43	7.25	4.41	2.90
Contract Negotiation Skills	=	7.14	2.90	4.41	5.80
Pressure on Academic Time	10.00	15.71	11.59	7.35	7.25
Funding	37.14	11.43	14.49	5.88	5.50
Collaborating Experience	1.43	1.43	=	2.94	5.80
Resources for Networking	2.86	1.43	5.80	7.35	8.70
Differences in Timescale	1.43	4.29	1.45	8.82	4.35
Academic Desire to Publish Own Work	8.57	11.43	20.29	8.82	4.35
Business Concerns	=	1.43	2.90	4.41	=
Trusting Personal Relationships	2.86	=	=	5.88	7.25
Mutual Understanding	4.29	4.29	1.45	4.41	5.80
Ability to Work Across Boundary	1.43	1.43	2.90	=	7.25
Communications with Partners	=	1.43	2.90	=	1.45
University Management Buy-in	5.71	4.29	4.35	10.29	5.80
Willingness to Devote my Time	1.43	=	4.35	1.47	2.90
Founding Mission of the University	17.14	=	=	5.88	2.90
Technology Transfer Experience	=	2.86	2.90	5.88	4.35
Research Budget	4.29	12.86	14.49	10.29	11.59
Quality of Research Output	1.43	2.86	=	1.47	5.80

Discussion

The analysis of this study suggests that irrespective of the potential gains associated with university-industry collaborations, resources dilemma and institution-based barriers cannot be undermined. This conforms to existing findings in global reports (e.g. EU Special Report, 2014, African Innovation

Outlook, 2014, The Dowling Review, 2015, etc.) and scientific journals (e.g. Schuelke-Leech, 2013; Perkmann, King & Pavelin, 2011; D'Este & Patel, 2007).

Limited priority choices for commercialization and patent

The responses from our survey affirm D'Este and Patel's (2007) argument that very few academic members of the university who are involved in university-industry collaborations place premium on the development of laboratories, creation of university spin-offs, or licensing of patents. No doubt, successful commercialization inspires academic members to seek further collaboration (Tatari, Perkmann, & Salter, 2014) but the systematic review by Perkmann, Tatari, McKelvey, et al (2013) also show that fewer academics are interested in commercialization. These have been attributed to either individual factors or institutional factors. According to Wu, Welch, and Huang (2015), while attitude and collaboration preferences are notable individual factors, the technology transfer office's (TTO) cost-saving initiatives are notable institutional factors that significantly determine the likelihood of commercialization of research outputs, licensing of patents, or establishing spin-off enterprises by university researchers.

The resources dilemma

Resources play significant roles in the actualization of university-industry collaboration (Muscio, Quaglione, & Vallanti, 2015). Among the existing dimensions, research funding continues to attract more attention among the policy-makers, the university administrators, the faculty members, and the professionals in the industry space. In fact, irrespective of the prevailing economic and policy environment, limited access to research funding discourages academics from collaborating with the industry (AIO, 2014). Besides, research funding drought stiffens research budgets and limits the ability of university researchers to network effectively with industry professionals (Dooley & Kirk, 2007; Bruneel et al, 2010). According to Lee (2000), when research funding is scarce, it hinders the recruitment of research assistants and the procurement of laboratory equipment. While D'Este and Patel (2007) supports this view, they added that limited research funding beclouds the visibility of academics, irrespective of the strength of participation in the chosen field of research.

Considering the consequences of sub-optimal supply of research funding, Muscio et al (2015) observed that universities are faced with increasing pressure to seek funding from non-academic domains. This was also mentioned by Dooley and Kirk (2007) who observed that faculty members are being pressurized to undertake needs-driven research. Bruneel et al (2010) noted that since the demand

for research funding exceeds the supply, privileged government agencies impose stringent application laws and regulations, which in turn reduces the likelihood of accessing the funds by majority of the university researchers. Schuelke-Leech (2013) and Chai and Shih (2016) considered alternative sources of research funding, argue in favour of direct industry funding.

Following the aforementioned, this study, therefore, postulates that resources (i.e. research funding, research budget, and resources for network) matter in order to ensure that the academics successfully collaborate with the industry.

The institutional-based barriers

Several years ago, Woodrow Raymond wrote a classic article, *Management for Research in U.S. Universities*, in which he noted that *people, policies, practice, and attitude* are the secrets to the provision of research opportunities. These question the sincerity on the part of the University management to promote university-industry collaboration. Sharma and Yetton's (2003) classic piece on the *Contingent Effects of Management Support* noted that the task environment has significant impact on successful implementation. The task environment is well captured as a barrier to university-industry collaboration in this study in two ways: first, increasing pressure on academic time, and second, increasing desire among academic members to publish their work. When combined, these constitute institutional factors that are capable of either promoting or discouraging university-industry collaboration.

Conclusions

Understanding the perceived barriers to university-industry collaborations is of undoubted interest to policymakers and university managers at large. On the one hand, the prevailing economic circumstances in the country have contributed to the increased demand for economic diversification. On the other hand, the prevailing view that a synergy between the academics and the industry will further enhance the country's drive for a knowledge-driven economy adds more to the pressure on university managers to look inward. There are four policy-related lessons that can be drawn from this study.

First, the analysis of this study suggests a limited understanding of the challenges confronting university-industry collaboration as a strategic mechanism for driving innovation in this country. It is not enough for policymakers and university managers to call for university-industry collaboration, there is a need for stakeholders' dialogue. The university researchers know better what their

challenges are. Regular communication between these researchers and the university managers is recommended.

Second, the role of resources in the successful implementation of university-industry collaboration cannot be over-emphasized. For the policymakers, in particular, evidences abound that the government remains the major source of funding for university research. In Nigeria, for instance, the Tertiary Education Trust Fund (TETFund) research grants remain the major funding intervention available to researchers in Nigeria's public tertiary institutions. This encourages several scholars in the country to seek funding opportunities from international bilateral/multilateral donors. As such, publication of own research work gains priority above university-industry collaboration. Moving forward, government agenda must prioritize research funding. Legislations to enforce the development of appropriate research structures in the country's universities will be a welcome development.

Third, the need for university management support in pursuit of successful university-industry collaboration is well underlined. The commitment of the university should not be limited to the creation of awareness among the university researchers. There is an urgent need for the university managers to review the task environment. The review should cover common issues such as the number of hours of teaching per semester, implementation of research leaves, establish clear benchmark for journal publications, promote transparent promotion metrics, etc. Above all, the university managers should pay more attention to the monitoring of quality of research outputs and also promote sound organizational coordination mechanisms between the university research community and the industry.

Finally, training of university researchers should be made a continuous exercise. It is often assumed that a Doctoral degree is all that is needed to be a researcher. While this may not be true, it is imperative for policymakers to enforce training as a yardstick for accessing research funds. It is also necessary for university managers to include training as one of promotion metrics. Training of researchers has three benefits: it imparts requisite skills, instils positive attitude, and also allays unfounded fears among university researchers. If taken seriously, training has the potential to bridge existing performance gaps between the university researchers and their counterparts in the industry.

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APPENDIX I

Table IV: Perceived barriers to university-industry collaboration among academics in the University of Lagos

Barriers	Obs	Unlikely	Likely	Don't Know	χ^2	df	Pr	Findings
University promotion metrics	74	45.9	29.7	24.3	27.399	35	0.817	Accept H ₀
Contract negotiation skills	71	52.1	35.2	12.7	40.960	35	0.225	Accept H ₀
Collaborative experience	75	52.0	33.3	14.7	35.938	30	0.210	Accept H ₀
Differences in university/industry timescales	76	43.4	40.8	15.8	47.579	35	0.076	Accept H ₀
Academic desire to publish own work	76	50.0	42.1	7.9	29.732	30	0.479	Accept H ₀
Trusting personal relationships	73	41.1	37.0	21.9	31.590	35	0.633	Accept H ₀
Mutual understanding	73	43.8	41.1	15.1	40.526	40	0.447	Accept H ₀
Ability to work across borders	71	59.2	26.8	14.1	27.548	35	0.811	Accept H ₀
Communications with industry partners	74	48.6	29.7	21.7	21.139	35	0.969	Accept H ₀
Willingness to devote own time	75	49.4	33.3	17.3	39.154	35	0.289	Accept H ₀
Founding mission of my university	76	44.7	34.2	21.1	40.367	35	0.245	Accept H ₀
Technology transfer experience	76	60.5	23.7	15.8	34.103	35	0.511	Accept H ₀
Quality of own research output	76	57.9	28.9	13.2	46.705	35	0.089	Accept H ₀
University research budget	76	27.6	56.6	15.8	32.286	35	0.600	Accept H ₀
University senior management buy-in	74	40.5	44.6	14.9	33.271	35	0.552	Accept H ₀
Funding	76	22.4	73.7	3.9	24.405	30	0.753	Accept H ₀
Resources for networking	74	39.2	50.0	10.8	36.704	35	0.390	Accept H ₀
Business concerns	73	28.8	39.7	31.5	56.144	45	0.123	Accept H ₀
Pressure on academic time	75	34.7	53.3	12.0	56.193	35	0.013	Accept H ₀