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Research contract relationship between a large industry partner and South African universities

We propose and evaluate a contractual structuring instrument (in the form of a Framework Research Agreement) in support of research collaboration partnerships between universities and large industry, specifically for the case of large industry in the South African context. This study includes one large South African originated industry (as the pioneer of concluding Framework Research Agreements with several universities) and multiple South African universities, and stretches over several decades. This study was done within the broader context of the challenges and benefits experienced by both industry and university in the academic engagement sphere of industry–university collaboration. By providing insight from both industry and university perspectives, factors impacting on academic engagement (with specific emphasis on the legislative framework, contractual aspects, institutional research contract practices and institutional risks), are considered and discussed. Recommendations are made for improved industry–university collaboration by sharing experiences from the industry and universities on challenges faced, managing the expectations and proposing mechanisms to support constructive research collaboration through a mutually beneficial contractual framework instrument.

Significance:

- A novel Framework Research Agreement as a contractual instrument was developed and pioneered by the industry partner with several South African universities, to create a transparent framework based on fair contracting and determinable remuneration principles.
- This study specifically highlights the need for a contractual instrument, in which the intention is to build a long-term contractual relationship to support industry–university collaboration and academic engagement within the existing South African legislative framework.
- It further draws attention to research contract management practices and contractual aspects, which until now have been largely ignored in industry–university collaboration and academic engagement frameworks of this kind.

Introduction

Industry–university collaboration and academic engagement

It is widely acknowledged that industry–university collaboration (IUC) is to the benefit of both industry and universities, but also poses substantial challenges.[1-4] When considering IUC, available studies highlight the characteristics and motivations for industry and university, with foci ranging from gender, seniority, and scientific fields to geographical locations and funding.[5] Several frameworks to improve IUC have been proposed with particular attention to the consideration of the institutional context and national policy to support commercialisation of intellectual property (IP) and the academic engagement aspects.[6]

Most recently, Awasthy et al.[7] proposed an improved IUC framework which focuses on aspects such as different views, perspectives, motivations, and needs, held by universities and industry, the need to understand the various forms of interactions, and the importance of effective collaborations. In addition, they note that an efficient communication strategy between all stakeholders and leadership must be in place, and that the nature of the collaboration will depend on the creation and establishment of basic partnership characteristics, including management and encouragement of the collaboration, and adopting a joint strategy. Another relevant aspect is for IP concerns to be addressed appropriately.[7]

For this specific study we focus on academic engagement, and further distinguish between academic engagement and commercialisation.

Academic engagement is defined by Perkmann et al.[6] as 'knowledge related collaboration by academic researchers with non-academic organisations [and] include formal activities such as collaborative research, contract research, and consulting, [as well as] informal activities like providing ad hoc advice and networking…'. In addition, they noted that academic engagement involves more than financial benefits, and often includes in-kind benefits for research such as access to equipment, data/material, or input into ideas. Apart from serving academic goals, such as generating publications, it also serves the non-academic partners (such as industry) by offering expertise to create new ideas, solve problems, and provide input on novel application of the industry's expertise.[6]

On the other hand, commercialisation involves 'the patenting and licensing of inventions as well as academic entrepreneurship'[6]. Commercialisation within the context of this study is aligned with the activities usually undertaken by Technology Transfer Offices which focus on the '…generation of patents and the creation of spin-off firms stemming from research projects'[4]. Whether intentional or not, academic engagement can lead to commercialisation.[6]

It is acknowledged that universities' income derived via academic engagement is significantly higher (in high multiple) than income derived through commercialisation. Despite this, less attention is paid to the 'underpinning of academic engagement' theory, as well as to 'the role of the institutional environment and national policies' in contrast to commercialisation.[6] It is notable that academic engagement is considered by many companies to be significantly more valuable than commercialisation.[6] It is further noted that to use commercialisation (patents and spin-off firms) as indicators of collaborative research at universities, largely ignores the economic and productive context within which universities operate and 'may be detrimental to the strengthening of emerging trends that are oriented towards softer collaborative experiences and other forms of knowledge transfer'[4].

Further to the above-mentioned shortcomings in existing literature, there is very limited, if any, literature that guides industry or universities, in the contractual structuring of an appropriate contractual instrument, as well as very limited guidance on improving research contract management practices at universities within the context of academic engagement and IUC.

We therefore specifically argue the need for a contractual instrument, in which the intention is to build a long-term contractual relationship to support IUC and academic engagement within the existing South African legislative framework. It further draws attention to research contract management practices and contractual aspects, which until now have been largely ignored in IUC and academic engagement frameworks of this kind.

In this article we bring a better understanding to the external and internal landscape in the South African context that will impact the contractual structuring, in the hope that it will strengthen IUC through mutually beneficial academic engagement.

The South African context

Globally, national policies tend to inform IUC significantly (for example, one of the most recent global governmental initiatives was the creation of the European Innovation Council in 2021 which was designed to support high potential and breakthrough technologies as a result of IUC).[5] However, apart from studies on the role of national policies supporting academic engagement in countries such as the United States of America and European countries, information on other geographical areas is limited.[6] Although this article is intended to discuss the contractual relationship in terms of academic engagement, brief reference to some of the South African national policies is made here to provide context.

The importance of IUC is underlined in the White Paper on Science, Technology, and Innovation, March 2019[8], and the National Development Plan[9]. In addition, in 2018, the Human Resource Development Council undertook a workshop on behalf of the South African Department of Higher Education and Training, with stakeholders from universities, government, and industry, where partnerships amongst these organisations were examined.[10] From these partnerships, knowledge sharing, technology transfer and commercialisation of research, analysing and influencing government policies and legislative frameworks, among others, are listed as success factors emanating from IUC. The lack of funding for research and the mismatch in expectations of research output were given as challenges for IUC.

There are South African government initiatives to support and encourage IUC, some of which are briefly mentioned in this article. If the deliberate strategic focus from an industry partner is to support research with the 'intent to derive income', it may qualify for the South African Research and Development (R&D) Tax incentive.[11] With recent changes in the Skills Development Element (Code 300) of the BEE Codes of Good Practice (published on 31 May 2019 and effective as of 1 December 2019), industry has an opportunity to claim BEE points on its score card by funding black students at universities.[12] Another incentive programme from the national Department of Trade, Industry and Competition, is the Technology for Human Resources and Industry Programme (THRIP), which intends to boost industry through support of R&D and skills development by incentivising industry to work closer with universities and science councils.[13]

The above initiatives and regulatory/policy documents, support the R&D landscape and underpin the importance of partnerships, with IUC as one form. However, the lack of funding will remain a challenge, as is evident from the most recent South African National Survey of Research and Experimental Development (R&D) (2017/2018).[14] South Africa's gross domestic expenditure on research and experimental development (GERD) amounted to ZAR38.725 billion in 2017/2018, an 8.5% nominal increase from the previous financial year. The two major contributors of funding towards R&D activities were government (46.7% of total investment) and the industry sector (41.5%). However, a steady decline in funding from industry, from 57% in 2006/2007, was also reported.[14]

From an IUC perspective, the most prevalent legislation to consider is South Africa's *Intellectual Property Rights from Publicly Financed Research and Development Act 51 of 2008* (the IPR Act)[15], which came into effect in August 2010.

For this study we focused on a large South African originated company with an extensive international footprint in over 30 countries in the mining, exploration and production of oil and gas, and a focus on feedstock supply activities.[16] As this company has a range of formalised agreements with several South African universities, the scope covers perspectives from industry and universities.

Research methodology

Figure 1 illustrates the research methodology used for the purpose of this study, and each step is further described below.

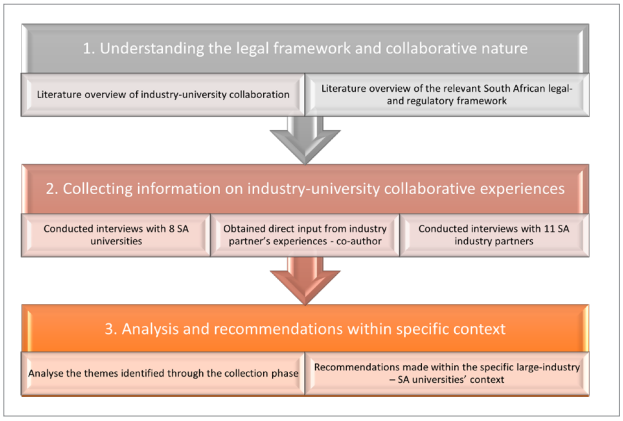

Figure 1: Research methodology undertaken in this study.

Understanding the legal framework and collaborative nature

A literature study on IUC, academic engagement as well as the legislative and regulatory frameworks relevant to IUC in South Africa, were used to identify themes for further analysis and provided the context of this study as explained in the introduction. As industry and universities are subject to several legislative frameworks, specific consideration was given to those that had a direct bearing on structuring research partnerships.

Collecting information on IUC experiences

Ethics approval (#14565) for this study was obtained from Stellenbosch University's Research Ethics Committee for Social, Behavioural and Education. Informed consent was obtained from the participants and the Principles of the Declaration of Helsinki were adhered to. The interview data are confidential and are therefore not available. The interview questionnaires are provided in the supplementary material.

Interviews were conducted with eight South African universities (from April 2020 to May 2021) that included high, medium and low research-intensive universities. The most pressing themes and findings have been described in detail for seven universities.[17] Those themes most

prevalent to this study were further explored and discussed and an eighth university was included to broaden the study. The findings were confirmed by this additional university, and therefore should be read as the collective views from eight universities.

South African universities were classified as high, medium, or low research-intensive universities as presented in Figure 2.

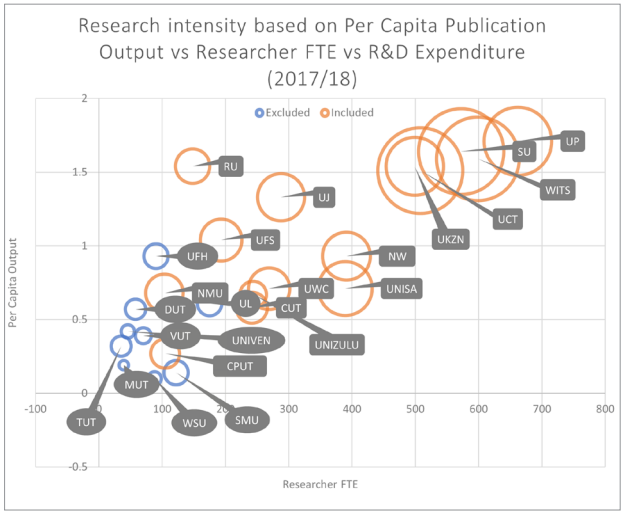

Figure 2: Classification of South African universities according to research intensity, with the highest research-intensive universities in the top right quadrant and the lowest in the bottom left quadrant. The point of the arrow meets the centre of the bubble for each university. Universities represented by blue bubbles were excluded from the sample.

The graph in Figure 2 is based on the South African National Survey of Research and Experimental Development (R&D) 2017/2018[14(p.82)], where the R&D expenditure per university (size of the bubble) and the full-time equivalent (FTE) per researcher (*x*-axis) were plotted against the per capita research publication output (*y*-axis), in line with the Report on the Evaluation of the 2018 Universities' Research Output[18]. The universities in the top right quadrant are the highest research-intensive universities, and those in the bottom left quadrant are the least research-intensive universities, based on the chosen criteria. The nine universities excluded from the sample group had a reported R&D income of less than ZAR200 000 for the 2017/2018 year, and are marked in blue. The universities that participated in this study were spread across the range of universities represented in the graph in orange. Interviews were conducted with senior management responsible for management of all research-related contracts at 53% of these universities marked in orange, to ensure that a broad perspective, across all levels of research intensity, was presented.

Internal views from stakeholders within the industry partner (represented by one of the co-authors, C.J.H.N., with input from senior management within the company, and permission from executive management), formed an integral part of this study, as this industry partner has current formalised partnerships with nine South African universities. This provides a valuable perspective of challenges in establishing collaborations within the complexity of the national legislative framework.

Interviews with executives from 11 other South African industry partners, with an interest in IUC, were conducted during the period April–June 2021, to obtain a more comprehensive perspective from them to corraborate the views of this specific large industry partner.

Analysis and recommendations within specific context

Themes for IUC, with specific reference to the contractual aspects with the intent on long-term research collaboration, were identified, analysed and discussed. Recommendations are made to enable and improve IUC.

Understanding the legislative framework leading to the Framework Research Agreement

Legislative framework

Industry and universities are required to operate in a complex legislative and governance framework. From an IUC perspective, the most prevalent legislation to take into consideration is the IPR Act.[15] When the IPR Act commenced in August 2010, from both our experience and corroboration through interviews, both industry and universities found it challenging to fully understand the impact thereof on research contract negotiations, and a significant mind-shift was required by all parties to redesign collaborative efforts that had already been ongoing for at least three decades.

The purpose of the IPR Act is

> *...to provide for more effective utilisation of intellectual property emanating from publicly financed research and development; to establish the National Intellectual Property Management Office (NIPMO) and the Intellectual Property Fund; to provide for the establishment of offices of technology transfer at institutions; and to provide for matters connected therewith.*[19]

NIPMO is mandated under the legislative framework, to ensure that

> *intellectual property from publicly financed research and development is identified, protected, utilised and commercialised for the benefit of the people of the Republic, whether it be for social, economic, military or any other benefit.*[19]

Once a research project is fully funded (on 'full cost') by an industry partner, the IPR Act does not apply, and the parties are free to negotiate the terms of the IP transaction. However, if the full cost principle is not applied, the transaction will be subject to the IPR Act as it is deemed to be subsidised by public funding. The IPR Act explains what is deemed as full cost which is based on the General Acceptable Accounting Principles.[15]

Since the commencement of the IPR Act, both industry and universities have been faced with uncertainties in the interpretation of the IPR Act which impacted contractual negotiations.[20] However, NIPMO was very supportive in addressing the challenges in application of the IPR Act. Several of these challenges were addressed over years, such as clarification on the definition of R&D, calculation of full cost, and granting of licences when research was not funded on a full-cost basis.[19]

Universities' perspectives

Costing and pricing practices

From our experience and as evidenced from the interviews, an immediate challenge faced by universities was to address the costing and pricing practices. A legislative requirement to agree to specific IP transactions (such as licensing of IP to industry, or assignment of IP ownership to industry), required that universities had to ensure that all direct and indirect costs were fully paid by industry. Calculating the direct cost of projects was less challenging than determining the indirect cost. South African universities cooperated over several years to define a generally accepted methodology in determining indirect cost, as approved by NIPMO.[21]

Specific requirements in terms of costing and pricing practices must be established and implemented at universities for compliance purposes. During interviews with the eight participating universities, it became clear that the high research-intensive universities already had established costing and pricing practices (including an indirect cost recovery policy) prior to the commencement of the IPR Act in 2010, and the challenge for these universities was mostly amending the calculation methodology and implementation of indirect cost policies for IPR Act compliance. For the lower to medium research-intensive universities, no established

or informal costing and pricing practices were in place prior to the IPR Act, and no indirect cost recovery was applied, which caused far more challenges for these universities to ensure IPR Act compliance.[17]

Dedicated research contracts function

It was evident from interviews that high research-intensive universities had dedicated research contracts functions/offices and technology transfer expertise available (and the appropriate mandates) to review, negotiate and manage research contracts. Consequently, these universities had a more accurate insight into all research contracts, which enhanced the ability to understand, assess and mitigate potential risks associated with the research contracts portfolio.[17]

In contrast, the lower research-intensive universities had no dedicated legal function to review research contracts, and this function was either managed by the central legal services or external law firms. These universities established Technology Transfer Offices (TTOs) in response to the IPR Act, but with their mandates limited to verification of IP clauses for IPR Act compliance. These universities were frustrated to manage research contracts in this manner, arguing that, the said central or external legal services functions had limited understanding of the research conducted or the relevant legislative, regulatory, ethical, post-contractual, and funder compliance aspects related to the research; insufficient involvement of research directorates in research contract management; the TTO's mandates were not conducive to improving research contract management, as their limited roles to verify IP clauses against IPR Act compliance excluded full contextual review of the research contract transaction; there was unavailability of accurate insight into the whole research contract portfolio, with the said legal functions only capturing information important for work-flow management, and not for appropriate research contract management; and there was a lack of costing and pricing practices, including severe problems in implementing full-cost and indirect cost policies, thus entailing a risk of non-compliance of the IPR Act.[17]

In fact, some of the medium research-intensive universities were moving towards establishing a dedicated research contracts function/office and TTO (or a combination) with appropriate mandates to support the research contract management functions. Like the lower research-intensive universities, TTOs were established in response to the IPR Act. These universities were making good strides towards improved insight into research contracts which would assist in improved risk management. Some medium research-intensive universities were still struggling with these aspects and faced similar challenges. These universities were all experiencing challenges in establishing costing and pricing practices and only research contracts subject to full cost in terms of the IPR Act were tested and costed on full cost.[17]

For some universities (especially lower and medium research-intensive universities), it was more challenging to negotiate research collaboration agreements with industry partners, and appropriately manage them through the contract lifetime, due to a lack of dedicated research contract functions and appropriate mandates, accurate insight into the research contract portfolio as well as the lack in established costing and pricing practices (especially for IPR Act compliance purposes).

Since commencement of the IPR Act, universities had been experiencing pressure to become more focused on IP commercialisation. However, valuation of IP created as such remained a challenge, especially where it formed part of a larger technology pipeline and core technology of an industry. Universities might also experience push-back from the industry when the value of the IP potentially emanating from the research, is under discussion at the start of a project. The broader context of what the industry offers to universities in terms of funding the research, as well as providing valuable confidential and sensitive information as background IP to universities in conducting research, must be duly considered.

Industry partner perspective

Considerations and negotiations

Contract research collaboration at universities is one of various options available when outsourcing research projects. Factors taken into consideration when allocating projects to universities include expert knowledge, cost, technology reward and ease of securing IP exclusivity. Although IP exclusivity (in the context of IUC) has been impacted by the IPR Act, this has not deterred the industry partner from collaborating with universities and allocating research projects.

The industry partner firstly formalised a research policy aimed at establishing IP principles that would be fair and reasonable to universities and, based on this policy, commenced negotiations with universities with which it had collaborated in the past (as these universities had the scientific expertise, as required), i.e. primarily high and medium research-intensive universities.

Negotiations on behalf of the universities were led by a few medium and high research-intensive universities. The other universities eventually accepted similar terms, albeit with a few differences depending on each university's research policy. As negotiations commenced prior to the implementation of the IPR Act, the primary challenge was to establish fair principles that would be consistent with the IPR Act, once effective. Evident throughout this process was the limited number of dedicated legal resources (also at some high research-intensive universities) that could provide meaningful contributions during negotiations.

Framework Research Agreements

This resulted in the conclusion of the Framework Research Agreements (FRAs) from 2008 onwards, within which sub-agreements for specific projects could be negotiated with minimal effort. FRAs provided a mechanism to pursue projects within the scope of and subject to the IPR Act, together with other benefits such as uniformity of agreements and establishment of fair contractual principles. Previously, separate agreements were negotiated for each research project, which was a cumbersome process.

Upon allocation of a research project, the IP terms are classified by the industry partner as either low, medium, or high risk. The risk categories are based upon the risk to the industry partner that its competitive advantage may be compromised if any foreground IP, as may be generated as a result of a project, is owned, used or commercially exploited by any entity other than the industry partner. If, for example, the foreground IP relates to or falls within the industry partner's core technology area, the project will be classified as high risk. In some instances, FRA do not provide for a high and/or medium risk allocation.

For low-risk projects, the university owns foreground IP generated, together with exploiting rights, including granting of non-exclusive licences for exploitation to third parties. The industry partner has a right to acquire a non-exclusive, royalty-bearing licence for commercial exploitation, negotiated on reasonable terms.

For high-risk projects, the industry partner owns the foreground IP against payment of a fee determined on a full-cost basis. The industry partner has the right to exploit the IP and obtain registered protection therefor. The university retains the right to use the IP for further research purposes. Reference is also made to serendipitous IP, i.e. other IP generated under the sub-agreement that falls outside the parties' collaboration field under the agreement, but within the scope of the industry partner's key operational activities. In these instances, the industry partner retains the right to exploit the IP and obtain registered protection. Apart from the right to use the IP for further research purposes, the university also has the right to a sole licence to commercially exploit and sub-licence the IP in applications outside the industry partner's key operational activities. In the event that serendipitous IP is commercialised by the industry partner, it will make an additional payment to the university, the amount of which will be negotiated by the parties on reasonable terms, but to a maximum limit.

In practice, some of these principles (e.g. mechanisms for handling serendipitous IP) are seldom applied. The benefit of FRAs is, however, that all foreseeable IP scenarios are covered irrespective of the nature of any sub-agreement, for beneficial application if foreground IP is generated.

Projects allocated to South African universities are generally classified as either low or high risk, but in most instances are low risk. Consequently, foreground IP generated under a project is generally university owned. While these projects involve the disclosure of confidential information of the industry partner to universities, such disclosures are carefully managed, as there are risks associated with disclosures – specifically to students for purposes of dissertations, theses and conference proceedings. Projects that are classified as high risk and which may entail disclosure of strategic information to the university are the exception to the norm and occur only where IP exclusivity is important to the industry partner, and a university has proven expertise in a certain field. The industry partner and the universities agreed not to build in a co-ownership option (as provided for by the IPR Act, under certain conditions) into FRAs, due to the complexities of managing jointly owned IP and potentially having to negotiate commercialisation or licence rights at a later stage, but rather to allocate IP ownership to one of the contracting parties on commencement of projects and completion of all payment obligations.

While the industry partner's strategic partnerships on important research projects with specific high and medium research-intensive universities have continued, the focus was also on building of capacity at universities, to maintain high academic standards and delivery of graduates for future employment. This explains why most projects allocated were classified as low risk, with limited emphasis on foreground IP ownership. Collaboration with lower research-intensive universities has been limited and the Open Call for Sasol Research Grant Proposals is an initiative to create a mechanism to enable the industry partner to collaborate with some of these universities.[22]

Balancing needs and expectations

For meaningful IUC, both parties' needs and expectations should be considered and balanced, and reasonable arrangements should follow.

The industry partner understands that a specific research or technological innovation or outcome cannot always be guaranteed due to the nature of experimental academic research where postgraduate students are involved. However, the benefits of social investment in postgraduate students and access to the research results, pose sufficient benefits to furthering this collaboration.

The opportunity remains for the industry partner to contract a specific university with the needed expertise on high-risk research projects where the outcomes of the research are related to strategic purposes or core technology. However, commercialisation and implementation of new innovations come with high risk and high costs for industry, and it remains a challenge for industry if some universities overvalue their innovation contribution to a commercial application. For this reason, it was important for the industry partner to negotiate limits to fees payable to universities in the case of high-risk projects as described above, even in the event in which serendipitous IP is generated by the university.

In the industry partner's experience, universities are still inexperienced when it comes to commercialisation of innovation and underestimate the risks and cost of implementation of new innovations as commercial solutions. This results in universities overestimating the value of the front-end innovation, which can complicate IP negotiations. It is notable that the 11 other industry partners interviewed shared this concern in terms of universities' overestimation of IP value and technology readiness levels.

On the other hand, universities need funding for postgraduate research projects and the opportunity to conduct applied research on a specific industry problem to enable a context to work on alternative solutions. Building of prototypes for proof of concept is a very expensive component of experimental research and generally supported by industry funds. Knowledge sharing between academics and industry R&D professionals benefits IUC, ensuring that postgraduate students gain valuable experience and are better equipped for industry once they have completed their studies. Funding is generally utilised to support students through bursaries, purchase equipment, obtain access to expensive industry standard software, present results at conferences, and fund postdoctoral fellows, to strengthen the research outputs of the university.

Universities and industry in general experience a disconnect in expectations when an industry partner requires a specific innovation or technological solution to a problem, whilst universities focus on the academic research which might, or might not, lead to a solution to the problem. However, it is notable that this specific industry partner embraces the importance of supporting universities to 'enhance world class research, teaching and innovation at universities …. where the industry partner has an operational footprint'[22]. This is an important element for building truly collaborative partnerships.

Specific challenges faced through IUC

This section gives attention to some challenges faced through IUC which are more project specific and should be appropriately considered at the project development stage to mitigate risk.

Compliance to contractual obligations

As determined through the interviews, the lower and medium research-intensive universities (except for one), have no accurate overview of research contracts conducted by researchers, and therefore also have no ability to ensure that researchers keep to the contractual deliverables as specified in the contracts. This poses a risk of contractual breach for universities.[17]

In a university context, critical to the success of implementing a FRA with sub-agreements, is a dedicated research contract function with an accurate overview of all contracts, to ensure that researchers are appropriately guided on the contractual terms applicable to their projects, which include aspects such as publication rights, IP management, confidential information management, adherence to deliverable schedules, and invoicing. Without a dedicated research contract function to filter out and communicate the contractual obligations for the researchers, the risk for contractual breach is much higher.

The industry partner follows a similar approach, with the roles fulfilled by its Technology Contracting department, a centre of expertise within its legal function, and the company's Research and Technology function. The latter function is responsible for the disclosure of confidential information to universities, management of the use of such information for dissertations and publications, recording of IP or foreground IP generated, and approval of funds payable as per the project schedule. While this arrangement generally works well, more controls are required with regard to the disclosure of information to universities.

Confidential information

Disclosing information

In the context of this specific scope, the norm is that in most instances confidential information is shared by the industry partner with the university; however, the contractual clauses are reciprocal. Sharing of confidential information has the potential to cause significant risks for both parties if the practical implications of the contractual requirements are not appropriately considered and addressed.

When entering into an agreement, the legal entities (namely the industry partner and the university) will be liable in the event of any breach. Within any large organisation, ensuring that employees who receive such confidential information understand the impact of non-adherence to the confidentiality obligations, poses significant risks. In the university context, the additional risk is that students will receive confidential industry information to utilise as part of their postgraduate research projects. Students are enrolled at universities and are not university employees, and therefore act in their own capacity but also under the

auspices of the university. The university should ensure that appropriate mechanisms for the treatment of confidential information, including aspects such as information security and obtaining approval from the industry partner for use of confidential information in publications, are in place and are communicated to researchers and students. This requirement also applies to external examiners. For this purpose, in addition to the normal confidentiality undertakings between the contracting parties, individual undertakings of confidentiality should be obtained from individual recipients of confidential information.

Confidentiality periods

Due to the challenges experienced by universities to police their confidentiality obligations for excessive periods, a practical solution to overcome this issue was negotiated under the FRA. The term of the recipient's confidentiality obligations will depend on the nature of confidential information disclosed, e.g. in the case of low-risk projects, a confidentiality term of 2–10 years may apply, whereas in the case of a high-risk project, a term of 15 years generally applies.

Consequently, information to be disclosed under a low-risk project may in certain instances be of limited value to the university but will generally enable a university to use such information for purposes of dissertations and publications. In this regard, confidential information is classified as either disclosed information or derived information. The industry partner requires that dissertations and publications be verified by the university and industry partner to ensure that no disclosed information is included. Derived information is treated as foreground IP, which may be generated by either of the parties. Such information may be included in the dissertation or publication, provided that where industry partner derived information is included, the dissertation or publication will be delayed for a certain period, allowing the industry partner to file a patent application.

Main findings and recommendations

Main findings

The IPR Act undoubtedly had an impact on the contractual considerations for IUC where academic engagement is concerned.

Some universities are facing more severe challenges to support academic engagement through contracting processes, due to institutional aspects that need improvement (such as dedicated research contract functions, appropriate mandates, an oversight of all research-related contracts, and improved costing and pricing practices).

By understanding the needs, motivations and expectations of both industry and university, academic engagement can be supported by applying fair and transparent contracting principles within an IUC framework. An effective framework is dependent on the negotiation of contractual terms governing future collaboration, which take cognisance of all foreseeable IP scenarios that may occur.

FRAs between the industry partner and the respective universities resulted from joint negotiations with various universities. This not only ensured that similar principles could be negotiated with all participating universities but is an example of how innovative principles can be developed by sharing best practices. Going forward it would be in the interest of universities to share best contracting practices with each other from time to time.

The development and implementation of an FRA to support a long-term IUC through academic engagement is a powerful instrument in contractual structuring.

Recommendations

A FRA which makes provision for various risk levels of projects according to the IP ownership and exploitation options, as well as confidentiality terms associated with these risk levels, is recommended when a long-term IUC is envisioned. Negotiations for a FRA may, however, take substantially longer than those for separate research projects, as all possible scenarios and risks must be carefully considered within the legislative framework, as well as the research strategies and policies of both parties. On the other hand, any requirement to negotiate a research agreement for a specific project for which there is no governing FRA is also challenging. Within this context, and within the experience of both industry and universities, formalising a FRA to govern long-term relationships is indeed contributing to a more effective IUC framework.

It should be ensured that negotiations are not conducted by the legal teams without appropriate consultation with researchers from the respective parties. During FRA negotiations, the industry partner occasionally experienced misplaced distrust from the negotiation teams of a few universities mainly due to differences in IP philosophies. This has been addressed by means of constructive and continued dialogue to ensure that research endeavours are not negatively affected.

A remaining cause for concern is the ability of universities to have an accurate overview of research sub-agreements and ensure that contractual obligations, especially in terms of IP and confidentiality management, are communicated to researchers and students and formally addressed. Appropriate costing and pricing practices at universities are critical to ensure that the IP transactions are compliant in terms of the IPR Act. We made specific recommendations to universities for improvement in this regard.[17]

A user-friendly risk assessment document should be provided to researchers by the research contracts office and should highlight the most pertinent contractual obligations to which researchers and students must adhere (i.e. publication requirements, disclosure of creation of new IP, treatment of confidential information, etc.). Due consideration must be given to signing of confidentiality agreements between the university and the students, external collaborators, and examiners. The practical aspect to safeguarding of confidential information is also essential.

Several industry partners (national and international) and universities have based IUC agreements on the principles of this FRA, which could therefore be considered as pioneering for IUC frameworks in South Africa.

In summary, Figure 3 presents an example of a flow chart for consideration, which may assist with the contractual structuring of a formal IUC research agreement.

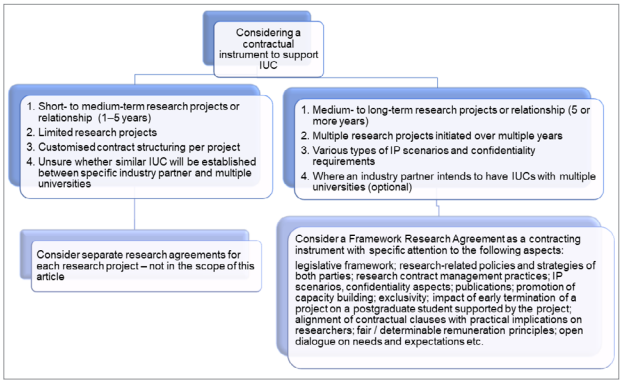

Figure 3: Aspects to consider when structuring an industry–university collaboration (IUC) research agreement.

Further work is needed on rethinking the current national drive towards commercialisation where significant funding is channeled to TTOs via NIPMO, whilst very limited, if any, government support is provided to universities to establish or grow a research contracts function to support academic engagement, even though it has been shown that industry deems academic engagement to be significantly more valuable than commercialisation activities.

Competing interests

We have no competing interests to declare.

Authors' contributions

C.M.: Conceptualisation; methodology; data collection; data analysis; validation and data curation; writing of the initial draft without industry

context; writing revisions; project leadership and management. C.J.H.N.: Conceptualisation; methodology; industry data collection and analysis; industry consultation and approval of the article; writing the industry context in the initial draft; writing revisions. C.S.L.S.: Student supervision; provided guidance on the design of the methodology; data collection (interviews with universities and the 11 industry partners and the literature study); data analysis; validation; writing – provided input through several rounds of revisions.

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References

1. Scandura A. University-industry collaboration and firms' R&D effort. Res Policy. 2016;45:1907–1922. https://doi.org/10.1016/j.respol.2016.06.009
2. Wright M, Clarysse B, Lockett A, Knockaert M. Mid-range universities' linkages with industry: Knowledge types and the role of intermediaries. Res Policy. 2008;37(8):1205–1223. https://doi.org/10.1016/j.respol.2008.04.021
3. Slotte V, Tynjälä P. Industry-university collaboration for continuing professional development. J Educ Work. 2003;16(4):445–464. https://doi.org/10.1080/13639080320000930 58
4. Ramos-Vielba I, Fernández-Esquinas M. Beneath the tip of the iceberg: Exploring the multiple forms of university-industry linkages. High Educ. 2012;64(2):237–265. https://doi.org/10.1007/s10734-011-9491-2
5. Perkmann M, Salandra R, Tartari V, McKelvey M, Hughes A. Academic engagement: A review of the literature 2011-2019. Res Policy. 2021;50(1), Art. #101114. https://doi.org/10.1016/j.respol.2020.104114
6. Perkmann M, Tartari V, McKelvey M, Autio E, Broström A, D'Este P, et al. Academic engagement and commercialisation: A review of the literature on university-industry relations. Res Policy. 2013;42(2):423–442. https://doi.org/10.1016/j.respol.2012.09.007
7. Awasthy R, Flint S, Sankarnarayana R, Jones RL. A framework to improve university-industry collaboration. J Ind Univ Collab. 2020;2(1):49–62. https://doi.org/10.1108/JIUC-09-2019-0016
8. South African Department of Science and Technology (DST). White Paper on Science Technology and Innovation. Pretoria: DST; 2019.
9. South African Department of Science and Technology (DST). National Development Plan 2030: Our future – make it work. Pretoria: DST; 2012.
10. Human Resource Development Council of South Africa. Research on the nature and extent of Post-School Education Institutions and Industry Partnerships. Pretoria: Human Resource Development Council of South Africa; 2018.
11. South African Revenue Service (SARS). Research and development (R&D) incentive [webpage on the Internet]. c2006 [cited 2021 Oct 26]. Available from: https://www.sars.gov.za/ClientSegments/Businesses/My-Bus-and-Tax/Pages/Research-and-Development-Incentive.aspx
12. Wilkes T. New BEE amendments allow you to recognise bursaries for your BEE Scorecard [webpage on the Internet]. c2019 [2020 Nov 14]. Available from: https://www.tathamwilkes.co.za/NewsResources/NewsArticle.aspx?ArticleID=2998
13. South African Department of Trade, Industry and Competition. Innovation and Technology Funding instruments: The Technology and Human Resources for Industry Programme (THRIP) [webpage on the Internet]. No date [cited 2021 Oct 24]. Available from: http://www.thedtic.gov.za/financial-and-non-financial-support/incentives/thrip/
14. South African Department of Science and Technology (DST). South African National Survey of Research and Experimental Development. Statistical report 2017/18. Pretoria: DST; 2019.
15. Intellectual Property Rights from Publicly Financed Research and Development Act 51 of 2008, South Africa.
16. Sasol. Sasol company profile – overview [webpage on the Internet]. No date [cited 2021 Oct 26]. Available from: https://www.sasol.com/about-sasol/company-profile/overview
17. Malherbe C, Schutte C. Moving beyond the challenges and seizing the opportunities: A study of South African universities' efforts to protect their research and innovation offerings during the COVID-19 pandemic. S Afr J High Educ. 2021;35(5):138–162. https://dx.doi.org/10.20853/35-5-4248
18. South African Department of Higher Education and Training (DHET). Report on the evaluation of the 2018 universities' research output [document on the Internet]. c2020 [cited 2020 Apr 20]. Available from: https://www.up.ac.za/media/shared/1/2020/May%202020/report-on-the-evaluation-of-the-2018-universities-research-output_april_2020.doc.zp189504.pdf
19. National Intellectual Property Management Office (NIPMO). About us [webpage on the Internet]. No date [cited 2021 Oct 26]. Available from: https://nipmo.dst.gov.za/about
20. Brand A, Dean OH. Intellectual property rights flowing from universities: An analysis of the impact of the current South African legal framework on international research collaboration. J S Afr Law. 2018;2018(3):475–506.
21. National Intellectual Property Management Office (NIPMO). Guideline 5.1 of 2019: Guidance for determining the full cost of research and development as per the Intellectual Property Rights from Publicly Financed Research and Development Act [document on the Internet]. c2019 [cited 2021 Oct 26]. Available from: https://nipmo.dst.gov.za/uploads/files/Guideline-5.1-of-2019_FC_FINAL-6-Aug-2019.pdf
22. Sasol. Open call for Sasol Research Grant proposals. SASOL; 2018.