

AFRICAN RESEARCH UNIVERSITIES ALLIANCE (ARUA)

Towards developing a Collaborative PhD Program across ARUA Member Universities

Experiences from the University of Mauritius

**A Research Report Produced for ARUA by the
Human Sciences Research Council (HSRC)**

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November 2022



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1. Introduction and background

1.1 Introduction to the study

This report highlights the status of PhD education in Mauritius, using the University of Mauritius as a case study. The report provides an overview of the country's socio-economic status, which has a bearing on how universities organise PhD programmes and which may influence the direction of the design of collaborative programmes as envisaged by ARUA. The report details the national and institutional policy and operational frameworks for PhD programmes in Mauritius, the nature of student access and progression policies across the programmes, opportunities for designing collaborative arrangements, and challenges that need to be addressed.

The report is divided into five sections. The next section provides an overview of Mauritius's socio-economic and political dynamics. Section two provides a brief description of the higher education landscape in Mauritius. Section three delves into the case study of the university and the two selected programmes. Section four presents the findings from the data collected from the two case study programmes. Section five provides some recommendations and conclusions.

1.2 Socio-political context

The Republic of Mauritius is part of the volcanic chain of Mascarene Islands and consists of two main islands, Mauritius and Rodrigues (UN, 2019). The population of the Republic is approximately 1, 265, 985 (World Population Review, 2019). Mauritius has the highest population density on the African Continent – about 625 per square kilometer. The Republic was colonized by Netherlands, France and Great Britain (World Population Review, 2019). The Republic of Mauritius operated under a system of parliamentary democracy. Mauritius, with a Human Development Index (HDI) of 0.77, has already achieved high medium development status and performs well above the African average value of 0.52 (United Nations Development Programme, 2016). The island has one of Africa's highest per capita incomes and is considered among the wealthiest countries on the continent. English and French are the preferred languages in educational institutions and professional settings. Media operations and literature are primarily in French. Table one presents detailed demographic characteristics of Mauritius.

Table 1: The Socio-economic statistics of Mauritius

S/No.	Socio-economic Indicators	Statistics
1	National Population	1,265,740 (2020)
2	Gross Domestic Product (GDP) Per Capita	US\$22,909 (2018)
3	HDI	0.8 (2019)
4	Unemployment Rate	9.50 percent (2021)
5	Main Economic Sectors	Agriculture and Tourism
6	Gross Pre-primary Enrolment Ratio	97.8 % (2019)
7	Gross Primary Enrolment Ratio	99.5 % (2019)
8	Gross Secondary Enrolment Ratio	97.1 % (2019)
9	Gross Tertiary Enrolment Ratio	40.6 % (2017)
10	Number of Public Universities	10 public institution
11	Number of Private Universities	50 private institutions

The Republic of Mauritius is a stable democracy, with regular and free elections, as well as a positive human rights record. Politics in Mauritius are fundamentally stable, characterised by shifting coalitions and peaceful changes of power, despite the ethnic background of the parties. Mauritius ranks number 16 worldwide, and one of the countries with a stable democracy. The Ibrahim Index of African Governance ranked Mauritius first in good governance in 2018.

1.3 Main economic activities

Since independence from Great Britain in 1968, the economic history of Mauritius, has been referred to as the *Mauritian Miracle* and the *success of Africa* (Stiglitz, 2011). Mauritius has transformed from a low-income, agriculture-based economy to a high-income diversified economy, based on tourism, agriculture, textiles, sugarcane, and financial services (Gwartney et al.2019). Information and communication technology (ICT), seafood, property development, healthcare, renewable energy as well as education and training have also emerged as important sectors of the economy (Gwartney et al., 2019). The gross domestic product (GDP) was US\$29.187 billion in 2018, and GDP per capita was over US\$22,909, which is, as indicated in Table One, the second highest in the continent (International Monetary Fund, 2018).

1.4 Secondary education system

The education system in Mauritius is divided into three sub-systems: primary, secondary and tertiary. The education structure consists of six years of primary education and seven years of secondary education. The Mauritian education system is largely based on the British system due to colonial ties and influences. The Ministry of Education and Human Resources of Mauritius manages and controls the development and administration of public schools. The Ministry also plays advisory and supervisory roles with regards to private schools. Schooling

is compulsory up to the age of 16. Education in Mauritius is free from pre-primary to tertiary levels.

The Technical and Vocational Education and Training (TVET) sector is coordinated and regulated by the Mauritius Qualifications Authority (MQA) . The MQA is responsible for developing and maintaining the national Qualifications Framework (NQF). In addition to providing pre-vocational and vocational education and training options for early school leavers, the TVET sector in Mauritius, also provides further education and training for greater employability and career skills enhancement, as well as practical training in a number of fields. The prevocational training is provided to students who are unable to meet the established benchmark for promotion to mainstream secondary education. In this regard, prevocational education provides a second chance to students who have failed the Certificate of Primary Education (CPE) or who are above age 13. Additionally, students who completed a three-year programme in secondary schools, but did not pass, can move into the TVET sector and undertake a four-year programme.

2. Tertiary Education System

2.1 Current Overview

The Mauritian tertiary education landscape started in 1924 with the College of Agriculture. While the development and administration of schools in Mauritius are led by the Ministry of Education and Human Resources, tertiary education is led by the Ministry of Tertiary Education, Science, Research and Technology. The government of Mauritius provides free education and transport service to its citizens from pre-primary to tertiary levels.

Over the last decade, Mauritius has invested significantly in its education sector to produce a skilled labour force. In order to compete globally and move to a higher socio-economic development level, Mauritius has been expanding its tertiary education system. As such, there has been considerable investment in the tertiary education sector, and noteworthy progress has been achieved. Mauritius aims to be a centre for higher learning and excellence and a knowledge hub in the SADC sub-region. The country has also embarked on lifelong learning.

Mauritius higher education institutions have increased intake capacity by promoting Open and Distance Learning (ODL), both locally and regionally. One of the most visible manifestations of globalisation in the tertiary education sector in Mauritius has been the emergence of a “borderless” tertiary education market. This is owing to the opportunities created by communication technologies and the internet which are re-creating and re-shaping the tertiary education milieu. As such, for-profit higher education providers have extended the supply of educational services via the establishment of branches on campuses, franchising, and twinning agreements with local institutions. To be globally competitive and engage in innovation and technological progress, since the last decade, Mauritius, like other developing countries, has been developing and expanding its tertiary education systems, particularly through the use of ICTs. The provision of tertiary education extends beyond the local public tertiary education institutions. In 2005, the Mauritian government initiated a plan to further encourage the private provision of education by both local and foreign providers. Consequently, the tertiary education sector has developed into a diversified system, comprised of public, private, regional and international institutions, providing different programmes with different modalities (Higher Education Council, 2018).

2.2 Shape and size of the higher education system

There are 10 public and 50 private higher education institutions (HEI) in Mauritius (HEC, 2019). Enrolment in public tertiary institutions accounted for 46.7%, with private institutions

making up 53.2% of the total (TEC, 2019). Most enrolments, 18 675 (84.3%), is at undergraduate level, while the postgraduate enrolment accounts for 3 480 (15.7%) (TEC, 2019). Private institutions, including international institutions, deliver programmes mostly in the business field niche areas such as, information technology, law, management, accountancy and finance. A significant number of Mauritian students either go overseas to pursue their studies, or resort exclusively to the ODL model. Table two summarises enrollments at the 10 public institutions or Public Financed Institutions (PFI) by the level of programme of study.

Table 2: Total enrolment of PFIs by undergraduate and postgraduate levels

#	PFI	Postgraduate degrees		Undergraduate degrees		Total PFI enrolment	
		Student enrolment	% per institution	Student enrolment	% per institution	Total student enrolment	% of total
1	University of Mauritius	1120	13.0	7463	87.0	8583	38,7
2	Open University Mauritius	1677	29.9	3924	70.1	5601	25,3
3	University of Technology Mauritius	449	15.3	2491	84.7	2940	13,3
4	Mauritius Institute of Education	107	3.8	2710	96.2	2817	12,7
5	Universite des Mascareignes	48	5.7	789	94.3	837	3,8
6	Mahatma Gandhi Institute and Rabindranath Tagore Institute	40	6.7	553	93.3	593	2,7
8	Mauritius Institute for Training and Development	0	0.0	557	100.0	557	2,5
9	Fashion and Design Institute	0	0.0	188	100.0	188	0,8
10	Mauritius Institute of Health	39	100.0	0	0.0	39	0,2
	Total	3480	15.7	18,675	84.3	22,155	100

Source: (HEC, 2018)

The table highlights that the Open University Mauritius, the University of Mauritius (UoM), and the University Technology of Mauritius constitutes the largest proportion of enrolment across the system. The Fashion and Design Institute, and the Mauritius Institute of Health, constitute the smallest proportion of enrolment. Even though all 10 public institutions have students enrolled for undergraduate programmes, the Mauritius Institute for Training and Development and the Fashion and Design Institute focus exclusively on undergraduate training. The Open University Mauritius has the highest number of postgraduate enrollments.

The UoM, the oldest and largest institution, enrolls close to 40% (8 583) of all the students at public institutions. The university offers undergraduate, master’s and doctoral academic programmes. While undergraduate programmes take at least four years to complete,

postgraduate programmes take between three to six years. English is the official language of instruction at HEIs. There are also programmes available in French. The academic calendar has two regular (spring and autumn) and one optional (summer) semester. The spring semester covers the period January to February, and autumn semester is from August to December.

2.3 Position on internationalisation

Mauritius has identified internationalisation as a key strategy to achieve knowledge hub status and become a regional center of excellence (Motala-Timol, 2017). Internationalisation in public institutions mainly takes place through collaborative agreements with a wide range of international institutions and the use of foreign external examiners for postgraduate programmes. The country has effectively used the International Program and Provider Mobility (IPPM) in higher education (HE) as a modality to achieve this. This is when foreign tertiary education programmes move to Mauritius to provide tertiary education for local students and increase access in the Island.

The Tertiary Education Commission (TEC) was set up in January 2020 as a statutory body based on the Tertiary Education Act of 2017. The TEC developed a robust regulatory framework to ensure that all domestic and foreign private institutions were registered, and their programmes accredited to offer quality tertiary education. It is an apex national quality assurance agency for public and private HEIs. However, while it registers and accredits the programmes of private HEIs, it only undertakes periodic quality audits on public HEIs. The TEC is also responsible for the recognition and equivalence of qualifications, both foreign and local. Therefore, there is a robust framework in place to ensure quality of the programmes and integrity of the foreign qualifications on offer.

All public institutions receive an annual government grant for recurrent and capital expenditure. There is no formula funding used for the budget preparation of institutions. The budget needs to be submitted every year. This makes long-term planning by the institutions very difficult. In 2018, the education expenditure for all levels of education, as a percent of all government expenditure, was 5.1% (UNESCO, 2019). Of this, the TEC allocated a budget of MUR1.23 billion (about US\$35 million) to the public tertiary education sector in 2018, representing 6.8% of the total budget of the Ministry of Education. Specifically, the expenditure for the tertiary education and research and development currently is four percent of the GDP (Republic of Mauritius, 2019). In recent years, public institutions have faced a substantial shortage of budget due to the dwindling state of funding.

2.4 Challenges facing the higher education system

Public institutions do not charge tuition fees owing to the government policy of free education for both full-time and part-time undergraduate students. Postgraduate students are charged tuition fees whether they are full-time or part-time students (Tertiary Education Council, 2019). The number of postgraduate students is lower than that of undergraduate students. This, coupled with the insufficient budget given to institutions, has created budgetary problems, particularly at this level. As such, of the main challenges facing the tertiary education sector in general, and postgraduate programmes is budget constraints. This has caused a ripple effect, where there is a limited number of international student enrolment, and difficulty in attracting and retaining qualified and experienced academic staff (TEC, 2019).

Furthermore, given the policy to increase access to tertiary education, university entrance requirements has been lowered to accommodate students who do not have the necessary requirements (Ibid). The number of young people enrolled in HE in Mauritius has increased significantly. This increase, like at most institutions in Africa, has been affecting the quality of education in Mauritius. This is a cause for concern regarding the quality of HE as quantity alone, will not position Mauritius as a knowledge hub in the region. The vision of Mauritius, to be a regional HE hub, could be achieved only when the Island establishes itself as a provider of quality education. Currently, the challenges in the Mauritian tertiary education sector could negatively impact on the country's goal to become a higher-income country by 2030.

Primarily, HEIs should prepare graduates either for employment, and/or job creation. In order to achieve this, the knowledge and competence required for, and valued in, the labour market, should be in congruence with the forms of knowledge and capability taught and researched at Mauritian HEIs. However, HEIs have been widely criticised for not producing graduates who meet the needs of the local economy, thereby implying that they are producing graduates who are unemployable. This poses a real threat to economic progress and the democratic stability of Mauritius (Carnoy, 2005). The unemployment rate in Mauritius only marginally decreased to 9.50% in the third quarter of 2021 from 10.50% in the second quarter of 2021 (Central Statistics Office Mauritius, 2021).

In Mauritius, the majority of private providers have been established by franchise arrangements with foreign providers. They function, like their counterparts in other parts of Africa, as corporate bodies or for-profit organisations. Very few international students enrol at the public institutions as none of these institutions have student residential facilities. In 2015,

there were 1 524 foreign students and only 10% of them were studying in public HEIs (TEC, 2018). However, a sizable number of students, an average of 9 000 per year, sought tertiary education opportunities abroad (Sarangapani and Pappu, 2020). Very few foreign academic staff are recruited by public institutions. There has not been a responsive, relevant, resilient, sustainable, and engaged stand-alone internationalisation and collaboration policy to enable collaboration at national, systemic and institutional levels in Mauritius.

3. Institutional context of the study

3.1 University of Mauritius (UoM)

Established in 1914, the College of Agriculture was established in Mauritius to train technicians for the sugar industry (Manrakham, 1991). More than 50 year later, the UoM was inaugurated on 24 March 1972 by Queen Elizabeth II of the United Kingdom. At the time, the UoM had three schools: Agriculture, Administration and Industrial Technology. It later expanded to include five Colleges/Faculties – the Faculty of Agriculture, Faculty of Engineering, Faculty of Law and Management, Faculty of Science, and Faculty of Social Studies and Humanities. The UoM has four Centres – Medical Research and Studies; Distance Education, Information Technology and Systems, and Consultancy.

There is a noticeable difference between the UoM and other institutions with regards to the appointment of the chief executive officer (CEO). At the UoM, the Vice-Chancellor is appointed by the Council of the university, without the need to seek approval from government, whereas at other universities, the Director-General, which is parallel to the Vice Chancellor, is appointed by the Prime Minister on the recommendation of the Minister of Tertiary Education, Science, Research and Technology. Therefore, the Minister gives general directive in the running of these institutions, except for the UoM. All public institutions are organised along the lines of faculties or schools, headed by the most senior staff or by competitive application, although the latter option is not yet the dominant practice and culture (TEC, 2019).

The UoM has been open to collaboration and internationalisation since its inception, with the agenda of internationalisation through partnership, being a core factor of its operations (UoM, 2019). This has helped the university to reconstruct its academic portfolio and strategic orientations through several initiatives (UoM, 2019). The UoM is a signatory of 70 memoranda of understanding with universities and research institutes from 10 different countries. A research grant of US\$150 000 is given to international students who want to study their PhD at the UoM. However, access to these programmes by international students in the last two years has been restricted and delayed due to COVID-19 policies. It was also observed that even before the pandemic, the enrolment of international students (internationalisation) was resolutely insignificant despite the university's vision to become one of the leading international tertiary education providers and a research-led university (UoM, 2019).

The Doctoral School was approved and set up by the Council of the UoM in May 2014. This is with the view to progressively concentrate on graduate programmes, research, and consultancy. The school is responsible for the smooth running of postdoctoral and postgraduate programmes namely the MPhil, MPhil/PhD, and PhD, by providing training and capacity building, assisting students in securing grants, and facilitating a forum to brainstorming and promoting publications. However, at the UoM, most students 87% (7 463) were registered at the undergraduate level, only 13% (1 120) were registered for postgraduate programmes.

3.2 Recap of research focus and objectives

The overarching objective of this research report is to respond to ARUA's objective to create globally competitive collaborative PhD programmes among ARUA member universities. More specifically, the research seeks to identify selected PhD programmes at ARUA member universities, review the programmes and make recommendations to ARUA towards better collaboration across the alliance. Two PhD programmes were selected; one from the humanities and one from the natural sciences. Data was collected from each of the programme coordinators or head of programmes.

Additionally, institutional data was collected from the institutional websites, and these were analysed according to three main themes: (1) access to the programmes, (2) structure of the programme, and (3) experience through the programme. Furthermore, the research sought to conduct interviews with each university Vice-Chancellor to get inputs into four main issues related to collaboration: (1) national and institutional policy, (2) current collaboration practice, (3) challenges facing collaboration, and (4) recommendations for better collaboration. As the only member of ARUA from Mauritius, the UoM was included as the sample institution to be studied in the project.

The PhD programmes from the university were selected through a negotiated approach between the research team and university. While a set of criteria were proposed, the university had the discretion to suggest a preferred programme from the humanities and another from the natural sciences. Two programmes have been selected for detailed review. These are the PhD in economics, from the social sciences and humanities, and the PhD in biomaterials and nanomedicine representing the science, technology, engineering and mathematics (STEM) field.

3.3 Case studies: PhD in economics and PhD biomaterials and nanomedicine

This section provides an overview of the selected case study programmes in terms of access, structure and experiences variables. As admission to the UoM, is conducted centrally by the School of PhD Education, nearly all the MPhil/PhD programmes of the UoM are similar when it comes to these factors.

3.3.1 Access

At the UoM, a student will not be admitted to any MPhil/PhD, unless special permission is granted from the Senate once they are satisfied that the entrance requirements for the selected programme has been met. Registration days are announced by the university. Aside from these days, a student may be permitted to register only with special permission of the Registrar. Application to the MPhil/PhD programmes is open throughout the year. Application procedures and admission criteria are set centrally by the UoM. Although these criteria remain similar across the programmes of study, various documents of the university, explain that these could be modified considering the nature of the programme. In this regard, the admission requirements are not specific to the social sciences and humanities and STEM MPhil/PhD programmes. The minimum admission requirements for the MPhil/PhD programmes in economics and biomaterials and nanomedicine are successful completion of an undergraduate degree with a second-class honours degree in the relevant field or equivalent, or a grade point average (GPA) not less than 2.5 out of four or equivalent, from a recognised HEI.

Applicants of the MPhil/PhD degrees are required to apply via official online application form. The form must be accompanied by a synopsis of their research proposal to the Doctoral School. Applicants are also required to provide two academic references. International students may be asked to provide evidence of language proficiency in English or French or another language, depending on the medium of learning of the programme. The online registration system automatically generates application forms. All applicants must ensure that all information and documents submitted are valid. Once the School receives all MPhil/PhD applications, these are processed jointly with the Higher Degree Committee, which comprise of specialists in the discipline. After checking the viability of funding, supervisors, and ethical clearance, they refer the application to the Teaching and Research Committee (TRC), which is composed of Deans from faculties and chaired by the Vice-Chancellor, for final approval. Applicants are expected to receive feedback within two months.

3.3.2 Structure

Both the MPhil/PhD programmes in economics, and biomaterials and nanomedicine, have no credits attached, as the programmes are only by research/dissertation. For full-time students, these programmes take between two and four years to complete, and between three and five years for part-time students. The UoM has embarked on the European Credit Transfer System (ECTS) to replace the credit system, considering the ECTS as a dynamic learning system for the future generations of learners. Moreover, the general programmes at the UoM, as well as the MPhil/PhD programmes are structured in modularly. A module refers to any discrete, and relatively self-contained course unit characterised by a particular content and structure, specific methods of delivery, and a particular approach to assessment. Each module can either be taught in one semester (semester module) or throughout two semesters (yearly module).

There are two pathways for admission to the MPhil/PhD programme economics and biomaterials and nanomedicine: (1) students who are already registered for an MPhil programme may request an upgrade to the PhD; and (2) students who already possess a MPhil research degree or equivalent in the relevant field could directly apply to the PhD programme. Students who want to upgrade to the PhD programme should submit a transfer report detailing the following: (1) a concise account of the research work already conducted; (2) demonstrate that the student has understood the problem and is aware of relevant literature; (3) demonstrate the capacity to conduct research of PhD standard; and (4) the establishment of a realistic research plan and schedule for the duration of the PhD study.

The MPhil transfer report is assessed by internal and external assessors. The external assessor must be a professor with the internal assessor at least at the level of an associate professor or equivalent status. In exceptional cases, where a student has exceeded the maximum timeframe in submitting the MPhil transfer report as well as the final dissertation, he/she will be granted an additional two years (full-time) and three years (part-time) respectively, after the date Senate has approved the upgrade.

3.3.3 Experience

At the UoM, for general, and specifically, the MPhil/PhD programmes, funding opportunities are available in the form of sponsorship, bursaries, assistantships; and tutoring/lecturing. MPhil/PhD students can also teach on a part-time base. However, funding has never been considered sufficient from the perspective of both, students, and academics. There are departmental, faculty and institutional level facilities such as libraries, laboratories, ICT

support; research writing centres, and studios, amongst others, at the required levels for both MPhil/PhD programmes chosen for this study. The MPhil/PhD programmes for biomaterials and nanomedicine has synthetic, analytical, characterisation and in vitro facilities to accommodate the unique academic nature of the programme. Moreover, it has a scanning transmission electron microscope equipped with an Energy Dispersive X-Ray (EDX), a fully automated fluorescence microscope, two nano spinners including a pilot line, thermal analyses, mechanical testers, and a particle size analyzer.

Neither of the MPhil/PhD programmes in economics and biomaterials and nanomedicine are joint programmes supported and financed in partnership with other universities in Africa or beyond, and no joint degrees are issued. However, collaboration on these programmes does take place with other institutions. The UoM has signed Memoranda of Understanding with the University of La Reunion and the Cyclotron Réunion Océan Indien (CYROI). The University of La Reunion is a French public higher education and research institution, located in the the Indian Ocean. The MPhil/PhD programme in biomaterials and nanomedicine has joint students with this university. The agreement with CYROI, a biomedical research and innovation institute, includes the provision of facilities for viva-voce (oral exams) of the PhD students. This MPhil/PhD programme in biomaterials and nanomedicine also collaborates with the University of Witwatersrand, South Africa (ARUA member) on an Advanced Drug Delivery Platform (WADDP), as well as with German universities to exchange collaborators' labs, which is critical for the acquisition of new skills. Additionally, exposing students to other environments has a positive impact on student experience.

The MPhil/PhD programmes in economics has a collaboration with the African Economic Research Consortium's (AERC). Students can apply for the Commonwealth Doctoral Scholarship and can spend a year in a foreign university across from a Commonwealth country if their application is a success.

Within the MPhil/PhD programmes in economic and biomaterials and nanomedicine, there are well qualified academics in supervision positions. In economics, there are 10 out of 15 academic staff members who can supervise MPhil/PhD students (six associate professors; five senior lecturers; and four lecturers). With regards to the biomaterials and nanomedicine MPhil/PhD programme all academic staff had PhDs and 50% of them were full professors.

Both programmes are financed through projects. While the average yearly cost for the MPhil/PhD programme in biomaterials and nanomedicine, was estimated at MUR Rs460 000

(US\$10 000), in terms of consumables and the use of equipment; the MPhil/PhD programme in economics was estimated at MUR Rs58 800 (US\$1 278). The UoM posts an updated list of scholarships and sources of funding for research for MPhil/PhD applicants. For both programmes, PhD proposals are an integral part of project funding, and the principal investigator (PI) serves as the main supervisor. The main supervisor is ideally a full-time academic staff member, either of the UoM, or from an external institution. The research staff member is responsible for providing appropriate academic and administrative guidance and support to the student in order for he/she to achieve their full research potential, and the standard required for MPhil/PhD research. The supervision model employed tends to be that of team supervision, where co-supervisors are normally appointed on the recommendation of the main supervisor in the case where the research project has an interdisciplinary dimension. Applicants should contact academics/research staff who could possibly be their supervisor before finalising their research proposal. Therefore, the onus to identify potential supervisor(s) is normally left to the student.

For both programmes there are no compulsory elements for graduation such as orientation, course work, minimum lab work, seminar attendance, residency requirements, as well as professional work/internship requirement and field work. However, students are encouraged to attend such aspects through the TEC's funding. Additionally, for both programmes, the student is expected to publish at least one research paper in an internationally peer-reviewed journal prior to the final submission of their thesis for examination. and as a pre-requisite for awarding the degree. MPhil/PhD students in biomaterials and nanomedicine are considering translating their nano scaffold technology into modern medicine technology for the African continent targeting wound healing. Currently, however, there is no viva-voce , but it is under discussion and is up for consideration.

Even though there were nine PhD students/candidates enrolled in the programme over the last five years (2016 to 2021), only four have graduated and obtained their PhD degrees in biomaterials and nanomedicine. Over the same period, in the PhD in economics, a higher number of students were enrolled (17), but comparatively, a much smaller proportion were successful in graduating (three).

Table 3: Summary table of access, structure and experiences of the sample programmes

Access	Structure	Experiences
<ul style="list-style-type: none"> • Application procedures and admission criteria are centrally done. • Official online application form. • Open throughout the year. • Second Class Honours degree or GPA not less than 2.5 out of 4. • Synopsis of research proposal. • Two academic references. • Language proficiency in English/French (international students). • Approval by Teaching and Research Committee (TRC). • Permission of the Senate. • The approval is normally available in two months. 	<ul style="list-style-type: none"> • Only by research/dissertation. • Two to four years full-time and three-to-five-year part-time students. • Embarking on the ECTS. • Modular modality. • MPhil students may request an upgrade to the PhD – must submit a transfer report. • Students who already have an MPhil degree could directly apply to the PhD programme. • The MPhil transfer report is examined by internal and external assessors. • When the transfer report is submitted, the final dissertation is granted additional two years (full-time) and three years (part-time) 	<ul style="list-style-type: none"> • Availability of facilities. • Funding is not enough. • Qualified academic for supervision. • PhD in biomaterials and nanomedicine: works together in collaboration University of La Reunion, University of Witwatersrand, and German universities. • PhD in Economics: Works together with Africa Economic Research Commission and universities from Commonwealth countries. ; • PhD in biomaterials and nanomedicine: MUR Rs460 000 (US\$10, 0000) per year. • PhD in economics: MUR Rs58 800 (US\$1 278) per year. • Team supervision. • One research paper in an internationally peer-reviewed journal. • No viva-voce testing. • In the last five years, only four graduated in PhD biomaterials and nanomedicine and three with PhD in economics.

4. Emerging findings

This section highlights some of the emerging findings from the institutional data and their implications for collaboration between the Association of African Universities (AAU) and other ARUA member universities. The findings are classified under two broad themes – enabling or constraining conditions for collaboration.

4.1 Enabling conditions

the UoM believes strongly in internationalisation and collaboration as this has the possibility to make the partnering institutions, their governments and the region internationally visible. The tertiary education sector could enhance human capital development on the continent if mobility is enhanced. In the Mauritian HE landscape, the private sector is the major driver of the IPPM. The IPPM has created competitiveness in the tertiary education sector and enhanced the development of employable graduates for the changing Mauritian labor force needs. Arguably, private tertiary institutions are the dominant forces and driver of internationalisation in Mauritius. There is a framework in place to ensure quality of the programmes and integrity of the foreign qualifications on offer by all tertiary education institutions. While this can be seen as an enabling factor within the Mauritian case, the fact that this is driven to a large extent through the private sector, is an aspect to consider regarding collaborative PhDs.

As opposed to other institutions of the country, the UoM is autonomous. Its Vice-Chancellor is appointed by the council of the university, without the need to seek approval from government. As such, it can independently decide on academic matters of the university, for instance, on how to run collaborative PhD programmes. In the case of other institutions in the Mauritian HE landscape, the Director-General, which is parallel to the Vice-Chancellor, is appointed by the Prime Minister on the recommendation of the Minister of Tertiary Education, Science, Research and Technology. The Minister also provides general directive in the running of these institutions.

The UoM is very much open for internationalisation and collaboration, and can share its institutional resources, especially with regards to PhD education. The MPhil/PhD programmes of the UoM are changing the credit system to the ECTS with the view to enhancing the mobility of students and academics. Therefore, the courses /modules taken at the UoM could gain recognition and traction in other ARUA member universities and beyond.

At the UoM, there have been capable and internationally competent academics at both MPhil/PhD programme for economics and biomaterials and nanomedicine. Furthermore, infrastructures such as laboratories, libraries, ICTs and internet connectivity, as well as other supporting facilities are available at the required and various levels of the university. These are accessible to all MPhil/PhD students.

A research grant of US\$150 000 is given to international students who want to study their PhD at the UoM. Although this grant might not be enough, especially for STEM PhD students, the experience is important to establish and run collaborative PhD education in the ARUA member universities and the continent.

4.2 Constraining factors

The expansion of schools has created pressure on tertiary education institutions. As a result, there has been emphasis on quantity rather than quality, and this affects the global and regional competitiveness of graduates. The pressure to increase access has had negative implications for the perceived quality of university graduates. This appears to be contributing to the graduate unemployment which has become a challenge for the country. Furthermore, the increase in student numbers could pose a challenge on doctoral enrolment and graduation as an increased teaching load is placed on the academic staff which does not grow as fast as the student population.

To gain admission to the MPhil/PhD programmes at the UoM, there are two pathways: (1) students who are already registered for an MPhil programme may request an upgrade to be admitted into the PhD programme by submitting a MPhil transfer report, and (2) students who already have an MPhil research degree or equivalent in the relevant field could be admitted directly. While the option of transfer opens up the possibility to capable students to fast track their PhD education, this modality is not common in other African universities, and could pose a challenge to PhD collaborations.

In Mauritius there are no explicit policies on internationalisation or collaboration at the national level. This is visible at the UoM as there is a lack of effective implementation of an institutional policy with more bilateral collaboration agreements. The absence of clear national and institutional policy is not necessarily a hindrance to the internationalisation and collaboration efforts of the UoM. The university has engaged in memoranda of understanding with reputable institutions in the region and beyond, although its impact is limited on the production of PhDs.

It could also be perceived that the policy gap is responsible for the perceived limited number of international academics and students at the UoM and the HE system in general. The IPPM programmes, which are mainly run by private institutions, might create pressure on the internationalisation endeavor of public tertiary education institutions or the structures that can be used as a framework to institutionalise such efforts in the public sector.

At the UoM, there is the challenge of funding for PhD programmes across all disciplines, especially those in STEM. The latter demands substantial investments to establish well-resourced laboratories and other resources such as laboratory reagents. Furthermore, the funding gaps create difficulties in attracting quality academics to the university which could ultimately compromise internationalisation through collaboration.

5. Conclusion and recommendations

5.1 Conclusion

Despite the fact that the UoM is a flagship university of the country, there has not been a stand-alone internationalisation and collaboration policy to steer PhD education in a manner that is significant to the country's ambition of becoming a regional higher education and research hub.

Through the MPhil/PhD structure of the UoM, candidates who have the abilities to be fast tracked to PhD studies, can be identified early on during their MPhil programme. This, can then expedite throughput rates of PhD graduates.

Funding has been a stumbling block for collaboration at the UoM. It is good for ARUA to steer the collaboration of PhD education in Africa, by facilitating the availability of funding and resources. ARUA could set up formal mechanisms such as focused grants to support collaboration.

5.2 Recommendations

A first recommendation would be to foster the development of national and institutional policy on collaboration. The Republic of Mauritius, in consultation with the UoM, which is the flagship institution of the country, needs to develop a standalone robust policy and strategy of PhD education collaboration. This is significant to reap the benefit of collaboration, which drives the country's ambition of becoming a regional higher education and research hub.

Investigating how the large supervisory capacity in the university can be more effectively applied is a second recommendation. The UoM is duty bound to conduct a study exploring why their doctoral output is significantly low, despite the presence of qualified and competent academics who could effectively and efficiently guide and supervise PhD candidates.

A third recommendation is that the MPhil/PhD structure can expedite throughput rates of PhD graduates. It is good for ARUA to consider facilitating and implementing the fast track MPhil/PhD structure of the UoM in other ARUA member universities. This structure can positively impact and increase the number of PhD graduates. It could also be coupled with other schemes regarding institutional capacity development.

A final recommendation is that ARUA could set up formal mechanisms such as focused grants to support collaboration. ARUA should steer the collaboration of PhD education in Africa by facilitating the availability of funding and resources. Funding is a challenge to collaboration

across many African countries. This is critical, even in the instances where there is willingness at institutional level to collaborate towards PhD production. ARUA's centres of excellence could be another vehicle through which collaboration between the University of Mauritius and other ARUA member countries.

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Appendix

African Research Universities Alliance (ARUA)

Data Collection Instrument: Doctoral Degree Programme

Towards a Collaborative PhD Program across ARUA member universities

in the Natural Sciences and the Humanities and Social Science Disciplines

Compiled by [Name of researcher(s)]

(1) Name of the university where the degree is offered

Programme-specific information:

(2) Name of the faculty/school and department/centre/institute where the degree is offered

(3) Exact name of the degree programme and qualification

(4) Number of credits (total; elements)

(5) Number of students/candidates enrolled in the degree programme over the last 5 years (number of enrolled PhDs)

(6) Academic staff available for supervision / staff to student ratio

(7) Qualification of staff (% PhD, % professors)

(8) Graduation number in the degree programme over the last 5 years

(9) Availability of supporting infrastructure, including institution-wide infrastructure (library; ICT support; statistics support; research hub; writing centres etc.); faculty-wide infrastructure / department / centre (e.g. laboratories, studios, postgraduate academies); and programme specific infrastructure (if any).

(10) Is this a collaborative programme (with another institute/university)? If yes, please elaborate on any relevant aspect.

(11) What is the history of this programme? (date started, how it might have changed with time)

(12) What makes this programme one of the best? Any notable graduates, ranking achievements, patents or so (or other 'bragging rights' or significant achievements or recognitions worth mentioning)?

Admission requirements

(13) Minimum prior qualification plus other requirements (e.g. masters GPA or score average points/merits; work experience; professional registration, or the like)

(14) Application date & start date of programme (deadlines)

(15) Formal application procedure and requirements for supporting documents (e.g. PhD proposal; CV; sample writing; etc.)

(16) Contacting and assignment of supervisor(s)

(17) Please comment: Are these admission requirements typical for all doctoral programmes nationally, in this institution, or are they specific to the HUM or STEM, or are they unique to this particular programme?

Structure and content of programme

(18) Assignment of supervisor and supervision model

- i. one student-one supervisor (traditional / apprenticeship model);
- ii. one student-several supervisors (team supervision model);
- iii. many students-several supervisors (cohort supervision)
- iv. is there a contract between supervisor and student?
 - (19) Collaborative supervision aspects and other research support (e.g. joint cohort research days; postgraduate academies; etc.)
 - (20) Provisional vs. full registration rules e.g. Is there a period when one is provisionally admitted pending some procedures? such as proposal presentation and acceptance, title registration;

Programme requirements:

- (21) Compulsory elements (e.g. compulsory orientation; compulsory course work; minimum lab work; seminar attendance; residency requirements; professional work/internship requirement; field work requirements;)
- (22) Other elements, e.g. exchange programmes
- (23) Milestones and outputs of the programme:
 - i. Requirement to present (inhouse or at a conference)
 - ii. Requirement to publish (type and number of minimum publications)
 - iii. Thesis by monograph, by professional capstone, by articles (explain all in detail)
- (24) Duration of the programme: Minimum time to graduation; maximum time to graduation
- (25) Financial obligations and benefits
- (26) Costs of the programme (per annum; overall)
- (27) Funding opportunities: availability of sponsorship, bursaries, scholarships, assistantships; tutoring/lecturing; etc.
- (28) Conference attendance (e.g. availability of sponsorship)

Assessment of this programme

- (29) Please comment: Is this structure and content of the programme typical for all doctoral programmes in this institution, or are they specific to the HUM or STEM, or are they unique to this particular programme?
- (30) Please comment on the programme's comparability with other doctoral programmes you are familiar with.
- (31) Please comment on best practices or the need to modify.
- (32) What could be done to make the programme more harmonized with others within ARUA universities.

