Ministry of Tertiary Education, Science and Research

Report of the National Committee on Research Strategy

2025 HIGHER EDUCATION summit

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Abbreviations

ABDC	Association of Business Deans Council
ADI	Academy of Design and Innovation
AHCI	Arts and Humanities Citation Index
AJG	Academic Journal Guide
BOM	Bank of Mauritius
CBBR	Center for Biomedical and Biomaterial Research
CDC	Center for Disease Control and Prevention
CPD	Continuous Professional Development
DBA	Doctor of Business Administration
ECR	Early Career Researcher
ERA	Excellence for Research in Australia
GDP	Gross Domestic Product
GII	Global Innovation Index
HEC	Higher Education Commission
HEI	Higher Education Institution
IORA	Indian Ocean Rim Association
iPhD	Industrial Doctor of Philosophy
IRCFS	International Research Collaboration Funding Scheme
JIF	Journal Impact Factor
KTIO	Knowledge Transfer and Innovation Office
KTO	Knowledge Transfer Office
MRIICS	Mauritius Research and Innovation Impact Case Studies
MCCI	Mauritius Chamber of Commerce and Industry
MCIA	Mauritius Cane Industry Authority
MGI	Mahatma Gandhi Institute
MIE	Mauritius Institute of Education
MPDFS	Mauritius Postdoctoral Fellowship Scheme
MREF	Mauritius Research Excellence Framework
MRIC	Mauritius Research and Innovation Council
MSIRI	Mauritius Sugar Industry Research Institute
MWF	Mauritius Wildlife Foundation
NCRE	National Center for Research Excellence
NCRS	National Committee on Research Strategy
NRP	National Research Priority
OECD	Organisation for Economic Cooperation and Development
OUM	Open University of Mauritius
PhD	Doctor of Philosophy
R&D	Research and Development
REF	Research Excellence Framework
REGU	Research Evaluation and Governance Unit
RTA	Research Training Academy
SCIE	Science Citation Index Expanded
SDG	Sustainable Development Goal
SJR	Scimago Journal Rank
SNIP	Source Normalized Impact Factor
SSCI	Social Science Citation Index
THE	Times Higher Education
UDM	Université des Mascareignes

UKRI	United Kingdom Research Institute
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UOM	University of Mauritius
UTM	University of Technology, Mauritius
WHO	World Health Organisation
WIPO	World Intellectual Property Organisation

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Executive Summary

Achieving productivity and growth requires a research and innovation ecosystem that generates socioeconomically relevant knowledge, new products, and processes. Particularly for small island developing states like Mauritius characterized by limited resources and unique developmental challenges, knowledge can potentially become a source of competitive advantage. However, this cannot be achieved without national commitment to research and innovation. The sacrosanct role our universities and research institutions have played in the socioeconomic development of Mauritius is undeniable. However, for Mauritius to survive the pressures of globalization, its institutions now have a stronger obligation to leverage research to address new development challenges while engendering prosperity of its people.

This National Research Strategy 2025-2035 pursues the vision of the Ministry of Tertiary Education, Science and Research to promote socioeconomically relevant research and innovation as part of the government's national development agenda articulated in the 'Government Program 2025-2029, A Bridge to the Future'. The strategy evaluates the current state of research and innovation in Mauritius using objective indicators and qualitative data and sets out a framework to guide research and innovation activities in Mauritius considering the roles of various institutions.

The 10 recommendations proposed in this strategy are mutually inclusive and ultimately aim at building research excellence by strengthening and consolidating three core pillars of the research system: (i) institutional framework governing research and innovation activities; (ii) high quality and impactful research and innovation; and (iii) academia-industry linkages. Its implementation requires strong political will, as well as boldness, open-mindedness, and a readiness to transform how we conceive and conduct research and innovation.

Summary of Recommendations

Recommendations	Pillars		
	High quality and impactful research and innovation	Academia-industry linkages	Institutional strengthening
Recommendation 1: A Research System based on National Research Priorities	✓	✓	
Recommendation 2: Institutional strengthening	✓		✓
Recommendation 3: Ex-Post Evaluation of Research and Innovation Projects	✓		✓
Recommendation 4: Modernizing and Strengthening Doctoral Programs	✓	✓	
Recommendation 5: Mauritius Post-Doctoral Fellowship Scheme	✓	✓	
Recommendation 6: Research Training Academy	✓		
Recommendation 7: National Centers of Research Excellence	✓	✓	
Recommendation 8: Knowledge Transfer and Innovation Office	✓	✓	
Recommendation 9: International Research Collaboration Funding Scheme	✓	✓	
Recommendation 10: Standardized Workload Model for Public HEIs	✓	✓	

1. BACKGROUND TO THE NATIONAL RESEARCH STRATEGY

Mauritius requires a comprehensive and well-defined research strategy if it is to survive in a globalized and competitive environment and secure its economic future. This NRS advances the vision of the Mauritian Government articulated in the '*Government Program 2025-2029, A Bridge to the Future'*[1] and that of the Honorable Minister of Tertiary Education, Science and Research to promote and use scientific research for innovation and socio-economic development of Mauritius. The Government Program 2025-2029 is probably the only one in the annals of Mauritian politics that formally and explicitly recognizes research as an engine of innovation and growth.

The role of scientific research in the socio-economic progress of countries, irrespective of their level of development, is clear. Empirical evidence based on global analysis of historical data on large samples of countries confirms a positive and significant relationship between research outputs and economic growth for both developed and developing countries[2,3,4]. Research complements labor and capital and natural resources to determine national output and provide nations with a source of competitive advantage, providing the necessary basis for technical and social development, and evidence-informed policy and practice.

There are, however, marked differences in the capacity of societies to generate and absorb research that responds to their economic needs. The ways in which scientific disciplines interact with the economy also vary between countries. For example, countries with the pharmaceutical industry as a main economic sector require extensive research in both animals and humans to develop products. In contrast, different types of research interventions are required for nations dominated by primary and secondary sectors. The relevance of scientific knowledge for economic

[1] Prime Minister Office (2025). Government program 2025-2029: a bridge to the future. Retrieved from https://pmo.govmu.org/Communique/Government%20Programme%202025-2029.pdf, March 3, 2025.

[2] Lee, L. C., Lin, P. H., Chuang, Y. W., & Lee, Y. Y. (2011). Research output and economic productivity: A Granger causality test. *Scientometrics*, *89*(2), 465-478.

[3] Pinto, T., & Teixeira, A. A. (2020). The impact of research output on economic growth by fields of science: A dynamic panel data analysis, 1980–2016. *Scientometrics*, *123*(2), 945-978.

[4] Solarin, S. A., & Yen, Y. Y. (2016). A global analysis of the impact of research output on economic growth. *Scientometrics*, *108*, 855-874.

development, therefore, is tied up in numerous and intricate ways to the economy, society, value systems, universities, and funding structures, all of which vary between nations, which must be considered in any well-informed NRS.

1.1. The Research and Higher Education Landscape of Mauritius

Mauritius is a small island developing state characterized by unique socio-economic features that present various challenges to its research environment and systems. Compared to industrialized nations, Mauritius is limited in natural and human capital, has a narrower resource base, and limited funding which restrict the nation's ability to produce research that addresses its unique development and sustainability challenges such as climate change, rising sea levels, and biodiversity loss. Its insularity and remoteness hinder international collaborations which are often mandated by research funders and that facilitate interdisciplinary, impactful, and socio-economically relevant research. Like several other small island developing states, Mauritius has traditionally borrowed or transferred foreign knowledge instead of producing indigenous knowledge sensitive to its socioeconomic, cultural, and environmental contexts and relevant to its development challenges and priorities.

Despite these inherent challenges, Mauritius has made considerable progress in research and innovation. According to the World Intellectual Property Organization (WIPO) over the last five years, Mauritius has made significant improvements in the Global Innovation Index (GII) ranking to reach 55th (out of 133 countries) in 2024 and is considered a leader in research and innovation among Sub-Saharan African countries[5].

However, much progress remains to be achieved and international concerns on the state of research and innovation in the country are mounting. The 2024 GII of the WIPO classifies Mauritius as 'inefficient' based on the input-output and ranks the country in the second quartile 2nd quartile (ranks 67th to 99th) on the 'Human Capital and Research' indicator[6]. Similar critiques have been made by the World

[5] WIPO (2024). The Global Innovation Index (GII) conceptual framework. Retrieved from https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2020-appendix1.pdf, March 21, 2025.
[6] WIPO (2024), op. cit. (as previously cited).

Bank[7,8] with respect to underinvestment in research and development initiatives, a lack of economically relevant research produced by universities, and weak university-industry partnerships. Furthermore, only one Mauritian university is ranked in global university rankings such as the Times Higher Education (THE) World University Ranking, the QS World University Ranking, and Shanghai Academic Ranking of World Universities, which pose several challenges for the international reputation and internationalization of the Mauritian higher education sector.

Addressing the challenges of globalization and concerns of international community requires policies that can facilitate Mauritius' transition to a knowledge-based economy. The country stands at the threshold of transformative change and has the potential to establish itself as a research- and innovation-driven economy. Scientific research that responds to the country's socio-economic and industrial needs and developmental challenges is vital to its economic survival, sustainability, and resilience. Public universities of Mauritius must take a prominent role in this process. However, historically, these institutions have focused mainly on manpower development for the labor market instead of becoming knowledge hubs. Therefore, these institutions must redefine their roles and responsibilities by producing research that addresses the socioeconomic and developmental challenges of Mauritius to ensure the nation's economic survival. Indeed, the World Bank[9,10] recommends reforms in higher education institutions to promote research excellence.

This NRS pursues the Mauritian government's vision to use research and innovation to foster productivity and growth and address the country's development challenges. These cannot be achieved by the current fragmented approach to research and innovation, where public universities and other institutions pursue their own

[7] World Bank (2023a). Mauritius public expenditure review: from resilience to performance – modernizing fiscal policies to boot Mauritius' growth post-pandemic. Retrieved from https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099112323101025381/p176975023a29404f0850b02f95174298e8, April 6, 2025.

[8] World Bank (2023b). Country private sector diagnosis. Creating markets in Mauritius: Increasing private sector participation in an innovation-led economy. Retrieved from https://www.worldbank.org/en/country/mauritius/publication/mauritius-afe-cpsd-increasing-private-sector-participation-in-an-innovation-led-economy, April 12, 2025.

[9] World Bank (2023a), op. cit.

[10] World Bank (2023b), op, cit.

initiatives in silos without adhering to a national research policy and quality standards for research. This NRS sets out a framework to support and guide research in Mauritius and is based on an integrated approach considering the roles of universities, regulatory institutions such as the Higher Education Commission (HEC), the government, the civil society, the Mauritius Research and Innovation Council (MRIC), and the private sector.

It should be noted at the very outset that the recommendations of the NRS not only aim to boost research productivity and innovation, but they also include mechanisms to promote research excellence by encouraging high quality and impactful research and innovation output while at the same time discouraging low quality research that brings little value to individual researchers, universities, and the country. The recommendations embed the principles of a performance-based funding mechanism, at times, involving a redistribution of resources from less impactful research activities to high impact research. In this way, the recommendations promote the most optimum use of available research resources in a context where public funding is limited.

1.2. The Methodology of the National Research Strategy

This research strategy rests on the philosophy of the British physicist and mathematician, William Thomson Kelvin, that "What is not defined cannot be measured. What is not measured cannot be improved. What is not improved is always degraded". Therefore, the development of this strategy rests on a strong methodology involving the use of measurable indicators to assess the research performance of Mauritius. The recommendations emanating from this strategy are pragmatic and supported by key performance indicators for monitoring research activities at the public HEIs in line with the principles of performance-based budgeting espoused by the Government of Mauritius.

A four-stage methodological approach has been adopted to develop this report. First, a comprehensive assessment of the research performance of public universities in Mauritius is carried out. This is achieved by analyzing research data on Mauritius available from Scopus (a multidisciplinary abstract and citation database with comprehensive coverage of scientific, technical, medical and social sciences

literature) and from the World Bank, United Nations Education, Scientific and Cultural Organisation (UNESCO), and the WIPO. We use various internationally validated indicators to quantify research performance of public HEIs such as the number of journal publications, citations, doctoral and post-doctoral researchers, extent of international research collaborations, and research funding. We also reviewed reports on the state of research and innovation published by such organizations as the World Bank and the WIPO.

Second, to understand the contextual and sociocultural environment under which research and innovation activities and processes take place in Mauritius, the NCRS engaged in consultations with higher education stakeholders and the public and private sectors of Mauritius including the University of Mauritius (UOM), University of Technology, Mauritius (UTM), Open University of Mauritius (OUM), Université des Mascareignes (UDM), MRIC, HEC, Bank of Mauritius (BOM), the Ministry of Finance, the Mauritius Chamber of Commerce and Industry (MCCI), and Business Mauritius.

Third, the NCRS administered a semi-structured questionnaire to academic staff working in higher education institutions to gather their opinion about the current research environment and key issues that they would like the national research strategy to address. The survey was administered online and remained open for a period of around three months, March-May 2025.

Finally, the report was presented at the Higher Education Summit organized by the Minister of Tertiary Education, Science and Research between the 4 and 6 June 2025. The summit featured a ‘panel discussion’ comprising representatives from academia, the World Bank, the Higher Education Commission, the Bank of Mauritius, and the Mauritius Chamber of Commerce and Industry. Panel members endorsed the recommendations and particularly welcomed the three pillars of research excellence: high-quality research and innovation, academia-industry linkages, and institutional strengthening. To foster an open dialogue on the content of the report and ensure inclusiveness in the development process of the research strategy, participants were invited to express their views during the ‘public voice’ part of the summit as well as through a dedicated online feedback platform.

2. NATIONAL RESEARCH ASSESSMENT

Knowledge accumulation is an important factor influencing the productive capacity of a nation and its international competitiveness. Various indicators such as research and development expenditure, number of researchers, research publications, citations, international collaboration, and the number of researchers involved in research and development can be used to proxy a nation's accumulated knowledge and research influence. To assess the current state of research in Mauritius, therefore, we use a combination of indicators to identify the nation's strengths and weaknesses. Table 1 presents some basic indicators on the four public HEIs: UOM, UTM, OUM, and UDM.

Table 1. Basic indicators for public HEIs

	UOM	UTM	OUM	UDM	MGI	MIE	Total
Total number of academic staff	264	69	34	61	59	87	574
Male	138	38	19	46	-	-	-
Female	126	31	15	15	-	-	-
Academic staff with a PhD	184	39	9	24	32	41	330 (58%)
Academic with ongoing MPhil/PhD	30	5	3	6	5	22	71 (12%)
Academic staff without a PhD	50	25	21	31	22	23	172 (30%)
MPhil/Doctoral students (2020-2024)	250	53	61	35	-	-	
Number of MPhil/PhD awarded (2020-2024)	95	17	75	12	3	-	
Post-doctoral fellows	1	0	0	0		-	
Post-doctoral fellows completed	15	0	0	0		-	
Number of patents	2	0	0	1		-	
Doctoral school	Yes	Yes	No	Yes	-	-	

Source: Data provided by the heads of the HEIs (as at March 2025)

Public HEIs in Mauritius currently employ 574 academic staff. Around 58% of them hold a PhD and 12% are currently undertaking an MPhil/PhD degree. Around 30% are currently not enrolled on a doctoral program. During the past five years, 2020-2024, 199 students have graduated from the public HEIs. Currently, 399 students are currently registered on an MPhil/PhD at the six HEIs. To date, public HEIs have produced a very low number of postdoctoral fellows (15) which is a challenge for progressing research and innovation programs and developing a well-trained pool of scientists. The low number of patents also indicates a low level of or lack of innovation activities taking place in Mauritius.

2.1. Research Output

Bibliometric indicators such as the number of publications produced by a country's researchers are a conclusive measure of research activity because of their

objectivity and because they consider different types of outputs from various disciplines. The number of publications allows for a comprehensive analysis of research performance and knowledge accumulation across time and between institutions and countries. An objective measure of research output is particularly important for a developing country like Mauritius where the public HEIs lacks strong and sophisticated institutional mechanisms for monitoring research and innovation. Research publications also reflect the end products of the creative and collective efforts of researchers and scholars. Research outputs in the forms of publications are more 'visible' and 'tangibles', and therefore, plays a very prominent role in research assessments exercises.

For the bibliometric assessment, we use Scopus data[11]. This was chosen in preference to other databases such as Web of Science for its wider coverage and more transparent subject categories. For example, around 99.11% of the journals indexed in Web of Science are also indexed in Scopus. There are up to 335 narrow fields in Scopus (depending on the year), and they are organized into 27 broad fields, one of which is 'Multidisciplinary'. Scopus also allows the analysis of research outputs based on journals' quality (quartile) and types of publications: journals, conference proceedings, books and book chapters, and trade publications. Table 2 clarifies the five types of publications indexed in Scopus.

The Scopus Content Selection and Advisory Board (CSAB) ensures transparency and integrity in the coverage of documents indexed by the database. Unlike Google Scholar and other databases such as EBSCO, all journals suggested to Scopus must undergo a rigorous evaluation and selection process to ensure it meets all the high-quality title selection criteria required for acceptance. For these reasons, Scopus provides an objective and reliable database for the assessment of Mauritius' research performance. Scopus data are also used by university ranking systems such as the Times Higher Education Financial Times Global MBA Rankings, QS World University Rankings, Maclean's University Rankings Canada, and national university rankings in China. However, although the CSAB evaluates listed journals annually to detect dubious journal practices, due to lack of information about the peer-review and

[11] Scopus is a database that offers a comprehensive overview of global interdisciplinary scientific information, covering various disciplines and types of publication.

publication process for certain journals, Scopus can also index journals with some predatory elements, however, these journals are mostly found in the lowest quartile of Scopus (Q3 & Q4)[12,13].

Table 2. Types of publications indexed in Scopus

Types of publications	Characteristics
Journals	The bulk of the content on Scopus is peer-reviewed journals which are selected according to Scopus content coverage policy. Any serial publication with an ISSN that meets the technical criteria can be suggested for review and covered on Scopus. Over 5,500 peer-reviewed titles are full open access titles (according to DOAJ and/or ROAD).
Trade publications	Serial publications covering and intended to reach a specific industry, trade or type of business. These publications usually are a magazine type of periodical with articles on topical subjects, news items and advertisements that appeal to those in the field. Trade journals are seldom refereed and do not always have an editorial board.
Book series	A serial publication that has an overall series title, an ISSN and in which every volume and/or issue in the series is also a book with an ISBN. Usually, but not always, each book has a book title separate from the series title and a different editor or editors. Typically, each book is a monographic publication. Book series are usually published irregularly.
Books (non-serial titles)	A non-serial source is a publication with an ISBN and is usually a monograph or composed work. One-off book publications covered in Scopus include monographs, edited volumes, major reference works and graduate level textbooks. Over 217,000 book titles are in Scopus that significantly increase the breadth and depth of coverage for book-oriented disciplines in the social sciences and humanities. Books are indexed on both a book and a chapter level. Book selection policy is publisher-based, meaning publishers are reviewed based on the relevancy and quality of their complete books list. Once a publisher is accepted, all books from that publisher that fit the scope of the project are indexed in Scopus.
Conference materials	Conference material enters Scopus in two different ways: (1) as a special issue of a regular journal, (2) as a dedicated conference proceeding. Proceedings can be published as serial or non-serial and may contain either the full articles of the papers presented or only the abstracts. The source title usually includes words like proceeding(s), meeting(s), conference(s), symposium/symposia, seminar(s) or workshop(s) (or their synonyms in other languages), although some journals also include proceeding(s) in the title. Scopus covers conferences that publish full-text papers (i.e., document type conference papers).

Source: https://www.elsevier.com/products/scopus/content

[12] Frandsen, T. F. (2022). Authors publishing repeatedly in predatory journals: An analysis of Scopus articles. *Learned Publishing*, *35*(4), 598-604.

[13] Pollock, D., Barker, T. H., Stone, J. C., Aromataris, E., Klugar, M., Scott, A. M., ... & Munn, Z. (2024). Predatory journals and their practices present a conundrum for systematic reviewers and evidence synthesisers of health research: A qualitative descriptive study. *Research Synthesis Methods*, *15*(2), 257-274.

2.1.1. Journal and Other Publications

Among the several types of research outputs, journal publications hold higher credibility than conference papers, books and book chapters in most fields because they are verified for their originality, theoretical and methodological rigor, and significance through a rigorous double-blind review process. This is why journals publications are used by most university ranking agencies to assess institutional research performance. Both the Times Higher Education ranking and QS World University Ranking use publications in academic journals indexed by Scopus as an indicator of research quality. The WIPO also considers the number of articles in peer-reviewed journals as an indicator of knowledge creation under Pillar 6: "Knowledge and Technology Outputs" of the GII. Mauritius performs poorly on this indicator. The country is ranked 110th out of 133 countries on the 'Scientific and technical articles/bn PPP$ GDP' indicator of the GII 2024[14].

For these reasons, it is important to differentiate between journal publications and other forms of research outputs in our research assessment. Journal publications is a key research performance indicator that Mauritius should leverage to improve its research profile locally and internationally and its ranking in the GII.

*Table 3. Scopus indexed publications for Mauritius[15] (as of Dec 2024)

Institutions	Journal publications	**Other publications	Total
UOM (1969-2024)	3271	1346	4617 (76.87%)
UTM (2004-2024)	228	170	398 (6.63%)
UDM (2014-2024)	61	151	212 (3.53)
MWF (1997-2024)	155	2	157 (2.61)
MCIA (1957-2022)	139	7	146 (2.43%)
MIE (1979-2024)	81	53	134 (2.23%)
MSIRI (1957-2017)	127	7	134 (2.23%)
Middlesex (2015-2024)	33	67	100 (1.67%)
OUM (2013-2024)	48	18	66 (1.10%)
JSS Acad. (2011-2024)	17	9	26 (0.44%)
MGI (2012-2024)	5	8	13 (0.21%)
ADI (2023-2024)	-	2	2 (0.03%)
Total	4166 (69.36%)	1840 (30.64%)	6006

**This table should not be used to compare the performance of institutions; ** Other publications include books, book series, and conference proceedings.*
Source: Data retrieved on 8 March 2025 from Scopus.

[14] WIPO (2024), op. cit.

[15] Co-authored publication by researchers from more than one institution is counted as one document for each institution; **Other publications include conference proceedings, books, book series, and trade publications.

Table 3 shows the research outputs produced by HEIs and other institutions in Mauritius. As of December 2024, Scopus indexed 6006 publications produced by 11 institutions of the country, including the public HEIs: UoM, UTM, UDM, OUM, MGI, and MIE. Of course, this figure does not include research outputs not indexed in Scopus produced by these institutions which cannot be captured and evaluated for their quality, especially in the absence of an automatic method for extracting these types of publications. These outputs are 'lost in the system' because Scopus-indexed publications are used as a proxy to determine the research strength, ranking, and prestige of an institution and its academic staff.

Journal publications represent around 70% of the total research outputs of Mauritius' HEIs. The first publication in Scopus appeared in 1957, published under the name of "Mauritius Sugar Research Institute" (MSIRI). The UOM, the first and oldest HEI in Mauritius, established in 1969, is the major producer of research, contributing to around 76% of all research output, followed by the UTM (6.63%), and the UDM (3.53%). The performance of the Mauritius Wildlife Foundation, a non-governmental organization, is noteworthy. Private HEIs such as Middlesex University and the JSS Academy of Higher Education and Research contribute a negligible proportion to total research outputs in Mauritius. These are teaching-oriented institutions where research, although desired, is not mandatory for academics. These institutions also lack the necessary culture and mechanisms to promote research. However, given their higher education institution status, a reasonable level of research engagement should be expected from them.

2.1.2. Trends in Research Publications

Figure 1 shows the trends in research publications for the past 20 years, disaggregated by types of publications: journal article, conference, books, and book series for each HEIs (see Table 2 for a description of each type of publication). Except for the UDM, the number of journal publications has generally increased, but growth has been erratic. For the UOM, the number of journal publications increased from 49 in 2005 to 291 in 2021 but have been decreasing to reach 209 in 2024. Papers in conference proceedings, books, and book chapters have generally increased over

the years. The UDM is an exception because unlike the other HEIs, conference proceedings appear to be an important publication outlet for its academic staff.

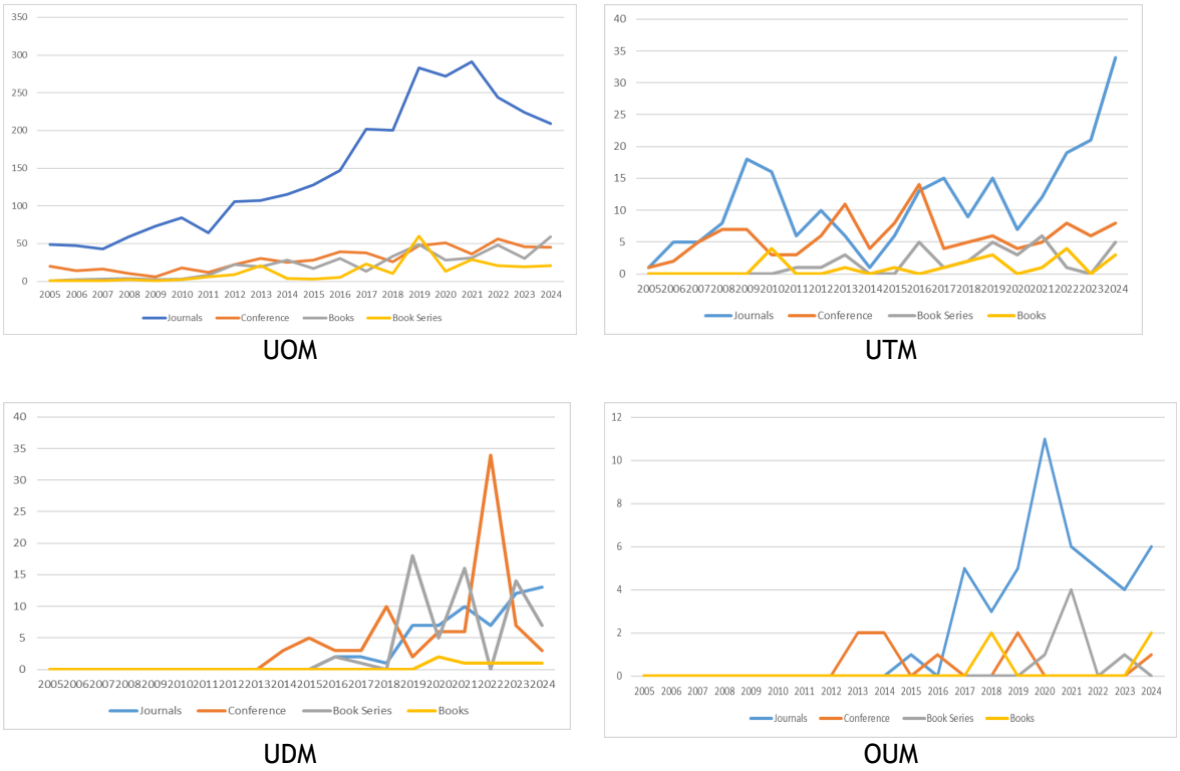


Figure 1. Trends in research publications for public HEIs, 2005-2024

2.1.3. Research Output Per Academic Staff

The low research output per academic staff in the four public HEIs is concerning, especially for journal publications (Table 4). An academic staff at the four HEIs, on average, produces one research output per year in the form of journal publications, books and book chapters, or conference proceedings (Table 4). However, there are marked differences between institutions. The yearly average research output for one academic staff at the UOM is 1.32 and less than one for other HEIs: UTM, 0.42; UDM, 0.49; and OUM, 0.24. The situation is more alarming in the case of journal publications (Table 5). The average number of journal publications per academic staff per year is less than one at each of the four public HEIs and for the whole country (0.65 journal article).

*Table 4. Research output per academic staff per year at public HEIs[16]

	UOM	UTM	UDM	OUM	Total
Research outputs per year[17]	349	29	30	8	416
Number of academic staffs[18]	264	69	61	34	428
Research output per academic staff per year	1.32	0.42	0.49	0.24	0.97

**This table should not be used to compare the performance of institutions*

*Table 5. Journal article per academic staff per year at public HEIs

	UOM	UTM	UDM	OUM	Total
Journal articles per year[19]	244	19	10	6	279
Number of academic staffs	264	69	61	34	428
Journal publication/academic staff per year	0.92	0.27	0.16	0.18	0.65

**This table should not be used to compare the performance of institutions.*

Furthermore, research output at the public HEIs is highly skewed toward a small percentage of academic staff. At the UOM, for example, for the period 2010-2024, around 75% of the research output (including collaborative research) was produced by only around 17% of researchers with an affiliation to the institution, where each researcher produced at least 30 publications during this period. Included in this group are four post-doctoral researchers/research associates who produced at least 35 research publications each (one of them produced 141 research publications for the period 2010-2024). Several academic staff at the UOM published, on average, less than one Scopus indexed research output per year for the period 2010-2024.

The results are concerning because they suggest that many academicians working at the different public HEIs in Mauritius are not research active, although their employment contract stipulates research activities as a job requirement. Public HEIs are currently not making optimum and full use of their existing pool of researchers to promote research. These results contribute to explaining the low status of Mauritius' public HEIs in global university rankings.

2.1.4. Research Publications by Quartile Classification

Publications in high-ranking journals are necessary for peer esteem and institutional reputation and are a requirement for research excellence. Using Scopus data, Scimago has developed a quartile-based classification (Q1, Q2, Q3, and Q4) based

[16] Includes journal articles, books and book chapters, and conference proceedings.
[17] Averaged over five years 2020-2024 using Scopus data.
[18] Data obtained from the heads of the HEIs.
[19] Averaged over five years 2020-2024 using Scopus data.

on the Scimago Journal Rank (SJR)[20] to categorize research publications based on their citation scores. The first quartile (Q1) includes publications with the highest citation scores and, therefore, includes the most prestigious journals while the fourth quartile (Q4) includes publications with the lowest citation scores that are considered least prestigious. The prestige of a university in university ranking systems is determined partly by the number of articles published in the top-tier journals by its academics. Table 6 shows the distributions of journal quartile across the 27 Scopus subject categories.

Table 6. Distribution of journal quartile

Subject categories	Journal ranking				
	Q1	Q2	Q3	Q4	Total
Agricultural and Biological Sciences (12 subcategories)	748	636	563	481	2428
Arts and Humanities (14 subcategories)	1684	1306	1084	890	4964
Biochemistry, Genetics & Molecular Biology (16 subcategories)	839	566	404	264	2073
Business Management and Accounting (11 subcategories)	650	388	327	189	1554
Chemical Engineering (9 subcategories)	248	179	139	105	671
Chemistry (8 subcategories)	327	266	227	159	979
Computer Science (13 subcategories)	810	508	364	209	1891
Decision Sciences (5 subcategories)	186	127	112	93	518
Dentistry (7 subcategories)	71	68	59	52	250
Earth and Planetary Science (14 subcategories)	421	335	299	234	1289
Economics, Econometrics and Finance (4 subcategories)	430	362	282	173	1247
Energy (6 subcategories)	228	142	122	95	587
Engineering (17 subcategories)	1002	857	661	493	3013
Environmental Science (13 subcategories)	637	460	350	301	1748
Health Professions (17 subcategories)	217	170	163	116	666
Immunology and Microbiology (7 subcategories)	245	162	132	91	630
Material Science (9 subcategories)	450	379	302	205	1336
Mathematics (15 subcategories)	564	469	399	280	1712
Medicine (49 subcategories)	2176	1771	1571	1393	6911
Multidisciplinary	49	43	40	37	169
Neuroscience (10 subcategories)	250	175	118	75	618
Nursing (24 subcategories)	240	173	158	130	701
Pharmacology, Toxicology, and Pharmaceutics (6 subcategories)	237	204	137	108	686
Physics and Astronomy (11 subcategories)	375	337	290	170	1172
Psychology (8 subcategories)	571	338	252	199	1360
Social Sciences (23 subcategories)	3022	2143	1603	1090	7858
Veterinary (5 subcategories)	80	73	63	64	280
Total	16757	12637	10221	7696	47311[21]

[20] SJR is a prestige metric weighted by the prestige of a journal. Citations are weighted based on the status of the journal where the citations are coming from. A citation from a high SJR journal has more value than a citation from a lower SJR journal. SJR normalizes differences of citation behavior in different subjects.

[21] This figure exceeds the actual number of journals indexed in Scopus because a journal can be listed under more than one subject categories. For example, the International Journal of Information Management is listed under four subject categories.

Source: Data retrieved from Scopus as of March 2025.

Figure 2 shows the share of publication per journal classification for the UOM, UTM, UDM, and OUM. For UOM, around 46% and 25% of articles have been published in the Q1 and Q2 categories, respectively. Publications in these two categories have generally been increasing over the years. For the UTM, UDM, and OUM, more than 50% of articles have been published in the lower two journal categories (Q3 and Q4). The UTM has the lowest number of publications in Q1 journals (27.1%), followed by UDM (32.4%), and OUM (35.3%).

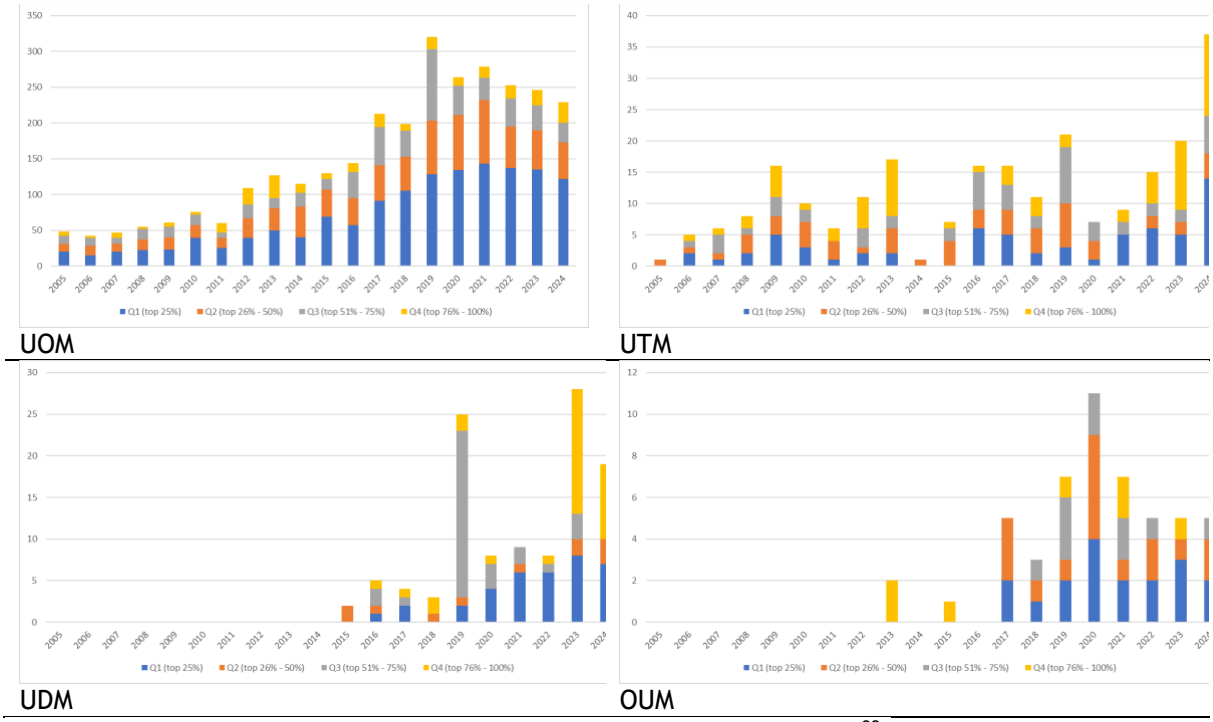


Figure 2. Share of publication per journal quartile as of December 2024[22].

Table 7 presents the number of journal publications in Q1 per academic staff in the four public universities. The average number of Q1 journal publications per academic staff per year across all four institutions is very concerning and is less than one across each institution and nationally.

[22]Data retrieved from Scival on March 2023, 2025.

*Table 7. Article per academic staff in Q1 journals[23].

	UOM	UTM	UDM	OUM	Total
Average number of articles in Q1 journals/year[24]	134	6	6	2.6	148
Number of academic staffs	264	69	61	34	428
Q1 publications/academic staff per year	0.51	0.08	0.09	0.07	0.35

**This table should not be used to compare the performance of institutions.*

2.1.5. Citation Performance

Publications serve to disseminate research ideas and findings to a broader audience. They serve as an invitation for other scholars and scientists to use the findings of the published works in their own research[25]. Citing the work of others becomes a formal acknowledgement process of scholarship. In this way, citations become "reproductive technologies" as they emphasize certain ideas, theories, concepts, and methodologies. From a market-based perspective, citations suggest the preferences for ideas and knowledge in a scientific discipline. In this way, citations quantify the scholarly impact of research and have, therefore, become an important measure of research influence used to evaluate institutional performance or that of individual scholars.

The GII uses the *h*-index[26] as an indicator of the impact of scientific publications under Pillar 6: "Knowledge and Technology Outputs"[27]. QS University Ranking assigns a weight of 20% to the 'Citation per Faculty' indicator which reflects the volume of citations being achieved on average by an institution's academic staff[28]. In the THE University Ranking, citation impact is accorded the highest weightage (15%) in the research quality component[29].

[23]Data retrieved from Scival on March 2023, 2025.
[24]Data averaged over five years, 2020-2024.
[25]Bornmann, L., Mutz, R., Neuhaus, C., & Daniel, H. D. (2008). Citation counts for research evaluation: standards of good practice for analyzing bibliometric data and presenting and interpreting results. *Ethics in Science and Environmental Politics*, *8*(1), 93-102.
[26] The *h*-index (or Hirsch-index) is defined as the number *h* such that, for a general group of papers, *h* papers received at least *h* citations while the other papers received no more than *h* citations. For example, an *h*-index of 10 means that 10 publications produced by a researcher or an institution have been cited at least 10 times.
[27] WIPO (2024), op. cit.
[28] Elsevier (2024). Understanding Scopus & SciVal & the QS World University Rankings. Retrieved from https://www.elsevier.com/academic-and-government/qs-university-rankings-data, March 23, 2025.
[29] THE World University Ranking (2023). World university rankings 2024: methodology. Retrieved from https://www.timeshighereducation.com/world-university-rankings/world-university-rankings-2024-methodology, March 22, 2025.

The total number of citations received as of March 2025 by all Scopus indexed research outputs produced by Mauritian HEIs as at December 2024 is presented in Panel A of Table 8. Across all the HEIs, most of the research outputs have been cited: UOM, 82%; UTM, 68%; UDM 67%; and OUM, 78%. Overall, 79% of all research outputs produced by the four HEIs have been cited at least once while the remaining 21% has received zero citation as of March 2025. The *h*-index for each institution varies significantly from 12 for the OUM to 129 for the UOM. The citation per document ranges from 6.60 for the UDM to 24.86 for the UOM. The average number of citations for Mauritius' research output is 23.77.

Table 8. Citation performance of public HEIs[30]

	UOM	UTM	UDM	OUM	Mauritius
Panel A: All documents (doc.)					
Number of doc.	4616	398	211	64	5289
h-index	129	32	14	12	187
No. of cited doc.	3730 (82%)	271 (68%)	141 (67%)	50 (78%)	4192 (79%)
No. of doc. with 0 citations	886 (18%)	127 (32%)	70 (33%)	14 (22%	1097 (21%)
No. of citations	92744	5171	931	791	99637
Citation per doc. (all doc.)	20.09	12.99	4.41	12.36	18.84
Citation per doc. (cited doc.)	24.86	19.08	6.60	15.82	23.77
Panel B: Journal Publications					
No. of doc.	3271	227	60	46	3604
h-index	128	31	11	12	182
No. of cited doc.	2908 (89%)	166 (73%)	48 (80%)	41 (89%)	3163 (88%)
No. of doc. with 0 citations	363 (11%)	62 (27%)	12 (20%)	5 (11%)	442 (12%)
No. of citations	87955 (95%)	4652 (90%)	482 (52%)	773 (97%)	93862 (94%)
Citation per doc. (all doc.)	26.89	20.49	8.03	16.80	26.04
Citation per doc. (cited doc.)	30.25	28.02	10.04	18.85	29.69
Panel C: Other publications[31]					
No. of doc.	1346	170	151	18	1685
h-index	26	11	10	3	50
No. of cited doc.	822 (61%)	105 (62%)	93 (62%)	9 (50%)	1029 (61%)
No. of doc. with 0 citations	524 (39%)	65 (38%)	59 (39%)	9 (50%)	657 (39%)
No. of citations	4789 (5%)	519 (10%)	449 (48%)	18 (3%)	5775 (6%)
Citation per doc. (all doc.)	3.56	3.05	2.97	1	3.42
Citation per doc. (cited doc.)	5.82	4.94	4.83	2	3.43

Source: Scopus data as of 23 March 2025.

There are differences in the citation impact of various types of research outputs (Wu et al., 2024). Conference proceedings have a relatively limited scientific impact

[30] Co-authored publication by researchers from more than one institution is counted as one document for each institution.

[31] Other publications include conference proceedings, books, book series, and trade publication.

compared to journal publications in most fields (with some exceptions), representing around 1.7% of references made in natural sciences and engineering, and 2.5% in the social sciences and humanities[32]. For these reasons, it is important to distinguish between the scholarly impact of journal articles and other types of research publications (e.g., conference proceedings) produced by Mauritian's HEIs.

At the national level, around 94% of all citations are to journal articles while 'other publications' account for only 6% of all citations (see Panel B, Table 8). At the level of the institutions, except for the UDM, more than 90% of all citations are to journal articles. UDM is an interesting case because unlike the other three institutions, 48% of all citations are to 'other publications'. The institution's main research outputs are in the disciplines of engineering and computer science. In these disciplines, the scholarly impact of conference proceedings may be relatively higher than in other disciplines[33]. Indeed, a closer look at the Scopus data suggests that conference proceedings and book series such as *Advances in Intelligent Systems and Computing* and *Lecture Notes in Networks and Systems* are important publication outlets for academic staff of the UDM. Across all institutions, however, the citation per document is far higher for journal articles than for other types of publications. Compared to journal articles, a significantly higher proportion of 'other publications' has never been cited. At the national level, journal articles are cited 8 times more than any other publications (see Panel C and D in Table 8).

2.1.6. Subject-Wise Research Output

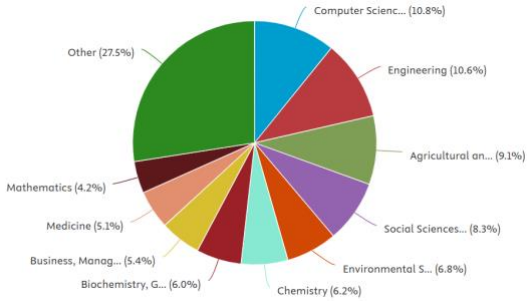
The subject-wise research outputs of Mauritian HEIs are presented in Figure 3. Such an analysis is an important component of a research assessment exercise because it helps identify an institution's research trends, strengths, and weaknesses within specific subject-areas. Although the classification of research outputs based on

[32] Lisée, C., Larivière, V., & Archambault, É. (2008). Conference proceedings as a source of scientific information: A bibliometric analysis. *Journal of the American Society for Information Science and Technology*, *59*(11), 1776-1784.

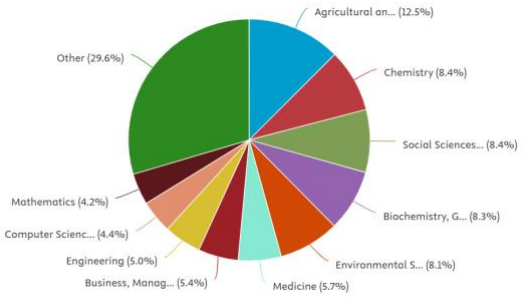
[33] Glänzel, W., Schlemmer, B., Schubert, A., & Thijs, B. (2006). Proceedings literature as additional data source for bibliometric analysis. *Scientometrics*, *68*(3), 457-473.

subject categories has certain limitations[34], it does provide an overall picture of an institution's subject-wise research performance.

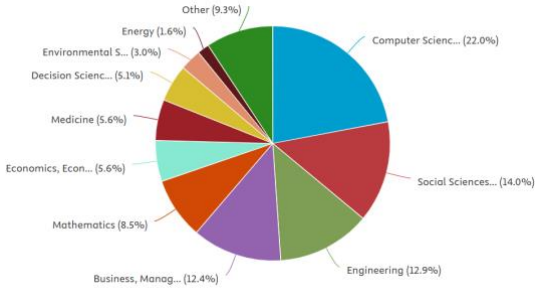
The left panel of Figure 3 shows the overall research output including journal publications, conference proceedings, books, and book chapters for each HEI while the right panel shows the subject-wise output based on journal publications only. There are important differences in the subject-wise research output between all publications and journal publications only.



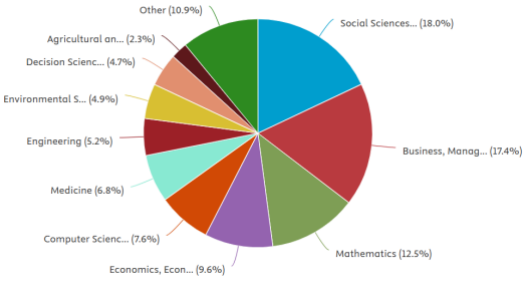
UOM (all publications)



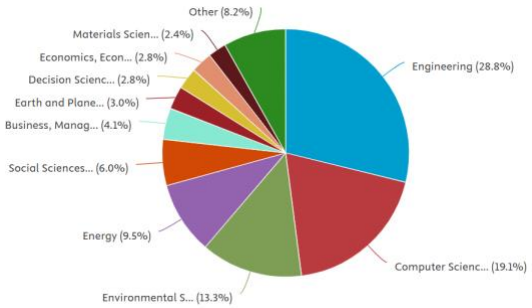
UOM (journal publications only)



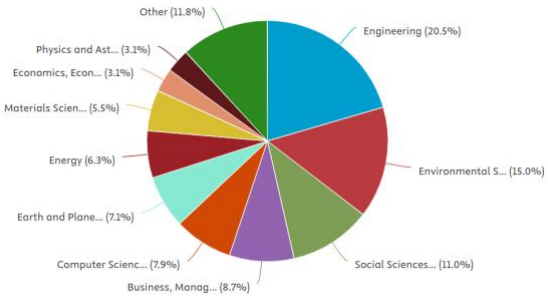
UTM (all publications)



UTM (journal publications only)

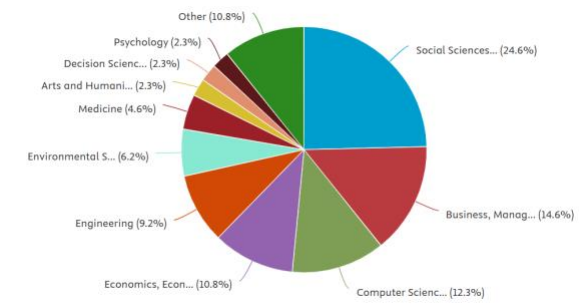


UDM (all publications)

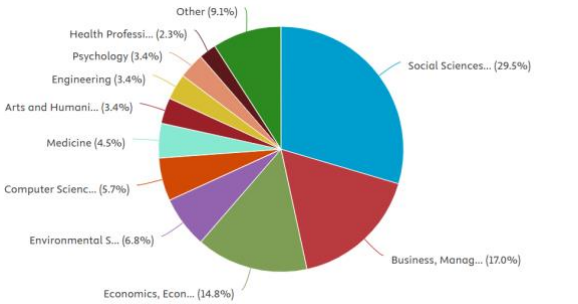


UDM (journal publications only)

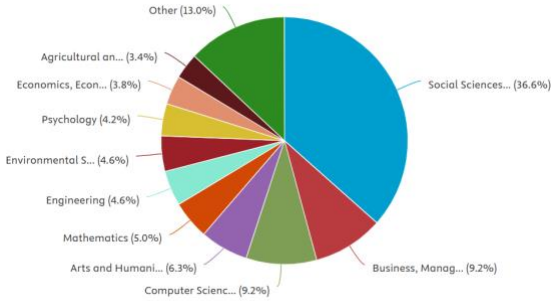
[34] Aviv-Reuven, S., & Rosenfeld, A. (2023). A logical set theory approach to journal subject classification analysis: intra-system irregularities and inter-system discrepancies in Web of Science and Scopus. *Scientometrics*, *128*(1), 157-175.



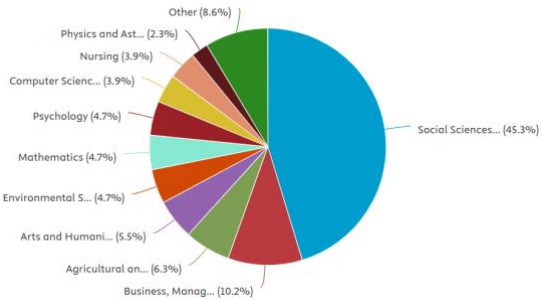
OUM (all publications)



OUM (journal publications only)



MIE (all publications)



MIE (journal publications only)

Figure 3. Subject-wise research output by public HEIs (Scopus)

For the UOM, when all publications are considered, the top four subject areas of research output are 'Computer Science' (10.8%), 'Engineering' (10.6%), 'Agriculture and Biological Sciences' (9.1%), and 'Social Sciences' (8.3%). However, when only journal publications are considered, the top four subject areas change to 'Agriculture and Biological Sciences' (12.5%), 'Chemistry' (8.4%), Social Sciences (8.4%), and 'Biochemistry' (8.3%).

A similar pattern can be observed for the UTM. When all publications are considered, 'Computer Science' (22%) is the single most significant subject. However, when only journal publications are considered, 'Social Sciences' (18%) predominates. These findings suggest that conference proceedings and books are important dissemination outlets for those working in the areas of 'Computer Science' and 'Engineering'. For the UDM, 'Engineering' constitutes an important research area across all types of publications. OUM's main subject areas of research are 'Social Sciences' and 'Business Management and Accounting' irrespective of the types of publications. For the MIE, 'social sciences' constitute the major subject area for journal publications. Thus, there are not only important nuances in research areas between public HEIs, but also between journal and other types of publications.

2.2 International Collaboration

International collaborations have become a hallmark of contemporary academic and research systems, with several benefits to the collaborating researchers, institutions and countries. Evidence suggests that international collaborations allow academics to improve the scholarly and societal impacts of their research and nations to pull resources to address global challenges that no nation alone can tackle. Inter-country research collaboration is often mandated by certain funding agencies: for example, the standard European Union grants require participation from at least three countries. As a result, fostering international collaborations between academic and research institutions has been a priority for many governments in their national research assessment exercises.

International collaborations are particularly important for a small island developing state like Mauritius because it faces several constraints related to human resources, research expertise, infrastructure, and funding resulting from its small size, remoteness, and limited resource endowment. It is also for these reasons that many highly trained research scientists emigrate from Mauritius to more advanced economies.

The extent of international collaborations is used to ranked institutions. In Scimago institutional ranking, for example, international collaboration is accorded a weight of 2%[35]; QS World University Ranking assigns a weight of 5% to an institution's international research network (sustainable partnerships, defined as those where an institution has collaborated in three or more joint papers published in a five-year period) as part of its measure of 'Global Engagement'[36]; THE World University Ranking assigns a weight of 2.5% to international collaboration as part of the 'International Outlook' dimension[37].

It is important therefore that the national research assessment considers the current state of international collaborations between Mauritius' HEIs and other countries. Mauritian researchers have collaborated with institutions located in 180 different

[35] https://www.scimagoir.com/methodology.php
[36] Elsevier (2024), op. cit.
[37] THE World University Ranking (2023), op. cit.

countries. Figure 4 shows the network visualization of countries with at least 5 instances of collaborations with any of the Mauritian public HEIs. Of the 180 collaborating countries, 100 of them meet the minimum threshold of 5. For each of the 100 countries, the total strength of the co-authorship link is calculated and countries with the greatest link strength are presented in Figure 4. The top 10 collaborating countries for Mauritius are South Africa, India, United Kingdom, Turkey, Italy, China, Australia, Saudi Arabia, Thailand, and France.

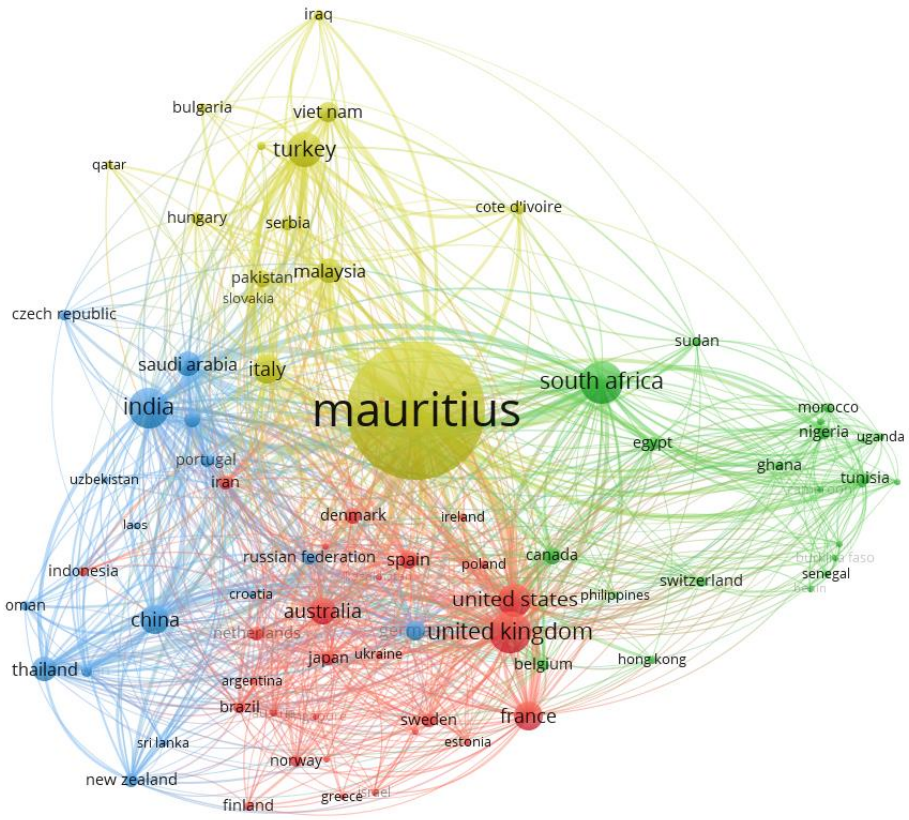


Figure 4. Network visualization of collaborating countries (all public HEIs).

Source: Scimago (data extracted on 2 March 2025).

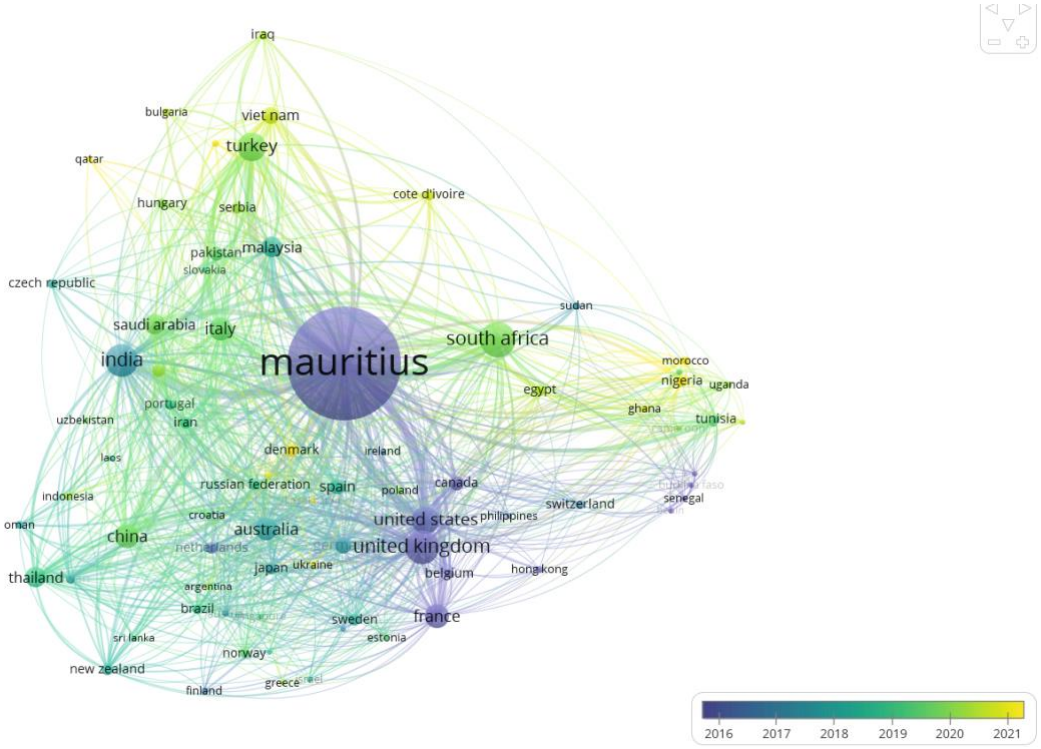


Figure 5. Variations in international collaborations across time (all public HEIs).

Source: Scimago (data extracted on 25 March 2025).

While the aforementioned countries remain the main research partners of Mauritius, recent years have seen the emergence of new collaboration networks between public HEIs and such countries as Cote D'Ivoire, Qatar, Iraq, Nigeria, Uganda, and several others (Figure 5). Figure 6 shows the percentage of documents produced by Mauritian researchers where the affiliations of authors include addresses from more than one country, including Mauritius. International collaborations in research publications have been erratic over time decreasing from around 65% in 1996 to 39% in 2009 and increasing to around 60% in 2023.

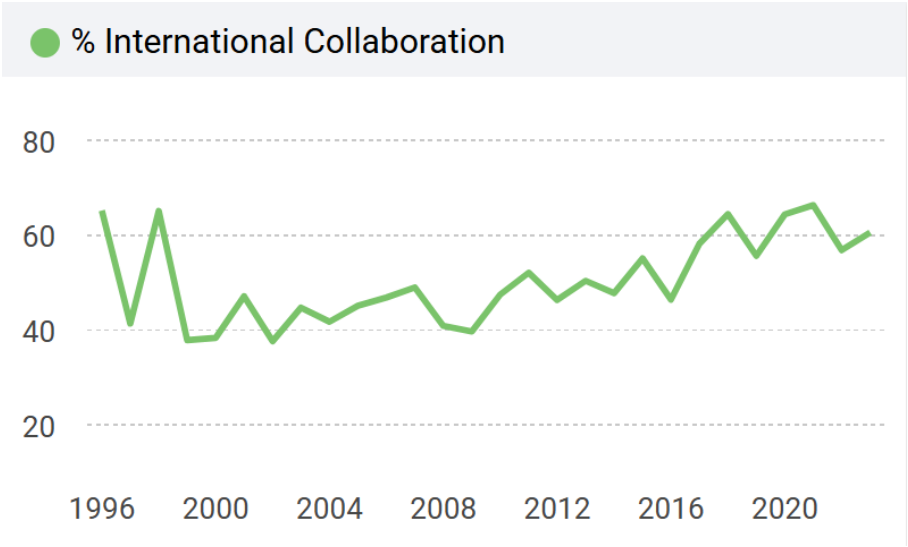


Figure 6. Trends in international collaboration for Mauritius

Source: Scimago (data extracted on March 25, 2025).

2.3 Research Funding by MRIC and HEC

The MRIC and HEC are the two major research funding institutions in Mauritius. While the MRIC funds both HEIs and industry, HEC is mandated to fund only public HEIs. From the financial year 2019/2020 to 2024/2025, the MRIC has spent around 230 million rupees on funding research and innovation projects under its various schemes (Table 9). Of this amount, MRIC has awarded around 19 million rupees (8.3%) to public HEIs (main applicant) under various schemes such as Proof-of-Concept Scheme, Social and Innovation Grant Scheme, Innovation Boost Grant, and Special Call Proposal – Covid 19 (Table 10).

Table 9. MRIC research funding schemes (FY 2019/2020 – FY 2024/2025)

Scheme	Amount disbursed (MUR)
Innovation Boost Grant	49,192,611
Research and Innovation Bridges	40,871,920
Proof of Concept Scheme	32,036,905
Pole of Innovation	25,710,500
Specia Call for Proposals: Blue Resilience	16,858,112
Specia Call for Proposals: Covid-19	15,595,007
Enterprise Innovation Booster Scheme	11,054,350
Special Call for Application: Fast Track Innovation Initiatives	10,766,831
Collaborative Research & Innovation Grant Scheme	10,478,589
Public Sector Transformation Scheme	7,472,750
Social Innovation and Research Grant Scheme	5,522,644
Rodrigues Research and Innovation Grant Scheme	4,797,362
Total	230,357,581

Source: Data provided by the MRIC

From 2017-2023, the HEC has funded 80 research projects for a total value of MUR 85,519,493 (Table 10). However, research funding from HEC has decreased considerably from around 46 million in financial year 2017/2018 to around 2 million in financial year 2019/2020 and 1.3 million in financial year 2020/2021. This decrease was primarily due to the impact of COVID-19 and reflects the decrease in the amount of grant obtained by HEC from the government.

Table 10. Research funding awarded to public HEIs by the HEC and MRIC

	HEC (FY 2017/2018 - FY 2022-2023)		MRIC (FY 2019/2020 – FY 2024/2025)	
	Amount	No. of projects	Amount	No. of projects
UOM	72,008,062	56	15,402,861	20
UTM	4,133,761	12	2,303,673	4
OUM	270,000	1	Nil	
UDM	668,985	2	1,000,000	1
MGI	80,000	1	Nil	
MIE	8,358,685	8	533,200	1 (terminated)
Total	85,519,493		19,239,734	

Source: Data obtained from HEC and MRIC

3. INTERNATIONAL COMPARISON OF MAURITIUS' RESEARCH PERFORMANCE

3.1. Research and Development Expenditure

Research and development (R&D) expenditure is a key input to the development of a research-oriented economy. Various growth theories are conclusive that investment in R&D leads to economic growth via its influence on the knowledge base, innovation, productivity, and human resource capital. International organizations such as the World Bank and OECD emphasize the need for governments to invest in R&D for economic growth. A common problem across several small island developing states (Singapore is an exception) is that a large proportion of government funding for education goes into the financing of primary and secondary education instead of research and development initiatives. The free tertiary education policy in Mauritius which requires considerable financial resources has posed further challenges for the funding of research and development initiatives.

Table 11. Research and development expenditure as a percentage of GDP[38]

	1996	2000	2005	2010	2015	2020	2022
Mauritius	-	0.3	0.4	-	-	0.4	0.3
Seychelles	-	-	0.3	-	-	-	-
Singapore	1.3	1.8	2.1	1.9	2.2	2.2	-
South Africa	-	-	0.8	0.7	0.7	0.6	-
Malaysia	0.2	0.5	-	1.0	1.3	1.0	-
World	2.0	2.3	2.2	2.3	2.1	2.5	-
High income countries	2.1	2.0	2.0	2.0	2.5	2.9	-
Upper-middle income countries	-	0.6	0.9	1.2	1.5	1.8	-
Middle-income countries	-	0.6	0.8	1.1	1.4	1.7	-
Lower-middle income countries	-	-	-	-	0.5	-	-
Low-income countries	-	-	-	-	-	-	-

[38] Includes basic and applied research, and experimental development.

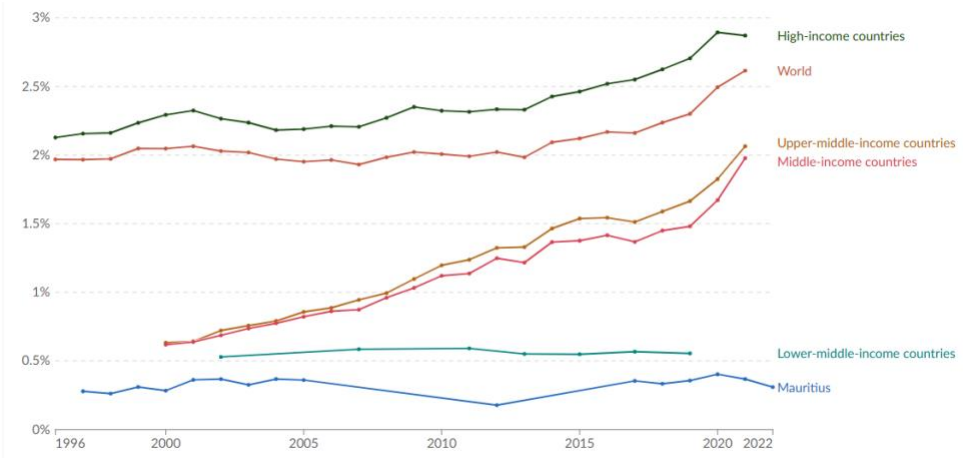


Figure 7. Mauritius' research and development expenditure in comparison with other groups of countries.

Data source: ourworldindata.org; UNESCO Institute for Statistics (2025)

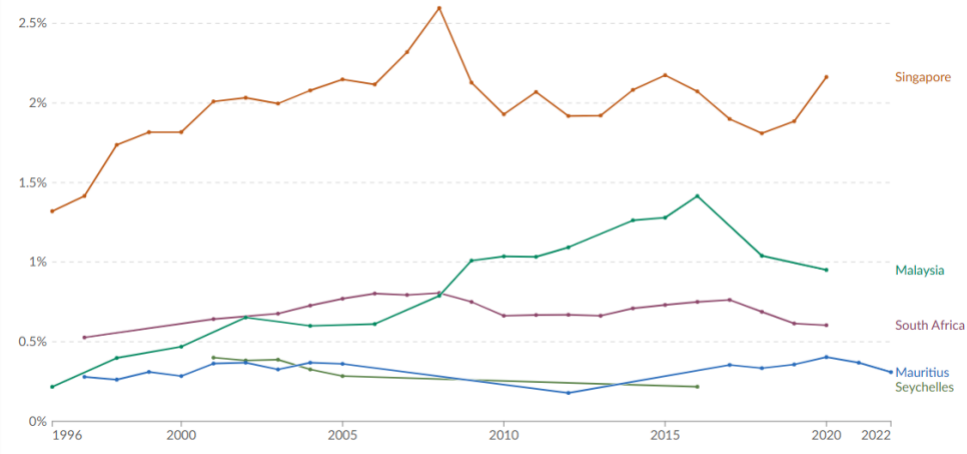


Figure 8. Mauritius' research and development expenditure in comparison with other countries.

Data source: ourworldindata.org; UNESCO Institute for Statistics (2025)

As shown in Table 11 and Figure 8, Mauritius has one of the lowest R&D expenditure as a percentage of its GDP (0.3% of GDP). While for most countries expenditure on R&D has increased over the years, for Mauritius, it has remained stable for some years but declined in the most recent years (Table 11). Mauritius' share of R&D expenditure as a proportion of its GDP is comparatively lower than other middle- and upper-middle income countries (see Figure 9).

3.2. Number of Researchers

The number of researchers in a nation is an important input to the research system. The number of researchers involved in research and development per million population[39] for Mauritius and other countries and groups of countries are presented in Table 12 and Figure 9 and Figure 10.

Table 12. Number of researchers involved in research and development per million population

	2012	2014	2016	2018	2020	2022
Mauritius	177			464	553	569
Seychelles	-	-	-	-	-	-
Singapore	6402	6632	6897	6787	7225	-
South Africa	405	435	489	511	473	-
Malaysia	1769	2020	2350	2140	726	-
World	-	-	-	1521	-	-
High income countries	3680	3843	3913	4168	4259	-
Upper-middle income countries	934	972	975	1088	1283	-
Middle-income countries	-	-		-	874	-

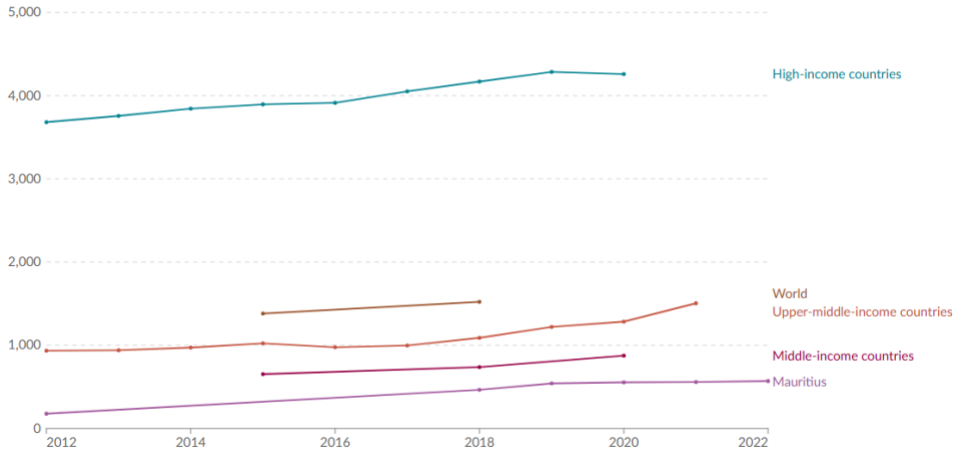


Figure 9. Number of Mauritian researchers involved in research and development expenditure in comparison with other groups of countries.

Data source: ourworldindata.org; UNESCO Institute for Statistics (2025)

[39] Students studying at the master's or doctoral level engaged in R&D are included; Data are for full-time equivalent (FTE); the FTE of R&D personnel is defined as the ratio of working hours actually spent on R&D during a specific reference period (usually a calendar year) divided by the total number of hours conventionally worked in the same period by an individual or by a group. The statistics include the number of researchers engaged in research and development expressed as per million and include professionals who carry out research and improve or develop concepts, theories, models techniques instrumentation, software of operational methods. They include basic research, applied research, and experimental development (https://ourworldindata.org/grapher/researchers-in-rd-per-million-people)

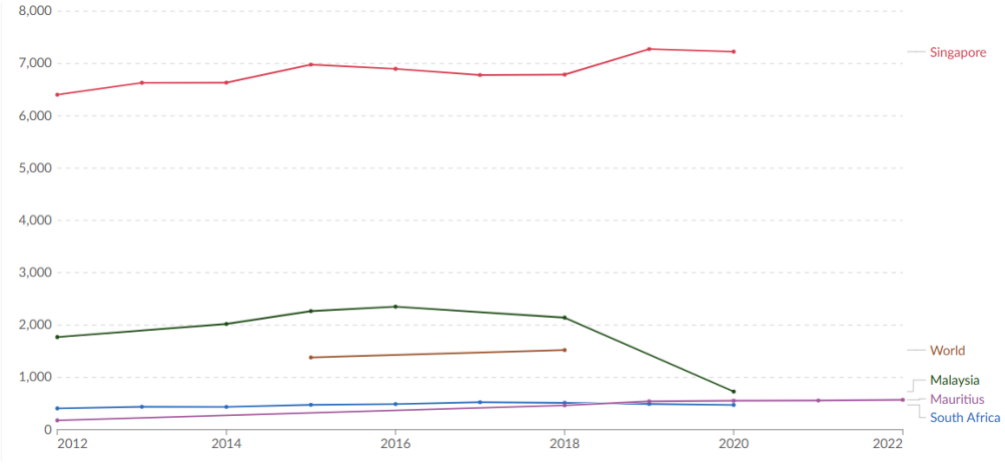


Figure 10. Number of Mauritian researchers involved in research and development expenditure in comparison with other countries.

Data source: ourworldindata.org; UNESCO Institute for Statistics (2025)

The number of researchers per million population in Mauritius has more than triple over the past 10 years, from 177 in 2012 to 569 in 2022. However, Mauritius faces several constraints with respect to qualified and well-trained human resources. Brain drain poses constraints and challenges to the existing human resource base because it is common for Mauritian researchers with advanced research training to migrate to research-intensive institutions in developed nations, a problem typical to several small island developing states. On average, 50% of the skilled labor in most small island developing states have emigrated and for some islands, the brain drain exceeds 75%[40]. Emigration represents a critical loss of human resource capabilities for Mauritius that impedes on research and innovation and, therefore, this issue must be highlighted in our research assessment and policy interventions.

[40] De la Croix, D., Docquier, F. and Schiff, M. (2014) 'Brain drain and economic performance in small island developing states', in A. Artal-Tur, G. Peri and F. Requena-Silvente (eds.) *The Socio-Economic Impact of Migration flows — Effects on Trade, Remittances, Output, and the Labour Market*. Springer, pp. 123–144.

3.3. Journal Publications

Although journal articles constitute the largest component of Mauritius' research output, its performance in comparison to other countries remains bleak. Table 13 and Figure 11 and Figure 12 show the number of journal publications per million people for Mauritius and selected countries and group of countries.

Table 13. Number of journal publication/million people for Mauritius and selected countries

	1996	2000	2005	2010	2015	2020
Mauritius	12	44	58	67	93	153
Seychelles	33	56	57	139	193	311
Singapore	668	1187	1847	1913	2012	2068
South Africa	88	85	106	146	195	270
Malaysia	39	58	97	378	578	659
World	169	174	227	276	306	374
High income countries	815	842	1040	1158	1226	1229
Upper-middle income countries	48	59	121	200	256	407
Lower-middle income countries	15	16	23	42	60	94
Low-income countries	2	2	3	4	6	12

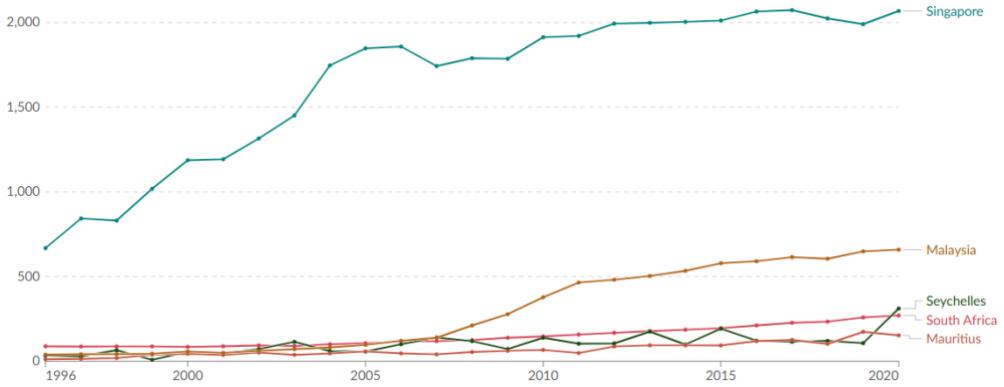


Figure 11. Mauritius' number of journal publications in comparison with other countries

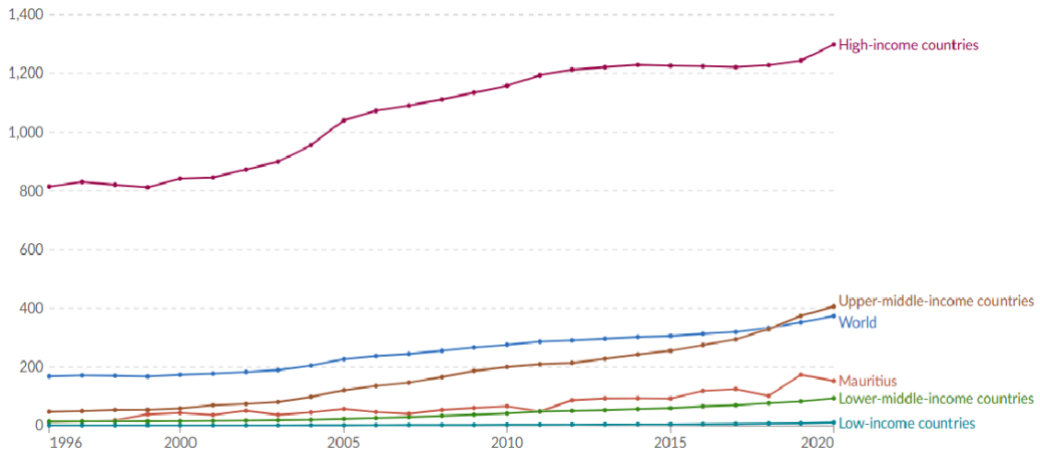


Figure 12. Mauritius' number of publications in comparison with other country groups[41].

Data source: ourworldindata.org

[41] Articles are assigned based on the country of the first author's institution.

Mauritius compares favorably only with lower-middle income countries and low-income countries, but unfavorably with the world average, high income-countries, upper-middle income countries, and middle-income countries in its research performance, despite being itself an upper-middle income economy. Mauritius also persistently underperforms in comparison with other SIDS like Seychelles and Singapore, although the latter is an exception (outlier).

Figure 13 shows the contribution of Mauritius' research to world and African research output, 1996-2023. Mauritius' contribution to world research output is negligible and has remained relatively low and stable at 0.01% from 1996-2003. The nation's contribution to research output in Africa has been erratic: it was at its peak in 2019 (0.49%) but has declined to reach 0.3% in 2023.

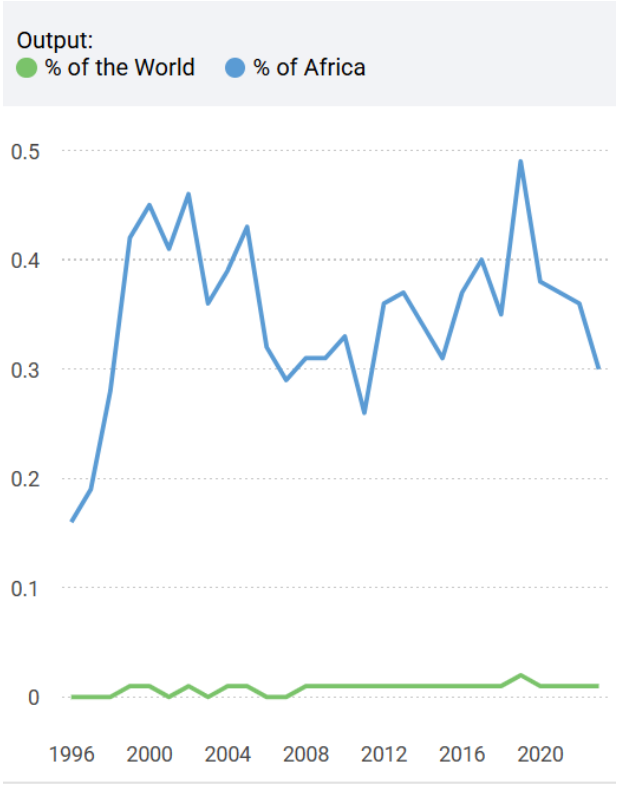


Figure 13: Mauritius' percentage contribution to world and Africa research output

Data source: Scimago (data extracted on March 25, 2025).

4. RECOMMENDATIONS

This NRS contains 10 recommendations emanating from a deep evaluation of and reflection on the current state of research and innovation and the institutional framework governing research in Mauritius, views gathered during consultative meetings between the NCRS and stakeholders, and insights from the survey administered to academic staff of HEIs. Together, these recommendations aim to develop research excellence in fundamental and applied research and innovation by consolidating and strengthening three pillars of research excellence: (i) high quality and impactful research and innovation in line with national priorities; (ii) a research system that fosters academia-industry relationships to facilitate the production of socioeconomically and commercially relevant research and innovation; and (iii) institutional strengthening (see Figure 14).

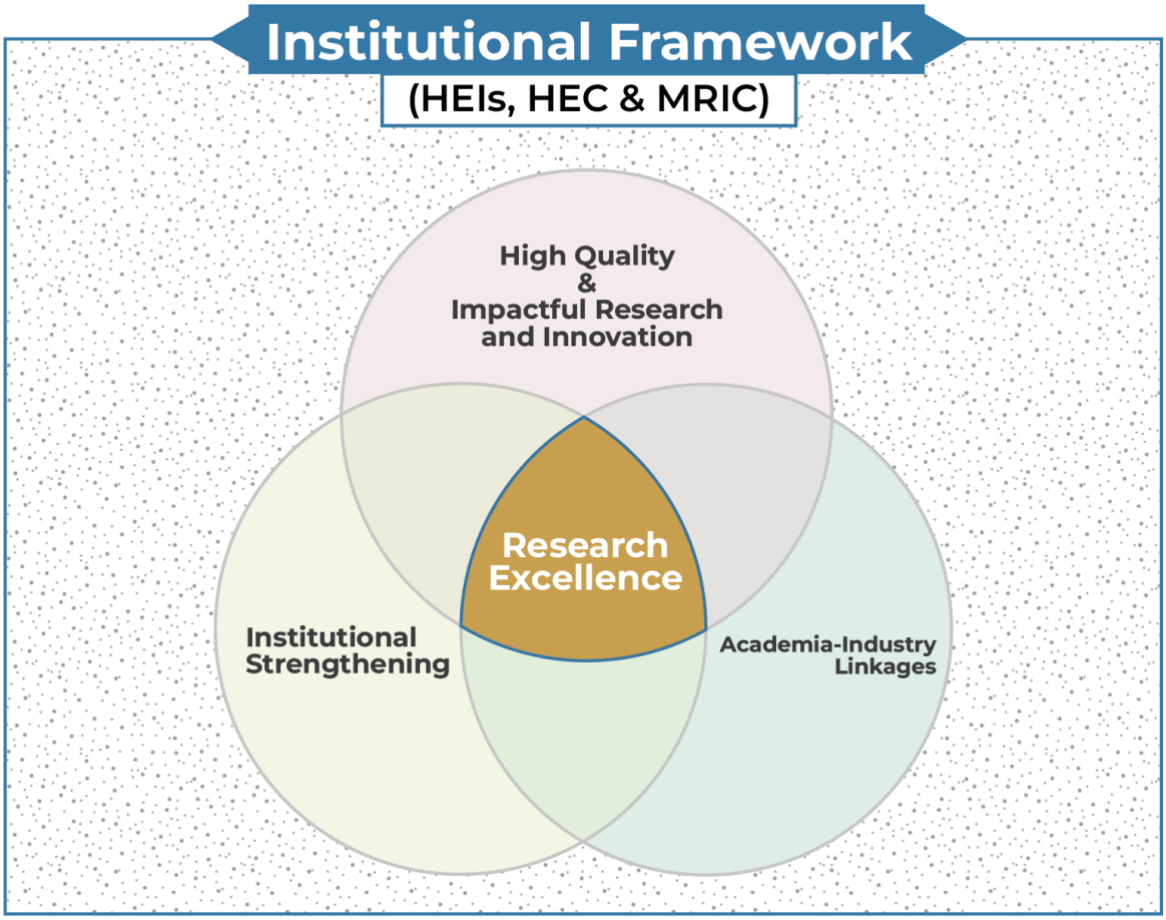


Figure 14. The three pillars of research excellence

4.1. Recommendation 1: A Research System based on National Research Priorities

National Research Priorities (NRPs) represent a set of areas a country considers as being of critical importance for its national development and advancement. They guide research the research agenda and funding allocation and provide the basis for developing a national research agenda. Several countries have developed specific NRPs aligned to their development goals. For example, Luxemburg's four NRP include 'industrial and service transformation', 'personalized health care', 'sustainable and responsible development', and '21st century education'[42]. For Seychelles, the NRP include 'a modern public service', 'the transformative economic agenda', 'a healthy nation' 'promotion of law and order', 'a modern education system in line with future needs', and 'environmental sustainability and climate change resilience'[43].

However, although research addressing national priorities appears to be on the agenda of many institutions in Mauritius, such priorities have never been formally defined at the national level. Institutions, therefore, have developed their own research agendas. MRIC operates eight funding schemes under a 'thematic based' priority area for funding comprising 'financial innovation', 'blue and green innovation', 'health and wellness innovation', 'travel, tourism, and entertainment innovation', 'social and grassroot innovation', and 'IT and emerging technologies innovation'. The HEC has its own research priorities determined institutionally using survey data and operates various funding schemes not necessarily related to specific sectors or specific national development goals. Public universities have their own research priorities determined internally and funding schemes that lack a clearly defined research agenda.

While some progress has been achieved with the current research system, it has also resulted in a misalignment of research agendas, institutional fragmentation of research across different organizations, and limited collaborations and sometimes

[42] https://www.fnr.lu/national-research-priorities/
[43] Ministry of Finance, National Planning and Trade (n.d). Seychelles national development strategy 2024-2028. Retrieved from http://www.finance.gov.sc/uploads/files/Seychelles-National-Development-Strategy-2024-2028.pdf, April 19, 2025.

tensions between the two main research institutions of the country - the HEC and the MRIC. Research institutions and public universities have produced a collection of individually interesting research projects but lacking an overarching theme and not significant enough to be impactful on Mauritian society and economy and innovation. Such institutional fragmentation of scientific research is undesirable[44]. According to World Bank reports, research and innovation strategies in Mauritius has met with little success and generally, institutions are trying to do too much with too few resources[45,46] and do not prioritize areas for investment. These reports also highlight the need for more coordinated efforts among research institutions, universities, and industry partners to achieve impact in research and innovation endeavors.

4.1.1. National Research Priorities

The NCRS recommends a new research system for Mauritius based on NRPs (see Figure 15. As a small island developing state, the country not only has limited human resource capacity and financial resources, but it also faces unique socioeconomic and environmental challenges not common to other nations that can only be addressed by indigenous research. The NRPs shall ensure that government support for research is adequate in areas of critical importance to Mauritius by providing directions to the MRIC, the HEC, and HEIs for the allocation of research funding into strategic areas and sectors of national importance. The NRPs shall represent a shift from curiosity-driven fragmented research to challenge-based research that addresses issues of national importance for Mauritius.

A research system driven by the NRPS shall allow the concentration of research activities toward national priorities, creating a critical mass of knowledge and infrastructure that would otherwise be difficult to achieve by the current fragmented research system. Research concentration along NRPs should also provide epistemic value[47] by ensuring that Mauritian researchers capable of producing

[44] van der Pol, J., & Frenken, K. (2025). Fragmentation of national research systems: the case of the Netherlands. *Scientometrics*, 1-15.
[45] World Bank (2023a), op. cit.
[46] World Bank (2023b), op. cit.
[47] Aagaard, K., Kladakis, A., & Nielsen, M. W. (2020). Concentration or dispersal of research funding?. *Quantitative Science Studies*, *1*(1), 117-149.

ground-breaking research are rewarded based on their abilities and potential, leading to research excellence and providing the country with a competitive edge in certain fields of science.

The NRPs can be set at broad thematic level (e.g. food security, healthy population, industrial and service transformation, sustainable production), take the form specific Sustainable Development Goals (SDGs) most relevant to Mauritius or can be in the form of specific research questions (e.g., How can Mauritius develop a comprehensive, community-based approach to prevent drug abuse and support rehabilitation, especially among its youth?). The proposed structure in Figure 15 considers interactions between the NRPs and the priority sectors. For example, 'achieving food security' as a national priority not only requires research emphasis on the agricultural, farming, and fisheries sector, but it also has implications for other sectors such as biotechnology, logistics, retail and distribution, food processes, etc.

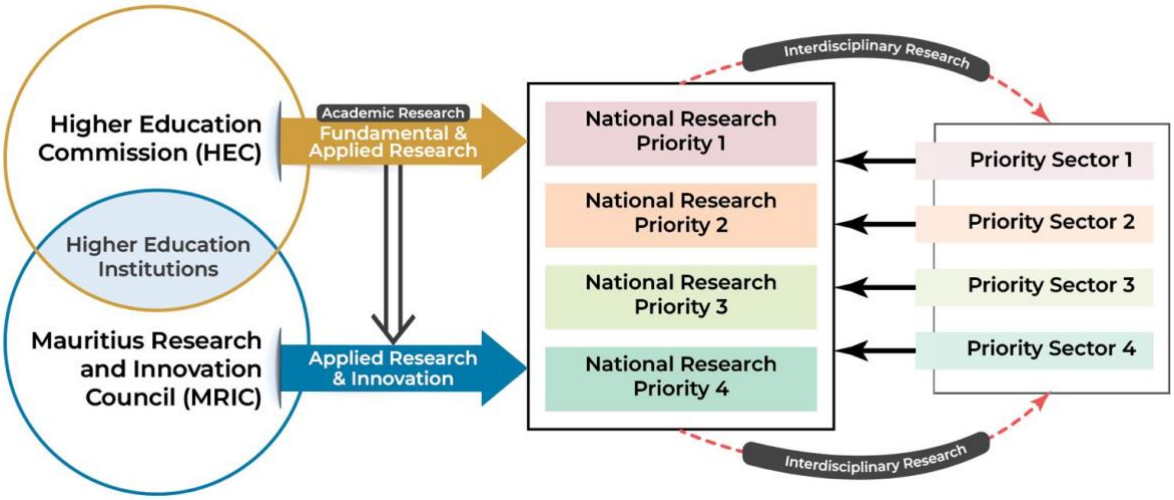


Figure 15. A research system based on NRPs and priority sectors[48].

4.1.1 Setting the National Research Priorities

In line with the Trible Helix model that emphasizes interactions between academia, industry, and government to produce economic relevant research and innovation, the NCRS recommends that the NRPs are determined by an advisory committee

[48] This figure is designed by the NCRS members and is illustrative only. There can be more than four NRPs and priority areas depending on the needs of the country and society as determined by the advisory committee.

comprising all stakeholders including relevant ministries, universities, the HEC, the MRIC, industry partners, civil societies, and international development partners such as the World Bank and European Union. The advisory committee should consider the socioeconomic and global challenges facing Mauritius, knowledge gaps, and the research and innovation needs of industry partners. Consultative meetings between the NCRS members and the Mauritian Chamber of Commerce and Industry and Business Mauritius suggest that industry partners see little value in research in which they have no initial inputs, and they should not only be considered as the end-users of research. Rather, industry partners should be involved in determining strategic research directions and in all aspects of a research project: from initial conceptualization to research implementation and dissemination of findings.

An inclusive process to determine the NRPs is important to develop a shared vision and strategy for research, gain the endorsement of all stakeholders, and develop stronger and long-term relationships between universities, research institutions, and the private sector which are at present lacking[49,50]. Involving industry partners at the strategic level shall also facilitate private sector funding for research and innovation.

The NCRS also recommends that the proposed advisory committee is chaired by the Honorable Minister of Tertiary Education, Science, and Research to ensure legitimacy and authority of the process. It is also recommended that the NRPs are endorsed by the Cabinet of Ministers to guarantee compliance at the national level. For example, Australia's National Science and Research Priorities are outlined in an official document of the Australian Government[51]. Seychelles' NRPs are endorsed by its Cabinet of Ministers[52].

4.1.2. NRP-Driven Research and Innovation: Roles of HEC, MRIC, and HEIs

The HEC and the MRIC are research funders while HEIs are the beneficiaries of research funds and execute the research. HEIs also have their own internal funding

[49] World Bank (2023a), op. cit.
[50] World Bank (2023b), op. cit.
[51] https://www.industry.gov.au/publications/national-science-statement-2024
[52] Ministry of Finance, National Planning and Trade (n.d), op. cit.

schemes available to their academic staff. Here, it is important to clarify the roles of these institutions and the nature of research they fund and their relevance to advancing the NRPs. The MRIC is mandated to fund both applied research and innovation while HEC is mandated to fund academic research. While academic research is traditionally understood to be fundamental research[53] carried out by universities (Mode 1 knowledge), as part of their social contract and greater accountability to their governments, HEIs are now also expected to produce applied research that advances national development goals (Mode 2 knowledge) - hence the emphasis on 'research impacts and applications'[54] in many national assessment exercises of university research. From this perspective, applied research attempts to find solutions to specific practical problems (economic, environmental, social, cultural, political, technological, etc.). Therefore, HEC's roles in promoting research should be understood considering the changing mode of knowledge production (from mode 1 knowledge to mode 2 knowledge) where academic research now comprises both fundamental and applied research. Box 1 and Box 2 provide two examples of academic research carried out by universities and their impacts.

Box 1. Research by the Center for Biomedical and Biomaterial Research, UOM[55].

The Center for Biomedical and Biomaterial Research (CBBR) has been engineering nanoparticles for biomedical applications addressing human health challenges. Researchers at the CBBR have repurposed nanoparticle technology into nanofertilizers and nonstimulants that are non-toxic and are less harmful to humans and the environment, to address plant growth in the presence of abiotic and biotic stress, that is, climate change effects and pathogens.

The technology has been tested on tomatoes, potatoes, and soybean plants, both in Mauritius and in the USA, and have paved the way towards precision agriculture and food security. Industry partners have also invested in scaling up the project to increase production and yield.

[53] Fundamental research is experimental or theoretical work undertaken with a primary purpose of the advancement of knowledge for its own sake, has traditionally been central to university missions and their public funding.
[54] Bentley, P. J., Gulbrandsen, M., & Kyvik, S. (2015). The relationship between basic and applied research in universities. *Higher Education*, *70*, 689-709.
[55] Details provided by the CBBR.

Box 2. Research by the Center for Analysis of Social Exclusion, LSE[56].

Policymakers working to alleviate social disadvantages face the challenge of how to measure and analyze poverty and inequalities in a coherent, comprehensive, and systematic way. Research by LSE's Centre for Analysis of Social Exclusion (CASE) has made substantial contributions to how poverty and multidimensional inequalities are understood and measured – and consequently tackled. CASE has done this by developing tools for measuring multidimensional inequality, while also demonstrating the central role that poverty plays as a driver of inequality.

These frameworks have been applied in the UK, Ireland, and within the EU. CASE has also worked with national and international NGOs and civil society groups to measure and tackle inequality. CASE's measurement frameworks have been incorporated into governmental and institutional approaches to measuring and reporting on inequalities. In 2015, the UK's Equalities and Human Rights Commission (EHRC) began using four measurement frameworks for equality and human rights, three of which were CASE's. When the UK Cabinet Office undertook a Race Disparity Audit in 2017, it consulted with CASE and built on the insights CASE shared to develop their own multidimensional and disaggregated framework.

The proposed research system based on the NRPs also allows interactions between academic research and innovation. Mauritius lacks contextual knowledge on several aspects of its economy, society, and culture, requiring fundamental research to generate indigenous knowledge. In addition to its long-term positive impacts on local economies and productivity, fundamental research provides new ideas fueling applied research and innovation. Various empirical works support the relationship between fundamental research and industrial innovation[57,58]. Therefore, Mauritius should maintain a balance between fundamental research, applied research, and innovation.

Research driven by the NRPs shall also encourage interdisciplinary research to address the national priorities. For example, achieving food security not only requires research on the agricultural sector, but studies on the impact of climate change on local food production, food prices, and food accessibility are also needed. This requires interdisciplinary teams of researchers from environmental sciences,

[56] https://www.lse.ac.uk/Research/research-impact-case-studies/2021/Improving-the-lives-of-disadvantaged-people-through-better-measurement-of-poverty-and-inequality, Retrieved, April 24, 2025.

[57] Lim, K. (2004). The relationship between research and innovation in the semiconductor and pharmaceutical industries (1981–1997). *Research policy*, *33*(2), 287-321.

[58] Toole, A. A. (2012). The impact of public basic research on industrial innovation: Evidence from the pharmaceutical industry. *Research Policy*, *41*(1), 1-12.

economics, and sociology. At the same time innovations in agricultural and farming methods such as automation and robotics are also required to advance the NRP.

The UK and Australia spend between 60-70% of their research budget on funding NRPs[59,60]. In line with the funding structures of many countries and organizations, the NCRS recommends that the MRIC, the HEC, and HEIs devote a similar proportion of their research budget to address NRPs and use the remaining funds to finance curiosity-driven research. Thus, research funding mechanisms and schemes of public universities, the HEC, and the MRIC should be reviewed considering NRPs and their mandates. Table 14 is a proposed allocation of research funds for HEIs, HEC, and MRIC.

Table 14. Proposed research funds allocation

	HEIs		HEC		MRIC	
Proportion of funds devoted to NRPs:	50%		75%		80%	
Fundamental research		50%		40%		-
Applied research		50%		60%		20%
Innovation		-		-		80%
Proportion of funds devoted non NRPs	50%		25%		20%	-

The proposed funding structure recognizes that not all academics employed by the HEIs shall work in areas related to NRPs. Consequently, the NCRS recommends that HEIs' spend an equal proportion of their internal funds to fund research projects on NRPs and those not related to NRPs. In keeping up with the traditions that fundamental research is central to the mission of universities[61], the NCRS also proposes that HEIs devotes 50% of their internal funds to fundamental research and the remaining 50% to applied research. For the HEC, the NCRS recommends that a larger proportion of its research funds are devoted to NRPs and to applied research, while the MRIC should use 80% of its budget to fund projects that encourage innovation in NRP areas. The convergence of fundamental and applied research and innovation toward the NRPs shall ensure that Mauritius develops a significant stock of knowledge and expertise on research fields relevant to these NRPs and shall allow

[59] Ecological Society for Australia (n.d). National research and science priorities review. Retrieved from https://www.ecolsoc.org.au/wp-content/uploads/research_priorities_review_esa_submission_final.pdf, April 20, 2025.
[60] Morgan, B. (2016). Defining national research priorities. Retrieved from https://www.nature.com/nature-index/news/defining-national-research-priorities, April 20, 2025.
[61] Bentley, P. J. et al. (2015). op, cit.

the scaling-up of research and innovation endeavors to achieve meaningful national impact. Such a model shall also allow Mauritius to develop an international reputation for research excellence in certain fields.

4.2. Recommendation 2: Institutional Strengthening

Mauritius requires a new and formal institutional framework for academic research. Formal institutions, that include the laws and regulations governing research, are fundamental to the success and advancement of the government's research agenda. These laws and regulations shall allow public universities to overcome informational and coordination problems and to function within a standardized framework for academic research to achieve a common national agenda. The HEC is mandated to implement a regulatory framework by promoting the development of higher education[62]. The object of the Commission is to, inter-alia, ensure the "planning and implementation of research in higher education institutions", foster "the achievement of international standards of scholarship through a diversity of teaching and research". Among its other functions, HEC shall give effect to government policy on funding of public higher education institution by inter-alia "monitoring the performance of public higher education institutions that receive funding from the Commission, including measuring their performance against specified outcomes" (Higher Education Act, 2017) [63].

Therefore, research monitoring and evaluation of the research performance of universities is a fundamental responsibility of the HEC. However, due to limited human and financial resources, HEC has been unable to discharge its duties fully as stipulated in its act. Its regulatory functions have thus far been limited to registration of private institutions, accreditation of academic programs, and implementations of research funding schemes. In the absence of NRPs, public universities and research institutions like the Mauritius Research and Innovation Council (MRIC), and the HEC have developed their own research programs that lack coherence[64]. Research is unregulated and carried out in silos, very often leading to

[62] https://www.hec.mu/
[63] https://www.hec.mu/pdf_downloads/our_act/revised_he_act.pdf
[64] We reviewed the research policies and schemes of the UOM, UTM, OUM, and UDM, the HEC and the MRIC.

research duplication and fragmented findings that do not always reflect national priorities and contribute to the socio-economic development of Mauritius.

Furthermore, research institutions and universities do not have strong research monitoring and governance structures in place, leading to research outputs that do not always meet international standards, and poor accountability in the use of research funds. The World Bank's public expenditure review for Mauritius, while not specifically referring to universities, emphasizes the need to monitor outcomes at all levels to reduce inefficiency[65]. In its most recent GII report, the WIPO considers Mauritius as "inefficient" in the innovation input to output performance[66]. Therefore, research accountability and monitoring of research output are obvious policy responses to such critiques. To address these shortcomings, the NCRS recommends the setting up of a Research Monitoring and Governance Unit (REGU) and the design of a Mauritius Research Excellence Framework (MREF) to allow the HEC to fully discharge its regulatory duties.

4.2.1. Research Evaluation and Governance Unit (RGEU)

Research activities in Mauritius must be formalized and regulated by a governance framework. This framework shall include the processes through which research policies are defined and implemented and the roles of the various actors involved in the process[67]. The REGU shall articulate the principles of good governance that shall apply to and govern all research activities carried out by public universities. While these principles should apply to all research activities, the ways in which relevant quality standards are achieved shall depend on the types of research. Research in Mauritius differs largely across disciplines in scale, funding, contexts, methods, stakeholders' involvement, organizational context, and experience of the investigators that the governance framework should consider. The framework shall set out the roles and responsibilities of everyone involved in a research project: institutions, researchers, students, research assistants, funders, sponsors,

[65] World Bank (2023a), op. cit.
[66] WIPO (2024), op. cit.
[67] Molas-Gallart, J. (2012). Research governance and the role of evaluation: A comparative study. *American Journal of Evaluation*, *33*(4), 583-598.

participants, the public, and any other actors having an interest in or impacted by the research.

4.2.2. Mauritius Research Evaluation Framework

Principles such as accountability, marketization, and the social value of research to inform public investment in research have led to a growing emphasis on research monitoring. Research evaluation, sometimes referred to as research assessment, is an integral part of research governance. A research evaluation system refers to the activities and practices related to the formal determination of research quality, or the value of research produced by researchers and institutions. It includes the evaluation of research outputs based on pre-defined criteria that meet international standards.[68] An evaluation system plays an important role in defining a new institutional framework for research and thus it is an important step towards institutional strengthening. National research assessments such as the UK Research Excellence Framework (REF) and the Excellence for Research in Australia (ERA) are concrete examples of frameworks for research evaluations.

Mauritius has yet to develop a framework for research excellence. Research output is currently evaluated on an ad hoc basis, for example, during university academic promotion exercises only, based on guidelines that differ across institutions and that do not always meet international standards for research excellence. Furthermore, ex-post evaluation of research initiatives is limited. The World Bank's (2023b)[69], in its country private sector diagnosis report, notes "the lack of policies fostering research excellence in the universities" (p. 24) and recommends that appropriate reforms should be undertaken to foster research excellence. To ensure coherence with national research objectives and to avoid undue influences on the process, research evaluations cannot be left to individual institutions. The NCRS, therefore, recommends that the proposed REGU at the HEC develops a Mauritius Research Evaluation Framework (MREF) as a national and standard tool for HEIs and other institutions to evaluate their research outputs and promote research excellence.

[68] Molas-Gallart (2012), op. cit.
[69] World Bank (2023b), op. cit.

Although no perfect systems of research evaluation exist[70], a regime of governmentality[71] espoused by an evaluation system such as the proposed MREF, shall provide an enabling environment for research to deliver solutions to national socio-economic and environmental challenges and steer research activities towards aims such as global competitiveness and innovation. Countries like Mauritius with very little experience in evaluation exercises should borrow practices from countries with advanced evaluation cultures but adapt them to the local context and culture[72]. Therefore, a starting point for research evaluation in Mauritius is important. It is expected that Mauritius shall advance through different evaluation cultures as the limitations and weaknesses of the MREF become known through experiences, to progress toward a more established framework for research excellence.

The proposed MREF is inspired by the UK REF[73], the ERA[74], the Norwegian model of research assessments used in Sweden, Denmark, and Norway, as well as their critical appraisal discussed in The Metric Tide report[75], the Leiden Manifesto for Research Metrics[76], and Lord Nicholas Stern's review of the UK REF 2014[77] but adapted to the Mauritian culture and context. A review of existing good practices suggests that research should be evaluated both quantitatively and qualitatively as well as in terms of its academic and non-academic impacts. Quantitative evaluations are usually based on the use of bibliometric indicators such as journal impact factor, *h*-index, *i*-10 index, and citation counts that indicate the academic influence of a research and a researcher, while the non-academic influence of a research includes its impact on society and economy.

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[70] Sivertsen, G. (2017). Unique, but still best practice? The Research Excellence Framework (REF) from an international perspective. *Palgrave Communications*, *3*(1), 1-6.
[71] Governmentality refers rules and processes (e.g., the MREF) used to govern a population not through coercion, but guidance and controls that encourage certain outcomes and ways of thinking.
[72] Molas-Gallart (2012), op. cit.
[73] https://2029.ref.ac.uk/
[74] https://www.arc.gov.au/evaluating-research/ei-assessment
[75] Wilsdon, J et al. (2015). The Metric Tide: The Independent Review of the Role of Metrics in Research Assessment and management. Retrieved from https://www.ukri.org/wp-content/uploads/2021/12/RE-151221-TheMetricTideFullReport2015.pdf, April 13, 2025.
[76] Hicks, D., Wouters, P., Waltman, L., De Rijcke, S., & Rafols, I. (2015). Bibliometrics: the Leiden Manifesto for research metrics. *Nature*, *520*(7548), 429-431.
[77] Stern, N. (2016). Research Excellence Framework (REF) review: Building on success and learning from experience. Retrieved from https://assets.publishing.service.gov.uk/media/5a803df4e5274a2e8ab4f03d/ind-16-9-ref-stern-review.pdf, April 13, 2025.

Qualitative evaluation includes peer assessment of the research. The REF, for example, is a process of qualitative evaluation of research outputs produced by UK universities, based on expert review carried out by sub-panels focused on subject-based units of assessment, under the guidance of overarching main panels and advisory panels[78]. However, Mauritius does not possess the required financial and human resources and expertise to engage in a national research assessment exercise involving peer evaluation of research output at a scale at par with the UK REF and the ERA. Furthermore, unlike other countries, as a small island developing country, Mauritius is characterized as an 'intimate community' – 'a close-knit society' that can pose some challenges for a national peer evaluation of research output. Therefore, the process of research evaluation must be refined given the specificities of Mauritius and its society. However, some qualitative evaluation of research outputs usually takes place at the level of university promotion committees or other research assessment committees in Mauritius where peer evaluation of research is carried out. In line with the Leiden Manifesto for research metrics, quantitative indicators should guide peer-evaluation to avoid human bias in the evaluation process[79].

It is not possible to develop a fair research evaluation process without a predefined and internationally validated set of criteria. Therefore, to develop the MREF, we borrow from the principles of the UK REF and the ERA but adapt the process to fit the institutional context of Mauritius. Originality, rigor, and significance (impact) or their variants, are the criteria generally used to evaluate research in national research assessment exercises[80]. For example, while the UK REF uses the term 'significance', the ERA uses the term 'research application' to denote the societal impact of research. The criteria of originality, rigor, and impact constitute the underlying principles of the MREF and are, therefore, not open to debate and contestations (see Table 15). Originality and rigor relate to the scientific aspects of research and can be assessed using journal ranking systems (see Table 16). Impact includes both academic as well as the societal impact (non-academic) of the

[78] https://2029.ref.ac.uk/
[79] Diana, H., Paul, W., Ludo, W., Rijcke, S., & Bibliometrics, R. I. (2015). The Leiden Manifesto for research metrics. *Nature*, *520*(7548), 9-11.
[80] Sivertsen (2017), op. cit.

research work. The non-academic impact is useful to evaluate researchers whose work focuses more on application (e.g., engineering) rather than theory and methods[81].

Table 15. Dimensions of research excellence

Dimensions of research excellence	Definition
Originality	Originality is the extent to which the output makes an important and innovative contribution to understanding and knowledge in the field. Research outputs that demonstrate originality may do one or more of the following: produce and interpret new empirical findings or new material; engage with new and/or complex problems; develop innovative research methods, methodologies and analytical techniques; show imaginative and creative scope; provide new arguments and/or new forms of expression, formal innovations, interpretations and/or insights; collect and engage with novel types of data; and/or advance theory or the analysis of doctrine, policy or practice, and new forms of expression.
Rigor	Rigor is the extent to which the work demonstrates intellectual coherence and integrity, and adopts robust and appropriate concepts, analyses, sources, theories and/or methodologies.
Impact	Impact is the extent to which the work has influenced, or has the capacity to influence, knowledge and scholarly thought, or the development and understanding of policy and/or practice.

Source: Adapted from Higher Education Funding Council for England (HEFCE, 2012, p. 66.67)[82]

4.2.3. Journal Quality as an Indicator of Originality and Rigor

The quality of the journal in which an article has been published is a good indicator of originality and rigor[83,84,85]. This is because leading academic journals publish original research that makes significant contributions to knowledge in their respective disciplines. They have a rigorous peer-review process and a low acceptance rate and, therefore, they are very selective in articles they choose to publish. Articles published in top-tier journals are characterized by theoretical and

[81] Thelwall, M., Kousha, K., Wilson, P., Makita, M., Abdoli, M., Stuart, E., ... & Cancellieri, M. (2023). Predicting article quality scores with machine learning: The UK Research Excellence Framework. *Quantitative Science Studies*, *4*(2), 547-573.

[82] HEFCE (2012). REF 2014 Panel criteria and working methods. Bristol: Higher Education Funding Council.

[83] Jarwal, S. D., Brion, A. M., & King, M. L. (2009). Measuring research quality using the journal impact factor, citations and 'Ranked Journals': Blunt instruments or inspired metrics?. *Journal of Higher Education Policy and Management*, *31*(4), 289-300.

[84] Lindgreen, A., Di Benedetto, C. A., & Brodie, R. J. (2021). Research quality: What it is, and how to achieve it. *Industrial marketing management*, *99*, A13-A19.

[85] Thelwall, M., Kousha, K., Wilson, P., Makita, M., Abdoli, M., Stuart, E., ... & Cancellieri, M. (2023). Predicting article quality scores with machine learning: The UK Research Excellence Framework. *Quantitative Science Studies*, *4*(2), 547-573.

methodological rigor and are cutting-edge research. These journals are recognized globally for their quality and contribution to knowledge advancement. Lower tier journals generally have a 'light' peer-review process that compromises scientific rigor. They have small readership and lower visibility, are not well cited among the scientific community. Some lower tier journals may also have some predatory elements even if they appear in certain journal rankings[86]. Publishing in such predatory journals brings disrepute to the author and institution[87].

Unlike several countries, Mauritius has yet to develop a formal national policy on journal quality that guides publication activities. Universities have developed their own list of 'recognized journals' that are not always at par with the required standards to achieve research excellence. Local journal lists encourage predatory publishing and are considered as inferior to journals listed in internationally validated list[88]. In some cases, research credit and incentives are given to academics for publications in journals that do not add much value to the repute of the university and the researcher, leading to a misallocation of financial resources. It is also important to highlight that many journals indexed in databases such as EBSCO or in regional journal lists (e.g. Department of Higher Education and Training, South Africa) do not always meet international standards.

Therefore, it is important that Mauritius adopts a national policy on journal ranking. The NCRS recommends that HEC uses the following four journal ranking systems to regulate publication activities in public universities: Journal Impact Factor (JIF) by Clarivate, SJR by Scopus, the Academic Journal Guide (AJG) by the Chartered Association of Business School, and the Association of Business Dean Council (ABDC) journal list (Table 16). These journal ranking systems guide publication activities in several countries and institutions and are used by ranking agencies to rank universities. Furthermore, to calculate the GII score, the WIPO uses the number of peer-reviewed articles published in the Social Sciences Citation Index (SSCI) and

[86] Pollock et al. (2024), op. cit.
[87] McLeod, A., Savage, A., & Simkin, M. G. (2018). The ethics of predatory journals. *Journal of Business Ethics*, *153*, 121-131.
[88] Perlin, M. S., Imasato, T., & Borenstein, D. (2018). Is predatory publishing a real threat? Evidence from a large database study. *Scientometrics*, *116*, 255-273.

Science Citation Index Expanded (SCIE) to as an indicator of 'Knowledge and Technology Output'.

It is therefore important for the HEC to address issues of journal quality using the MREF to regulate research publication activities at public universities. At the same time, incentive mechanisms should be designed and implemented to encourage publications in the top-tier journals across different ranking systems. The NCRS recommends that HEIs and the HEC review their research publication schemes to incentivize publications in Q1 and Q2 Scopus categories only. To ensure the best use of research funds, conference funding must also be linked to demonstrated research performance evidenced by publications in Q1 and Q2 journals only and not on a 'first come first serve' basis as is the case at most HEIs.

Table 16. Recommended journal ranking systems[89]

Ranking	Descriptions	Classifications
Journal Impact Factor (JIF)	Journals are categorized into: SCI (>9,000 journals); SSCI (>3,500 journals); AHCI (>1,800 journals); ESCI (>8,000 journals)	Q1: $0.0 < Z \leq 0.25$[90] Q2: $0.25 < Z \leq 0.5$ Q3: $0.5 < Z \leq 0.75$ Q4: $0.75 < Z$
Scimago Journal Rank (SJR)	Rank around 28,200 journals in 335 narrow fields in Scopus, classified into 27 broad fields, one of which is 'Multidisciplinary'	Q1: journal that has a percentile of 75%-99% (16,757 journals). Q2: journal that has a percentile of 50%-74% (12,637 journals). Q3: journal that has a percentile of 25%-49% (10,221 journals). Q4: journal that has a percentile of 0%-24% (7,696 journals).
Academic Journal Guide (AJG)	The AJG ranks around 1700 journals in 22 disciplines related to Business and Management. The ratings are based upon peer review, editorial and expert judgements following the evaluation of publications and is informed by statistical information relating to citation data.	4*: Journals of Distinction. As the world leading journals in the field, they would be ranked among the highest in terms of citation metrics. 4: publish the most original and best-executed research. These journals typically have high submission and low acceptance rates. Papers are heavily refereed. These top journals generally have among the highest citation metrics within their field. 3: publish original and well executed research papers and are highly regarded. These journals typically have good submission rates and are very selective in what they publish. Papers are heavily refereed. These highly regarded journals generally have good to excellent citation metrics relative to others in their field, although at present not all journals in this category carry a citation metric.

[89] Table compiled using data from Clarivate (https://support.clarivate.com/ScientificandAcademicResearch/s/article/Journal-Citation-Reports-Quartile-rankings-and-other-metrics?language=en_US), Scopus (https://www.scopus.com/sources), Chartered Association of Business School (https://charteredabs.org/academic-journal-guide), and the Association of Business School (https://abdc.edu.au/wp-content/uploads/2023/03/ABDC-2022-Journal-Quality-List-Review-Report-150323.pdf); Data retrieved on April 16, 2025.

[90] Z is defined as: Z=(X/Y), Where X is the journal rank in category and Y is the number of journals in the category. Examples: When sorted by Impact Factor, if a journal is rank 78 out of 314 in a category, Z= (78/314) = 0.248 which is a Q1 journal; When sorted by Impact Factor, if a journal is rank 102 out of 204 in a category, Z= (102/204) =0.5 which is a Q2 journal.

		2: publish original research of an acceptable standard. For these well regarded journals in their field, papers are fully refereed according to accepted standards and conventions. Citation metrics are somewhat more modest in certain cases. Many excellent practitioner-oriented articles are published in 2-rated journals. 1: publish research of a recognised, but more modest standard in their field. Papers are in many instances refereed relatively lightly according to accepted conventions. Few journals in this category carry a citation metric.
Association of Business Dean Council (ABDC)	The first ABDC Journal Quality List was released in 2008. In establishing a Journal Quality List, the ABDC sought to guide stakeholders — ABDC member business schools, and researchers in business-related disciplines in Australia and New Zealand — about quality outlets for research publication. The ABDC ranks around 2600 journals in the field of business.	A*: the highest quality category, representing the top 5–7% of the journals assigned to an individual Field of Research A: the second highest quality category, representing the next 15–25% of the journals assigned to an individual Field of Research. B: the third highest quality category, representing approximately the next 35–40% of the journals assigned to an individual Field of Research. C: the fourth highest quality category, representing the remaining recognised quality journals assigned to an individual Field of Research.

4.2.4. Academic Impact

Measurement of research impact is a form of accountability to demonstrate the outcomes of research projects. Research impact comprises the academic (scholarly) impact and the non-academic impact of a research. The academic impact measures the influence of research work on the intellectual development of the field, that is, the extent to which the work has influenced other research in the discipline as well as in other fields. In line with international practices, the NCSR recommends that academic impact is assessed at two different levels using established bibliometric indicators: author level and journal level metrics (see Table 17).

Author level metrics consist of those indicators that measure the productivity and influence of a researcher and include citation counts, h-index, g-index, and i10-index. The *h*-index is a robust measure of a researcher's productivity and influence because it is insensitive to uncited or lowly cited articles. However, a drawback of the *h*-index is that it does not provide information on a researcher's highly cited articles (significant works) because once an article is included in the calculation of the h-index, it is not 'used' anymore in the determination of *h*, even if this article is no longer cited or cited numerous times in subsequent years[91]. The g-index addresses this limitation of the *h*-index to measure the global citation performance of a set of articles. Taken together, these author level metrices reasonably demonstrate a researcher's productivity and influence on the production and reproduction of knowledge.

Journal level metrics have become more sophisticated and inclusive to capture a journal's influence on as well as outside a discipline considering the size of the discipline as well as the types of publications that cite that journal. For example, while the JIF measures the citation performance of a journal over the last two years, the Citescore and the 5-year JIF cover a period of 4 years and 5 years, respectively, and are useful for evaluating the performance of journals in slow moving fields where citations take time to occur. The Source Normalized Impact Factor (SNIP) accounts for field differences in citation practices and enables a direct comparison of journals in different fields (e.g., medicine, languages, and anthropology).

[91] Egghe, L. (2006). Theory and practise of the g-index. *Scientometrics*, *69*(1), 131-152.

Table 17. Indicators of academic impact

Indicators	Description	Sources
Author level metrics:		
Academic age of the researcher	• Number of years in academic employment to benchmark citation and publication record	
Citations	• Measures the number of times articles written by a researcher have been cited by others.	• Google Scholar; Clarivate Web of Science; Scopus
h-index[92]	• The *h*-index (or Hirsch-index) is defined as the number *h* such that, for a general group of papers, *h* papers received at least *h* citations while the other papers received no more than *h* citations. For example, an *h*-index of 10 means that a researcher has 10 publications that have been cited at least 10 times. The *h*-index measures both productivity and influence of a researcher.	• Google Scholar; Clarivate Web of Science; Scopus
g-index[93]	• The *G*-index considers the highly cited works of an author. The g-index is defined as 'the largest number such that the top 'g' articles received together at least g citations. A g-index of 20 means that an academic has published at least 20 articles that combined have received at least 400 citations	• Harzing Publish or Perish software
i-10 index[94]	• Number of articles written by an author having at least 10 citations. An i-10 index of 20 means that an author has published 20 publications that have received at least 10 citations each.	• Google Scholar
Journal level metrics:		
JIF	• JIF provided by the Journal Citation Report (JCR) measures the scholarly influence of a journal. The JIF of a journal is calculated by citations articles published in a journal have received over the last two years by the total number of publications in that journal for those two years. Total citations in 2022 and 2023 for articles published in Journal X = 500 Total Number of Publications in 2022 and 2023 in Journal X = 100 JIF of journal X in 2024 = 500/100 = 5	• Clarivate Web of Science https://mjl.clarivate.com/search-results
5-year JIF	• The 5-year journal Impact Factor is the average number of times articles from the journal published in the past five years have been cited in the JCR year. It	• Clarivate Web of Science https://mjl.clarivate.com/search-results

[92] Bornmann, L., & Daniel, H. D. (2007). What do we know about the h index?. *Journal of the American Society for Information Science and technology*, *58*(9), 1381-1385.
[93] Egghe, L. (2006). Theory and practise of the g-index. *Scientometrics*, *69*(1), 131-152.
[94] Exclusively used by Google Scholar.

	is calculated by dividing the number of citations in the JCR year by the total number of articles published in the five previous years	
Citescore	• The calculation of the Citescore is based on the number of citations to documents (articles, reviews, conference papers, book chapters, and data papers) by a journal over four years, divided by the number of the same document types indexed in Scopus and published in those same four years.	• Scopus https://www.scopus.com/sources
SNIP	• SNIP measures contextual citation impact by weighting citations based on the total number of citations in a subject field.	• Scopus https://www.scopus.com/sources
SJR	• SJR measures the frequency with which content published in a journal was cited in other journals during the three previous years. Accounts for both the number of citations received by a journal and the prestige of the journals where the citations come from.	• Scimago https://www.scimagojr.com/journalrank.php
*h*5-index	• h5-index is the h-index for articles published in the journals during the last 5 complete years. It is the largest number h such that h articles published in 2019-2023 have at least h citations each	• Google Scholar https://scholar.google.com/citations?view_op=metrics_intro&hl=en
h-median	• h5-median for a publication is the median number of citations for the articles that make up its h5-index	• Google Scholar https://scholar.google.com/citations?view_op=metrics_intro&hl=en
Eigenfactor	• The Eigenfactor metrics, developed in 2007 by Carl Bergstrom and Jevin West measures the number of times articles from the journals published in the past five years have been cited in Journal Citation Reports (JCR). It considers which journals have contributed to these citations; therefore, this approach identifies the most influential journals, those which are cited by other influential journals. Scores are scaled so that the sum of all journal scores is 100.	• http://www.eigenfactor.org/projects/journalRank/journalsearch.php
Article influence score	• Article Influence score measures the influence of a journal per article. It is calculated as a journal's Eigenfactor Score divided by the number of articles in that journal and normalized so that the average article in the JCR has an Article Influence score of 1.	• http://www.eigenfactor.org/projects/journalRank/journalsearch.php

The NCRS recommends that metric-based evaluations should be gender sensitive by considering the challenges women researchers face in academia resulting from their dual family-professional responsibilities and obligations that can interfere with their career, often termed as the 'family gap'[95] or 'the child penalty'[96] in the economics literature[97]. The implications of this are that some women researchers may experience a decline in research productivity and reduced research visibility[98], and face challenges in seeking research collaborations because of gender homophily tendencies[99]. Science commonly refers to this process as the Matthew-Matilda effect[100]. Gender sensitivity can be addressed by considering the number of years in academic employment relative to number of citations and publications to benchmark research performance, considering periods of maternity leave and other factors that may interfere with women's professional responsibilities.

4.2.5. Non-Academic Impact

The non-academic impact of academic research is an important and relatively new criterion of research excellence. This reflects the need for universities to become knowledge hubs deeply embedded and intentionally engaged in the socioeconomic development of nations by producing research that supports social and economic progress. Small island nations like Mauritius have traditionally relied on imported knowledge that do not always reflect their socioeconomic realities. Indigenous knowledge produced by local universities has the potential to address the economic and environmental vulnerabilities of Mauritius - a philosophy espoused by the Mauritian government. However, Mauritian universities have been criticized for not producing "enough knowledge that can be transferred to the real economy"[101]. Therefore, the non-academic impact of research is an important dimension of

[95] The "family gap" refers to the wage penalty that women experience after becoming mothers, leading to lower earnings compared to their childless peers.
[96] The "child penalty" refers to the reduction in labor market outcomes, such as wages and employment, experienced by women, and to a lesser extent men, after having children.
[97] Budig, M. J., & England, P. (2001). The wage penalty for motherhood. *American Sociological Review*, *66*(2), 204-225.
[98] Hunter, L. A., & Leahey, E. (2010). Parenting and research productivity: New evidence and methods. *Social Studies of Science*, *40*(3), 433-451.
[99] Nunkoo, R., Thelwall, M., Ladsawut, J., & Goolaup, S. (2020). Three decades of tourism scholarship: Gender, collaboration and research methods. Tourism Management, 78, 104056.
[100] Rossiter, M. W. (1993). The Matthew Matilda effect in science. *Social studies of science*, *23*(2), 325-341.
[101] World Bank (2023b) op. cit. pg. ix

research excellence that must be addressed nationally and considered in the MREF. While the HEC has developed its own criteria to assess the non-academic impact of research, the NCRS recommends that research impact becomes a formal criterion for research excellence in the proposed MREF.

Table 18 provides examples of various non-academic impacts of research in terms of the impact areas, types of impacts, and measurements and indicators. Table 16 is illustrative only and the types of impacts are not necessarily mutually exclusive and overlap. There are also other types of impacts that are not included in the table. The 'indicators and measurements' are also listed independently of the 'types of impacts'. Using the illustrative examples provided in Table 16 as foundation, the NCRS recommends that the HEC and MRIC consult with civil societies, industry partners, universities, the government, and the local communities to develop a comprehensive guide for research and innovation impacts and their indicators.

Table 18. Non-academic impacts of research and innovation and their indicators[102]

Impact areas	Types of impacts	Indicators/Measurement
Impacts on industry and economy	Research that results in, but not limited to: • patent and patent applications. • improvements in production yield. • optimization • introduction of new processes. • financial loss mitigation. • development of new products and services. • development of new technologies. • increased productivity and lower production costs. • new business opportunities. • introduction of more efficient methods of production. • the development of new economic sectors. • development of better forecasting models for climate, tourism, for example. • improvements in workplace practices. • new collaborations and partnerships with industry (knowledge transfer, etc.). • development of new economic models for Mauritius. • decent employment opportunities. • the advancement of SDG 19: build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.	• Number of patents and patent applications. • Evidence of service or process change. • Commercial adoption of new technology and processes. • Demonstrated university-industry collaboration. • Business performance measures such as profitability and waste. • Number of joint articles/technical papers jointly between academic and industry practitioners. • Evidence of improved sustainability. • Number of new jobs created. • Reduction in rate of unemployment. • Sales figures. • Labor productivity. • Business confidence indicator.
Impact on society and communities	Research that results in, but not limited to: • improvements in quality of life of Mauritians. • attitudinal and behavioral changes among community members toward the environment, for example. • empowerment of local communities. • improvements in community resilience. • improvements in social welfare, community cohesion, social inclusion. • access to social justice. • changes in social policies. • integration of marginalized groups in the development process.	• Testimonials from civil societies/community leaders. • Mentions in social policy documents. • Evidence of public debates driven by the research. • Women participation rate. • Affordable housing units. • Domestic violence rate. • Number of startups by local community members. • Crime rate. • Number of training programs for local communities. • Invitations by civil societies to disseminate results.

[102] This table has been developed following a review of national research assessment exercises such as the UK REF and the ERC and of the scientific literature.

	• promote equality of opportunities for Mauritius across all social classes. • community regeneration or development. • policy recommendations to address social problems facing the Mauritian societies such as drugs, suicide, delinquency, etc. • improvement in health, safety, and security. • improvement in social relationships among the Mauritian community members. • improvement in family relationships.	• Mentions in documents produced by civil societies. • Number of households with proper access to clean water. • Evidence of local community participation in development projects.
Impact on the environment	Research that results in, but not limited to: • development of environmentally friendly products and processes. • development of new techniques and methods leading to environmental preservation. • decrease in the level of environmental pollution. • improvements in waste management strategies. • policy debates on climate change. • management and conservation of natural resources. • protection of animals, flora and fauna, and biodiversity. • improvements in landscape design and architectural designs • better water management strategies. • changes in business operations to achieve green objectives. • pro-environmental behavior among individuals.	• Number of green products introduced in the market. • Evidence of new production processes with environmental benefits. • Documented evidence of environmental preservation and conservation. • Mentions of the research in environmental policy documents. • Amount of waste generated. • Amount of recycling materials. • Carbon footprint • Handprint. • Water usage. • Energy usage.
Impact on local culture	Research that results in, but not limited to: • revival of Mauritian heritage and culture. • creation of new artistic expressions such as music, drawings, and language. • collaborations with the creative sectors. • co-production of cultural artefacts and events. • Improvements in the legal framework governing the cultural sector in Mauritius. • New forms of artistic expressions that promote the Mauritian culture.	• Number of cultural events organized jointly by academic researchers and the cultural sector. • Documented changes in national cultural policy. • Sales figures of products portraying the Mauritian culture. • Testimonials from stakeholders in the cultural and creative sectors.

4.2.6. Research Impact Quadrant

Figure 16 illustrates a research impact quadrant that can guide evaluation. Quadrant 1 includes research that scores high on originality/rigor and has low to medium impact on society and economy at least in the short run. Included in this group is fundamental research that advances theory and methodology, usually publishable in top-tier journals but with no immediate impact, at least at the time of publication. Quadrant 2, the most desirable, includes research that is highly original and rigorous in approach, publishable in top-tier journals, and having considerable impact on society, economy, and policy. For example, Chu et al.'s (2020) study on the impact of social distancing, face masks and eye protection on transmission of Covid-19 published in *The Lacent*, has influenced public health policies in over 50 countries during the Covid-19 pandemic and the World Health Organisation's (WHO) and Center for Disease Control's (CDC) recommendations on mask-wearing[103].

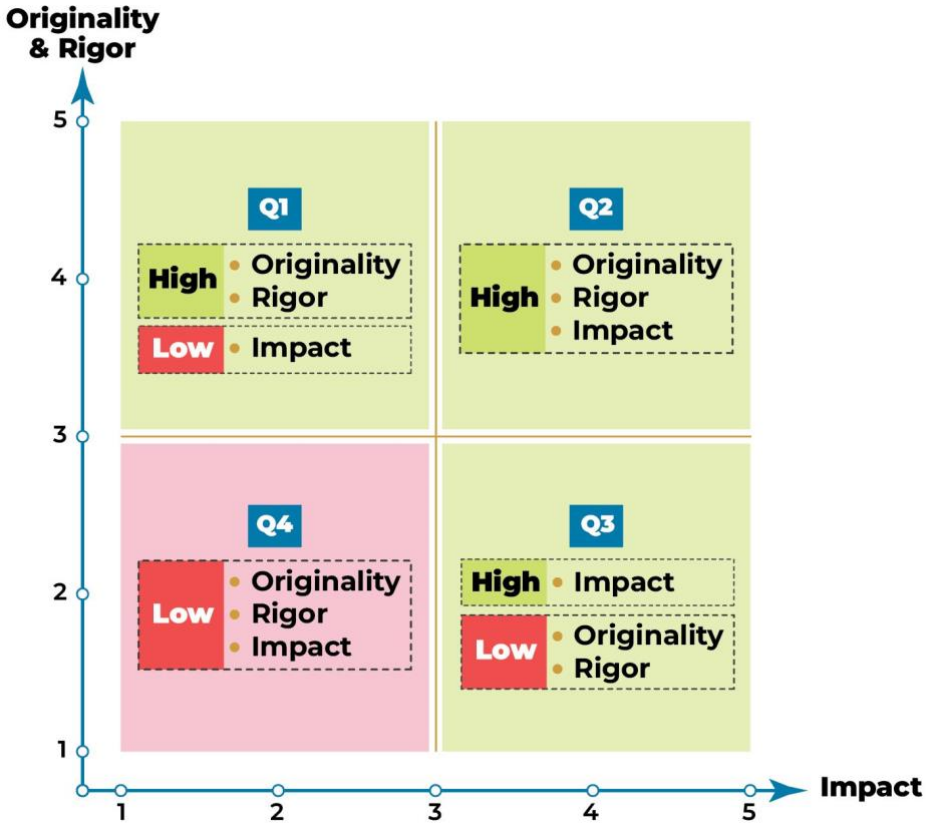


Figure 16. Research impact quadrant

[103] Chu, D. K., Akl, E. A., Duda, S., Solo, K., Yaacoub, S., Schünemann, H. J., ... & Reinap, M. (2020). Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis. *The lancet*, *395*(10242), 1973-1987.

Quadrant 3 includes research such as those published in consultancy or other types of reports which may be based on ideas that are not necessarily original by academic standards, but that have significant influence on policymaking. McKinsey & Company's report on *The Power of Parity: Advancing Women's Equality* has been used by the G20, World Economic Forum, and UN Women to develop their gender policy frameworks[104]. Quadrant 4 captures non-meaningful research that is neither original/rigorous nor impactful and must be discouraged. These include publications in low quality journals, books, and book chapters that fall below academic standards with neither any scholarly impacts nor societal ones.

This research impact quadrant is useful to evaluate both researchers that engage in fundamental research that contributes to theory and methodology as well as applied researchers who may not be publishing in top-tier journal, but whose works have an influence on policy decisions and/or society. It can also help identify 'promotion-driven publications' where academics publish low quality papers with the only purpose of accumulating marks for academic promotion.

4.3. Recommendation 3: Ex-Post Evaluation of Research and Innovation Projects

Ex-post evaluation of research projects is a common exercise carried out by funders. The UK Research and Innovation (UKRI), for example, requires funded researchers to report the outcomes of their research during the lifetime of the project and for at least five years after the project has been completed, otherwise, the UKRI applies sanctions to the principal investigator[105]. The UK REF has a similar process where universities are required to submit 'impact case studies' to demonstrate the societal and economic value of research funded in earlier years which influences research funding allocation in subsequent years.

MRIC and HEC devote considerable resources to fund research and innovation projects. The MRIC, for example, has spent more than 230 million rupees on funding

[104] McKinsey Global Institute (2015). The power of parity: How advancing women's equality can add $12 trillion to global growth. Retrieved from https://www.mckinsey.com/featured-insights/employment-and-growth/how-advancing-womens-equality-can-add-12-trillion-to-global-growth, May 26, 2025.
[105] https://www.ukri.org/wp-content/uploads/2023/11/UKRI-23112023-UKRI-Sanctions-Policy-UPLOAD-v2.pdf, retrieved May 24, 2025.

various projects during the past 6 years while the HEC has spent around 85 million rupees on research funding from 2017-2024. Research and innovation projects submitted for funding considerations to the MRIC, HEC, and HEIs are evaluated at the proposal stage based on their 'expected/anticipated impact' on the economy, society and innovation, and potential for publications in journals. Successful completion of research projects requires the submission of a final report and in some cases, a dissemination exercise by the research team, in the form of a presentation of the research findings to stakeholders. However, the extent to which expected impacts translate into actual outcomes (impacts) is not known in the absence of a proper mechanism to assess research projects ex-post. In addition to accountability and governance challenges these pose for funders especially when public funds are utilized, the effectiveness of funded projects in influencing the society and economic and effecting change cannot be truly assessed.

To address this concern, the NCRS recommends that MRIC and HEC engage in an Ex-post evaluation of research and innovation projects to monitor the outcomes of funded projects, especially for those involving large amounts of public funding using but not limited to, the non-academic impact framework outlined in Table 17. In line with international best practice, the MRIC and HEC can make it compulsory for beneficiaries (principal investigators/companies) to report the impact of funded projects one year (or more) after completion (see Table 19). In some cases, the funder can retain a proportion of the funding until the ex-post evaluation of the project has been carried out. In case of non-compliance, the beneficiary can be debarred from applying for research funding in subsequent years.

The NCRS also recommends that MRIC and HEC develop a repository of 'Mauritius Research and Innovation Impacts Case Studies' (MRIICS) that can be used as the key performance indicators of these organizations. This process of ex post project evaluation may mean that MRIC and HEC fund fewer, but more impactful projects, ensuring a more optimum use of public funds for research. The MRIICS can be made publicly available and disseminated widely to improve institutional and research legitimacy in the eyes of the public, government, and industry and development partners.

Table 19. Timeline for ex post evaluation of projects

Funding amount	Ex post reporting of outcomes
< 1 million rupees	One year after completion
1 million to 2 million rupees	18 months after completion
> 2 million rupees	2-5 years after completion, depending on the nature of the project

4.4. Recommendation 4: Modernizing and Strengthening Doctoral Programs

4.4.1. Developing Rigorous Doctoral Training

The provision of doctoral education has been central to the mission of several universities. Doctoral students play an important role in advancing the research agenda of universities, with an emphasis on the production of original knowledge, often reflected in publications in top-tier journals. A PhD serves as a terminal degree that leads to academic, research and other professional careers. All public HEIs in Mauritius offer doctoral programs. UOM, UDM, and MGI offer a PhD program while the OUM and UTM offer both a PhD and a DBA program. The MIE offers a doctoral program, namely, an Ed D in collaboration with the University of Brighton, UK (Table 20).

Doctoral programs in Mauritius are largely influenced by the British style and are based on an apprenticeship model with a thesis component. This model involves student mentorship by a supervisor who guides the student through the research process by providing feedback on the different aspects of the thesis until completion. The OUM, MGI, and more recently, UOM and UTM have introduced structured courses as part of their doctoral programs. However, there are several inconsistencies in terms of the number and types of structured courses offered, teaching hours dedicated to these courses, and the mode of assessment. The PhD program at the UOM, for example, consists of 36 teaching hours devoted to structured courses while at the OUM, the PhD and DBA programs comprise of 120-150 hours dedicated to structured courses. UDM does not have structured courses as part of its PhD program but provides several workshops for its doctoral students.

Table 20. Characteristics of doctoral programs offered by public HEIs in Mauritius

	UOM	UTM	OUM	UDM	MIE
Type of programs	PhD	PhD & DBA	PhD & DBA	PhD	Ed D*
Structured courses	Yes	Yes	Yes	No, workshops only	
Number of hours	60	DBA: 216 PhD: 36	130-150	18	150
Courses/Workshops	Fundamental concepts; Literature review; Research ethics; Research philosophy and approaches; Fundamentals of manuscript preparation and writing skills; Soft skills for doctoral students. Research methods units: Survey design; Qualitative research design; Time series and panel data; Experimental design; Research methods in computer science		Research issues and professional practice; Systematic literature review; Quantitative methods for business; Qualitative methods; Quantitative methods	Starting a doctorate; Academic databases and library services; Academic writing; Policies and procedures at the doctoral schools; Philosophy and literature review; The PhD roller coaster; Review of scientific publications; Referencing tools; Presentation skills; Managing relationships with supervisors; Systematic literature review and research questions; Ethics in research; Expectations of examiners; Conceptual framework, theories and models; Review of thesis components, etc.	
Formal assessment	No	Yes, for some courses	No	No	Yes
Research proposal required as part of application	Yes	Yes	No	Yes	Yes

*in collaboration with University of Brighton

The types of courses offered by these institutions also differ in the depth and breadth of topics covered. OUM's doctoral program consists of five dedicated but unassessed courses on various aspects of research, including quantitative and qualitative techniques of around 30 teaching hours each. However, at most HEIs, these courses currently lack legitimacy because they are weakly integrated in the doctoral curriculum and because of the absence of formal assessments (see Table 20). The MIE, which is an exception, has a more structured doctoral program consisting of 120 hours contact hours dedicated to courses on research methodology that are formally assessed.

Generally, admission to doctoral programs at most public HEIs in Mauritius (OUM is an exception) requires applicants to submit a research proposal. This process assumes that doctoral applicants have prior domain knowledge and a thorough understanding of the research process, including the theoretical and methodological underpinnings relevant to their research area. However, this is generally not the case because most applicants hold a taught master's degree (sometimes a bachelor's degree) with minimal formal research training. Doctoral applicants are expected to evaluate and select research areas and develop proposals and research plans by themselves, sometimes with the active or passive participation of a supervisor. Such a model of doctoral program has also been criticized for leaving students without appropriate research support during the early phases of doctoral research and for rendering them vulnerable to the personality, leadership style, and standing of their supervisors[106].

The implication of these is that many doctoral research proposals submitted to research committees for evaluation often lack the theoretical and methodological rigor desired at doctoral level. They tend to emphasize context, but not theoretical or methodological contributions and/or the advancement of knowledge resulting in the inapplicability of research findings (lack of general relevance), compromising research quality and decreasing the potential for the research make a significant contribution to knowledge. Of course, the likelihood of such research to be published in leading journals is minimal. Students recognize this after much effort

[106] Metcalfe, M., & Kiley, M. (2000). Arguing for PhD coursework. *Australasian Journal of Information Systems*, *7*(2).

has been expended and sometimes too late in the research process to take corrective actions. The current system of PhD studies in Mauritius has produced eminent researchers, but it is time to review the approach to doctoral studies given the changes in the scientific enterprise, development challenges, and doctoral applicants' profile.

This NRS recognizes and emphasizes on the potential of doctoral research to develop new knowledge and ideas that not only advances science but also respond to the socioeconomic and development challenges of Mauritius and the region. This requires that public HEIs appreciate that the end product of doctoral training is not just the award of a PhD or DBA but a community of competent scholars. This premise calls for reforms in doctoral training offered by public HEIs in Mauritius. In line with the first Salzburg Principles[107] established in 2005 in the Bologna process[108], doctoral programs should aim at developing and nurturing a creative mindset and intellectual autonomy through the production of original research in the form of a thesis. Modernizing doctoral programs, therefore, involves improving research training in areas ranging from theory to methodology (including reproducibility and experimental design) and soft skills[109].

The NCRS recommends a new approach to doctoral programs involving changes in the application process and requirements and restructuring of the curriculum of doctoral programs to include a more formalized approach to research training:

[107]The Bologna Seminar on "Doctoral Programmes for the European Knowledge Society" provided the first major forum to discuss the new Action Line in the Bologna Process entitled "European Higher Education Area (EHEA) and the European Research Area (ERA) – Two Pillars of the Knowledge-based Society". The event was held on the initiative of the Austrian Federal Ministry of Education, Science and Culture, the German Federal Ministry of Education and Research and the European University Association. The main aim and objective of the Seminar was to identify the key challenges to be met in implementing the new Action line during the period 2005-2007.The main outcome of the Seminar was to reach agreement on the establishment of a set of ten basic principles that should underpin further considerations of the key role of doctoral programmes and research training in the Bologna Process.

[108]European University Association (2005). Salzburg 2005 – Conclusion and recommendations. Retrieved from https://www.eua.eu/publications/positions/salzburg-2005-conclusions-and-recommendations.html, retrieved May 15, 2025.

[109] Gould, J. (2015). How to build a better PhD. *Nature*, *528*(7580), 22.

i. HEIs shall move to a cohort-based doctoral program.

ii. research proposals should not be a requirement for application and admission to doctoral programs. Instead, doctoral applicants should submit a letter of motivation, articulating their motivation to undertake doctoral studies and their broad research interests.

iii. In line with international standards, any program at doctoral level shall include a minimum of 120 hours of devoted research training courses, adapted to the needs and requirements of the HEI. (For example: C1: The Research Process: Philosophy, Theory and Methodology; C2: Introduction to Quantitative and Qualitative Research; C3: Experiments and Advanced Quantitative Methods; C5: Advanced Qualitative Methods; C4: Professional Development).

iv. These courses shall be formally assessed using coursework/assignments to ensure their legitimacy and active participation from doctoral students.

v. HEC shall define quality standards for doctoral programs in line with the above principles and ensure enforcement using the accreditation process.

Figure 17. A new structure for doctoral studies

Figure 17 illustrates a new structure for doctoral studies. Doctoral candidates spend the first six months on research training (The Research Process: Philosophy, Theory and Methodology; Introduction to Quantitative and Qualitative Research). These courses shall be purposely designed to give students an understanding of the research process, research philosophies, theory and methodology to equip them sufficiently to develop strong research proposals that have potential to advance

knowledge in the field. Following successful completion of these courses at the end of the sixth month, students spend the next three months developing their proposals under the guidance of a supervisor. Advanced courses in quantitative and qualitative techniques and the professional development course can be scheduled during subsequent months of the first year of the doctoral program.

4.4.2. Developing an Industrial PhD (iPhD)

Policy discourses on university-industry collaboration in Mauritius have intensified over the last few years, but mechanisms to achieve this remains weak and have been subject to criticisms by several international organizations. The World Bank's public expenditure review[110] and country private sector diagnostic report for Mauritius[111] have been critical of the state of university-industry collaborations in Mauritius and universities' research that does not have real impact on the economy. Mauritius is also ranked low (83rd out of 133) in the 'university-industry R&D collaboration' indicator in the latest GII report by the WIPO[112]. Doctoral topics at public HEIs in Mauritius principally arises from the joint research interests of the candidate and the supervisor and may have little relevance to the economy. Although doctoral degree holders are valued, their research topics may not necessarily match the needs of the employers, thus proving insufficient opportunities for the PhD graduate in private sector organizations. In many cases, doctoral graduates in Mauritius are underemployed.

The Trible Helix model emphasizes the dynamic interactions between academia, industry, and government to foster economic growth and competitiveness and has been widely used to analyze universities' contributions to regional development. In this model, universities are assigned an important socio-economic role that highlights their interactions with industry partners and society. Universities are increasingly operating within the framework of the Trible Helix model that recognizes the role of these institutions not only in providing education and

[110] World Bank (2023a), op. cit.
[111] World Bank (2023b), op, cit.
[112] WIPO (2024), op. cit.

conducting research, but also in facilitating entrepreneurship, innovation, and industrial competitiveness[113].

The NCRS recommends the development of an industrial PhD (iPhD) in certain applied fields (e.g., engineering, computer science, nano technology, advanced materials and manufacturing) to promote industry-relevant research and innovation and foster university-industry collaboration. This recommendation considers that competitiveness is often the outcome of collaborative efforts between universities, industry, and policymakers to create economically relevant knowledge. It also takes into consideration that most doctoral graduates in Mauritius do not join academia given the limited job opportunities in this sector and because of professional and personal reasons. Several universities, including University of Strathclyde, UK, Aarhus University, Denmark, McMaster University, Canada, and University Technology, Sydney have developed a successful iPhD program. Empirical evidence suggests that iPhDs have positive impacts on innovation and regional economic growth.[114]

Unlike the traditional doctoral program offered by HEIs in Mauritius, the iPhD shall have a more entrepreneurial focus combining studying and working in a related industry or public sector and provides a career path not only in academia, but also industry, consultancy, and research. While the academic requirements to join and complete an iPhD program are like those of a traditional PhD, the former generally requires the student to be employed at a private company or research institute. The novelty of the iPhD lies in its problem-solving approach and generating new ideas and processes to solve industry problems. Another distinctive characteristic of the iPhD is that the research topic shall be jointly negotiated between the student, the academic supervisor and the industry partner and the supervisory team shall include industry experts. The topic of research must support the development activities of and bring innovative solutions to the industry partner (see Box 4). The goals of the proposed iPhD are:

[113] Gustavsson, L., Nuur, C., & Söderlind, J. (2016). An impact analysis of regional industry—University interactions: The case of industrial PhD schools. *Industry and Higher Education*, *30*(1), 41-51.
[114] Gustavsson et al., (2016) op, cit.

i. to educate doctoral researchers about industry-relevant research and innovation.
ii. to foster collaboration and facilitate knowledge transfer between Mauritian public HEIs and industry partners in areas of research and innovation.
iii. to develop innovative solutions to industry problems to foster business growth and competitiveness.

The NCRS recommends that the HEC develop guidelines and regulations for the iPhD and that the MRIC develops a new funding scheme – the 'iPhD funding scheme' that shall be available to iPhD candidates and industry partners on a competitive basis. The industry partner shall provide the iPhD candidate with access to the necessary equipment and other resources and shall be encouraged to contribute to the research project in cash or in kind. The MRIC and the HEI shall co-administer the program within the doctoral framework and guidelines of the HEI.

Box 3. CBBR's model of industry doctoral fellowship

In 2025, CBBR implemented two Industry Doctoral Fellowships in the area of 3D Bioprinting for organ reconstruction and Nanostimulants/nanofertilizers for plant health with RT Knits Ltd and MCFI Ltd for economic growth and diversification. Both projects have international reach and outcomes. This pioneering model can be used as a model to build the iPhD.

4.5. Recommendation 5: Mauritius Post-Doctoral Fellowship Scheme

The role of postdoctoral researchers in scientific advancements is undeniable, especially in fast-moving and competitive scientific research areas[115]. Their contributions to scientific progress are manifold (see Box 3). First, given their high level of learning capabilities and their knowledge of recent scientific advancements and methodologies, postdoctoral fellows produce high quality research that makes significant contributions to science. Second, postdoctoral fellows accelerate the speed of research because they are fully devoted to research activities. Third, they develop collaborative relationships with foreign researchers as well as local industry

[115] Igami, M., Nagaoka, S., & Walsh, J. P. (2015). Contribution of postdoctoral fellows to fast-moving and competitive scientific research. *The Journal of Technology Transfer*, *40*, 723-741.

partners during and even after their fellowship period[116]. Empirical evidence suggests that postdoctoral fellows appear disproportionately more frequently as first authors in research publications[117]. In line with this, data from Scopus suggests that postdoctoral fellows at the UOM have produced between 35 to 141 research articles for the period 2010-2024, which is much higher than the average research performance of an academic staff.

Box 4. Importance of postdoctoral fellows

Driving Research Productivity

- High research output: Postdocs are often responsible for a significant portion of publications and experimental work in research labs.
- Innovation engine: They are key contributors to the development of new theories, discoveries, and technologies, often pushing the boundaries of current knowledge.

Bridging Academia-Industry Linkages

- Technology transfer: Postdocs often work on applied research that can lead to patents, startups, or partnerships with industry.
- Translational research: Many work on moving basic science discoveries toward practical applications in medicine, engineering, and technology.

Mentorship and Leadership

- Training others: Postdocs often mentor graduate and undergraduate students, passing on knowledge and fostering a collaborative research environment.
- Lab leadership: They frequently serve as informal leaders in labs, helping to manage projects and direct junior researchers.

Public HEIs currently lack a proper framework for postdoctoral research and the required financial resources to recruit postdoctoral fellows. The HEC Postdoctoral Research Fellowships scheme, for example, has been inactive due to lack of research funds. This scheme also lacks integration within an overall research strategy and ecosystem that supports collaboration with industry to produce impactful research. The scheme is also not opened to international candidates which present a missed opportunity for Mauritius to attract high caliber post-doctoral researchers.

The NCRS, therefore, recommends a complete redesign of the Mauritius Postdoctoral Fellowship Scheme (MPDFS) to attract high-caliber postdoctoral fellows from

[116] Martinez, A., Epstein, C. S., & Parsad, A. (2016). Developing internationally engaged scientists and engineers: The effectiveness of an international postdoctoral fellowship program. *Research Evaluation*, *25*(2), 184-195.

[117] Black, G. C., & Stephan, P. E. (2010). The economics of university science and the role of foreign graduate students and postdoctoral scholars. In *American universities in a global market* (pp. 129-161). University of Chicago Press.

Mauritius and abroad in high priority research areas such as health, climate change, biodiversity, conservation, marine sciences, tourism, and new technologies. These fellows shall work with Associate Professors and Professors (the host academic) with a proven track record of high-quality research publications in the top journals and successful supervision of doctoral students. This fellowship shall be available to public HEIs on a competitive basis and shall require that the host academic submits a theoretically and methodologically strong research proposal to the HEC that has the potential to advance theoretical and/or applied knowledge in the respective discipline.

To improve research impact, the committee also recommends that the postdoctoral fellowship scheme becomes a basis to foster university-industry-government collaborations in research and development which is an important indicator of 'Innovation Linkages' in the GII. Therefore, the committee recommends that the host academic develops the proposal in collaboration with an industry partner/civil society/public sector organizations to promote socio-economically relevant research that addresses key issues facing the Mauritian society and economy. In this case, the host academic shall encourage the partner to partially or fully fund the research in cash or in kind to ease the burden on public finance. To encourage private sector participation, the NCRS recommends that the government provides fiscal incentives in the form of tax rebates (e.g., triple tax deduction) to private sector organizations for funding postdoctoral research.

Postdoctoral fellows make considerable financial and personal sacrifice by engaging in a committed long-term research program. Therefore, an attractive and competitive package must be offered to attract well-qualified postdoctoral candidates, especially from countries like India which hosts many high caliber scientists. The committee recommends the award of 10 postdoctoral fellowships annually comprising of a monthly salary of Rs 50,000 for each fellow for a period of two to three years.

It is recommended that the HEC sets up a Postdoctoral Selection Committee (PDSC) comprising of accomplished researchers from Mauritius and internationally and, when required, co-opts an industry representative to evaluate proposals based on

reviews from external reviewers. The committee recommends the following criteria commonly used internationally to evaluate postdoctoral applications (Table 21):

Table 21. Postdoctoral application evaluation criteria

Criteria	Score (%)
Originality and scientific merit of research proposal	25
Qualifications of postdoctoral fellow, including prior publications	20
Industry collaboration/Support of the civil society	15
Postdoctoral candidate global research commitment	10
Research statement from the host academic	10
National Research Priority	10
Qualifications and research experience of the host academic	5
Project feasibility	5

Adapted from Heimburger et al. (2014)

In line with the performance-based budgeting emphasized by the Government of Mauritius, the committee recommends that the performance of postdoctoral fellows is evaluated yearly on the following measurable criteria: number of publications in journals of high standing; scholarly impact of research outputs; collaboration with other researchers and industry partners; mentorship of graduate students and junior academic; and patents (where applicable).

4.6. Recommendation 6: Setting up of a Research Training Academy

The success of any research and innovation initiative in an economy, whether measured by scholarly output or by its impact on society, economy, and policies or by international ranking of countries such as the GII, rests on a pool of well-trained scholars. Under-developed human capital can lower research productivity and the pace of innovation. Particularly for a small island developing state like Mauritius that faces several resource and economic constraints, having strong human capital is crucial for driving socio-economically relevant research[118]. By prioritizing human capital development, Mauritius can enhance its research output and boost innovation and position itself as an important contributor to the global research community.

[118] Nunkoo, R., Thelwall, M., Croes, R., Ridderstaat, J., & Alrasheedi, A. F. (2024). Academic Publishing in Small Island Developing States: Does University Research Support Development?. *Higher Education Policy*, 1-22.

Unfortunately, many academics working in the public HEIs, even those holding a PhD, have not received structured and intensive research training. Research training has been on an ad-hoc basis at best which has served little purpose in the absence of a structured program. A lack of research training not only limits one's ability to publish papers and produce socio-economically relevant research but also adversely affects teaching quality and quality of supervision of graduate students. Data from the World Bank (2024) suggests that the number of research publications produced by researchers from Mauritius is among the lowest in the upper-middle income countries. The WIPO (2024) ranks Mauritius 110th out of 133 countries on the "Scientific and technical articles/bn PPP$ GDP" indicator of the GII. The poor performance of Mauritius in global rankings results partly from the inability of academic staff to produce good quality publications because of a lack of training and mentorship. In the survey carried out by the NCRS on academic staff, more than 70% of respondents indicated they require a training and mentorship program for skill development and career growth.

To address these shortcomings, the NCRS proposes the setting-up of a Research Training Academy (RTA) to deliver research training programs to all academic working in the public HEIs. Such training program shall be of two types: structured research training and continuous professional development (CPD). Structured research training shall be tailor-made based on the discipline (e.g., natural sciences, physical sciences, social sciences) and shall focus on the scientific aspects of research including conceptualization, theorizing, methodology, data analytic techniques and research ethics, journal publication process as well as funding application and acquisition, commercialization of research findings, patenting, impactful research, and developing formal industry collaborations. Such a high-level training shall provide a mastery of fundamental theoretical and methodological skills as well as substantive disciplined-based knowledge. It should also facilitate socialization of researchers with academia and foster familiarity with the styles and culture of their own discipline[119]. CPDs shall focus on contemporary and evolving issues such as use of artificial intelligence for research, big data, etc. Empirical

[119] Bazeley, P. (2003). Defining early career in research. *Higher Education*, *45*(3), 257-279.

evidence suggests that research training improves the quality and social impact of research[120].

For such research training programs to be effective, they should be formalized at the level of universities by integrating them into performance management mechanisms and promotion systems for academic staff. Institutions should provide full support to academic staff in the form of special leaves and reduced teaching loads to allow them to participate fully in the research training. Academic staff who have successfully completed the research training should be granted an 'approved doctoral supervisor' status by the HEC, which should be a requirement for academic staff to supervise Master and PhD thesis. For newly recruited academic staff, the successful completion of the research training should be part of their contractual agreement and a requirement for a permanent and pensionable position at the university.

4.6.1. Support for Early Career Researchers

Academia and its research environment have become increasingly competitive. Research funders allocate funding for research projects on a competitive basis and the rejection rate for manuscript submitted to leading journals is as high as 80% and even 95% for some. At the same time, as universities become more accountable to the government and the societies they serve, they expect better research and teaching performance from academic staff. These pose significant challenge for Early Career Researchers (ECRs) to survive and develop a well-established research program. We define an ECR as an academic who has joined a public HEI within the past five years[121]. The recent survey carried out by the NCRS on academic staff suggests a need to support ECRs.

The HEC currently has an "Early Career Research Grant" scheme to support ECRs. While this is a laudable initiative, the NCRS recommends additional support to ECRs in the form of "Paper Development Workshop". These are purposely designed

[120] Dodani, S., & LaPorte, R. E. (2008). Ways to strengthen research capacity in developing countries: effectiveness of a research training workshop in Pakistan. *Public Health*, *122*(6), 578-587.
[121] https://segh.net/early-career-researchers

intensive workshops to provide ECRs with the opportunity to work with editor-in-chief of journals and other leading scholars with an established publication record. These scholars shall provide ECRs with practical and development feedback aimed at improving the quality of their manuscripts and support them throughout the process of manuscript preparation to the journal submission.

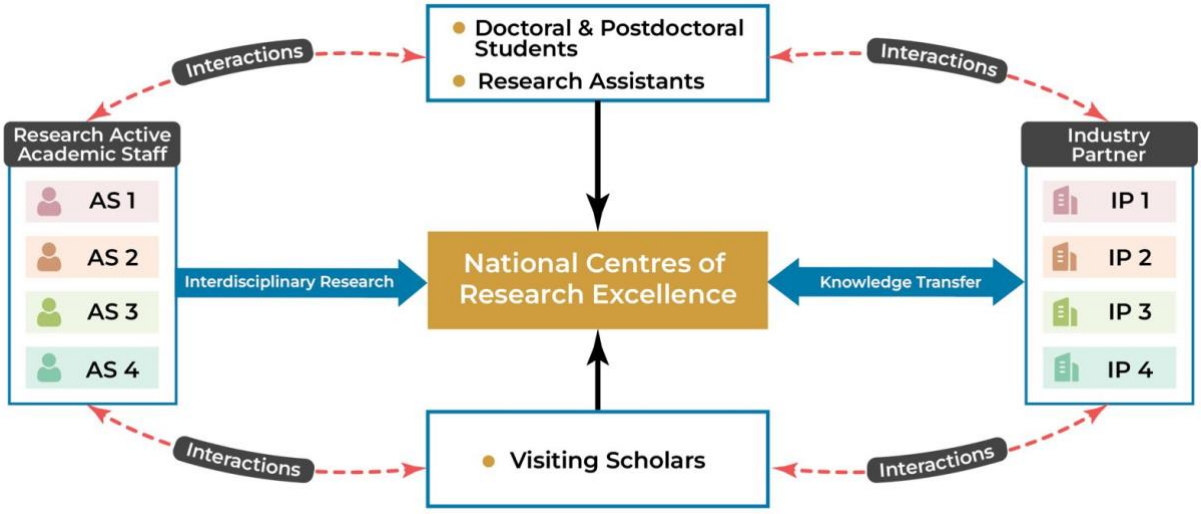
4.7. Recommendation 7: National Centers of Research Excellence

The development of research centers has been fueled by the need for universities to produce socioeconomically and commercially relevant research output and other forms of technology transfer that, historically, has not taken place in traditional university faculties and departments[122]. Faculty and department-based university structures also perpetuate disciplinary-based research at the expense of interdisciplinary and cross-disciplinary research. Addressing contemporary societal problems, industry needs, and broader development agendas such as those articulated in the SDGs, require interdisciplinary research. For example, research on sustainable water management requires principles from environmental engineering, computer science, and hydrology. The development of smart agriculture requires research that draws from agriculture, computer science, environmental science, and social science. Research centers are, therefore, explicitly designed to break disciplinary and institutional boundaries by fostering collaborations and networking between researchers from different disciplines and between academia and industry partners.

Therefore, the setting up of centers of research excellence is an obvious way forward for public HEIs to respond effectively to the research and innovation needs of Mauritian society, economy, and industry partners. This is particularly important to address the critiques that public HEIs in Mauritius do not produce enough socioeconomically relevant research and that the academia-industry linkage is weak[123,124]. Using the Center for Biomedical and Biomaterial Research (CBBR) as a successful model, the World Bank recommends that Mauritius considers the

[122]Boardman, P. C., & Corley, E. A. (2008). University research centers and the composition of research collaborations. *Research Policy*, *37*(5), 900-913.
[123] World Bank (2023a), op. cit.
[124] World Bank (2023b), op. cit.

development of similar research centers to build scientific excellence[125]. Given the small size of Mauritius and limited resources available to public HEIs, the NCRS recommends that these research centers are set-up at the national level in collaboration with all public HEIs and relevant industry partners to optimize resources and ensure inclusiveness of all public HEIs.



Note: AS – Research active academic staff; IP – Industry partner

Figure 18. Illustrative structure of a NCRE

Figure 18 is illustrative of the composition and functioning of a National Center for Research Excellence (NCRE). A NCRE should be designed considering the evolving business and societal needs as well as the research expertise available in the country. Research active academic staff from different disciplines brings an interdisciplinary perspective to produce economically relevant and cutting-edge knowledge to advance the center's research agenda. Industry partners bring the necessary practical knowledge, expertise, and other resources that contribute to the mandate of the NCRE and in return benefit from research that is commercially and practically relevant. In this way, both the NCRE and industry partners benefit from a reciprocal exchange of knowledge and expertise.

The NCRE is supported by doctoral and postdoctoral students who advance the center's research agenda and contribute to research productivity through high

[125] Ipid., p. 29.

quality publications. Visting scholars who can be recruited through the HEC's "Recruitment of International Faculties" scheme, brings additional research expertise and provide new opportunities for international collaborations. The proposed model NCRE emphasizes interactions between research active academic staff, doctoral and postdoctoral students, research assistants, visiting scholars, and industry partners to create an atmosphere of healthy exchange of ideas, nurturing a fertile research environment. In this case, NCRE facilitates both intra- and inter-institutional collaborations, breaking the silo culture under which public HEIs function.

4.8. Recommendation 8: Knowledge Transfer and Innovation Office

Knowledge Transfer Office (KTO) has been an important development in universities since the 1980s to bridge the gap between academia and industry in the contemporary research and innovation system. A KTO functions within the Triple Helix model and recognizes that research and innovation outcomes and technology transfer results from collaborations between universities, industry partners, and the government. Given the small size of Mauritius and limited financial and human resources, a KTO for each public HEI is not likely to be effective and appropriate. The NCRS, therefore, recommends the setting-up of a dedicated National Knowledge Transfer and Innovation Office (KTIO) to leverage research knowledge and innovation produced by Mauritian HEIs, the MRIC, and HEC as a strategic and economic asset to help the economy and society adapt and thrive in a globally competitive environment.

The KTIO's functions can be summarized into four activity groups[126]: (i) the provision of switch-board services for managing relationships between HEIs and non-academic actors such as industry partners, civil society, and the government; (ii) developing networks by strengthening HEIS' link with industry by proving entrepreneurship services; (iii) managing technology transfer, including patenting and licensing (e.g., the KTIO can act as an intermediary to find a buyer interested in a technology developed by an academic; and (iv) managing intellectual property rights (IPR).

[126] Compagnucci, L., & Spigarelli, F. (2024). Improving knowledge transfer and innovation services: A roadmap for Knowledge Transfer Offices. *Journal of Innovation & Knowledge*, *9*(4), 100577.

Given the comparatively limited prospects for commercialization of research in Mauritius, the KTIO should expand in activities beyond the Mauritian territory to tap into potential markets such as Africa and other island states. To this end, the NKTIO can leverage forums such as the Small Island Developing States Global Business Network (SIDS-GBN)[127] and Indian Ocean Rim Association (IORA)[128] to identify new market opportunities. The KTO will pave the way from the triple helix to the quadruple helix model for Mauritius making it a leader in the African region. The Quadruple Helix Model is an innovation framework that extends the traditional Triple Helix Model (university–industry–government) by adding a fourth helix: civil society or the public.

The NCRS also recommends that the KTIO is managed by well-trained staff. The OECD emphasizes well-trained staff for the efficient functioning of a KTO and handling of multiple actors. These include skills in managing stakeholder relationships and engagement and building capacity for brokerage, knowledge of the research and innovation ecosystem and culture, and ability to identify new markets for research commercialization[129]. A more fine-grained analysis suggests that KTO staff should have skills in intellectual property protection, networking, finance and business, negotiation, communication and business development[130]. Therefore, appropriate training should be provided for staff of the KTIO in line with the above skill requirements.

4.9. Recommendation 9: International Research Collaboration Funding Scheme

In the context of globalization and "Big Science"[131], international collaborations have become an important feature of the contemporary research environment. Global competition, rapid technological changes and limited domestic resources and

[127] The Small Island Developing States Global Business Network (SIDS-GBN) by UN-OHRLLS harnesses private sector innovation to drive sustainable development in small island developing States (SIDS).
[128] The IORA is a regional forum, tripartite in nature, bringing together representatives of Government, Business and Academia, for promoting co-operation and closer interaction among them.
[129] OECD. (2003). Turning business into science: Patenting and licensing at public research organisations. Paris: OECD.
[130] Compagnucci, L., & Spigarelli, F. (2024). op, cit.
[131] Big science is a term used by scientist to describe a series of changes in science in industrial nations during and after World War II, as scientific progress increasingly came to rely on large-scale projects usually funded by national governments or groups of governments.

expertise have induced many countries to engage in international research collaborations to address national and global challenges. Particularly for a SIDS like Mauritius, international research collaborations are particularly important given its limited scientific infrastructure and expertise. International collaboration allows countries to have access to an interdisciplinary pool of foreign expertise and is a means to achieve research quality. International collaborations lead to more impactful research and innovation outcomes. International collaboration is also an indicator used by agencies such as QS World University Ranking, THE World University Ranking, and Scimago to rank institutions. Mauritius, therefore, requires a formal funding structure to facilitate international research collaborations.

The NCRS recommends that HEC sets up an International Research Collaboration Funding Scheme (IRCFS) available to academic staff of public HEIs to complement and support the 'Interdisciplinary/Inter-Institutional Team-Based Research Scheme' currently available. The IRCFS scheme shall require the principal investigator to be a Mauritian employed in a public HEI and the involvement of at least one partner university outside of Mauritius. The collaborator from the partner university shall be a leading researcher with a demonstrated track record of publications in leading journals. It is also expected that the international collaborators shall also assume a mentoring role in the project. This scheme shall be available to Mauritian HEIs on a very competitive basis based on the submission of a theoretically and methodically rigorous research proposal of relevance to the Mauritian economy and society, in line with the NRPs once these are established. The project should have clear and measurable deliverables that go beyond the submission of a final project report such as research publications in leading journals and impacts on Mauritian society and economy.

4.10. Recommendation 10: Standardized Workload Model for Public HEIs

Public HEIs in Mauritius have traditionally focused on teaching as their main activity. As a result of the path dependent model in which these universities have evolved, it is unrealistic and unreasonable to expect all academic staff to become highly productive researchers. However, a minimum level of research should be expected from each academic staff. Furthermore, across these universities, there are a select

few highly productive researchers. For example, at the UOM, Scopus data suggest that the top five most productive researchers have produced between 50 to 205 research publications for the period 2020-2024 while the five least productive researchers produced 9 to 10 research publications during the same period. Therefore, academic staff employed at the public universities have different levels of research involvement and productivity that must be considered.

In a recent article published in the Harvard Business Review, Gotian (2024) suggests that high performers are the driving force behind productivity, excellence, and innovation, and make a disproportionate impact on an organization's reputation. Therefore, they should be rewarded accordingly to keep them engaged and motivated. However, currently, the teaching and administrative load of academic staff is independent of their research productivity such that all academic staff are required to teach the same number of hours. This puts severe pressure on highly productive researchers which hinders their ability to perform at their optimum level. Existing teaching and research policies have not only failed to consider this issue, but they differ across institutions although all academic staff are governed by the same legal framework and parameters such as the Pay Research Bureau.

Therefore, the NCRS recommends a Standardized Academic Workload Model (SAWM) that considers the teaching, research, and administrative involvement of academic staff and the necessary tradeoff between these activities, while providing incentives to productive researchers. The NCRS recommends that a technical committee is set up to develop a SAWM considering the following principles:

1. All academic staff, irrespective of grade and research productivity, should be involved in teaching, research and administration as part of their contractual obligations with the university.
2. An academic staff who is research productive should not have the same teaching hours and administrative load as those who are producing only the minimum required research output as part of their contractual obligations.
3. Teaching hours and administrative load should be inversely related to research productivity while maintaining a minimum number of teaching hours (e.g.,

two modules in an academic year) even for the most productive academic staff.

4. Academic staff who are not research active should have a higher minimum workload compared to a research active academic staff.
5. Teaching relief should be provided against demonstrated research outputs produced by academic staff in top-tier journals only, defined by internationally validated journal rating systems; generation of research/grants/consultancy funds and infrastructure.
6. Teaching relief and research expectations should consider the different grades of academic staff: lecturer, senior lecturer, associate professor, and professor.

5. Conclusion

Mauritius requires a new vision for research and innovation if it is to remain competitive and resilient in an era of new socioeconomic and environmental challenges. This NRS 2025-2035 sets a bold and transformative vision to position Mauritius as a knowledge-driven and innovation-led economy. The recommendations aim to promote research excellence by consolidating and strengthening three key pillars: (i) high quality and impactful research and innovation; (ii) institutional strengthening; and (iii) academia-industry linkages. They call for coordinated actions between HEIs, MRIC, HEC, industry partners, civil societies, and development partners to effect meaningful changes in ways research and innovation activities are conducted. The effective implementation of the recommendation requires committed financial and technical resources as well as strong political will to positively disrupt the status quo.