RESEARCH, INNOVATION
AND ENGAGEMENT

ANNUAL
REPORT

2024

**Tshwane University
of Technology**

We empower people

#fromGood2Great

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FOREWORD
by Vice-Chancellor and Principal

The year 2024 was a momentous one for South Africa and for the Tshwane University of Technology (TUT). The country marked 30 years of democracy – and TUT celebrated its 20th anniversary.

Twenty years later, TUT is one of the best performing universities in the country, consistently ranked among the top 15 universities in the country and one of the top 2 250 universities in the world.

More importantly the University has rebranded itself as:
- an entrepreneurial University,
- an AI hub,
- a center for problem-solving innovation,
- a thought leader on the future of work,
- an institution with zero tolerance to gender-based violence,
- a University whose research contributes to sustainable development and climate action, and
- a University whose staff and students subscribe to the highest levels of ethical conduct.

This report speaks to all of the above and more.

Prof Tinyiko Maluleke

EXECUTIVE SUMMARY IN NUMBERS

By Deputy Vice-Chancellor:
Research, Innovation and Engagement

1.9%
increase in research output units

7
research niche areas –
all focussing on SDG's

4th
nationally in DHET's accredited
creative research output units

22%
increase in external research funding

55%
increase in Postdoctoral Research
Fellows

7%
increase in Rated Researchers

13
Research Chairs, six of which
are DSI-NRF SARChI

17.8%
increase in staff with Doctoral degrees

2
licence agreements signed

58%
is the contribution of Research Chairs
to research output units

12
patents filed

17
designs registered

34
creative research outputs submitted

3
winners at 2024 Innovation Challenge

TOP 13
in South Africa (Centre for World University Rankings)

51st
position (Times Higher Education Sub-Saharan Africa University Rankings)

9
major transformative agreements with publishers renewed

Dr Vathiswa Papu-Zamxaka

INTRODUCTION

During the 2024 academic year, the Tshwane University of Technology (TUT) strengthened its research capacity through increased research outputs, funding, and global collaborations.

Postgraduate support remains a priority, with efforts to enhance enrolments, graduation rates, and scholarships. Innovation and technology transfer initiatives continue to expand, fostering industry partnerships and contributing to the economic aspirations of the country.

The Library and Information Services (LIS) continue to provide information to support the staff and students. This report outlines the strategic initiatives undertaken during the 2024 academic year in research support, postgraduate students, innovation and technology transfer, internationalisation, and LIS.

RESEARCH
SUPPORT

RESEARCH SUPPORT

Research Outputs

In 2024, the Tshwane University of Technology (TUT) research publication outputs recognised by the Department of Higher Education and Training (DHET) increased slightly to 461.52 units from 453.08 units in 2023.

The per capita research output units also increased from 0.52 to 0.54, marking an 8.44 units (1.9%) increase compared to the previous year. This achievement indicates significant progress, exceeding the Department of Higher Education and Training (DHET) target of 388 publication output units by 73.52 units.
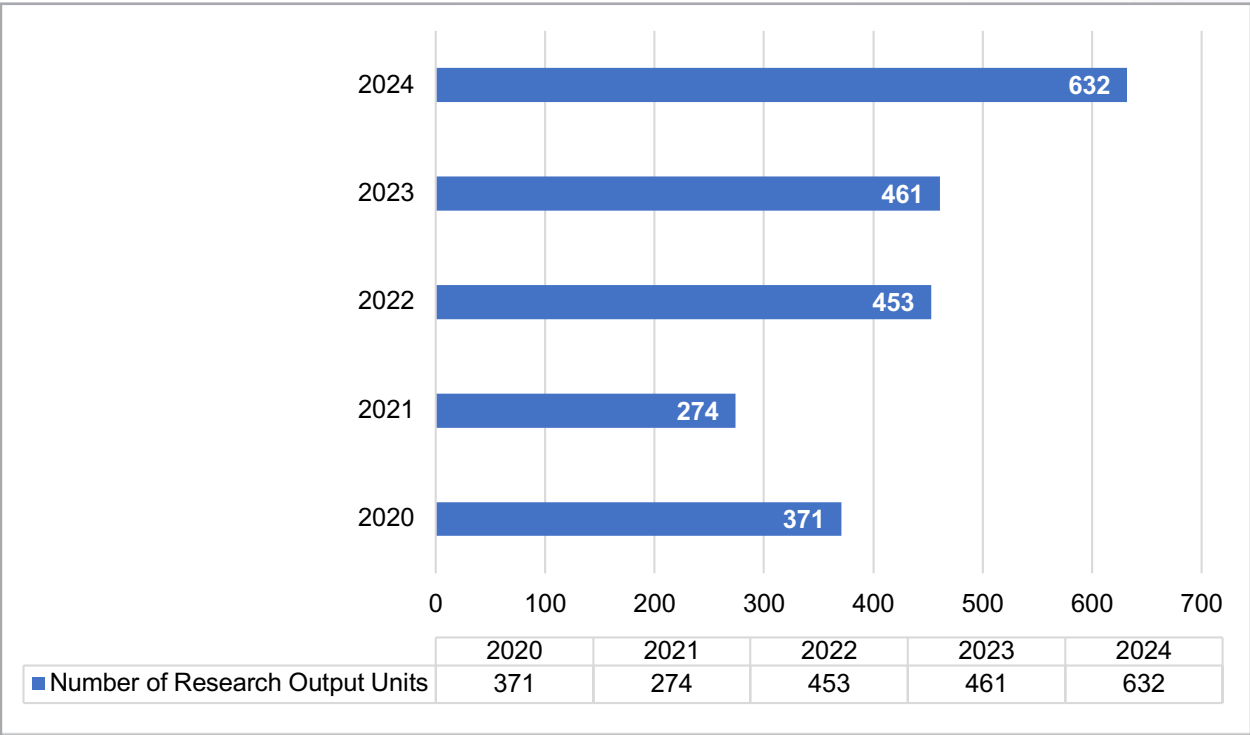
The table represents an overview of the institutional research outputs in 2024.

Type	Submitted Units (2022/2023)	Awarded Units	Declined Units	Growth from previous year
Journals	407.76	398.86	8.90	2.0%
Proceedings	51.76	49.67	2.09	40.7%
Books & Chapters	27.07	12.99	14.08	-51.2%
Total	**486.59**	**461.52**	**25.07**	**1.9%**

Table 1: Overview of institutional research outputs
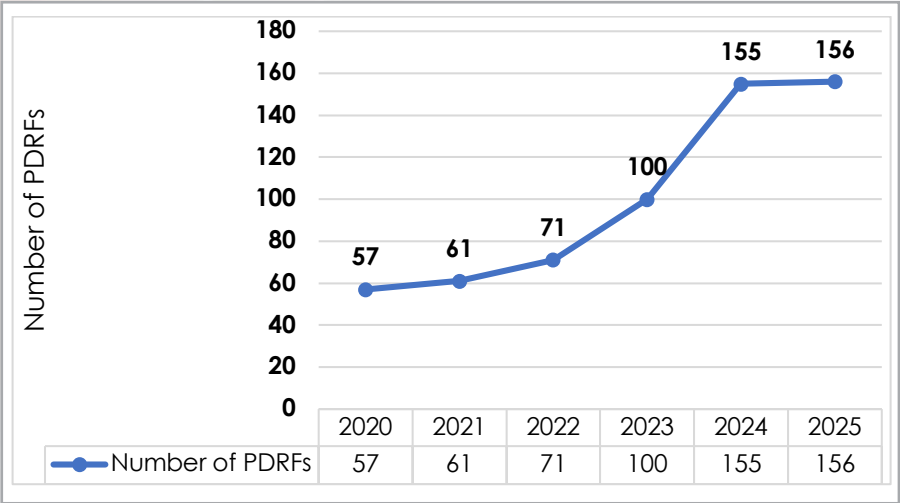
- For 2024, the units are NOT yet awarded but were submitted to the DHET, currently awaiting results.
- Generally, there is a significant growth trajectory since 2021

Institutional per capita research output units = 0.54

	2020	2021	2022	2023	2024
■ Number of Research Output Units	371	274	453	461	632

Postdoctoral Research Fellows

The University had 155 Postdoctoral Research Fellows (PDRFs), comprising 42 females and 113 males. The number of fellows significantly increased from 54 in 2020, 61 in 2021, 71 in 2022 and 100 in 2023 to 155 in 2024, representing a 55% increase from 2023 to 2024. The PDRFs contributed 38.52 units, constituting a 9.52% contribution to the overall institutional research output of 461.52. A Memorandum of Understanding (MoU) was signed in 2024 between TUT and Wits University for co-hosting fellows. The MoU made 10 vacancies for PDRFs available.

	2020	2021	2022	2023	2024	2025
Number of PDRFs	57	61	71	100	155	156

The number of Postdoctoral Research Fellows (PDRFs) has grown consistently from **57 in 2020 to 155 in 2024.** Representing a **172% increase over five years.** This upward trend highlights a significant institutional commitment to expanding research capacity and postgraduate support.

Research Chairs

By the end of 2024, the University had 13 research chairs, 12 of which were funded externally and one internally. Among these, six are Department of Science and Innovation – National Research Foundation South African Research Chairs Initiative (DSI-NRF SARChI).

The other Chairs are funded by the Media, Information and Communication Technologies Sector Education and Training Authority (MICTSETA); Gibela; the Transport Education Training Authority (TETA), the Energy and Water Sector Education Training Authority (EWSETA); the Manufacturing, Engineering and Related Services Sector Education and Training Authority (MerSETA); and the African Research Chair for the Campus and School Public Safety. The internally funded one is the United Nations Educational, Scientific and Cultural Organisation (UNESCO) Chair.

The table represents the research Chairs' contribution to the overall institutional research outputs and postgraduate students' graduations in 2024.

CONTRIBUTION
120.41 units (26% towards the overall institutional research outputs awarded in 2024)
36 Master's Graduations (8.49% towards overall Master's Autumn and Spring graduations in 2024))
24 Doctoral Graduations (24% towards overall Doctoral Autumn and Spring graduations in 2024)

Table: 2 Research Chairs contribution to research outputs

Research Niche Areas

In 2024, TUT had seven active research niche areas (RNAs) in alignment with the UN Sustainable Development Goals. Three RNA leaders were female.

Research Funding

A total amount of R 233 440 789.49 was awarded to TUT for research and innovation activities in 2024. About 20% of the award was from the NRF (R48 042 736.67) dedicated towards grants, fellowships and scholarships, while 32% was from Centres, Institutes and Technology Stations, Hubs and Incubators – CITSHIS – (R75 482 349), 10% was from other external sources (R23 566 553.82), and 35% came from DHET-research outputs (R83 870 150) and 3% (R2 479 000) from DHET University Capacity Development Grant (UCDG). External research grants increased by 22% from R190 878 329.55 in 2023 to R223 440 789.49 in 2024. Figure 1 and Table 3 provide an overview of the institutional research funds in 2024.

Figure 2: Overview of research funding in 2024
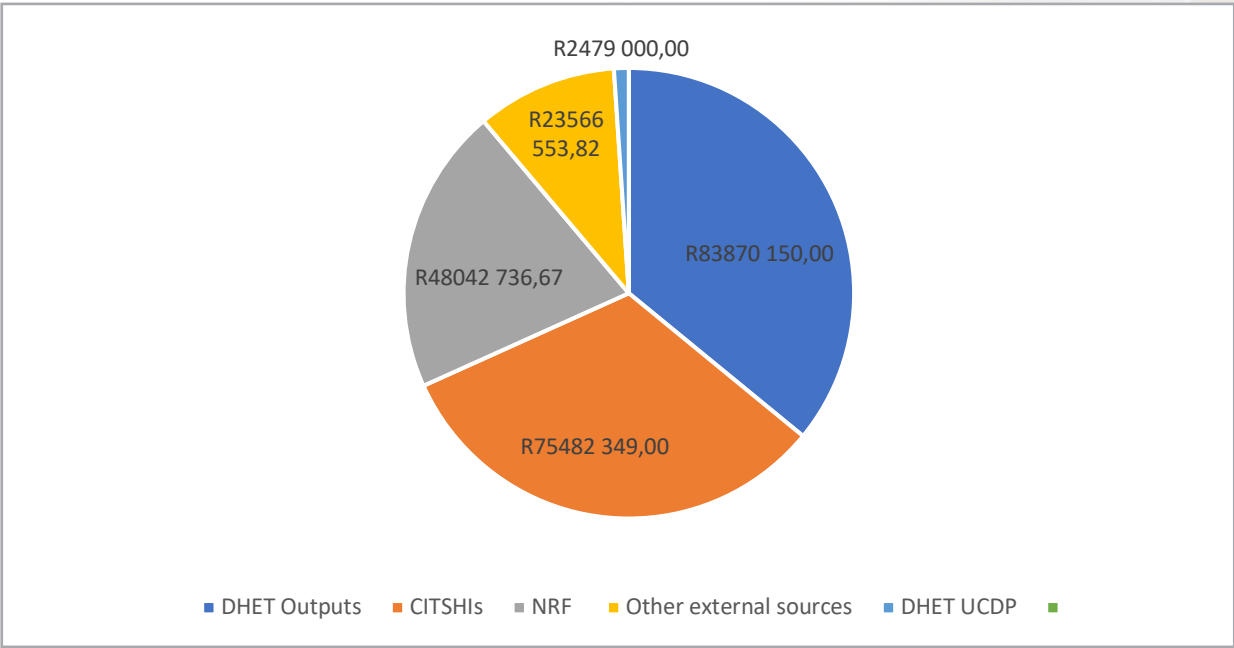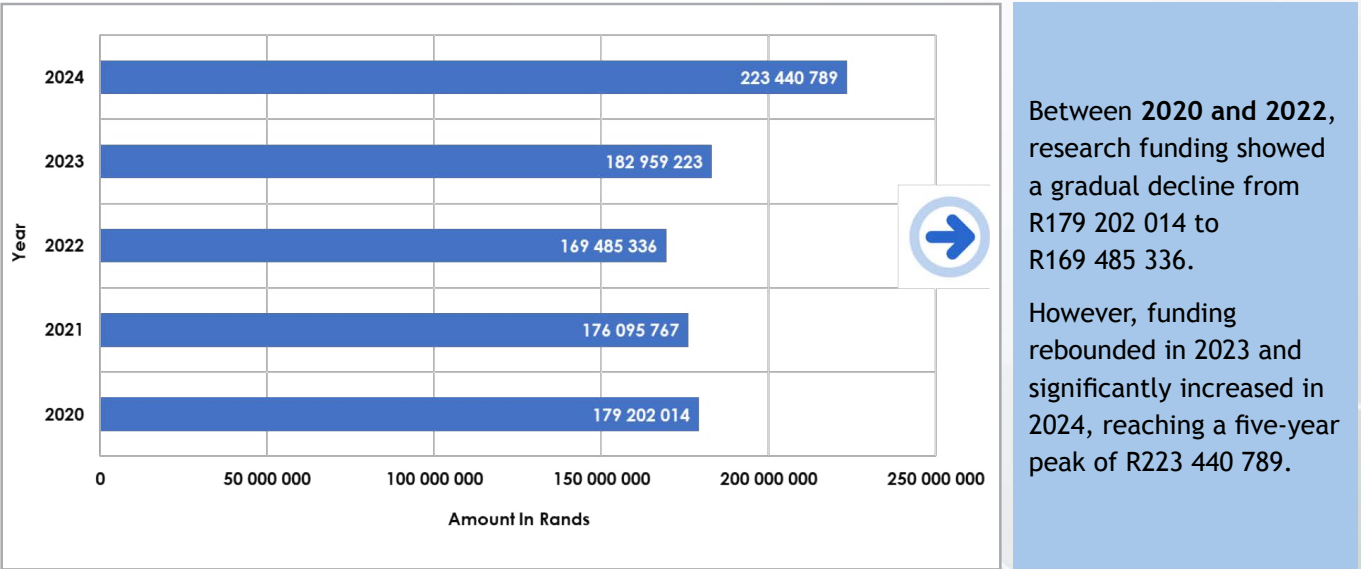

Between **2020 and 2022**, research funding showed a gradual decline from R179 202 014 to R169 485 336.

However, funding rebounded in 2023 and significantly increased in 2024, reaching a five-year peak of R223 440 789.

Rated Researchers

In 2024, the University increased its rated researchers by 7%, resulting in 62 active NRF-rated researchers. This indicates that 15% of TUT's academic staff hold an NRF rating.

Research outputs by Rated Researchers in the 2024 reporting year

The NRF-rated researchers produced 149,467 units in 2024 (120,689 from journal articles; 4,468 from books; and 24,311 from conference proceedings), totalling R19 958 405.04 in DHET subsidy. The per capita research output unit for Rated Researchers is 1,9.
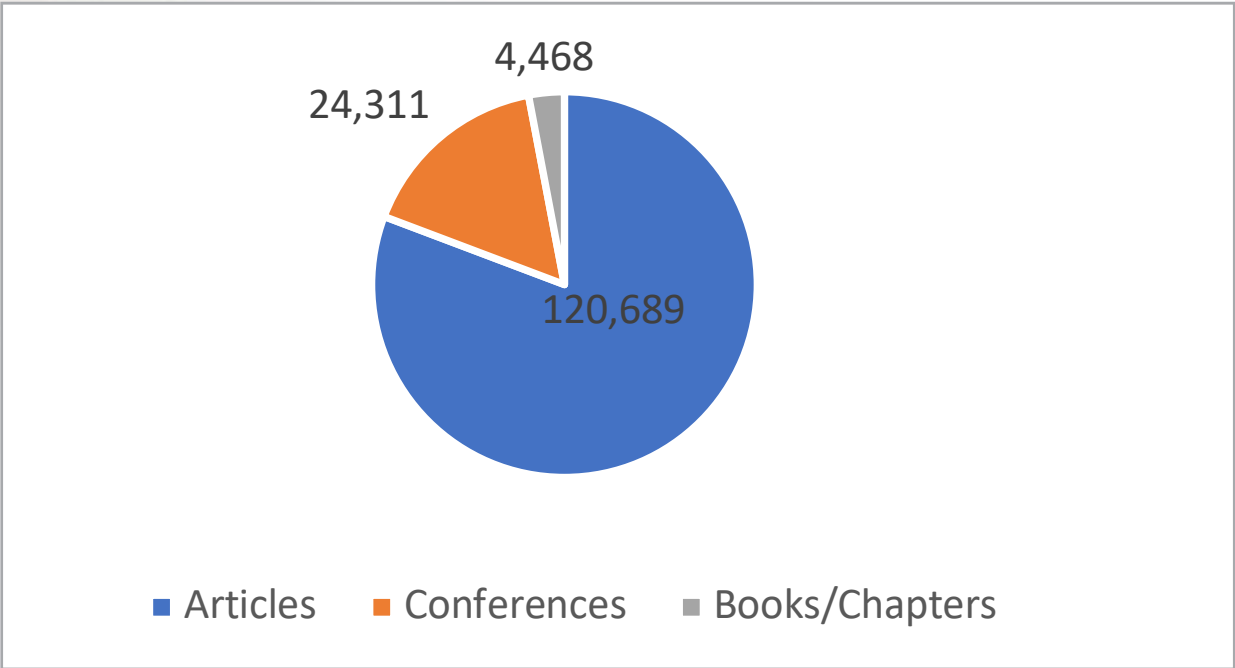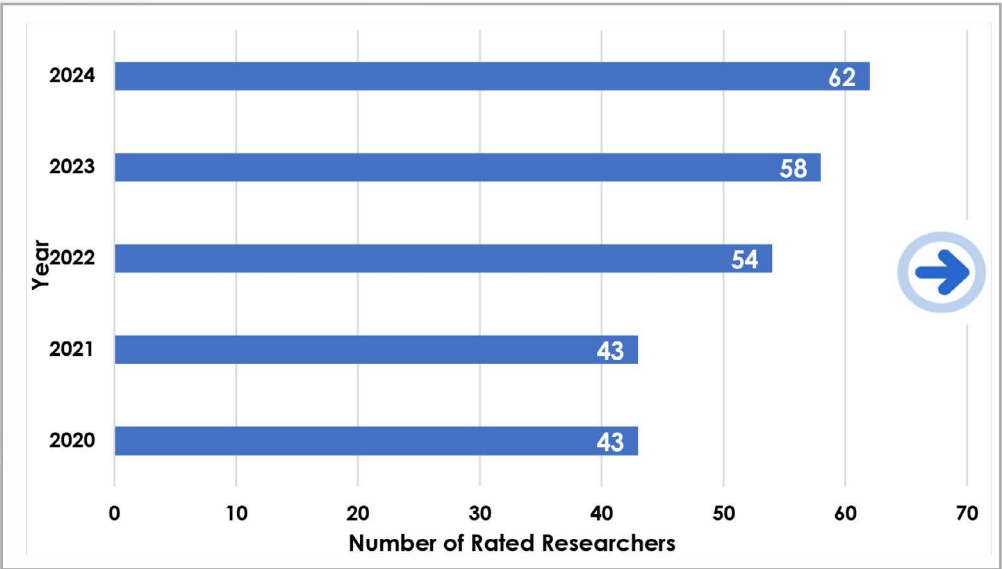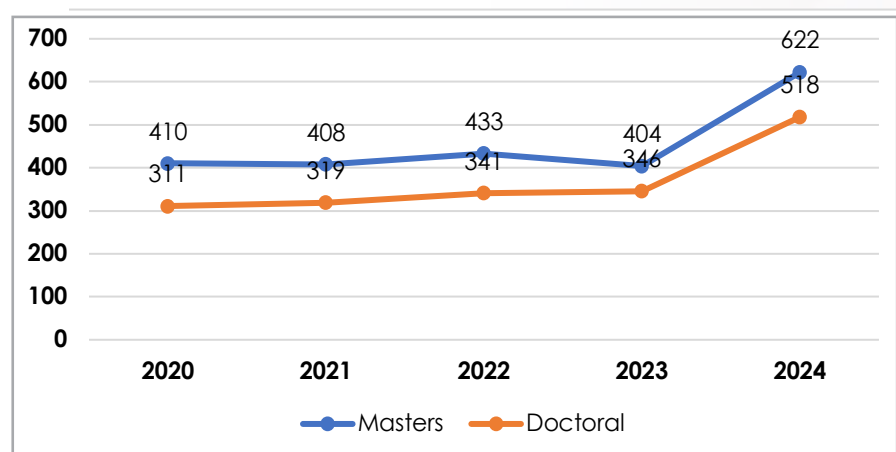

Figure 3: Contribution by Rated Researchers

The number of rated researchers remained constant at 43 in 2020 and 2021, but began to increase steadily from 2022 onward. By 2024, the figure had risen to 62, reflecting a growing recognition of research excellence and a strengthened research profile over the five-year period.

Staff qualification improvement

In 2024, 622 staff members had Master's degrees, an increase from 404 in 2023. The University's Doctoral degree holders increased to 518 in 2024 from 346 the previous year, a 17.8% increase. To maintain these figures, the Directorate of Research and Innovation supported Master's degree holders pursuing Doctorates and conducted research workshops to enhance their skills and academic growth.

- From 2020 to 2023, the number of staff with Master's and Doctoral qualifications remained **relatively stable with slight fluctuations.**

- However, there was a remarkable increase in 2024, with Master's qualifications rising sharply from **404 to 622** and Doctoral qualifications from 346 to 518

- The graph indicates a strong institutional focus on academic capacity building.

Academic Awards

Internal Excellence Awards

Staff excelling in their academic roles were recognised at the annual Academic Excellence Awards on 13 November 2024. Recipients included students, PDRFs, and professors whose teaching and research impact has been remarkable. Additionally, staff who achieved further qualifications, including Master's and Doctorates, were celebrated.

External Awards

- **National Research Foundation Awards**

On 22 August 2024, the NRF honoured outstanding South African researchers at the 2024 NRF Awards. Dr Amanda-Lee Manicum received the Research Excellence Award for Early Career Researchers. Notable nominees included Professor Jonathan Okonkwo for the Lifetime Research Award and Professor Khumbulani Mpofu for the Engineering Research Capacity Development Award.

- **Women in Science Awards**

On 15 August 2024, the University submitted three nominations for the South African Women in Science Awards; however, none were successful in securing an accolade.

- **Department of Science and Innovation/Technological Higher Education Network South Africa Nomination**

On 2 October 2024, several candidates were confirmed for the Department of Science and Innovation (DSI) and the Technological Higher Education Network South Africa (THENSA) Supervisor Enhancement Programme, which included eight academics from TUT.

POSTGRADUATE STUDENTS

POSTGRADUATE STUDENTS

Enrolments

In 2024, the target for master's degree enrolment was 2 095 students, but only 1 647 were enrolled, achieving 78.66%% of the goal. For doctoral programmes, the target was 680, with 676 actual enrolments, reaching 99.41%%. Overall, the total enrolment target was 2 775, with actual enrolments at 2 313, reflecting an achievement of 83.4%. This shows that while Doctoral enrolments were nearly met, master's enrolments fell short, contributing to the overall gap.

Qualification	Target Enrolment 2024	Actual Enrolment 2024
Master's	2 095	1647
Doctoral	680	676
Total	2 775	2 313

Table 4: Overview on Enrolments against Targets

Graduations

A total of 469 (Master's: 365 and Doctoral Students: 105) graduated in the 2024 academic year. This figure presents a shortfall of 20.83% towards DHET Master's graduation while the Doctoral graduation target has been met. The number of graduations per faculty is outlined in the table.

FACULTY	MASTERS			DOCTORAL		
	SPRING 2023	AUTUMN 2024	TOTAL	SPRING 2023	AUTUMN 2024	TOTAL
Arts and Design	9	5	14	1		1
Economics and Finance	13	6	19		1	1
Engineering and the Built Environment	34	60	94	10	8	18
Humanities	41	34	75	15	8	23
Information, Communication and Technology	14	11	25	1	1	2
Management Sciences	50	73	123	4	10	14
Science	33	14	47	8	5	13
TOTAL	194	203	397	39	33	72

Table 5: Overview on graduation against targets

Postgraduate Scholarships

External scholarships

Out of the 2 323 registered postgraduate students in 2024, comprising 1 645 Master's and 678 Doctoral candidates. A total of 85 students (3.7% of the overall postgraduate students) were awarded external scholarships. This group included 40 Master's students, 45 Doctoral students, and 11 Honours students.
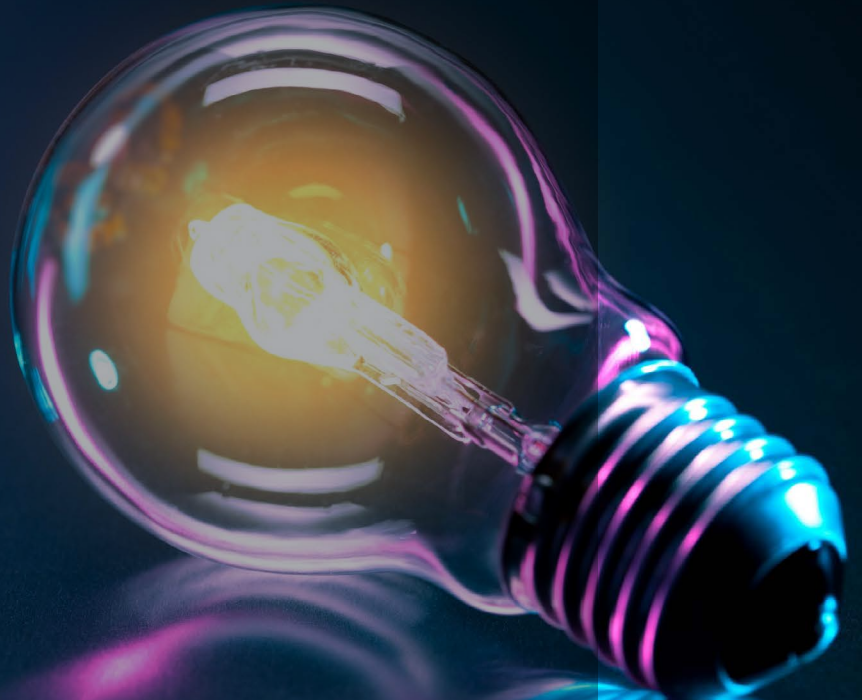
Internal Scholarships

TUT allocated R 11 985 000 for scholarships, supporting 119 Master's and 42 Doctoral students. In addition, R 2 300 000 was made available for National Qualification Framework (NQF) Level 7 scholarships, aiding 57 students (0.5% of the total), while R2 200 000 supported 48 students at NQF Level 8 (4.1% of the total). An additional R2 400 000 was allocated for Prestigious Scholarships at NQF Level 8 to support 34 students.

Overall, the total internal scholarship funding for 2024 was R18 885 000, benefiting 300 students across various levels. In 2024, full expenditure on the internal scholarship allocation was achieved.

INNOVATION AND TECHNOLOGY TRANSFER

INNOVATION AND TECHNOLOGY TRANSFER

Performance Indicators for Innovation and Technology Transfer, January – December 2024

In 2024, the Innovation and Technology Transfer Office (ITTO) set a target of 10 invention disclosures but submitted 12. The institutional target was four agreements for industry partnerships and five agreements were achieved. The target for patents was 10, and 12 were filed.

A total of 17 design applications enhanced innovation output were obtained in 2024, while 34 creative outputs were submitted, surpassing the target of 25. In DHET's Creative Research Outputs and Innovation Report 2024, TUT obtained position No 4 nationally out of 26 public universities, after Stellenbosch University, the University of Johannesburg and Rhodes University.

Additionally, there are two license agreements signed. The ITTO exceeded its institutional goal for intellectual property training sessions by conducting 10 against the goal of seven and completed six workshops.
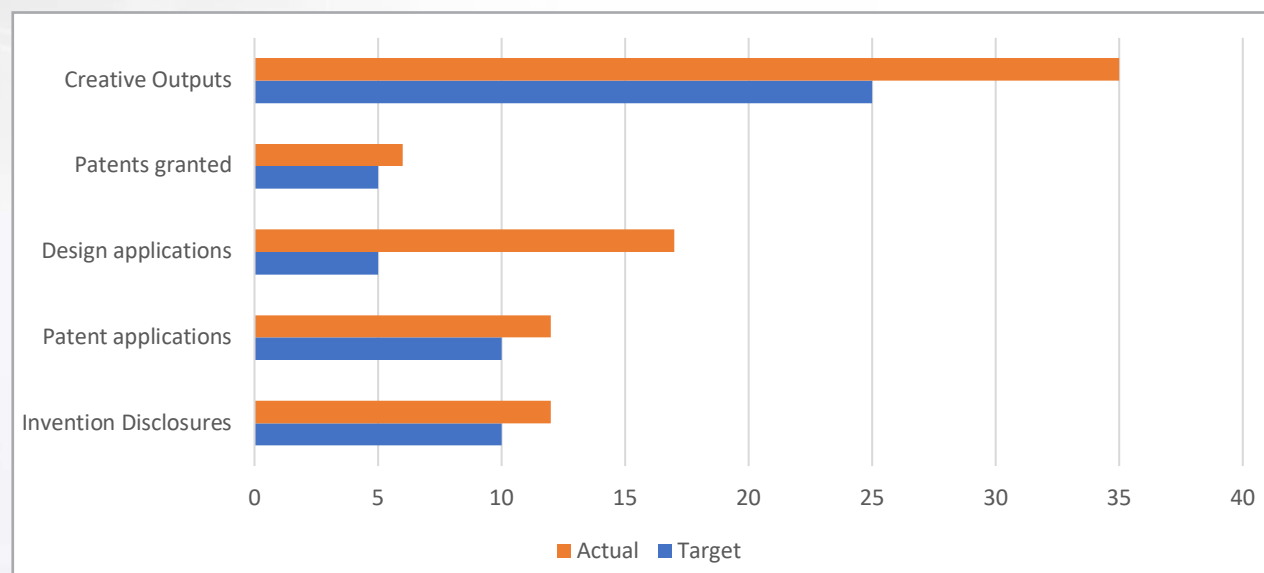

Figure 6: Performance indicators for the ITTO

Commercialisation

The ITTO signed two licence agreements. The first is with Mobile Juice to commercialise TUT technology for charging mobile phones. The second is with the House of Graduates for TUT designs for academic regalia. TUT grants Mobile Juice an exclusive, royalty-bearing licence for the licensed technology to produce and distribute the licensed products. In return, Mobile Juice will pay TUT a licence fee of 9% of net sales for five years.

Innovation and Technology Transfer Events

World Intellectual Day

In raising awareness and celebrating Intellectual Property (IP), the University, under the theme: "IP and the Sustainable Development Goals (SDGs): Building our Common Future with Innovation and Creativity", hosted the institutional World Intellectual Property Day celebration on 10 May 2024. A total number of 47 internal and external delegates attended the event.

Women in Innovation and Leadership Dialogue

TUT and the City of Tshwane convened a significant dialogue on 14 August under the theme "Invest in Women: Accelerate Innovation". The 2024 Women in Innovation and Leadership Dialogue represented a crucial advancement in the discussion of women's role in innovation and leadership.

Entrepreneurship Development in Higher Education Programme, Studentpreneurs Indaba

The ITTO supported 15 entrepreneurs/students to attend the Universities South Africa (USAF)'s 6th Annual Entrepreneurship in Higher Education (EDHE) Studentpreneurs Indaba, which took place on 5 and 6 September 2024 at the University of the Witwatersrand in Johannesburg, Gauteng.

Innovation Challenge 2024

TUT students participated in the 2024 Innovation Challenge, winning three prizes. In Challenge 1, T-Serve won the first prize for a multi-service municipal digital booking system. In Challenge 2, the City of Tshwane Cemeteries Management System won the first prize for an electronic burial management system. The second prize in Challenge 3, which focused on a human resource management system for the Expanded Public Works Programme (EPWP), went to the Algorithmic Workforce Management System.

Pitching Master Class

On 22 November 2024, the Internationalisation Office, the ITTO and the Centre for Entrepreneurship (CED) at TUT partnered with the US Embassy to host a Masterclass titled "How to Pitch Your Business". An invitation was sent to aspiring and established entrepreneurs wanting to improve their business pitching skills to attract clients and investors.

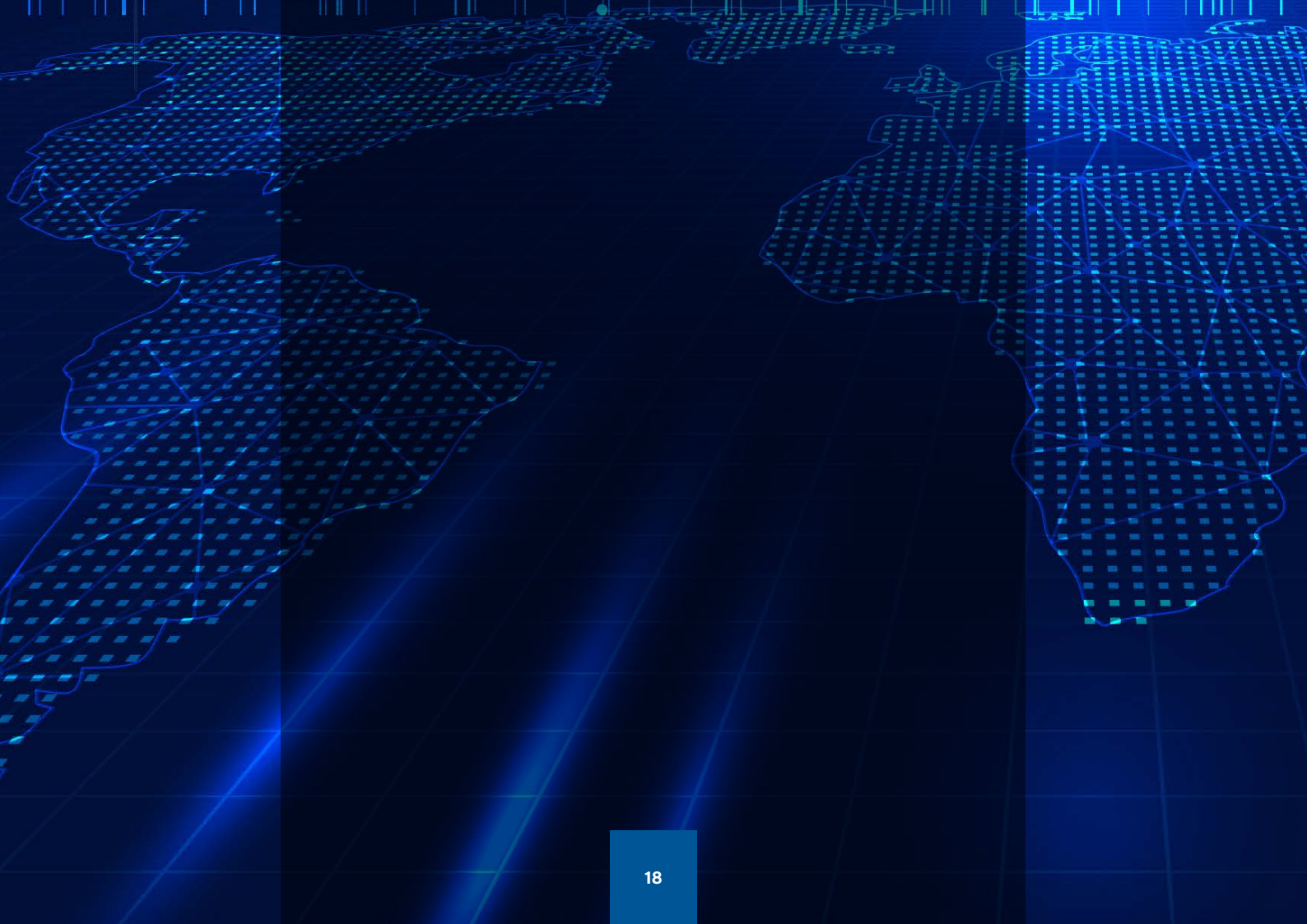## Innovation and Technology Transfer Advocacy Programmes

The ITTO trained 46 students in the Technology Entrepreneurship Programme 2024 from August to November, covering seven modules: design thinking, business plans, enterprise finance, legal issues, marketing strategies, IP, and pitching. ITTO hosted an IP Webinar on 30 July 2024, titled "Understanding Intellectual Property at the Workplace", with 54 participants. During a TUT and Technology Innovation Agency (TIA) meeting on 14 June 2024, a project received follow-up funding of R200 000 to create low-cost, eco-friendly briquettes from waste biomass.

Centre, Institutes, Technology Stations, Hub and Incubators (CITSHIS) highlights for 2024

- CED: On 14 November 2024, the Deputy Vice-Chancellor led a Global Entrepreneurship Week 2024 event on student innovation and entrepreneurship, themed "Entrepreneurship for Everyone", co-hosted with various organisations.
- Technology Station in Electronics (TSE): In December 2024, TSE presented a paper on "Internet of Things (IoT) Integration on Legacy Production Systems" at the International Conference on Smart and Sustainable Manufacturing. On 4 June 2024, TSE held a strategic planning workshop for advisory committee insights on financial sustainability sectors.
- Artificial Intelligence (AI) Hub: On 22 May 2024, TUT and Intel launched the TUT-Intel AI Career Tech Centre, a key milestone in their partnership after a 27 September 2023 Memorandum of Understanding. This initiative equips TUT students with essential skills in AI.

INTERNATIONALISATION

INTERNATIONALISATION

Student Exchanges

A total of 51 students participated in exchange programmes in 2024. The exchange programmes were organised with international partner universities in six countries.
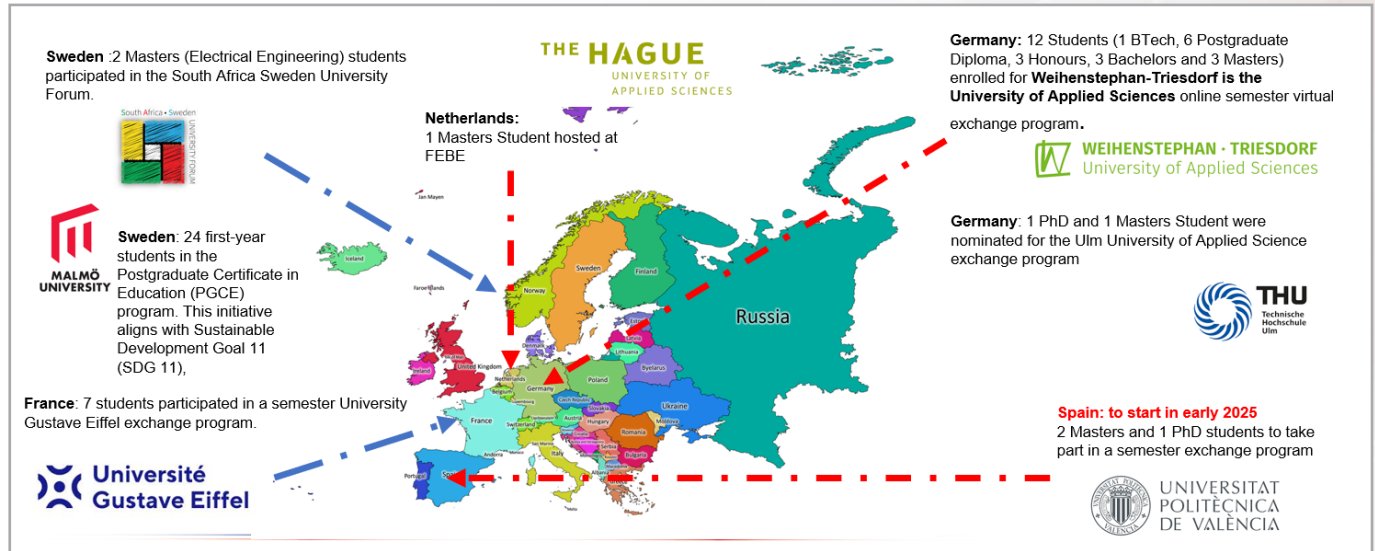

Figure 6 outlines the exchange programme, country and name of partner university

International Scholarships

In November 2024, TUT was approved to host Master's students under the Queen Elizabeth Commonwealth Scholarship for 2025. This initiative promotes educational opportunities for Commonwealth students, enhances our commitment to international partnerships, and enriches our academic community.

Staff Exchange Programmes

Two Facilities Management staff members received the Fulbright exchange programme award. Four Engineering and Arts staff members participated in the Vilnius Academy of Arts in June 2024. Six staff members attended Sweden's Research and Innovation Week from 12 to 17 May 2024, presenting research posters, co-hosting satellite events and leading workshops to showcase their innovative ideas.

International Research Funding

Erasmus Funding

In 2024, the Internationalisation Office facilitated Erasmus+ capacity building project funding totalling R1 330 000.00 across two projects and secured an additional R 450 000 00 for mobility with the Polytechnic University of Valencia, Spain. TUT also received R 736 777.39 for 7 students in France and R 230 000.00 for 2 students in Germany through exchange grants.

German Academic Exchange Service Funding

Additionally, an amount of R250 000 has been awarded to TUT by the German Academic Exchange Service (DAAD) for capacity building. These funds are earmarked to assist with travel and registration fees during the capacity-building course from March 2025 to May 2026.

United Kingdom Research and Innovation Funding

The Faculty of Engineering and the Built Environment, with the Faculty of Economics and Finance, secured £3.5 million in international funding for the Circular Economy Powered Renewable Energy Centre (CEPREC) under the United Kingdom Research and Innovation (UKRI) project. Dr Udochukwu Akuru of TUT's Department of Electrical Engineering is the South African lead.

Ranking Submissions

Times Higher Education Impact Rankings Submission

In 2024, Tshwane University of Technology (TUT) achieved significant recognition in global and regional rankings. It was ranked among the top 13 universities in South Africa by the Center for World University Rankings (CWUR) and 51 in the Times Higher Education (THE) Sub-Saharan Africa University Rankings.

TUT also participated in Times Higher Education (THE) Impact Rankings in five SDGs and achieved its highest position (301–400) for SDG 1: No Poverty. Other rankings included SDG 3 (800–1000), SDG 4 (1000–1500), SDG 10 (801–1000), and SDG 17 (800–1000), reflecting TUT's growing commitment to social impact and sustainability.

LIBRARY INFORMATION SERVICES (LIS)

LIBRARY INFORMATION SERVICES

Library Training for Postgraduate Students

Recorded a 458.9% increase in postgraduate training participation, reflecting the institution's research commitment. Training includes sessions on EndNote, transformative agreements, databases, research visibility, InCites evaluation, and predatory journal identification. The online basic EndNote module on myTUTor attracted 135,261 enrolments. Intermediate and advanced EndNote programs have also been developed to enhance students' research skills.

Library Systems Upgrades

The library has enhanced services by upgrading the EndNote Citation Tool to version 21, implementing Single Sign-On for staff accounts, and modernising off-campus access with a new authentication system. A customer feedback mechanism is now in place, and Library and Information Services (LIS) has improved marketing efforts, including an AI ChatBot for inquiries.

Library Digital Networks

LIS has joined global and local DSpace User Groups, reinforcing its commitment to digital repository best practices. By 2025, LIS plans to migrate historical records from Vital and implement quarterly online training to enhance user engagement. After a cyberattack, the collection size dropped from 7 565 in 2023 to 869, with 869 new items added in 2023 and 317 in 2024. Despite challenges, TUT Digital Open Repository recorded 1 664 476 visits in 2023 but only 419 in 2024 due to inaccessibility.

Transformative Agreements

LIS renewed nine agreements with major publishers like Wiley, IOP Science, Oxford University Press, and Cambridge University Press, Springer Nature, Royal Society of Chemistry, Sage Premier, Science Direct journals, and Taylor & Francis through South African National Libraries and Information Consortium (SANLIC) in December 2024.

Transformative agreements are open-access agreements with publishers with no article processing charge to increase Open Access Publishing and encourage the University to monitor publishing activities with better cost control. They also support compliance with Open Access Policies.
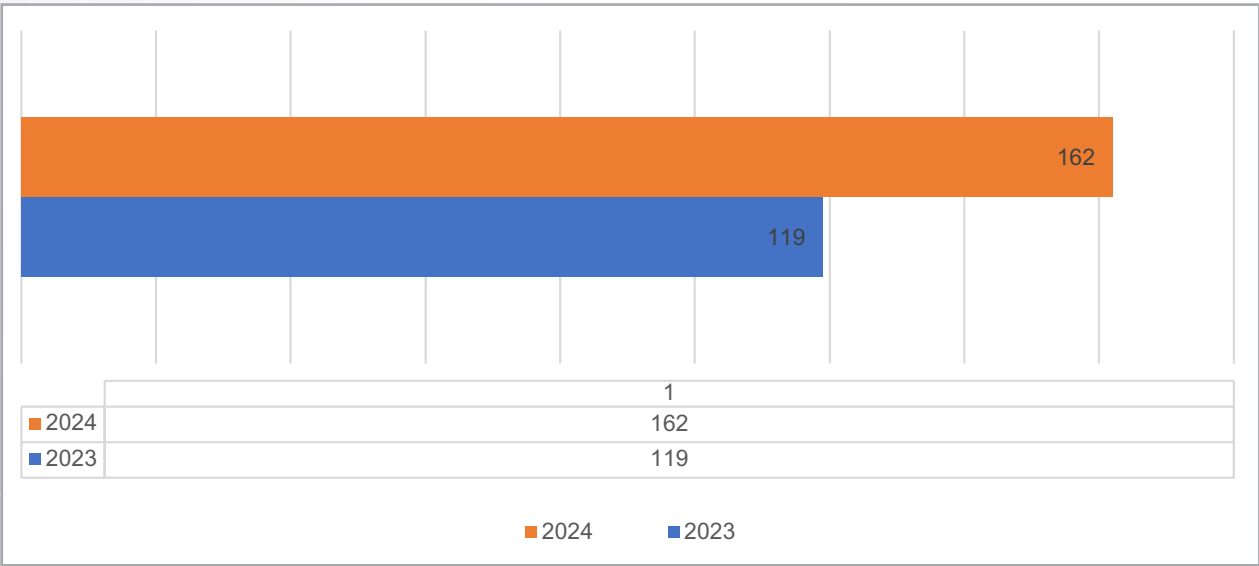

	1
■ 2024	162
■ 2023	119

■ 2024   ■ 2023

Figure 7: Articles approved through transformative agreements

Library Community Engagement initiatives

TUT libraries engaged in community initiatives, showcasing a commitment to student growth. Soshanguve North Library celebrated Heritage Day with events on cultural diversity. Science Library organised a "Winter Challenge" with activities to enhance academic skills. Soshanguve South Library marked National Read a Book Day, promoting reading. Emalahleni Library hosted a study skills event with essential strategies. Mbombela Library commemorated Mandela Day with soup distribution, promoting Ubuntu and community service. Arts Library contributed to the Arts Festival with author presentations, fostering literary appreciation.

CONCLUSION

The 2024 academic year was marked by significant progress in research, innovation, and postgraduate engagement. While enrolment and graduation rates fell short of targets, research outputs exceeded expectations, postdoctoral fellowships expanded, and substantial external funding was secured. The University's research Chairs and rated researchers contributed meaningfully to scholarly impact, reinforcing TUT's national and international standing.