UNIVERSIDADE
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# Gender-based assessment of STI ecosystem in Mozambique

**FINAL REPORT**
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# Acronyms

| | |
|---|---|
| ADB | African Development Bank |
| A&H | Arts & Humanities |
| CEDAW | Convention on the Elimination of All Forms of Discrimination against Women |
| CeCaGe | Gender Coordination Center, UEM |
| DFID | The Department for International Development |
| DNCT | National Directorate for Science and Technology |
| DNES | National Directorate for Higher Education |
| FAWoVC | Forum for African Women Vice Chancellors |
| FNI | National Research Funds |
| HE | Higher Education |
| HEI | Higher Education Institutions |
| IBE | Scholarship Institute |
| INDE | National Institute for Education Development |
| ISDB | Instituto Superior Dom Bosco |
| ISPM | Instituto Superior Politécnico de Manica |
| MCT | Ministry of Science and Technology |
| MCTESTP | Ministry of Science, Technology, Higher and Technical-Professional Education |
| MINEDH | Ministry of Education and Human Development |
| MEXT | Ministry of Education, Culture, Sports, Science and Technology - Japan |
| NUFFIC | The Dutch Organization for Internationalization in Education |
| PARPA | Action Plan for Poverty Reduction |
| SSA | Sub-Saharan Africa |
| S&T | Science and Technology |
| STEM | Science, Technology, Engineering and Mathematics |
| STI | Science, Technology and Innovation |
| TVET | Technical and Vocational Education and Training |
| UEM | Universidade Eduardo Mondlane |
| UN | United Nations |
| UniLúrio | Universidade Lúrio |

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# 1. Introduction

Promoting gender equality and Science Technology and Innovation (STI) policies to benefit both men and women are acknowledged as fundamental to reducing poverty and ensuring equitable development. Despite of several STI initiatives globally to ensure achievement of the 5th Sustainable Development goal on gender equality, the World Health Organization confirms that fewer women are employed in the STI sector globally (UN – Interagency Task Team, 2019). Participation of women in Science, Technology and Innovation (STI) has remained low globally regardless the initiatives geared towards supporting greater engagement of women especially in research for development. This is particularly true in sub-Saharan Africa (SSA) where women are greatly underrepresented in key areas of STI.

In Mozambique, apart from medical sciences where women make up 53% of scientists, women are behind in the rest of the science & technology fields. Despite several policies on gender equity in higher education in the country, the numbers of female students at higher education institutions have remained low compared to the male counterparts. Similarly, women are underrepresented in the academic staff of higher education institutions (António and Hunguana, 2013).

The Forum for African Women Vice Chancellors (FAWoVC) has received support from the Islamic Development Bank to develop initiatives to increase participation of women in Science, Technology and Innovation in Africa. FAWoVC is an umbrella group of female university leaders in Africa that was created in 2016 to spearhead gender responsive training in higher education institutions and to increase the enrolment of female students in STEM, as well as galvanize women to take up leadership positions. The FAWoVC establishment recognized that mainstreaming gender within higher education is of paramount importance for enhancing the performance of higher education institutions and enabling them to fulfil their mandates to train the next generation of talent to drive the continent forward. Noting that Women, STEM and education are key tenets of the Sustainable Development Goals, and the African Agenda 2063.

However, for any initiatives to make meaningful impact it is important to establish a baseline to act as the benchmark against which the impact of the intervention will be assessed. A country level gender based STI ecosystem assessment is needed and will act as this benchmark.

# 2. Objectives

The overall objective of the assignment is to conduct gender-based assessment of STI ecosystem in Mozambique.

The aim of this study is:

1. To gain a scientifically based understanding of the status of STI in Mozambique upon which capacity development will be premised
2. To conduct an assessment of the STI ecosystem in the country that will include mapping of the key actors, interactions, policies, and partnerships, ideal and actual roles of each actor. This assessment should also link the HEI to the national STI ecosystem.

3. To identify the gender-based capacity gaps, challenges, opportunities and future prospects and
4. To recommend strategies that promote the increase of women's participation in STI in Mozambique.

# 3. Science, Technology and Innovation Ecosystem in Mozambique: Policy overview and Gender Perspective

The Mozambican State is a signatory to various international and regional conventions that promote the principles and practices of gender equity and equality. Noteworthy is the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW); the Beijing Declaration and Platform of Action; Millennium Development Goals or for Sustainable Development; the UNDP Gender Equality Seal for Public and Private Organizations and the SADC Protocol on Gender and Development. The national gender policy and strategies framework for Human and social development, Higher Education (HE), Science, Technologies and Innovation (ST&I) Systems are informed and take into consideration these treaties.

The importance of the Science and Technology sector was distinguished and highlighted within the Government development program in year 2000, by the establishment of the first Ministry of Higher Education, Science and Technology through Presidential Decree No. 1/2000 of 17 January. The aim at the time was development of a skilled workforce, expansion and equity of access to quality higher education, development of technologies and identification of Mozambican resources and products that could serve as development factors. In the last 20 years, this Ministry has experienced different formats. From 2005 to 2015 this Ministry changed its focus to only Science and Technology and was renamed Ministry of Science and Technology (MCT) on February 4, 2005, through Presidential Decree nr. 13/2005. MCT coordinated the implementation of the S&T strategy and had functions related to regulation, coordination, development, monitoring and evaluation of science and technology in the country. During this period higher education sector was under the responsibility of the Ministry of Education.

In 2015, another transformation took place, and MCT was reconfigured by re-integrating the higher education as well as technical and vocational education, and was renamed Ministry of Science, Technology, Higher and Technical-Professional Education (MCTESTP). The current arrangement is argued to acknowledge and accommodate the need to deliver scientific and technological solutions for the main strategic development areas defined in the Government's Five-Year Program, the Action Plan for Poverty Reduction (PARPA), Agenda 2025, and other national development documents. The five-year government plan [2015-2019] emphasizes the need to develop human and social capital through promotion of an inclusive education system with actions and policies that promote gender equity. Along with the National Strategy for Science, Technology and Innovation [2010-2016], a Higher Education Strategic Plan [2012-2020] and a Gender Strategy for Education and Human Development [2016-2020] were developed. While the strategies for science technology and innovation and higher education are articulated within the MCTESTP the implementation of gender strategy for education and human development sector is coordinated by the Ministry of Education and Human Development. Current Gender Strategy for the education sector [2016-2020] broadens the concept of "education" by recognizing primary, secondary, vocational and higher levels. It also recognizes the specificities of

the higher education subsystem, although does not include specific actions that respond directly to the dynamics of students, academic staff, managers and leaders in HEIs (H. Monteiro, personal comm. November 2019). A strategy for gender equity in higher education [2018-2023] has been drafted and is in process of approval. It is recognized that there is a need for greater articulation between the two ministries (MCTESTP & MINEDH) as the challenges of gender equity and women participation in STEM, start during primary and secondary education. Enrollment in HE STEM areas is dependent on subjects chosen by students at the beginning of high school (11$^{th}$ grade).

# 4. Methodology

This study combines qualitative and quantitative data. Existing gender policies and strategies in the education and Science and Technology related sectors as well as reports on gender initiatives in the country, respective results and impacts, were reviewed. Data on female participation in the HEI in general and in STI related areas was analyzed, providing an overview of women participation in research. Additional information was collected through interviews with key informants from Ministry of Education and Human Development (MINEDH), from Ministry of Science, Technology and Higher and Vocational Education (MCTESTP), National Research Institutions, National Funds for Research (FNI) and 5 selected HEI across the country. The HEI were 2 public universities (UEM in the South) and UniLúrio in the North), 1 higher polytechnic institute (ISPM in the Center), and 1 private universities (A Politécnica and 1 private higher education institute ISDB) both located in the South of the country). Interviews were conducted using different formats, face to face, skype, emails and phone call interviews. In total 11 key informant from relevant ministries, higher education institutions (HEIs) and other relevant stakeholders were interviewed (Table 1).

***Table 1: Summary of data collection process***

| Data/Information collected | Method | Source or contact person |
|---|---|---|
| Gender policies and strategies in higher education;<br>Priorities & interventions<br>National debate about national education system and S&T | Literature review | Ministry of Education<br>Ministry of Science and Technology, HE and VE<br>National Fund for Research<br>5 HEIs (2 Public & 1 private universities, 1 polytechnic, 1 Technical-vocational institute)<br>Peer review articles |
| Overall number of admissions and graduates by sex<br>% of admissions and graduates in STI by sex<br>Nr of researchers by sex<br>Nr of academic managers by sex<br>Gross research expenditure | Compilation of secondary data and Descriptive statics analysis | MCT & MCTESTP databases<br>Annual reports (2011-2018)<br>Data provided by the 5 HEIs case studies (UEM, UniLúrio, ISPM, ISDB & A Politécnica) |
| Mapping of existing Gender and STI initiatives, main actors and their contribution<br>Women participation in STI initiatives, best practices, challenges and results on improving gender in STI | Documents analysis<br>Semi-structured interview<br>Triangulation | Annual Reports<br>Key informants at National Directorates in MINEDH and MCTESTP, FNI, National Research Institutions and other relevant Stakeholders (e.g. World Bank)<br>Top managers of the selected HEIs, and gender focal points<br>Websites |

Analysis focused on reviewing the HE gender oriented national policies and the level of articulation with national and sectorial strategies. For the data collection and analysis of women participation in HE and STI initiatives we took into account a 10 years' time frame, exceptionally when data were unavailable, we confined the analysis for the past 5 years. The analysis aimed at characterizing trends of women participation in HE in general and in the STI related areas in particular, the main actors promoting gender equity in higher education and initiatives to attract more women for STI related areas. Among the 5 HEIs we captured their perception about how their institution is performing regarding gender equity, initiatives that they are engaging to promote gender equality and STI appreciation by women, the kind of collaboration and partnership built and what they would consider as best practices, opportunities and challenges.

# 5. Findings

## 5.1. Overview of women access and participation in HE and STI

The higher education system is characterized by a range of HEI including public, private, universities and polytechnics. Statistics from 2017 account for a total of 52 HEI from which 19 are public and 33 are private (MCTESTP, 2017). Mozambique's gross enrollment ratio in higher education has been increasing since 2009 reaching 7.3% in 2018 and has been consistently higher for males than for females (Figure 1).

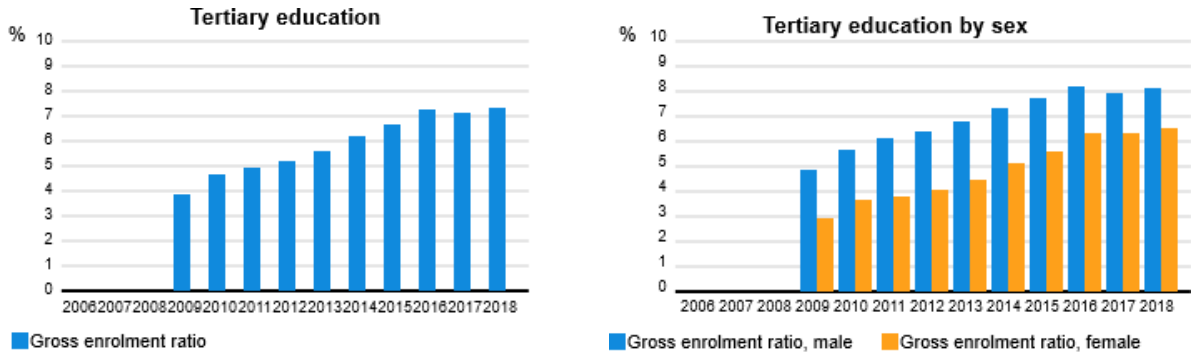


***Figure 1: Gross enrollment ratio in tertiary education from 2009 to 2018***
*Source: UNESCO (2019)*

This increase in gross enrollment ratio is the result of the emergence of new HEI over the last 10 years. Another factor contributing to the raise in HE students is the introduction of evening courses in the major public universities (Pedagogic University and Eduardo Mondlane University) which provided opportunity for both adult male and female citizens, already employed and who hadn't have the opportunity before to attend HE, to enroll in HE programs (Zavale *et al*. 2017; António and Hunguana, 2013).

There have been more admissions in Arts & Humanities (A&H) than in Science and Technology (S&T) HE programs over the last years (Figure 2), with more gender equality in A&H (40-50%) than in S&T (27-35%). It is also evident a sharper increase in A&H admission than in S&T.

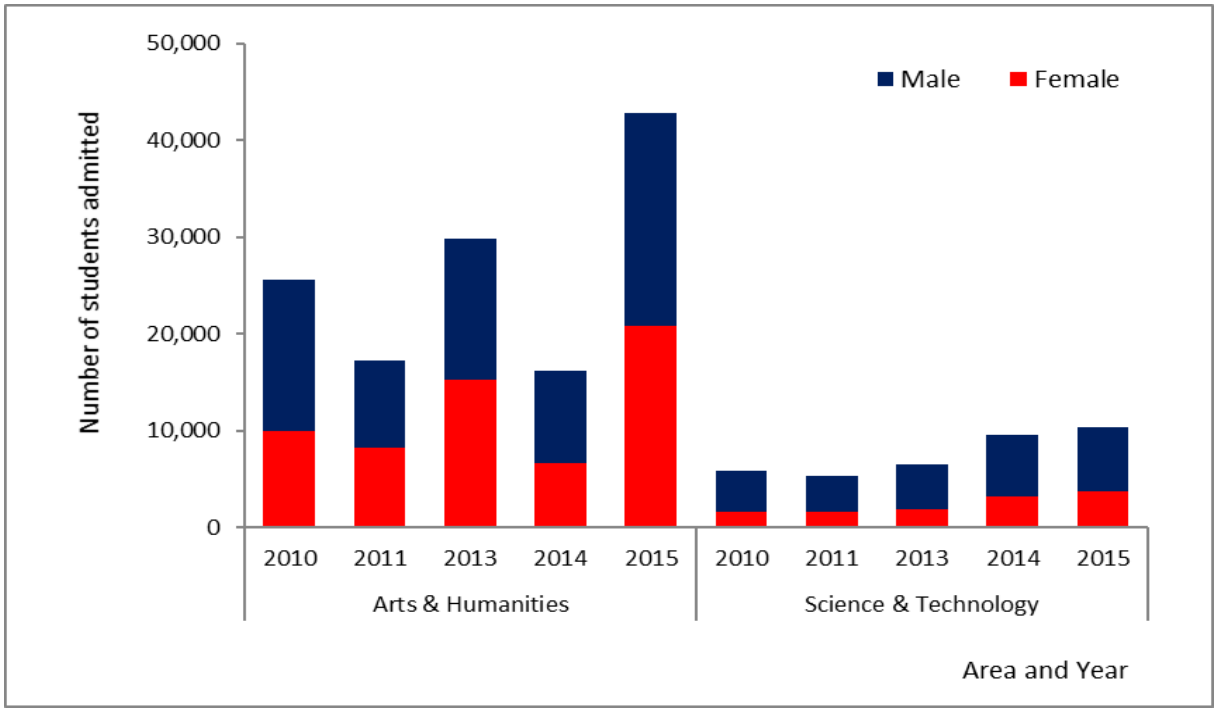


***Figure 2: Admission in Arts& Humanities and Science & Technology programs by sex***
*Source: MCTESTP – National directorate for higher education (2019)*

Despite of the yearly incremental trend observed in female's admission, males continue to dominate. Percentage of female admissions in S&T has slightly increased over time as well as the number of female students admitted. However, percentage of female admissions in A&H have remained almost the same overtime despite the fact that number of females admitted increased in the same period.

Similarly, number of graduates from HE (Figure 3), are higher (both males and females) in A& H than in S&T programs. Although the number of graduates in S&T related programs is relatively higher for male students, the overall number of graduates is low and the discrepancies between males and female students is notorious (Figure 3).

It is argued that the low percentage of graduates is caused by a significant number of drop-outs that in some cases are due to unaffordability conditions or wrong choices of the HE program and late awareness of their preferences. As part of the Mozambican education system students have to choose between STEM and Social related subjects when they finish 10$^{th}$ grade (INDE, 2007). For the majority of students this process is not supported with any kind of vocational assessment or information about programs offered by HEI. Data from interviews with HEIs leaders as well as lecturers revealed that the choice is done too early, at a time when students have no clear idea of their professional orientation or the offering of courses and possible careers ahead. In some cases students realized that they have done a wrong choice when they are already attending an HE program and once the selection of the orientation (STEM or Arts &Humanities) is done the range of choices of HE programs become limited.

Students that in 10th grade choose the Arts& Humanities orientation cannot transit to a STEM related program later on.

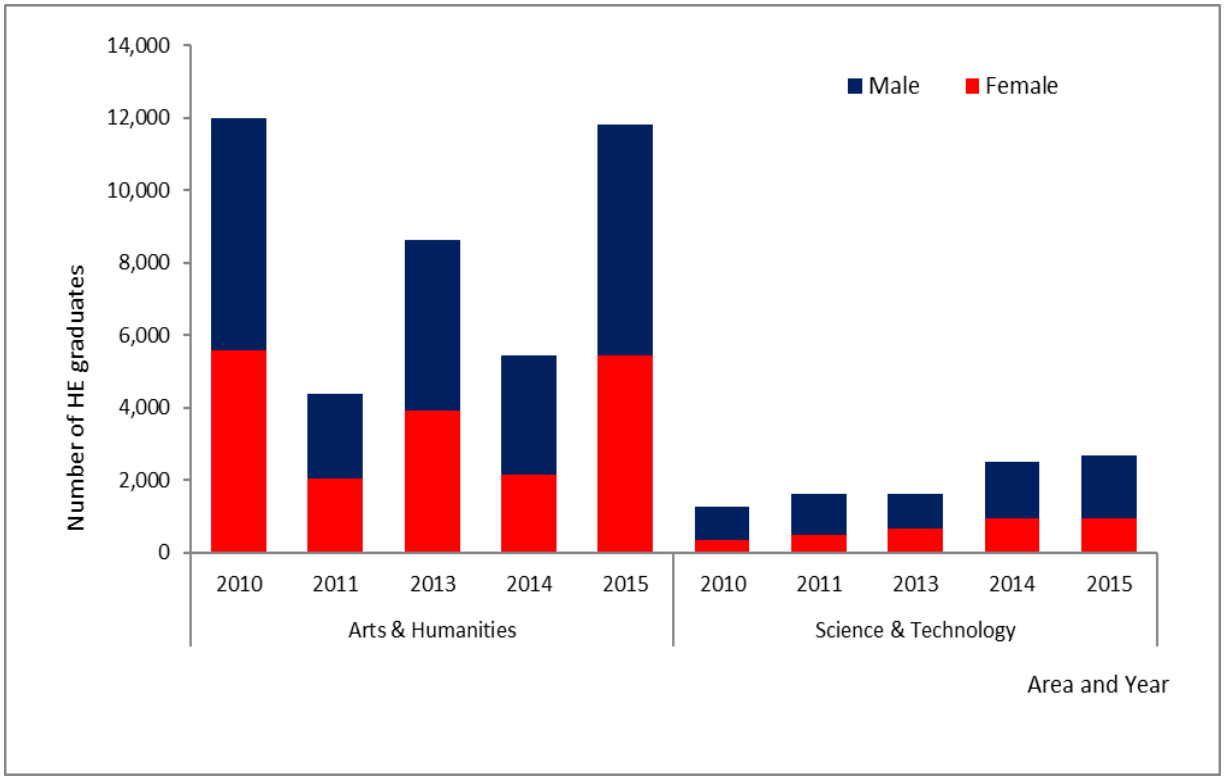


***Figure 3: Number graduates in A&H and S&T by sex***
Source: MCTESTP – National Directorate for Higher Education (2019)

The Ministries responsible for the HE national system are conscious about the gender differences in the HE access and stereotypes in the courses preferences between male and female. They also acknowledge the need to enhance dissemination of HE programs and the importance of establishing a mechanism for more informed choice of 10th grade students prior to their decision of taking STEM or Arts & Humanities courses. The forthcoming gender strategy for equity in the higher education [2018-2023] under revision for approval by the Ministers' Council, considers this issue. Actions listed in this strategy as mechanisms to increase participation of women in the higher education include allocation of quotes for females, establishment of specific programs to prepare and incentivize female students for higher education and appreciation of science and technologies related subjects and HE programs. It also includes strengthening the criteria for scholarship attribution to address gender and sex discrimination. Additionally, the strategy acknowledges the need to enhance articulation and collaboration between the MINEDH and MCTESTP in promoting initiatives that tackle the secondary schools' students, particularly 10th graders.

Interviewed key actors argue that apart from increasing dissemination of information about HE programs among students at secondary schools there is also a need to establish a vocational assessment mechanism to support students in selecting HE programs. Some studies (e.g. António and Hunguana, 2013) pointed out that the low preferences for STEM courses might be influenced by the weak level of industrialization in the country, combined with an employment sector that is mainly driven by service providers. It is expected that the current growth of gas and mining industry will bring

a different dynamic and more demand for S&T programs. Another factor mentioned as inhibiting participation of women in the S&T fields is the poorly equipped laboratories and research fields, low incentives for researchers compared to other employment sectors and also limited existence of role models in these areas.

However, the percentage of females is slightly higher at graduation when compared at admissions, in particular for S&T. This suggests that females perform better than males. Zavale *et al.* (2017) and Darvas *et al*. (2014) also observed a positive trend in the female students' graduation rate. Although, female students often face difficulties in accessing HE, once admitted the percentage of graduation is higher than the males, in particular in S&T courses.

When looking at women participation in S&T related programs it is clear the female preferences for health & wellness, agriculture, forestry and veterinary related programs (Figure 4). The number of female graduates increased more over time in health & wellness and engineering programs. However, gender equality is worse in engineering and natural sciences related courses (less than 30% of females) compared to other S&T courses (Figure 4) while in health the numbers of female and male students is more equitable (50% of females). In agricultural sciences female participation is around 35%.

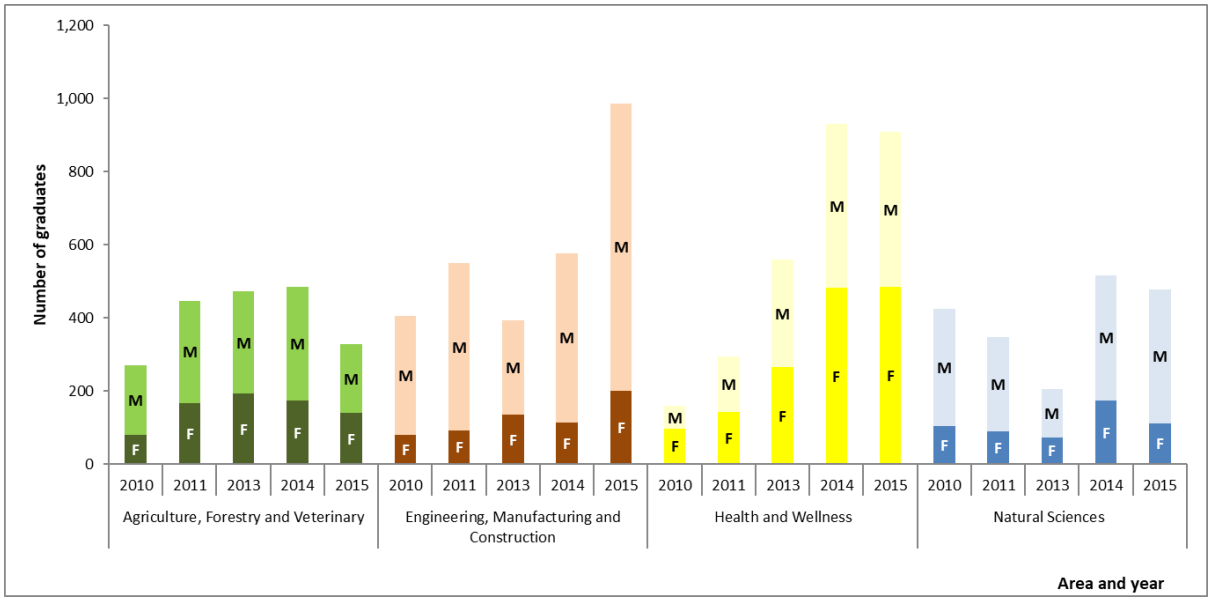


***Figure 4: Number of HE graduates in S&T courses***

*Source: Ministry of Education – Directorate for Higher Education (2012-2015) &MCTESTP- National directorate for higher education (2016)*

## 5.2. Gender strategies and Women participation in Science, Technology and Innovation

The Ministry of Science, Technology, Higher and Professional Education acknowledges that women are under-represented in different sectors of science, technology and innovation. In 2016 there were 7030 researchers in the country of which only 28.9% were female. Researchers with PhDs levels account for 14.8% of which 11.3% are male and 3.5% female. Despite the continuous increment over

the years, the gap between men and women is significant (Figure 5). The number of male researchers at all levels is more than two times greater than female researchers. The percentage of female PhD researchers is lower than the ones with MSc and with BSc, suggesting that males are more able to advance their academic qualifications than females.

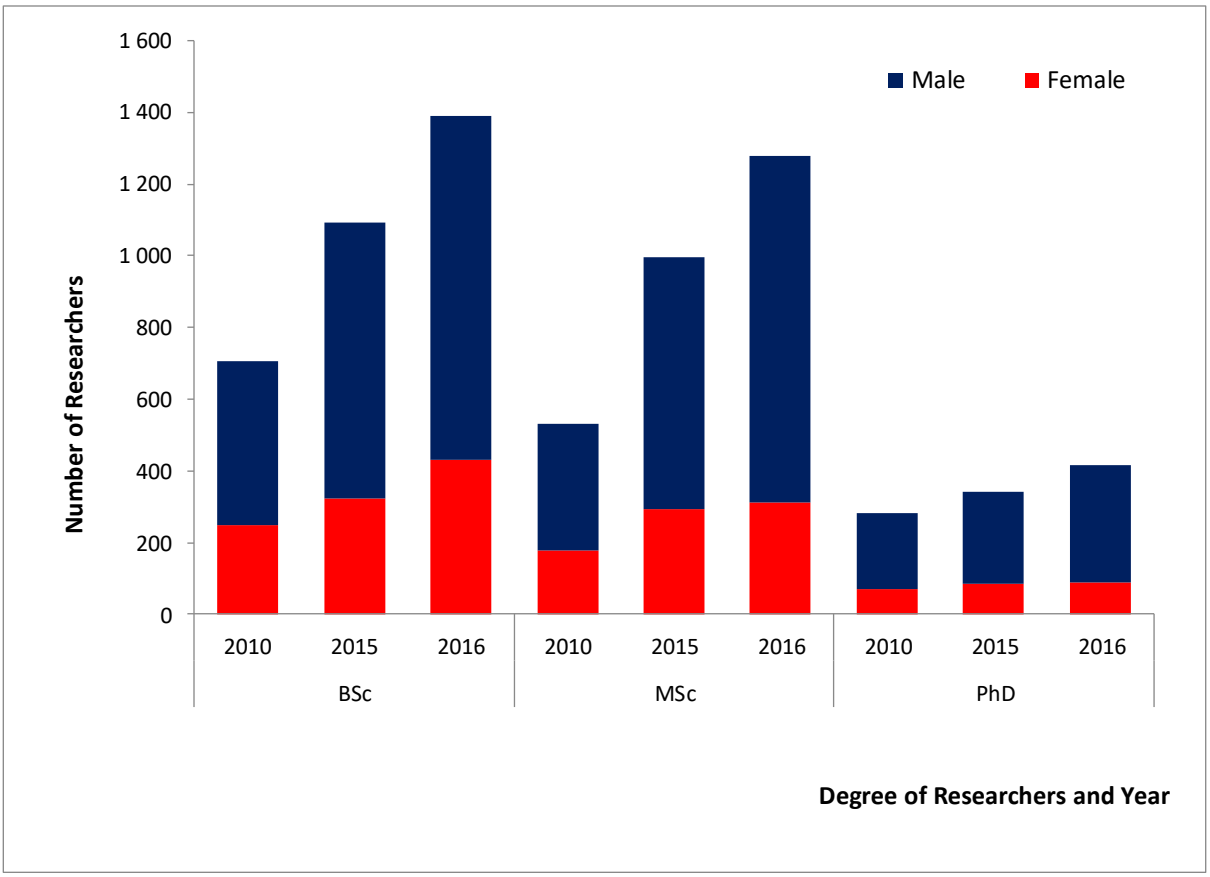


***Figure 5: Number of Researchers by gender and academic degree***
*Source: MCTESTP, 2017*

The gender strategy [2012-2016] includes initiatives to encourage participation of females' students in S&T related subjects in order to influence an increase of university females' students in S&T programs. The strategy also includes initiatives to attract and retain women in key areas of science and technology. However, there are not yet any specific policy instruments that promotes female participation in ST&I areas. This gap is acknowledged in the science and technology policy and strategy (DNCT, per. Comm, Nov 2019) and has been addressed in the new gender strategy for higher education [2018-2023]. Along the same line and reinforced by the SADC recommendation, the interviewee pointed out the ongoing work to constitute a women's forum for science, technology, engineering and mathematic (STEM). This forum will not only act to support dissemination of work done by women in STEM areas but is also expected to increase promotion and appreciation of STEM by women for women, thus building the role model culture (Pers. Comm. DNCT Nov. 2019).

The national research funds in their gender strategy (FNI, 2016) emphasize the need to address specific obstacles to women's professional development in research and to eliminate the negative stereotypes and prejudices that have been rooted from the earliest times to bridge the male and

female research gap. The three critical steps identified as important contribution for the evolution of the career of the woman researcher includes actions to (1) retain women in the research career; (2) revisit and evolve the research career; (3) appoint women to responsibility and power positions in the research field. These actions are unfold in 6 main objectives:

a. Promoting education for girls and women
b. Fighting discrimination between male and female professions or stereotypes
c. Balance between working life, motherhood and other family obligations
d. Minimize the pay gap and access to finance
e. Stimulate women's self confidence
f. Creation of a Network of Women Researchers in Mozambique

The strategy also emphasizes the need for stronger incentives to attract women to STEM related research courses. However, these objectives are yet to be transformed in systematic actions and adequate monitoring mechanisms for better and sustainable results. Some initiatives mentioned during interviews with key informants, such as the scholarship program for students interested in STEM funded by World Bank and implemented in collaboration with Ministry of Science and Technology gives priority to women, but it ends up benefitting more men than women because a limited number of women fulfilling the requirement. Another initiative mentioned was the best young women scientist award funded by Ford Foundation aiming at stimulating women researchers in STEM, but this practice has been discontinued. One of the interviewed senior staff from MCTESTP shared a reflection that for enabling systematic and effective actions towards stimulate women appreciation and participation in S&T there is a need to formulate a MCTESTP gender strategy that addresses ST&I challenges in the Ministry since they have never had one.

## 5.3. Mapping Gender and Science, Technology and Innovation Ecosystem in Mozambique

Science and technology have been referred as contributing to the development of entire human society. Higher expectations for science and technology are put forward nowadays due to global challenges such as climate change, the need for alternative energy, and others. Human resources are the essential and crucial of the fundamental capability to create new knowledge and value to achieve innovation. This refers to a special attention to advances in academic research and basic studies where both public and private sectors should have an important role of secure research and development investment (MEXT, 2018)

In Mozambique, however, the STI ecosystem (Figure 6) is primarily shaped and driven by government institutions through providing the policy framework that is informed and, to some extent, driven by the international development agencies. The foundation of knowledge is primarily ensured by HEI, research institutes and technical-vocational education training but the conditions on which these institutions operate do not allow exploration of their potential due to limited financial resources. Contrary to other countries where private sector has an expressive role in funding research and development, in Mozambique most of the research money comes from public sector or from HEIs.

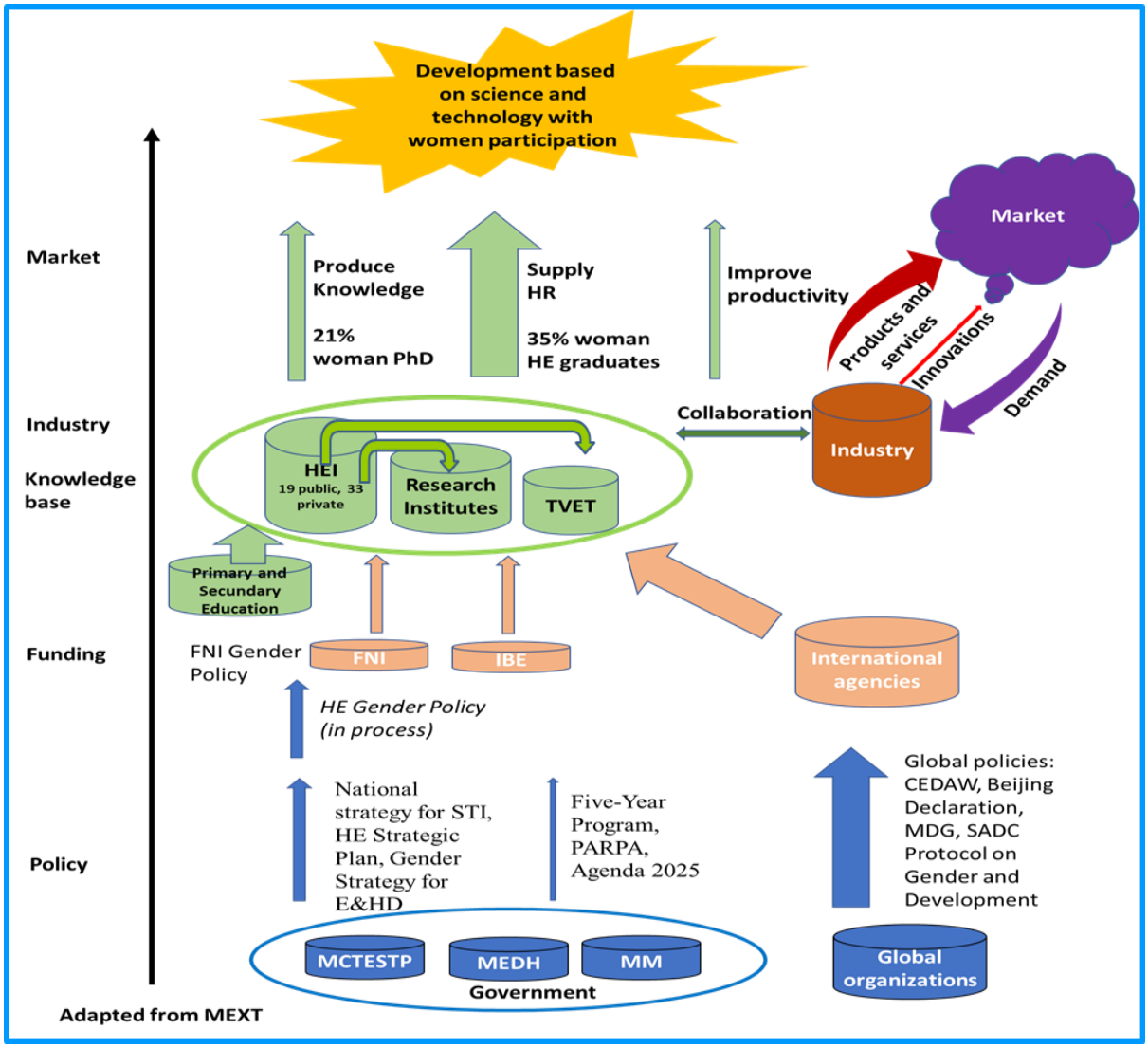


*Figure 6: Gender based STI Ecosystem in Mozambique*

A key actor in guaranteeing gender equity in the HE is the Scholarship Institute (IBE), created by Decree 30/2007 of 10 August, as a national public institution, responsible for the planning, allocation, coordination and scholarship management for academic training inside the country and abroad. In awarding scholarships IBE takes gender into account by offering half of the scholarships to girls. However, the application of this measure is not always possible because it often happens that girls do not fulfil the scholarship requirements. Additionally, there is a government recommendation that out-of-country scholarships should be for the natural sciences related courses which constitute an obstacle for girls as they often graduate in social sciences and humanities.

Another key actor is the Research National Fund (FNI) that includes a gender dimension in the criteria for selection of fundable projects. In an interview with a key informant it was explained that the gender criteria is not yet applied in a way that gives priority to women for funds allocation. The criteria looks more in terms of the extent the proposed project takes into account the gender dimension for the project team composition, the project beneficiaries and the project outcomes.

Donors and international funding agencies also play a key role in STI ecosystem in Mozambique. There are several initiatives funded by donors and international funding agencies (e.g. NUFFIC, DFID) aiming

at promoting gender strategies in higher education institutions such as universities and polytechnic institutions with the major aim of increasing women participation in science and technology. Technical and Vocational Education and Training (TVET) schools have also been funded by donors with the aim at developing and implementing gender equity initiatives through programs to increase opportunities for young girls to enter TVET as well as assisting vulnerable students to better perform and retain them in schools and integrate in the society.

Research expenditure by scientific area reveals that funding in STI is concentrated in few areas, being higher for biomedical and agricultural related and very low in engineering and technology (Figure 7).

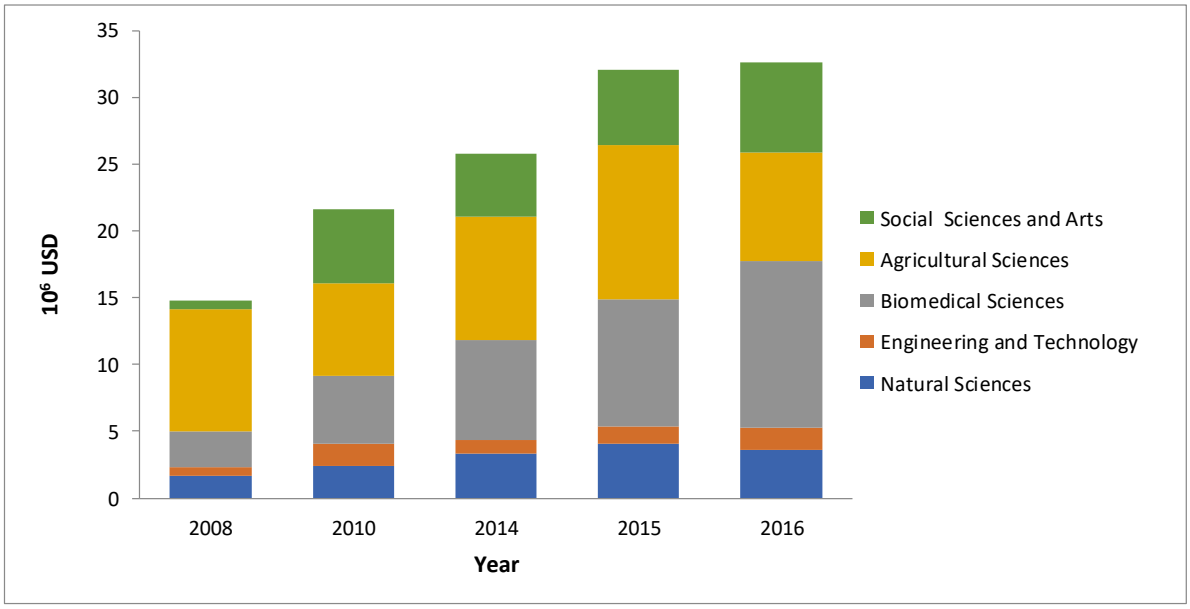


***Figure 7: Research expenditure by research area***
*Source: MCTESTP (2017)*

Then the question is whether the money spent in the specific scientific area reflects the importance of the scientific area through the number of researchers or the influence on attracting more researchers to the scientific area. Either way it emphasizes the need for more attention in other scientific areas.

On the other hand, data about the expenditure by sector (Figure 8) highlights that HEI and public research institutes are the ones spending more money on research with an incremental trend, while the private sector does not spend much in research. An interesting factor to explore could be the reason influencing the shift between the decreasing of the research expenditure in the private sector and the increasing in the NGO sector from 2010 to 2015.

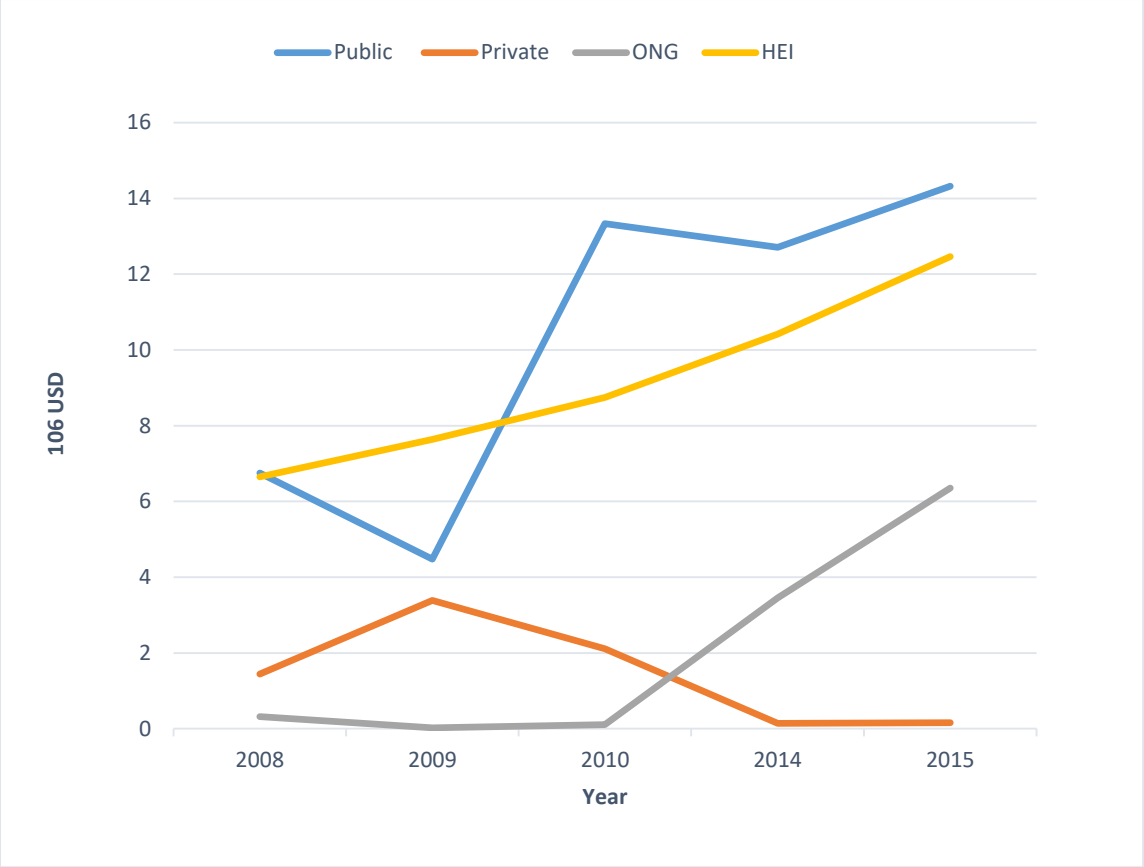


***Figure 8: Research expenditure by sector***
*Source: MCTESTP (2017)*

This data is consistent with findings of Zavale *et al*. (2017) that private companies in Mozambique hardly collaborate with HEI. Among the surveyed companies only 20% mentioned some kind of collaboration and these authors suggested that "*companies are more incentivized by their internal needs for short-term production than long-term innovations".* The few collaborations between companies and the few HEI is mostly through exchange of forms of embodied knowledge, exchange of skills embodied in students, graduates or academics. The same study suggested the need to strengthening the collaboration between HEI and private sector in curricula development and provision of teaching to enable HEI to better respond and provide students with skills that are relevant to companies, enabling students to spend part of their HE program time both at university and at company.

## 5.4. STI initiatives in HEI in Mozambique: The case studies of Public and Private Universities and Polytechnic Institutes

This study has zoomed in five HEIs for closer analysis of STI. These HEIs included the 2 public universities (UEM and UniLúrio), one private University (A Politécnica), one public and one private higher Polytechnic Institution (ISPM and ISDB). UEM is the public oldest and largest university in Mozambique thus the highest number of admission compared to other HEIs. However, gender figures

follow the national trend (Figure 9) with more gender equality in A&H (40-60%) than S&T (20-35%)

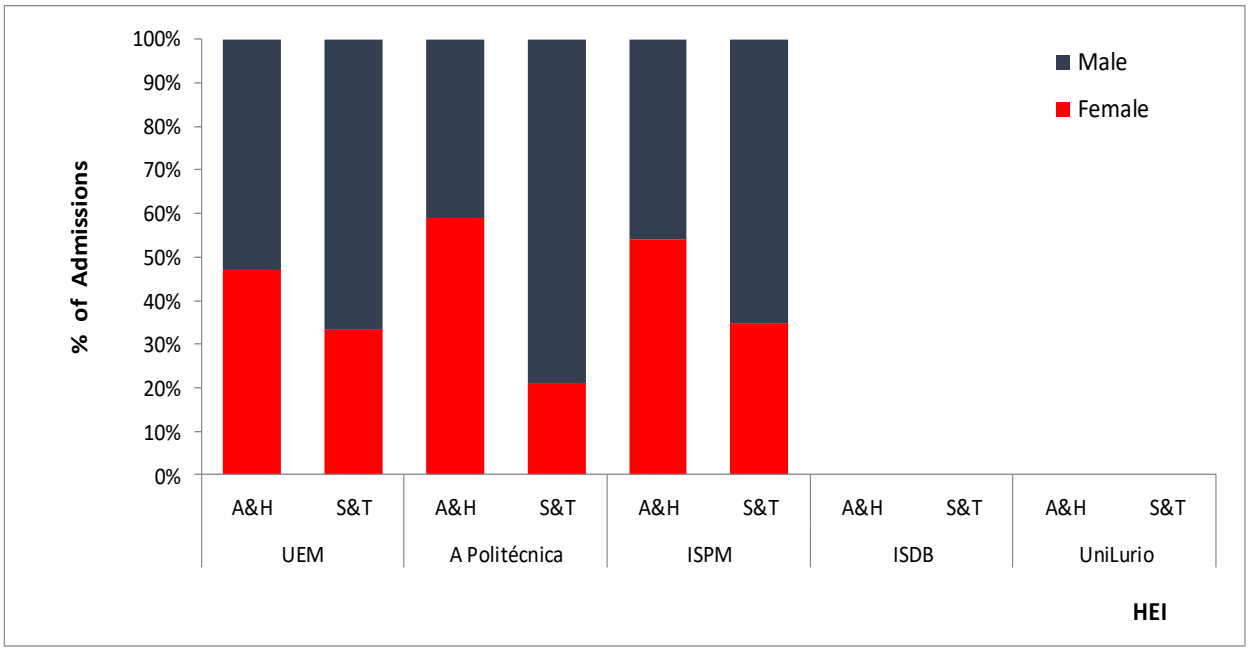


***Figure 9: Percentage of admissions by gender and area in the studied HEI***
*Source: Data provided by HEIs (2018)*

Regardless the years of existence, all studied HEIs are in the process of formulating their gender policy and strategies, and only two (UEM and ISPM) have gender units aiming at coordinating gender issues within the institution. Eduardo Mondlane University (UEM) is one of the case studies that has an internal unit, the Gender Affairs Coordination Center (CeCaGe) created by the UEM Council through resolution No.5 / CUN / 2008 of 8th May. This unit carries on activities in research, training and provision of gender related services to the all university community. The Manica Higher Polytechnic Institute (ISPM) has a gender unit since 2018 and since then they have been engaged in promoting gender equity and equality at all ISPM levels by reinforcing and strengthening political and management will, through promoting equity and combating discrimination in access, remuneration, promotion and retention of employed women and men.

Similarly, the percentage of graduates follow the same trend as national. More gender equality in A&H (around 50 to 65%) than S&T (around 15-40%). UEM as the same as national trend suggests in S&T females do better than males (graduation rates better as % of females is higher in graduates than in admissions) except for the A Politécnica (Figure 10).

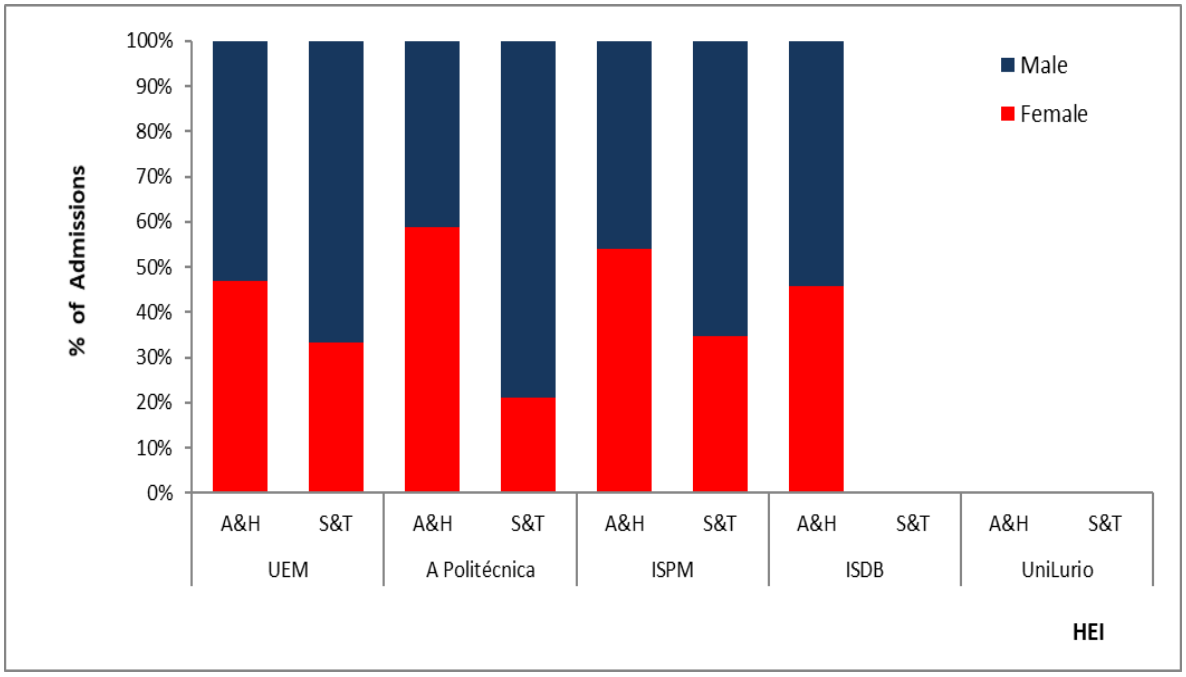


***Figure 10: Percentage of graduates by gender and area in the studied HEI***
*Source: Data provided by HEIs (2018)*

The percentage of females among academic staff of all HEI vary from 19% to 39% (Figure 11) and percentage of females in academic staff with a PhD is less than 30% across all HEI with the exception of ISDB that has only one PhD academic staff member that is a female (Figura 12).

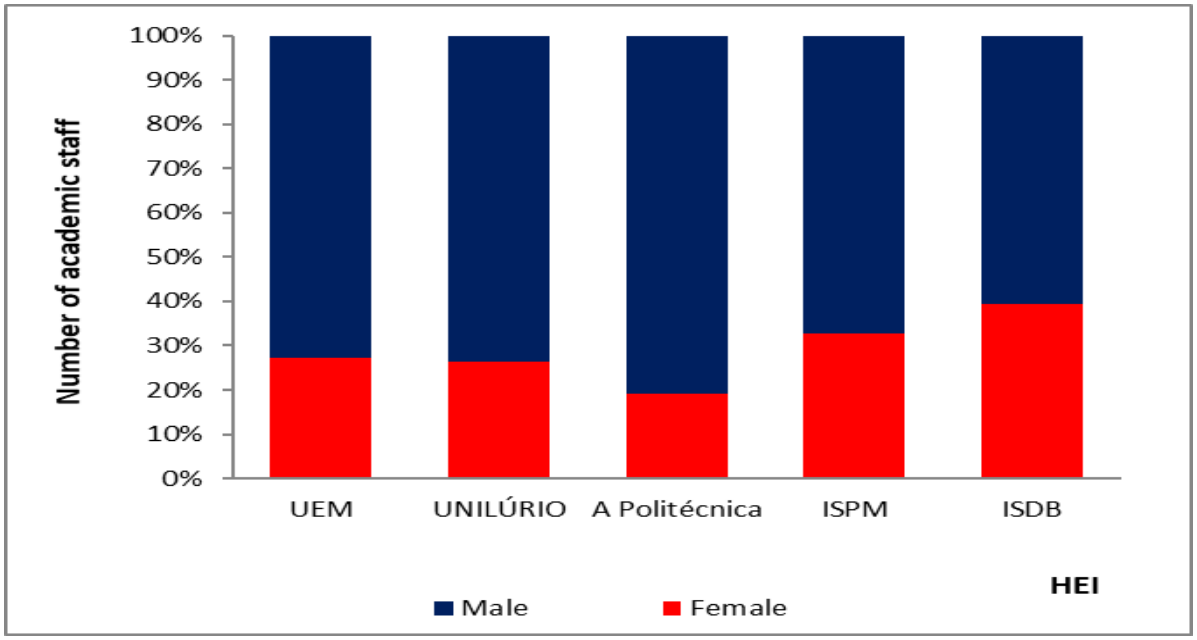


***Figure 11: Number of Academic Staff by HEIs studied***
*Source: Data provided by HEIs*

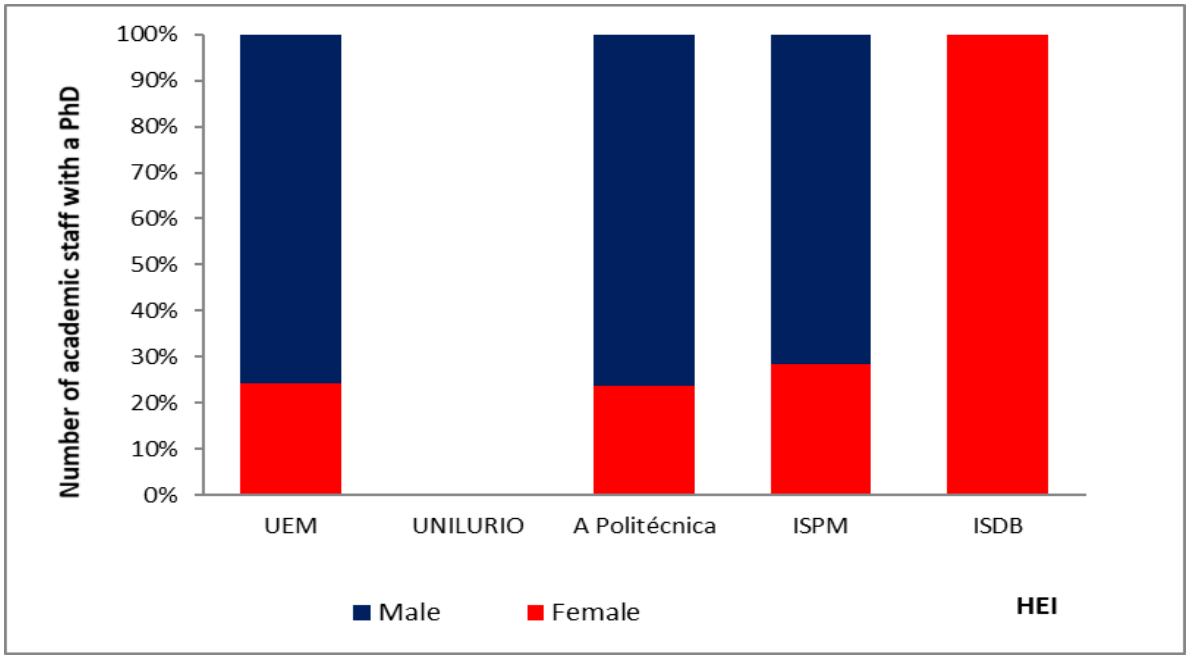


***Figure 12: Academic staff with PhD level in the studied HEIs***

*Source: Data provided by HEIs*

***Eduardo Mondlane University***

Eduardo Mondlane University is the oldest and largest public University in the country (total enrollment in 2018 around 40,000 students in BSc, MSc and PhD programs) offering courses over a broad range of domains both in A&H and S&T. As referred before UEM has a unit dedicated to gender related research, training and services. Recently, CeCaGe has coordinated the development of UEM gender strategy that is currently under revision in the UEM university council. CeCAGe develops studies and projects on topics such as violence against women, women's economic empowerment, gender-sensitive pedagogical practices, among others. In terms of training it promotes and conducts courses and seminars to empower the university community on gender issues, including the dissemination of national documentation and international conventions on gender issues, women's economic empowerment, gender planning and budgeting as well as life skills courses. The center has been working internally with UEM academic managers and leaders at all levels to raise awareness of greater gender equity through addressing concepts such as Gender Planning (bearing in mind that men and women have or may have different needs and access to resources). As service provision, CeCAGe has a Psychosocial Counseling Office for all UEM community (faculty, technical and administrative staff and students) including their families with psychosocial problems. As described above CeCaGe main activities are internally focus promoting awareness to gender equity, disseminating gender related information and addressing gender relation issues within UEM. It does not have initiatives that directly incentivizes women participation in HE and in STI in particular. However, to ensure gender equity, UEM has a strategy of offering 50% of scholarships to female students, advocates and promotes women to academic managers' positions.

**A Politécnica**

A Politécnica is a private university offering courses in three domains Business Sciences, Social Sciences, Humanities and Technology (total enrollment around 4,500 students in BSc, MSc and PhD programs). As pointed out by the vice-rector during the interview gender is embedded in their organizational culture. She explained that the previous rector who remain in the position for about 20 years promoted women in leadership positions because he believed that the maternal dimension in women provided them with an extra commitment and responsibility in their tasks, therefore A Politécnica has more women in leadership positions than men. Gender dimension was present all these years and shaped the development of the institution, however, only recently they started work on gender legal instruments to better regulate the intervention and promote gender initiatives in a systematic way. As the result, they created recently ( in 2018) the gender coordination group that will systematize all gender related initiatives and will lead the development of their gender policy which will explicitly include sexual harassment to acknowledge the attention it needs. Apart from promoting gender equity through scholarship programs, A Politécnica is the one of the few universities that offers vocational assessment to support their students in the selection of HE program orientation. This vocational test is free for their own students. The final year undergraduates' students provide legal assistance to vulnerable people. The top leaders' managers participate in an initiative funded by Danida called 'girls move' as mentors to support mentees at different university units providing advice and professional orientation. The idea of this program is to select mentors that are influential in the society to serve as role model. This initiative has inspired them and they are considered to replicate the idea by combining the gender unit activities with the A Politécnica foundation, an institution within A Politécnica that is responsible for students' scholarship. Despite that A Politécnica provides technical vocational education and that 60% of their students are female, there are few women in STI programs, and they acknowledge the need to promote initiatives to attract more women.

***Manica Higher Polytechnic Institute (ISPM)***

ISPM is a public polytechnic higher institute offering courses in agriculture, forestry engineering, animal production, food technology, biotechnology, ecotourism & wildlife management, and accountancy & auditing (total enrollment around 1,500 students in BSc and MSc). They also stated to be committed to gender and race equality, prioritizing people management in the Institution's organizational culture. Other gender responsibilities listed as part of the unit roles is to develop and strengthen gender mainstreaming policy and strategy, ensure implementation of action plans, establish relevant partnership with gender, diversity and human rights organizations and to monitor and evaluate gender mainstreaming in the institution. Activities being promoted by the Unit includes training (e.g. gender and seed training for teachers, funded by the NICHE MOZ 230 project); gender-based decision-making awareness lectures for ISPM Board members, as well as lectures on Gender Equality and Equity and Women's Empowerment in the various forums involving students, teachers, community leaders and board members. The Unit also assists students and other academic community in issues related to sexual and reproductive health, gender-based violence, premature marriages, access to information among others. They also have outreach programs with local communities in different districts of Manica Province (e.g. Guro and Gondola) through entrepreneurship training initiatives for young mothers and teachers, development and implementation of a preparatory project for higher education entrance examinations for girls and people with special needs in secondary schools at the central and northern zones of the country. Introduction of 'affirmative action' in the ISPM entrance examinations to benefit women and increase

the number of girls participating in higher education courses reducing dropouts, mainly in engineering courses.

***UniLúrio***

UniLúrio is a public university offering courses in a broad range of A&H and S&T (total enrollment around 4,500 students in BSc and MSc programs). The University Lúrio is in the process of creation of gender management Unit as part of their institutional action plan which will also coordinate the formulation of gender policy [2020-2025]. Nevertheless, the University is engaged in activities that promote gender equity and equality both internally and outside the university community as part of their organizational culture. UniLúrio adopted, in its curriculum structure, an approach that favors contact with local communities, through programs highlighted as "added value", called "One Student, One Family" Program that promotes knowledge transfer and community assistance. They also visit the secondary and pre-University Schools to disseminate information about the courses offered by UniLurio encouraging potential candidates to enter/enroll in this University. At the Faculty level they organize scientific journeys aiming at encouraging the creation of scientific debates through scientific studies. UniLúrio has a Scholarship Program [2018-2022] funded by African Development Bank (ADB) from which 82 girls benefits out of 142 scholarships. Under the same scholarship program, ADB funding postgraduate (MSc and PhD) courses for University staff and has awarded 6 Masters scholarships to 5 boys and 1 girl, 13 PhD scholarships to 6 girls and 7 boys respectively. Additionally, as part of the same ADB project, a specific program to support preparation of $11^{th}$ and $12^{th}$ grade high school girls' students, in the STEM and Portuguese areas is planned in order to promote appreciation for STI and ensure better grades in the admission exams.

***Higher Education Institute Dom Bosco*** **(ISDB)**

ISDB is a private higher education institute specialized in training teachers for TVET schools in the fields of mechanics, electricity, IT, tourism, management and accountancy (total enrollment around 1,000 students). The strategic plan [2017-2021] includes "Gender Sensitivity and Awareness" as one of the main values of the institution with focuses on access, diversity in staff representation and the integration of gender and social inclusion aspects into the institutional curriculum and training modules. As part of this, ISDB has a positive clearance strategy through which it facilitates the entry of more girls into the institution by making use of a subsidized credit scheme and its scholarship program targeting vulnerable families. The Institute has a mandatory percentage (30%) of girls. Even though four out of six courses offered by ISDB have more male students than female. A key informant commented that the trend of women and men participation in the ISDB courses reflects the prevailing sex and profession stereotypes of labor division in Mozambican society. For instance, courses such as 'receptionist or management' have more female trainees than males and courses such as 'electricity or mechanics' have more male trainees than female trainees. For those choosing to enroll in the "girls" courses are ridiculed and some drop out, widening gender gaps. In terms of teachers and academic managers the pattern is repeated, ISDB has more male than female teachers, has more male staff in leadership positions. Female staff are more involved in tasks considered feminine and of less monetary value such as secretariat and cleaning, reproducing a kind of continuity to the caring role that society assigns to women (ISDB, 2018).

# 6. Conclusions and Recommendations

### Conclusions

Gender and STI is an emergent subject in Mozambique that is slowly gaining space and more attention both at national policy and in the HEI. Instruments to practically implementing and monitoring the policies through systematic actions are yet to be developed.

Female participation in HE tends to increase over the years with greater preference for A&H and gender equality is more likely in Arts & Humanities related programs than in STI. HEIs acknowledge the trend and their gender strategies address not only issues related to gender equity and equality but it also gives emphasis to initiatives to stimulate and enhance women appreciation and participation in STI related programs. However, these initiatives are yet very limited and recent; their impact and effectiveness are yet to be assessed.

Initiatives to promote gender equality and women interest and participation in STI are essentially through scholarship quotas for females, programs for preparing female students for HE exam admissions, programs targeting STEM courses for female students in 11$^{th}$ and 12$^{th}$ grades.

Number of female students accessing HE is 2 to 3 times less that males students, however, the percentage of female graduation is slightly greater that in males, suggesting that female students once enrolled they perform better that males.

It was repeatedly affirmed by all interviewed key informants that the reduced number of students in STI is influenced by the current setup of the national system where students have to choose a STEM or A&H orientation after 10$^{th}$ grade which is considered to be too early and the students are not well informed to take that decision.

The gender based STI in Mozambique is prominent in the policy and knowledge base dimensions. The government institutions have established the policy framework that reflects the global policies, gender related conventions and treats that Mozambique is part of. The foundation of knowledge is primarily ensured by HEI, research institutes and technical-vocational education training but the conditions on which these institutions operate do not allow exploration of their potential due to limited financial resources. Funding is dominated by the international agencies with very little expression of the private sector. Contrary to other countries where private sector has an expressive role in funding research and development, in Mozambique most of the research money comes from public sector or from HEIs and is skewed towards medical sciences and agriculture. The week collaboration between HEIs and private sector reduce the visibility and contribution from HE to science, technologies and innovations.

The prospect of constituting women's forum for science, technology, engineering and mathematic (STEM) with purpose of promoting women in STI, reinforcing the role of women in STI and provide role models is seen as an important big step to enhance women visibility and increase appreciation for STEM related programs, therefore contributing to increase participation of women in HE and in STI programs in particular.

**Recommendations for HEI**

- Develop specific policies and strategies to tackle STI
- Consider creating a specific unit to carry on activities related to policy, training, promotion and supporting woman participation and retention
- Train/sensitize staff across the universities on gender equality and practical ways to improve inclusiveness and equality
- Develop programs to reach out to primary and secondary schools, from teacher training, mentoring programs for girls, educating communities and parents.
- Establish vocational assessment programs to support students in the selection of A&H or STEM orientation in order to reduce drop-outs and increase retention
- Strengthen and expand already existent scholarship programs targeting girls
- Address issues related to PhD training of female academic staff in order to increase their participation and role models
- Seek more collaboration with private sector towards finding solutions and technologies that fit their interests and secure funding

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