STRENGTHENING GENDER AND INCLUSIVITY IN THE NATIONAL SYSTEM OF SCIENCE, TECHNOLOGY, AND INNOVATION (STI) ENGAGING 100% OF BOTSWANA'S HUMAN DEVELOPMENT POTENTIAL FOR SUSTAINABLE SOCIO-ECONOMIC DEVELOPMENT

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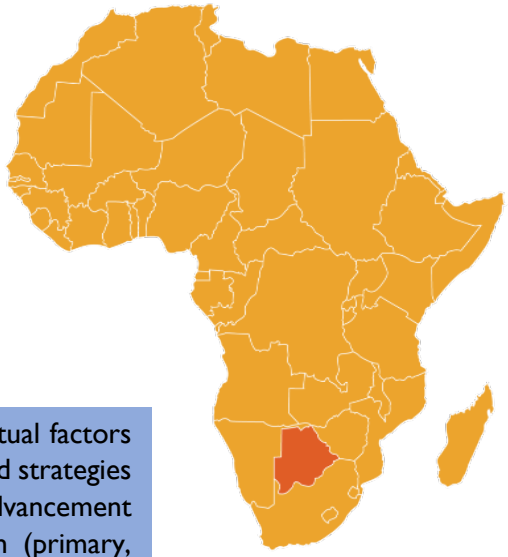
Gender & Inclusivity
A PROJECT OF THE SCIENCE GRANTING COUNCILS INITIATIVE

Botswana Country Profile

Strengthening Gender and Inclusivity in the National System of Science, Technology, and Innovation (STI)

Engaging 100% of Botswana's human development potential for sustainable socio-economic development



Strengthening Gender and Inclusivity in STI highlights the contextual factors driving gender and inclusivity disparities in STI in Botswana and options and strategies for addressing disparity gaps in some of UNESCO's STEM and Gender Advancement (SAGA) policy impact areas: social norms and stereotypes, education (primary, secondary and tertiary), the career progression environment, research content and practice, policy, and entrepreneurship and innovation. The series covers 15 Science Granting Council Initiative (SGCI) African countries and identifies stakeholders with influence in advancing gender and inclusivity in STI at country, regional, and international levels.

Country Overview

- Botswana is situated in Southern Africa and borders Zimbabwe, Zambia, South Africa, and Namibia.
- Women and girls make up 52% of the total population of 2,351,045 million people.
- More than fifty percent (51%) of the total population live in urban areas. Botswana has nine geographic districts.
- The country is classified as an upper-middle income country with a Gross Domestic Product (GDP) per capita of USD $6972 in 2016.[1]
- In 2016, Botswana entered its fourth year of drought negatively impacting the country's small, but vital agriculture sector. However, over the same period diamond exports increased to their highest levels since 2013, buffering economic growth. As a result, the economy registered a 2.9% growth in 2016.[1]
- Botswana is plagued by the second highest HIV/AIDS prevalence rates in the world. It is estimated that 35% of people ages 15-49 are HIV positive, but most of them do not know their status. This causes a decrease of 8-10% in the household per capita income increasing the percentage of households in poverty. [2]
- The results of the 2019 survey conducted by Star Awards (Afrobarometer) show the country's five-year performance trends on specific Sustainable Development Goals (SDGs) from the perspective of adult Botswanans:[3]

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- Trends are doing better for poverty and hunger (SDGs 1 and 2).
- Trends for good health and well-being as measured by frequency of going without medical care, have worsened.
- Quality education remains largely unchanged with some increases in the proportion of the population with secondary or post-secondary education (SDG 4).
- Gender equality is doing better for equality in technology use and has met the target for gender equality in financial control (SDG 5).

Gender and inclusivity disparities negatively impact Botswana's human potential for socio-economic development

- Gender disparities in Botswana are mainly due to reproductive health, empowerment, culture, and the labour market that hinders women and girls' access to opportunities, resources, and power.[4] The Abolition of the Marital Power Act 2004 provides for equal rights and status of women and men in marriage.[5]
- Women and girls continue to face challenges accessing their human rights due to laws, policies, socio-cultural practices, and customs that discriminate against in obtaining political leadership and economic achievements. Women comprise 19.4% of councillors in local government; 10% of members of parliament and 25% of cabinet, meaning that Botswana has not achieved the minimum 30% of women in decision-making, except in the case of public service. [6]
- Of the 13 SGCI countries, following Namibia and Mozambique, Botswana has the third-highest tolerance levels for people of different sexual identities or orientations at 38% for 2014-2018. In 2019 following the decriminalisation of same-sex activity, 48% of people expressed tolerance for people of different sexual orientations, a 10%-point increase.[7]
- Thus, structural drivers of gender inequality and inclusivity in Botswana such as unequal gender roles and unequal power relations between men and women hamper women and girls' access to opportunities, resources, and power and is evidenced in the country's poor performance on various gender-disaggregated socio-economic development indices (Table 1).

Table 1 Key gender indicators for Botswana

Key gender indicator	Meaning	Botswana
Human Development Index (HDI)	This index measures average achievement in human development in three dimensions: a long and healthy life (health), knowledge (education), and a decent standard of living (command over economic resources). The higher the value to 1, the higher the country's level of human development.	Botswana has a HDI value of 0,735 in 2019, and it places the country in the high human development category standing at 100 out of 189 countries and territories. Botswana's HDI value increased from 0,573 to 0.735, an increase of 28,3%.[4]
Gender Inequality Index (GII)	This index exposes the human development costs of gender disparities in three areas of human development: reproductive health (maternal mortality ratio and adolescent birth rate), empowerment (population with at least some secondary education, share of seats in parliament), and	Botswana has a gender inequality index (GII) value of 0,465, ranking it 116 out of 162 countries in the 2019 index. The GII is 0,465 (47%).[4] **Illustrative contributing factors**:[6] • Women only held 10,8% of parliamentary seats. • A percentage of 89,6 adult women have reached at least a secondary level of education compared to 90,9% of their male counterparts. • For every 100,000 live births, 144,0 women die from pregnancy related causes which is relatively high.

Key gender indicator	Meaning	Botswana
	the labour market (labour force participation rate). The higher the score towards 1, the more disparities between men and women and the greater loss to human development.	• The adolescent birth rate is 46,1 births per 1,000 women of ages 15-19. • Female participation in the labour market is 65,4 percent compared to 76,9 for men.
Social Institutions & Gender Index (SIGI)	Measures discriminatory social institutions (the gaps between women and men in terms of rights and opportunities as reflected in legislation, practices, and attitudes) on four dimensions. A SIGI value of 0 indicates no discrimination and 100% very high discrimination in social institutions.	At 39% Botswana has a medium level of discrimination against women in 2019 but is not ranked in the SIGI. The discrimination may result from discriminatory laws, attitudes, and practices.[8] ○ Discrimination in the family, 39.6% ○ Restricted access to productive and financial resources, 39.9% ○ Restricted civil liberties, 52.4% **Illustrative contributing factors:[8]** • 5.3% of girls between 15 and 19 years of age were married, divorced, or widowed. • 67.3% of women experienced domestic violence in their lifetime. • Women's lower socio-economic position and emphasis on land as collateral by the banks make women's access to financial services, including bank loans, difficult.
The Global Gender Gap Index (GGG)	This index measures gender-based gaps in access to resources and opportunities across four categories: economic participation and opportunity, educational attainment, health and survival and political empowerment. The closer the score to 1 the higher the gender parity.	GGG value of 0,716 in 2021 shows that resources and opportunities remain somewhat unequally divided between men and women.[9] When this value is disaggregated by the sub-indices a more nuanced picture emerges. • Educational attainment value of 1,00 (full parity) • Health and survival value of 0,980 (almost full parity) • Economic participation and opportunity value of 0,799 (20% parity gap) • Political empowerment value of 0,084 (almost a 91% parity gap) **Illustrative contributing factors:** • Women have achieved **educational parity** with a literacy rate of 87,5% (86,1% for men), a primary school enrolment rate of 88,1% (87,2% for men), a secondary school enrolment rate of 51,9% (48,1% for men) and a tertiary enrolment rate of 29,2% (20,5% for men). • Concerning **economic participation and opportunity**, the labour force participation rate for women is 68,5% compared to 78,1% for men. • Also, women estimated earned income (international $1,00) is less than men at 13,2 and 21,5. • Importantly, women have exceeded parity in senior officials, and managers at 54,5% (45,6% for men) and in the professional and technical workforce at 50,2% (49,8% for men). • However, the greatest gaps are for **political empowerment** with women holding only 10,8% seats in parliament (89,2% for men), only 15,8% of ministerial positions (84,2% for men) and no women serving as head of state within the last 50 years.

STI and sustainable socio-economic development

Botswana's science, technology, and innovation systems for human development are part of the long-term national development plans and strategies, legal frameworks and policy instruments stemming from the country's first long-term development plan developed in the 1990's. The Vision goals of 2016 identified science and technology-led development as well as funding for achieving the overarching sustainable development vision (See Figure 1).[10]

- The organisation of STI landscape in Botswana is principally guided by the **revised Policy on Research, Science, Technology, and Innovation (RSTI) in 2011** which is a response to the Botswana vision of 2016. **RSTI** made provision for gender inclusivity and previously disadvantaged groups such as women and people living with disabilities to increase participation in science and technology (See Appendix 1).[10]

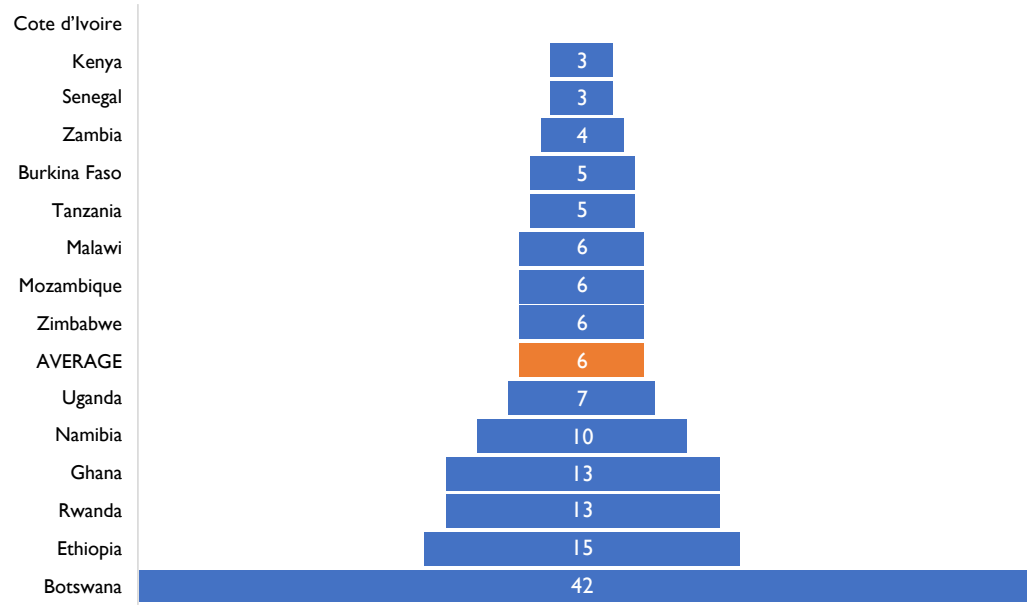
- The policy aims for Research, Science and Technology Innovation with clear vision, programmes, incentives, measures, roles, targets, and monitoring indicators. RSTI intends to increase investment in research and development activities.
- **On measures for assessing the impact of R& D and innovation** Botswana produced 281 scientific and technical journal articles in 2018.[11] Between 2008 and 2017 Botswana increased the number of gender-related publications by 42% from 6 to 145 publications (Figure 2) generating the highest growth rate among the 15 participating SGCIs with an increase in the number of authors contributing to gender-related publications by almost ten-fold.[11]

Figure 1 National Development Visions

Vision goals of 2016

- Adopt technology to suit local conditions
- Nurture and develop the innovative elements within its society and contribute to Science and Technology.
- The government should fund research to encourage the private sector to develop capacity in R & D.
- A National Research Council should be established to promote and fund research in Botswana.
- A strong capacity in scientific and engineering disciplines to provide long-term support for the manufacturing industry.

Figure 2 African SGCI Participating Countries: percent (%) increase in publications with gender-related content between 2008 and 2017



- Between 1997 and 2013 Botswana's publications by subfield of science was highest in environmental science and ecology at 10% of publications, followed by geology (8.3%), chemistry (8.2%), agriculture (7.0%) and veterinary sciences (4.7%).[10] The lack of publications in engineering and technology in Botswana is a major challenge for generating innovation in the productive sector.
- Botswana also publishes with international authors and is highly active in the region with 86% of its gender-related publications authored with researchers from other SGCI countries. [11]
- Botswana is ranked second to Uganda at 34.6% on the MasterCard Index in relation to women entrepreneurship activity rate, first in Africa at 66.6% in women advancement index, and first in Africa at 62.6% on providing supportive entrepreneurship conditions to women.[12]

Current status of human capital for STI[13]

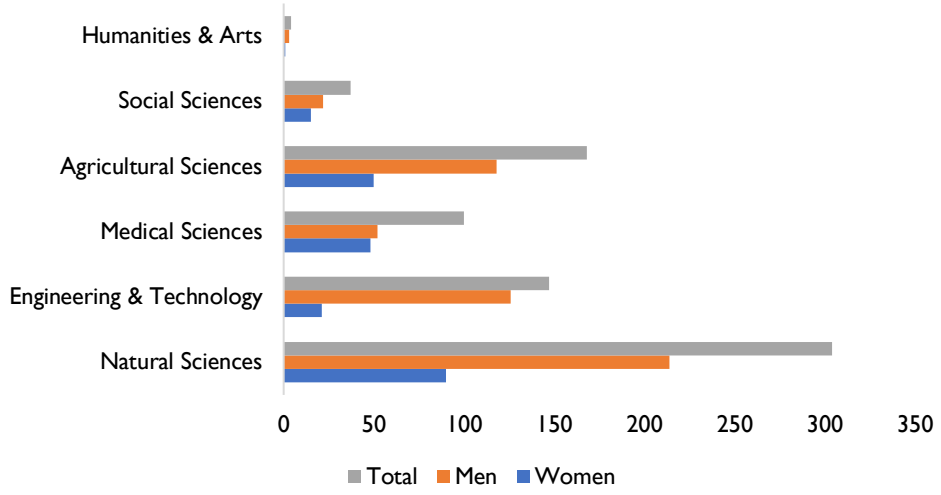
- In 2013, the total number of women in R&D is significantly lower than men for each category of R&D function (Table 2). For instance, 64% of researchers are males.
- Disaggregating R&D personnel by gender and function shows gender disparities with women increasingly and negatively affected across the three functional positions.

Table 2 Botswana's total number of R&D personnel (head count) by category & gender, for 2013

	Women	Men	Total
Researchers	225	535	760
Technicians	110	218	328
Supporting Staff	282	346	628
Total	**617**	**1099**	**1716**

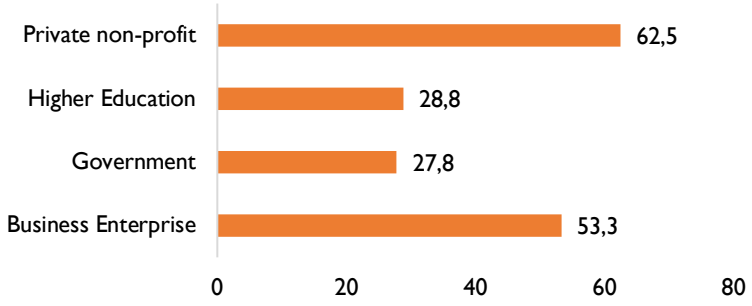
- Botswana's distribution of researchers by field of research in 2013/14 (Figure 3) illustrates gender disparities in field of scientific research with men prominent across the "hard sciences" of natural sciences, engineering & technology, and agricultural sciences and natural sciences. It is evident in Figure 3 that there were more men than women in all the scientific fields in 2013/2014.

Figure 3 Botswana's distribution of researchers (head count) by scientific field and gender, 2013/14



- Distribution by field of employment amongst researchers (Figure 4) shows that in 2013 women were more concentrated in private non-profit and business enterprise. Illustratively, in the Faculty of Science (FoS) at the University of Botswana (2003/4) women constituted around 30% of the total number of employed staff.[14]

Figure 4 Proportion (%) of women R&D by employment sector for 2013[11]



What factors encourage (discourage) women's participation in national system of science, technology, and innovation?

Policy and Frameworks

Botswana's constitution is one in which gender equality provisions were absent, thereby limiting the extent to which political actors can successfully pursue policies that contribute to women's equality. However, below are some efforts made to increase gender equality:

- Following the **1977 National Commission on Education, a re-entry policy** for students involved with pregnancy was adopted. In the re-entry policy, there is a 12-month leave aimed to provide the mother time to restore to full health after the pregnancy and return to school.[15]
- The **1995 National Policy on Women in Development** states that men and women are equal, and are equally important for economic, social, and political development.[5]
- The Botswana government has in place the **1998 National Gender Programme and the National Gender Policy Framework**, to guide gender mainstreaming within the country.[5]
- **The Revised National Policy on Research, Science, Technology, and Innovation (RSTI) 2011** (Figure 5) is committed to address gender inequality structural drivers to increase participation of women in Science and Technology fields from a young age to exploit the country's human potential to the full.[16,17] In addition, targeted schemes aim to provide equal opportunity for men and women to engage in careers in science and engineering.
- **National Policy on Gender and Development and the National Gender Commission** was established in September 2016 and pays close attention to a range of issues, systems, and institutions in which the same opportunities should be available to men and women to improve their potential as human beings and valuable citizens of Botswana.[18] The long-term goal of the policy consists of decreasing the inequalities in the opportunities and outcomes of social, economic, political, cultural, and legal development for both men and women.
- The **Convention on the Elimination of all forms of Discrimination Against Women (CEDAW)** in Botswana aims to eliminate discrimination and are committed to upholding the rights of women. [19]

Figure 5 RSTI policy directives: [17]

- The development of a coordinated and integrated approach to RSTI planning and implementation.
- The development of RSTI indicators along the guidelines of the Fractal and Oslo manuals.
- The start of regular participatory foresight exercises.
- The strengthening of the institutional structures which are responsible for policy monitoring and implementation.

Gender social norms and the education pipeline

- In 2003/4, there were 21,019 girls out of 41,056 primary level learners who outperformed boys in science, social science, mathematics, English and Setswana.[14]
- Additionally, at the junior secondary level, girls outperformed in mathematics (23.5% versus 23.2%) while boys performed better than girls in integrated science (27.8% versus 28.7%).[14]
- However, due to socialisation in Botswana, girls are made to believe that some subjects such as science and technology are associated with masculinity. Further to this, a lack of proper mentorship and exposure to wrong advice by teachers and parents leads to negative attitudes to STEM careers. Thus, at the senior secondary level, male learners led in participation and performance in Physics, Chemistry, Biology, and Mathematics.
- Gender stereotypes seem to affect progression of girls from one level to another in STEM subjects as they advance in the education level.
- Approximately, 31.7% of all children who leave secondary schooling result in imbalances in STEM enrolment and graduation across post-secondary institutions in Botswana.[14] Pregnancy (reproductive health) is one of the reasons for girls' drop out of school. The donor-funded Diphalana Programme was piloted in 1996 at one school to address this problem. The pilot showed a decrease in teenage pregnancies at the pilot school, with most girls returning to the school post-pregnancy. However, the programme's design failed to account for the local cultural context resulting in limited buy-in from communities and the Government, negatively impacting sustainability and scale-up. [20]
- Enrolment into tertiary education indicates higher participation by female students compared to male students. Botswana reports 70.9% gender parity across a range of measures and is one of only three countries in sub-Saharan African to have achieved full parity in education.[9]
- STEM-specific data, and in particular gender disaggregated data for tertiary education STEM graduates are, however, not available.

Gender-science norms and the STI career progression environment

- The STEM fields are an integral part of Botswana's economic development journey. Thus, there needs to be a shift in the culture of science as difference and inclusion is significant for research and innovation in the country. It is imperative for the science environment to encourage and empower women to take on leadership positions in science and drive innovation. Women's lives are affected by the repercussions of social, structural, and economic barriers that limit their capacity to take on these great challenges and decrease women's prospects for career advancement.
- A social barrier in Botswana is that childcare and family responsibilities are a women's role, and it is a disadvantage for female employees in STEM. In urban settings in Botswana where childcare services are either minimal or costly, women with more education make trade-offs between intermittently withdrawing from formal work or paying heavily for these services. [21]
- A structural barrier is within policies as they now aim to include demystifying science and technology to encourage the enhancement of targeted funding promoting female enrolment in STEM education. In Botswana it is difficult to describe the gender reach of the country's research funding model.
- Networks of stakeholders with interest and influence in advancing gender and inclusivity in STI in Botswana aim to create an enabling and empowering environment for women in science. Examples of such stakeholders include WEGSA (Forum for Women Engineers and Girl Scientists in Africa), AAS (African Academy of Sciences) and Debswana (joint venture between De Beers group and the Government of Botswana supporting girls and

women in STEM). These institutions and networks address inequality amongst boys and girls and men and women and motivate girls and women to take on science-based education and careers (Appendix 2).

Conclusion

Notwithstanding the network of institutions supporting the advancement of STI and gender and inclusivity in STI, there are gaps and trends that affect the country's capacity to implement RSTI and education policies to drive science, technology, and innovation within the country. Botswana continues to address traditional beliefs about the role of women in society and to promote the role of women in governance and decision-making. Botswana relies on several policies and frameworks mentioned above to ensure that no individual faces discrimination based on race, gender, sex, religion, social status, sexual orientation, and marital status. Still, Botswana's lack of women representation in STEM fields is due to social and/or structural barriers that discourages women from entering or persisting in STEM.

Harnessing 100% of the country's human development for accelerated socio-economic development requires regulation and linked policy instruments across the STI pipeline that provide clear direction for gender-responsive and gender-sensitive actions in each sector of the economy. Such actions might include collecting gender disaggregated data across the STI pipeline to understand the extent of gender disparities in education, research employment opportunities, research funding and awards, leadership positions, mentoring opportunities, and in how the research environment enables progression for some and not others.

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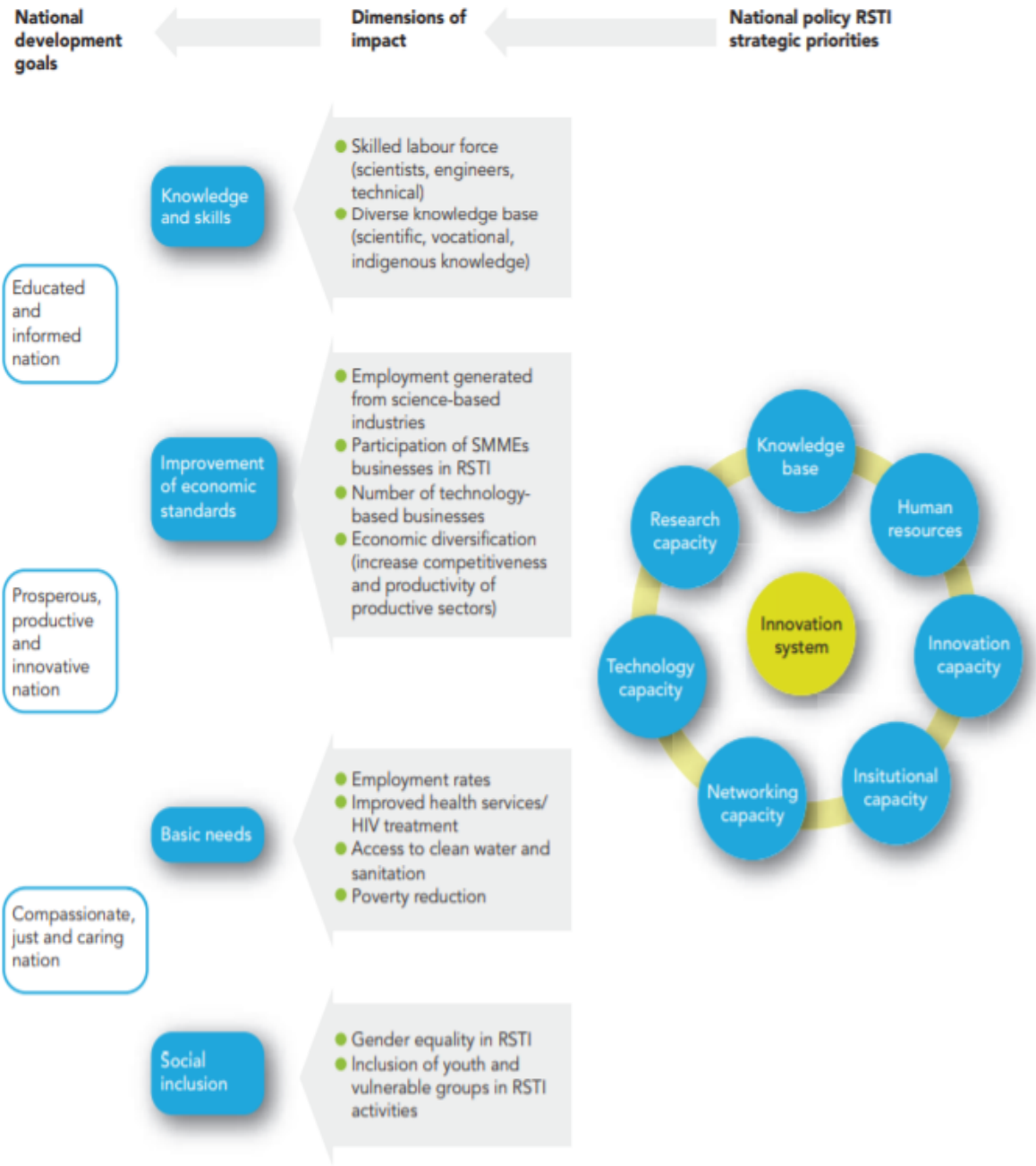
This profile and authorship will be updated in phases two, three and four (2021/2022/2023) of the project following input from Gender at Work and Botswana SGCI participants.

Appendix 1: (Contribution of the National Policy on Research, Science, Technology, and Innovation to national development goals according to Vision 2016, UNESCO, 2013, pp. 66).



Appendix 2: Summary of stakeholders with interest and influence in STI

Name of organisation	Focal areas	Contact details
Ministry of Tertiary Education, Research, Science and Technology Department of Research Science and Technology	The ministry exists to provide and build knowledge and innovation through the development and implementation of Policy on Tertiary Education, Research, Science and Technology to transform Botswana into a knowledge-based society through effective stakeholder collaboration.	Email: **kbaipoledi@gov.bw;** Tel: +267 397 2255
Ministry of Labour and Home Affairs, Gender Affairs Department	The ministry is mandated to facilitate the mainstreaming of gender issues in the development process.	Email: **mnig-pro@.gov.bw;** Tel: +267 361 1100/361 1115/361 1132
Botswana Institute for Technology Research and Innovation (BITRI)	BITRI is a parastatal under the Ministry of Tertiary Education, Research, Science and Technology, established in 2012, to conduct needs-based research and development in focused areas. The Mandate of BITRI is to identify, develop and/or adapt appropriate technology solutions that provides sustainable innovative solutions through co-creation and collaboration in line with national priorities and needs of Batswana.	Email: **communications@bitri.co.bw;** Tel: +267 360 7500; Fax: +267 3607 624
Citizen Entrepreneurship Development Agency	The organisation provides financial and technical support for business development with a view to promote viable and sustainable citizen owned business enterprises. In addition, it also offers training and mentoring for new and seasoned entrepreneurs and business advisory services to entrepreneurs in various skills as identified through the needs assessment that is conducted during project monitoring.	Email: **feedback@ceda.co.bw;** Tel: +267 317 0895; Fax: +267 317 0896
The Botswana Investment and Trade Centre	BITC plays an important role in driving Botswana's economic growth through investment and promotion and attraction.	Email: **enquiries@bitc.co.bw;** Tel: +267 3633300; Fax: +267 3181941/ +267 3170452
Forum for Women Engineers and Girl Scientists in Africa (Forum WEGSA)	Initiative addresses gender inequalities in science-based education and careers.[22] The aim is to encourage girls	Mandu Annah Jeffrey, Founder and Chair. (+267)72255013 (+267)3554288

Name of organisation	Focal areas	Contact details
	to opt for the sciences so that more women become engineers.	
African Academy of Sciences	Programmes are a platform for the country to train its future women scientific leaders and promote gender equity in the scientific sector.	Email: **communication@aasciences.ac.ke;** Tel: +254 20 240 5150 +254 736 888 001 |
University of Botswana	Faculty of Science	Prof. Julius Ramosweu Althopheng
Botswana International University of Science and Technology (BIUST)	Opened in 2012 with a cohort of 267 students. [23] (BIUST) aim to provide students with practical tools and routes to access engineering and technology careers.[24]	Tel: +267 493 1000
Debswana	Debswana is Government of the Republic of Botswana who hosted a series of GirlEng sessions designed to make STEM relevant and accessible and to demonstrate opportunities opened.[25]	Email: **CorporateAffairs@debswana.bw;** Tel: + 267 361 4200; Fax: + 267 318 0778