



**IERI Working paper
WP2019-008, June 2019**

MAINSTREAMING GENDER IN THE ANALYSES OF INNOVATION SYSTEMS

Lindile Ndabeni

ndabenil@tut.ac.za

Institute for Economic Research on Innovation (IERI),
Tshwane University of Technology (TUT)
Tshwane, South Africa

Polly M. Mashigo

MashigoMP@tut.ac.za

Faculty of Economics and Finance,
Tshwane University of Technology (TUT)
Tshwane, South Africa

Abstract

Economic and scientific discourse is often framed in a neutral language where women largely become invisible. However, the discourse remains male coded with its focus mainly on male coded production. Mainstreaming gender particularly in the analyses of innovation systems can improve the development of science technology and innovation policies. More significantly, a gender perspective shifts our attention from viewing women as individuals to interactional and institutional structures that reproduce inequalities and opens up opportunities for change. The paper contends that improved gender awareness can lead to the generation of new knowledge and refreshing insights for policy development and research.

1. Introduction

Economic and scientific discourse is often framed in a neutral language. In this discourse women largely become invisible. What is worth noting is that this discourse remains male coded and focuses mainly on male coded production. However, the reality is that in some developing countries such as South Africa being a woman or man is still significantly linked to other social relations such as race, class, sexuality, ethnicity, religion, and age (DTI, 2007). Thus being a woman or man in South Africa can be linked to multiple inequalities. Indeed, historically, gender has been a source of inequality as it often determines unequal access to socio-economic opportunities. Within science technology and innovation (STI) there are differences in innovation activities. These differences are often determined by gender representativeness of women in fields that frequently produce innovations. Therefore, the issue of gender and innovation requires more in-depth analysis.

Gender is also shaped by social institutions such as markets, states, values, and norms (Fraune, 2015). Norms and institutions are particular forces that shape social categorization and structure of power within society (Fraune, 2015, p. 58). Thus women and men's learning sometimes reveal their local roles in society (Najjar, Spaling, and Sinclair, 2013).

Mainstreaming gender particularly in STI remains an important intervention which seeks to integrate gender analysis into STI policy development. More importantly, a gender perspective shifts our attention from viewing women as individuals to interactional and institutional structures that can open up opportunities for change. Gender analysis addresses the transformation of gender relations and highlight an aspect of the system that can enhance the effects of innovation (Danilda and Thorslund, 2011; Fraune, 2015). Mainstreaming gender seeks therefore to identify new pathways for inclusive systems of innovation and development and enhance social cohesion. In the context of economic development, gender diversity can be an important source of economic growth and development. Thus, a gender perspective needs to be seen as an instrument for enhanced creativity in innovation and identifying new opportunities for growth. However, this requires a deep analyses of both the leaky pipes- the loss of women in the transition from the educational system to the STI workforce or women entering the field of STI but not staying resulting in the poor representation of women in STI careers - and the glass-ceiling effects on women- which refers to the lack of women representation in high level positions. Indeed, there is still not enough knowledge about why women drop out of STI system at various points particularly after tertiary education and before going into the STI workforce and why in certain fields and regions the numbers of girls and women in STI remain low at all levels (UNESCO, 2010).

Gender is a contextualised phenomenon and therefore gender mainstreaming should be viewed in specific contexts. Likewise, the analysis in this paper occurs at two levels. One is the socio-economic context which provides a broader context for viewing gender mainstreaming. The second is the STI context which provides a specific policy context for analysing gender mainstreaming. Consequently, the paper is organised into four sections of material. First is the broad analysis of gender mainstreaming. Second is the examination of innovation, innovation systems and gender. This section provides a conceptual framework for analysing STI and gender in the third section. That is, the focus in the third section is on the analysis of the intersection between gender and STI. The final section concludes the discussion and highlight areas for further research. Overall, the paper contends that improved gender awareness can lead to the generation of new knowledge and insights for policy development and research.

2. Gender Mainstreaming

Sex refers to the universal biological differences between females and males. By contrast gender refers to social attributes and opportunities associated with being a female or male and the relationships between women and men, and girls and boys (ILO, 2010, p. 3). Put differently, gender refers to the social differences between women and men that have been learned, are changeable over time and have wide variations both within and between cultures (Danilda and Thorslund, 2011). Gender roles are what a society or culture constructs and prescribes as proper roles, behaviour and personal identities for women and men (ILO, 2010, p. 3). These gender roles and characteristics affect power relations between men and women and can result in varied inequalities including access to opportunities.

It is argued that men and women have similar inherent preconditions and are only constructed masculine and feminine by education, society and role models, with political and economic interests supporting this distinction in favour of a clear gender-specific separation of work that discriminates women (Patz, 2011, p. 8). The impact of gendered toys that boys and girls play with while they are young remain partly a key element of the differentiated learning experience between boys and girls and reflect the traditional and stereotyped division of labour between men and women. Historically, social contexts often reproduce gendered systems that segregate between men and women both horizontally and vertically. Horizontally, men and women tend to be active in different sectors. Vertically, men and women often occupy different levels and positions. Consequently, gender mainstreaming seeks to integrate a gender perspective into policy and practice with a view to promote equality between women and men (Bryan and Varat, 2008; Hannan, 2000).

In the analysis of gender, the focus is often upon the relationships between men and women in society, as individuals, as groups and within institutions (DTI, 2007). Put differently, gender mainstreaming seeks to address unequal social and institutional structures that result in inequalities. It identifies the different social, cultural and economic realities, needs, and interests of women and men and the inequalities of their relationships (DTI, 2007). Gender mainstreaming highlight the systemic nature of exclusion and disadvantage faced by women and seek to facilitate systemic

interventions (DTI, 2011). Gender mainstreaming can also be used to assess how policies impact on the lives and positions of men and women as well as taking responsibility to redress them if necessary (Danilda and Thorslund, 2011; DTI, 2007).

The focus on gender mainstreaming has largely been viewed as a political strategy and its articulation as a policy approach (Daly, 2005). Three forms of mainstreaming can be identified. First is the integrated approach where the responsibility for gender equality is extended to all or almost all the actors that are involved in public policy and is embedded across institutions in society. Second is where government departments or ministries are involved in the implementation of a plan or program of gender equality. In the third approach gender mainstreaming is fragmented and confined to a small number of policy domains and is mainly disconnected from the general government policy on gender (Daly, 2005).

Like gender, gender mainstreaming is constructed in different contexts and therefore can be viewed in a range of contexts (Bryan and Varat, 2008). In the field of innovation, gender mainstreaming seeks to institutionalise gender equality in the sphere of innovation. This requires that we shift our attention from individuals to the structures, processes, systems, and norms that reproduce gender inequalities in our innovation systems and thus open up opportunities for change. Indeed, gender mainstreaming is especially grounded in a strategy for change (Daly, 2005).

At an international level, gender mainstreaming has been influenced by a number of developments. In 1979, the Gender Assembly of the United Nations adopted the Convention on the Elimination of all Forms of Discrimination against Women (CEDAW). This Convention outlines minimum standards for governments to ensure an end to gender discrimination and promote gender equity. CEDAW came into force in 1981 after twenty countries ratified it (United Nations, 2011; Geisler, et al 2009; Public Service Commission, 2006). The post-apartheid South African government ratified the CEDEW in January 1996 and called for all stakeholders, parties and employers to condemn discrimination against women in the governance of the country. In 1995, the United Nations organised the World Conference on Women which was held in Beijing. The Beijing Platform of Action was adopted in September 1995 and set out areas of concern regarding the status of women and gender

equality, including women and economic empowerment, women and decision-making, women and poverty, institutional mechanisms for the advancement of women, and the human rights of women and girls (Public Service Commission, 2006).

In the particular case of South Africa, gender mainstreaming is guided by a number of legislative frameworks. Gender equity is enshrined in the Constitution of the Republic of South Africa, Act 108 of 1996 (South Africa, 1996). The Bill of Rights places emphasis on prohibiting unfair discrimination directly or indirectly against anyone on the basis of sex, race, or marital status (South Africa, 1996). Equality is also promoted through affirmative action and employment equity throughout workplaces (Public Service Commission, 2006). The Gender Policy Frameworks, as outlined in the Framework for Transforming Gender Relations and the South African National Policy Framework for Women's Empowerment and Gender Equality, requires all South African employers to establish dedicated gender units to assist in the formulation and implementation of effective action plans to promote women's empowerment and gender equality in the workplace, structures, policies, and procedures and to facilitate equal access to goods and services for both women and men (Geisler et al, 2009; Public Service Commission, 2006).

What is encouraging is that consensus exists about the increasing importance of gender in the discussion of innovation systems. The economic case for gender equality stresses the wider economic benefits of gender equality. The labour participation of women in the economy contributes to economic growth. Indeed, women's marginalisation continues to negatively impact on poverty reduction, access to productive opportunities and economic growth. However, women are not a homogeneous group and therefore are not impacted uniformly by inequalities. While women have access to labour markets, most rewarding opportunities are accessible to those women who have access to education, training, and skills development. In the case of South Africa, Geisler et al (2009), highlight high unemployment rate of women, especially Blacks, in the country in spite of economic growth since 1994. To a large extent, Black African women's employment remains either within the traditional female occupations or the domestic and farming sectors often as casual workers occupying very low positions with very little rewards. Evidence from South Africa also shows widespread and increasing entry of women in largely unregulated

informal sector (Kabeer, 2012; Office on the Status of Women, undated; Bradshaw, 2012). A large number of economically active women are likely to be found in both the informal and subsistence sectors, as well as in unpaid family labour than the formal economy. Thus, women's increased labour force participation has not been accompanied by increased participation in the formal employment.

As an economic policy goal, gender mainstreaming is aimed at increasing the number of businesses owned by women and improve access to quality job opportunities, boosts productivity, and enhance the demand for goods and services produced by women. That is, the main objective is to accelerate women's economic empowerment by recognising the contribution that STI can make in unlocking the growth potential of their enterprises. It is expected that the application of STI can transform the productive capacity of their enterprises and open up more business opportunities. Overall, supporting women entrepreneurs in both formal and informal sector through the transfer of technology from research institutes and universities can reduce poverty and improve the economic situation of women particularly in developing countries. With their money, women are likely to educate both boys and girls and thereby contribute to increased number of women in the innovation system. Indeed, interesting insights can be drawn from the analyses of the intersection between gender and innovation.

3. Innovation, Innovation Systems and Gender

Danilda and Thorslund (2011, p. 26) argues that originally, the concept of innovation systems was developed to explain the differences in economic growth between countries and was soon adopted into innovation policy. The concept remains helpful in understanding the conditions that are conducive for economic growth, generation of new jobs and social cohesion. Likewise, innovation is viewed in terms of its potential to address major social problems and as a way of stimulating economic development (Schiebinger and Schraudner, 2011).

Recognising that innovation is not gender neutral enables us to view innovation in its economic, social, cultural, institutional and political settings and as it impacts on innovation. The emphasis is on viewing innovation as a process which results from a social interaction process that occurs among people and between men and women

with different power relations (Ostergaard, Timmermans, and Kristinsson, 2011). Moreover, since innovation is an interactive process which results from interaction among diverse actors, the diversity or lack of it affects the way knowledge is generated and applied in the innovation process (Ostergaard, Timmermans, and Kristinsson, 2011).

Science, technology and innovation are connected to masculinity (Danilda and Thorslund, 2011). In the production of gender the male and men are created as a norm. For example, in much engineering design, men are taken as the norm. Consequently, women are sometimes left out in the discovery phase. The design of vehicle seatbelts is a particular example. Conventional seatbelts do not properly fit pregnant women (Schiebinger and Schraudner, 2011). To make up for this gap, a supplementary strap was then developed in an effort to fix the original design (Schiebinger and Schraudner, 2011). Again, while cardiovascular disease is the leading cause of death for women in USA and Europe, cardiovascular disease has long been defined as a male disease with clinical standards and treatments developed accordingly (Schiebinger and Schraudner, 2011).

Focusing on information technology (IT) design, (Patz, 2011) argues that this sector is dominated by men and that the IT products that are generated by the sector are a reflection of the masculine perspective that neglects other alternatives. The lack of attention to women's needs is seen as a result of male domination in the areas of technology research, design and development (Patz, 2011). Therefore, a shift in mindset is required towards a greater focus on women as creators and users of technology (Patz, 2011).

Women's knowledge remains a huge untapped field that can result in the development of new innovations. Their tacit knowledge can be used to define new contexts for use of existing and new products and new solutions. Moreover, the integration of women's views, expectations and preferences early on in the innovation process is likely to make women customers feel more attracted to the respective products and thus the current distance to many technological innovations will diminish (Patz, 2011, p. 32). Furthermore, steps can be taken to encourage women to participate in innovation systems through their own enterprises and active engagement in innovation industry.

Gendered innovation introduces new analytical perspectives for considering the role of gender as a determinant of research outcome. Schiebinger and Scraudner (2011) define gendered innovations as the process that integrates sex and gender analysis into all phases of basic and applied research to assure excellence and quality of outcomes. Likewise, gendered innovations can enhance excellence in science, medicine, and engineering both in terms of knowledge and personnel and lead to gender responsible science and technology and seek to enhance the lives of women and men globally (Schiebinger and Scraudner, 2011, p. 154). Gendered innovations seek to build inclusive scientific communities where men and women share equally at all levels of decision making including policy and defining and carrying out the research; enhance creativity; stimulate economic and technological development; and, make research more responsive to society (Schiebinger and Scraudner, 2011). Including gender analysis in STI can spark creativity, offer new perspectives, pose new questions and open new areas for research (Schiebinger and Scraudner, 2011).

4. Gender and Science Technology and Innovation

Science technology and innovation (STI) institutions developed over a long period of time without much participation from women. Therefore, they cannot be neutral as they are embedded in their historical trajectories. To the extent that Western-style science has been replicated around the world, institutional structures, cultural stereotypes and divisions of labour disadvantage women's participation (Schiebinger and Scraudner, 2011, p. 156). Consequently, within STI women have historically been under-empowered.

There are multiple reasons for the underrepresentation of women in scientific and technological fields with many of them grounded in the Western social, political and religious culture that restricted women's education and the realisation of their scientific and technological careers for over centuries (Patz, 2011). Their absence in technical inventions has a historical context. Until fairly recently, women in Europe and the United States of America (USA) could only produce or market an invention under their husbands or a male family member given their limited property rights (Patz, 2011, p. 54). Thus the lack of women in STI is not an accident but a

consequence of patriarchal relations. The problem is not only men's monopoly of technology, but also the fact that gender has become embedded in the technology itself (Patz, 2011, p. 62). Again in creating equal opportunities for both men and women, the tendency has been to support women to fit into men's career models but fail to challenge power relations that are embedded in these career models.

Within STI gender mainstreaming involves more than increasing women's participation. It involves identifying and addressing the gender perspective in all areas of STI (Hannan, 2000). Furthermore, gender mainstreaming provides an analytical approach that enables us to assess the STI sector from a gender equality perspective. This analysis enables us to recognise the presence of gender biases in STI structures even when men or women are not visible.

Bringing a gender perspective to STI is an effort aimed at enhancing the effectiveness of STI policy and contribute to the sustainable achievement of STI goals. In particular, women comprise approximately half the intellectual potential of any nation(UNESCO, 2010). Their exclusion in STI deprives the nations of their potential contribution to the knowledge economy. By contrast, their inclusion can enhance the national STI capacities and their greater involvement in the knowledge economy. Their increased involvement should also be accompanied by their advancement through appointments to higher positions within the STI such as heads of science departments, deans of faculties, vice-chancellors of universities, and heads of companies. This will enhance the de-gendering of the context within which knowledge is produced and commercialized.

Human resources have different dimensions in terms of education, training and experience. Likewise, in a gendered society, demographic factors such as gender, age, cultural backgrounds have an impact on how people apply and combine existing knowledge and communicate their understandings. Diversity is thus considered a positive factor since it creates a broader knowledge base for creativity and innovation.

Given that women represent half of every nations' human resource base, it is important to increase the integration of women into the process of designing technology and into the context of its use (Patz, 2011). Enhancing access to higher education opportunities can greatly improve the position of women in STI. In this

regard, China has a long history of developing women scientists which dates back to 1949. The All-China Women's Federation (ACWF) was formed in 1949 to work towards advancement of Chinese women of all ethnic groups in all walks of life (UNESCO, 2010, p. 27). In India, the objective of the Scientific Policy Resolution of 1958 was to foster, promote and sustain the cultivation of sciences and scientific research in the country and to secure for the people all the benefits that can accrue from the acquisition of scientific knowledge (UNESCO, 2010, 31). The India's 2003 Science and Technology Policy has a specific focus on women as it seeks to promote the empowerment of women in all science and technology activities and ensure their full and equal participation (UNESCO, 2010, 31).

Mobilizing and retaining women in STI and addressing their priorities in STI are all important considerations. To achieve the objective of inclusive STI, programmes tend to focus on increasing the participation of women in STI. This approach often views the challenge of lack of women in STI as a pipeline problem and assumes that more women need to be trained in various STI fields, and that more support is provided for women's education and careers (Schiebinger and Scraudner, 2011). The implicit assumption in this approach is that science is a neutral subject (Schiebinger and Scraudner, 2011). It therefore fails to recognize the need to transform the STI and STI institutions in order achieve gender equality.

While education is a right, access to quality education remains a challenge in many developing countries. The lack of science infrastructure in the form of laboratories in many schools located in rural areas and urban poor neighbourhoods partly create inequalities. This situation lays the foundations for inequitable STI systems within developing countries and between the developed and developing countries. The lack of quality science education at lower levels impacts on the production of scientists particularly those that can become role models such as successful academics or entrepreneurs.

The contribution of highly educated mothers can be a first level of de-gendering the next generation of scientists. It is claimed that highly educated mothers' laps are the first and most important schools for both sons and daughters. It is there that mothers can promote equality and non-discrimination and cooperation among young men and women and prevents gender-based superiority or inferiority complex (UNESCO,

2010, p. 35). Therefore, the home environment is equally important in terms of influencing the career choices made by women later in life.

Women remain under-recognised drivers of innovation and social and economic agents. This also limits girls and women's opportunities to meet their basic needs and improve the quality of their lives and those of their families and deprives the nations of the contributions they could make in society (UNESCO, 2010). Consequently, women need to be viewed both as users of innovation and as contributors to innovation. The perspective of user-driven innovation, opens up more opportunities for new products and services. Silverstein and Sayre (2009) cited in Patz (2011) highlight that as a market women represent a bigger opportunity than China and India combined. While women influence 80% of consumer spending decisions, 90% of technological products are designed by men (Danilda and Thorslund, 2011). Again, women influence 60% of new car purchases in Japan and make up about 47% of PC users in Europe (McKinsey, 2007 cited in Patz, 2011). In spite of the observations that women represent a growing proportion of the consumer base, innovation and technological designs have tended to favour the dominant group with the needs of women users frequently neglected. There is a need therefore for a market research that includes gender perspectives and can lead to product designs that are more adapted to the needs of the users. The systematic integration of gender aspects in the design of technology represents an important driver for the quality, usability and acceptance of new products and solutions and for the success of technological innovations in the market (Latz, 2011, p. 34). Danilda and Thorslund (2011) argue that successful and profitable innovations can be developed by working with users and including them in the process thereby tapping into the tacit knowledge of their problems and needs. Therefore, looking at women within the context of user-driven innovation opens up more opportunities for innovation and redress.

Gender bias in research limits scientific creativity, excellence and benefits to society (Schiebinger and Schraudner, 2011). Thus, gender mainstreaming needs to include gender analysis in basic and applied research with gender analysis becoming an integral part of identifying priorities and designing research (Schiebinger and Schraudner, 2011). Indeed, it is critically important for women to be involved in the

innovation processes as their marginalisation has a profound influence on the design, technical content and use of innovations.

Public understanding of science and technology is equally relevant in the mainstreaming of gender in STI as it can promote an environment that values the role of women in STI (UNESCO, 2010). Equally important is the need to identify stakeholders whose work is concerned with the gender dimensions of STI and development. From these stakeholders, a national forum for gender and STI can be established to define policies and national priorities as well as national programmes of action that seek to root out gender inequalities in STI. Setting targets within the STI workforce can be a useful strategy for the transformation of the STI system. The achievement of these targets is more likely to enhance the presence and visibility of women in STI. Equally important is the perception that science as a career is less rewarding in financial terms than other careers (UNESCO, 2010).

5. Conclusion

The discourse on innovation and gender emphasizes a shift from focusing on individual women or women as a grouping to the system which reproduces inequalities in the STI and continue to make women invisible. Indeed, the existence of gender disparities in STI partially reflects gender disparities in society.

STI structures are still male dominated with decisions heavily influenced by men. What is needed is a transformative gender perspective which can be included in the analyses of innovation systems. Such an analyses can enhance the development innovations, create new innovation processes, and alternative value propositions (Danilda and Thorslund, 2011). Indeed, the inclusion of a gender perspective in the analyses of innovation systems can generate new insights, and expand both social and technological innovations. Indeed, gender mainstreaming is likely to create a more inclusive system of innovation.

As a focus area, the theme of gender in STI and development is a broad one. Thus it requires a range of expertise in varied disciplines and contexts where its implications can be properly considered. Equally, national strategies for rooting out inequalities in systems of innovation are required. Without a dedicated strategy at the national

level, the needs of women in the STI and more broadly in the national systems of innovation will remain inadequately addressed. Similarly, there is a need to improve the general public understanding of science and sensitize the public and policy makers of the relevance and importance of gender mainstreaming in STI. This will require capacity building for gender mainstreaming at all levels of STI policy making

Mainstreaming gender in national systems of innovation is not limited to promoting the role of women in STI but extends to how STI can serve women's lives and livelihoods. Indeed, decision makers including those in the NGO sector lack deeper knowledge of the gender dimensions of STI for development (UNESCO, 2010). Overall, a gender analysis sparks creativity by offering new perspectives, posing new questions, and open new areas of research. Given the paucity of studies on gender and innovation systems, there is room for further research especially in specific empirical settings.

References

- Bradshaw, S. 2013. Women's role in economic development: Overcoming the constraints. United Kingdom: Sustainable Development Solutions Network.
- Bryan, E., and Varat, J., 2008. Strategies for Promoting Gender Equity in Developing Countries: Lessons, Challenges, and Opportunities, Woodrow Wilson International Center for Scholars, Washington, DC.
- Daly. M., 2005. Gender Mainstreaming in Theory and Practice, Oxford University Press, Oxford. (pp. 433-450)
- Danilda, I, and Thorslund, J. G. (eds)., 2011. Innovation and Gender, VINNOVA, Sweden.
- DTI, 2011. Towards an Enabling Environment for Women Economic Empowerment in South Africa, Department of Trade and Industry, Pretoria.
- DTI, 2007. Draft Strategic Framework on Gender and Women's Economic Empowerment, Department of Trade and Industry, Pretoria.
- Fraune, C., 2015. Gender matters: Women, renewable energy, and citizen participation in Germany, *Energy Research & Social Science*, &, pp. 55-65.
- Geisler, G; Mokgope, K & Svanemyr, J. 2009. South Africa: The National Gender Machinery, Gender Mainstreaming and the Fight against Gender Based Violence. Republic of South Africa: Human Development Department.
- Hannan, C., 2000. Gender mainstreaming in economic development in the United Nations, paper presented at the Ministerial Conference on Gender mainstreaming, Competitiveness and Growth, OECD, Paris, 23-24 November.
- ILO, 2010. Gender Mainstreaming in Local Economic Development Strategies, International Labour Office, Geneva.
- Kabeer, N. 2012. Women's economic empowerment and inclusive growth: labour markets and enterprise development. United Kingdom: School of Oriental and African Studies.

Najjar, D., Spaling, H., and Sinclair, A. J., 2013. Learning about sustainability and gender through Farmer Field Schools in the Taita Hills, Kenya, *International Journal of Educational Development*, 13, 466-475.

Ostergaard, C. R., Timmermans, B., and Kristinsson, K., 2011. Does a different view create something new? The effect of employee diversity on innovation, *Research Policy*, 40, 500-509.

Ozor, N., Oti-Boateng, P., Otwoma, D., Ndhine, E., 2014. Mainstreaming Gender in the National Science, Technology and Innovation (STI) Policy of Kenya, African Technology Policy Studies Network, Nairobi.

Patz, H. S., 2011. Gender and Technology: The 'Female Factor' in Software Design, Thesis submitted for the degree of Master of Business Administration, Continuing Education Center, Kraichtal, Germany.

Public Service Commission, 2006. Gender mainstreaming initiatives in the Public Service. Republic of South Africa: Communications & Information Services.

Schiebinger, L., and Schraudner, M., 2011. Interdisciplinary Approaches to Achieving Gendered Innovations in Science, Medicine, and Engineering, *Interdisciplinary Science Reviews*, Vol. 36, No. 2, June.

South Africa, 1996. Constitution of the Republic of South Africa, Act 108 of 1996. Republic of South Africa.

South Africa, undated. South Africa's National Policy Framework for Women's Empowerment and Gender Equality. Republic of South Africa: Office on the Status of Women, undated.

UNESCO, 2010. International Workshop on Gender, Science and Innovation for Development, Workshop Report, UNESCO, Paris, January 18-19.

United Nations, 2011. Applying a Gender Lens to Science, Technology and Innovation. New York: United Nations Conference on Trade and Development (UNCTAD).