

Comparative Study on
Gender Dimension of Policies Related to
The Development and Application of
Science and Technology
for Sustainable Development



RESGEST



REGIONAL SECRETARIAT FOR GENDER EQUITY
IN SCIENCE AND TECHNOLOGY
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REGEST



FOREWORD

The policy framework for gender equity is anchored on the principle of equality of rights among men and women. This principle is embodied in the Constitutions or legal frameworks of all countries. While some have simple statements focusing on equality before the law, others have specified in details on the measures needed for women to enjoy the full and equal human rights constitutionally conferred on them.

The intent and spirit of equality and access to opportunities covering all spheres of human endeavours-economic, social, and political – is manifest in all of the Constitutions. The policies laid out in Constitutions, laws and presidential or ministerial declarations are significant components of a policy framework for gender empowerment. Based on the Scanning of APGEST (Asia Pacific for Gender Equity in Science and Technology) Project (2000) , many countries do not have specific gender S&T policy and this is reflected in their respective Constitutions, legislative framework and ministerial declaration. Nevertheless, the spirit and intent of these policies mechanisms can serve as the basis for developing, supporting and empowering women in science and technology.

The Comparative Study on “Gender Dimension of Policies Related to the Development and Application of Science and Technology for Sustainable Development”, was conducted to find out the extent by which the integration of gender perspectives in science and technology policies as well as application of science and technology are supportive nationally as well as regionally. The Comparative Study consists of six country case studies in Asia (China, India, Indonesia, and Republic of Korea, the Philippines and Vietnam).

Hope the reader will find the report useful.



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Finally, our gratitude goes to the Gender Advisory Board of United Nation Commission on Science and Technology for Development (UNCSTD) and the donor agency, Government of the Netherlands for their support to gender, science and technology in the Asia Pacific Region.

TABLE OF CONTENTS

Foreword	iii
Acknowledgement	v
Contents	vii
I. INTRODUCTION	1
Background	1
Objectives of the study	4
Scope of the study	4
Justification of the study	4
Components of the study	4
Primary Sources of Information	5
II. COUNTRY SITUATION ON GENDER, SCIENCE & TECHNOLOGY	7
The People's Republic of China	7
India	16
Indonesia	21
Republic of Korea	29
The Philippines	35
Vietnam	41
III. FINDINGS	47
The legal and Policy Framework of Gender, Science and Technology	47

Participation of Women in S&T	49
Problems in Women's Participation in Science and Technology	50
Strategic Actions Taken and Implemented	51
IV. CONCLUSIONS	55
References	57

I. INTRODUCTION

Background

The world has committed itself to the advancement of women to achieve gender equality through science and technology and gender equality in science and technology, to improve the quality of life of the humankind and sustainable development. This commitment has been expressed by the four World Conferences on Women¹, the United Nations Commission on Science and Technology for Development (UNCSTD) Declaration of Intent of 1995, UNESCO World Science Report of 1996, the South East Asia and the Pacific Preparatory Conference for the World Conference, 1998, and the World Conference on Science: "Science for the Twenty-First Century: A New Commitment"². These commitments are further emphasized in the "Declaration on Science and the Use of Science", which states that: "Equal access to science is not only a social and ethical requirement for human development, but also essential for realizing the full potential of scientific communities world wide and for orienting scientific progress towards meeting the needs of human kind"³.

In response to the World Conferences on Women, one international workshop and regional meetings on gender, science and technology were convened in the South East Asia and the Pacific region. The workshop and meetings were:

- The International Workshop on Women and Technology in South East Asia and the Pacific, January 1996. It was the first government-level international activity to respond to the *Beijing Platform for Action* and the *Beijing Declaration of the Fourth World Conference on Women 1995*. The workshop was hosted by the UNESCO Office, Jakarta, and the Indonesian Institute of Sciences (LIPI). Building on the success of the workshop, a Regional Secretariat for Gender, Science and Technology jointly organized and managed by LIPI and the UNESCO Office, Jakarta was established in 1997⁴. It aims to enhance the status and role of women in the

1 The First World Conference on Women, Mexico City, 1975, The Second World Conference on Women, Copenhagen, 1980, The Third World Conference on Women, Nairobi, 1985, The Fourth World Conference on Women, Beijing, 1995.

2 Budapest 26 June-1 July 1999.

3 UNESCO 2000, Science for the Twenty-First Century, A New Commitment, Declaration on Science and the Use of Scientific Knowledge, Science Agenda - Framework for Action, 42, p. 14

4 Funded by the Netherlands Government through the Gender Advisory Board, UNCTD, the Regional Secretariat began its operation in March 2000. It was housed in LIPI during 2000-2002. Since 2003 the Regional Secretariat is housed in the UNESCO Office, Jakarta.

development of science and technology (S&T); maximize the benefits of S&T for the advancement of women as equal partners with men; network and manage regional cooperation in exchange of information and skills.

- In December 1996, UNDP in collaboration with UNIFEM and the M.S. Swaminathan Research Foundation brought together a regional group of leading women experts, scientists and technologists from 12 countries in the Asia Pacific to meet in Chennai, India. The group produced a ten-point Agenda for Action on "Women in Science and Technology, Science and Technology for Women". One of the points for action is: "Gender sensitize public policy, particularly in S&T" The group committed themselves to act as facilitators in the task of bringing the benefits of modern science and technology to the service of women and work for the gender-sensitization of public policy and ensuring its translation into actions through the sharing of knowledge and the building of skills to empower women.
- The South East Asia and Pacific Preparatory Meeting for the World Conference on Science, Sydney 1998⁵ The meeting identified several key issues, among others: (1) the lack of sex-disaggregated data collection and indicators; (2) the lack of gender-responsive women's environment in SET (science, engineering and technology) limiting provision for women's career development, and insufficient women in decision-making roles in SET, (3) the lack of training and understanding of gender issues in SET communities. The meeting recommended, among others, (1) the consolidation of existing efforts in the region and encouraging the establishment of both a national and regional network of sex-disaggregated statistics, database and the development of S&T gender indicators; (2) the recognition of the increasing role of non-governmental organizations (NGOs) in the promotion and development of S&T. NGOs should be tapped in bringing S&T to the grassroots and mainstreaming women in S&T.
- The First Regional Workshop on Gender, Science and Technology, conducted by the Regional Secretariat for Gender, Science and Technology in Southeast Asia and the Pacific, Jakarta, October 2000⁶ The conclusions and recommendations of the workshop are, among others: (1) to put in place the data system on S&T at both national and regional levels to support policy making, planning, programming, monitoring and evaluating progress achieved; (2) the need to mainstream gender in the formulation of policies and strategies of S&T development and their application to development; (3) the need to apply gender analysis framework in the formulation of programs and projects related to S&T development and application; (4) the need to enhance dynamic networking at the regional level among National Focal Points, at the national level among all stakeholders, and existing regional and international networks in gender, science and technology. One of the recommendations agreed was to speed up the setting up of a National Committee on Gender, Science and Technology or its equivalence to facilitate gender

5 UNESCO, Women, science and technology. Towards a New Development?, World Conference on Science, Budapest, Hungary, 26 June-1 July 1999, pp 33-41

6 Regional Secretariat for Gender, Science and Technology in South East Asia and the Pacific, 2001, Report Regional Workshop on Gender, Science and Technology, Jakarta, 16 - 18 October 2000.

responsive country specific action. So far, two national committees have been set up, in Indonesia and the Philippines.

- The Second Meeting of the Regional Secretariat for Gender, Science and Technology, Yogyakarta, 21-22 September 2004. The participants of the meeting agreed, among others, (1) that the promotion of GST involves work at the national, regional and global levels, which include GST data collection and analysis, research and studies on the root causes of the gender gap, formulation of S&T policies and programs based on the results of gender studies for their country, develop networking for sharing experiences and wise practices at the regional level⁷

One important event emanating from the Chennai Declaration was the initiation of the Asia-Pacific Gender Equity in Science and Technology (APGEST). It has three main activities: (1) Scanning of policy and institutional reform, programs and projects as well as institutions and networks addressing gender issues in the science, engineering and technology sectors related to human development and poverty alleviation. This project, Assessment of Resources, Best Practices and Gaps in Gender, Science and Technology in the Asia-Pacific Region, was conducted across 11 countries in five technology areas⁸; (2) Provide technical assistance to two pilot projects in Thailand and the Philippines⁹; (3) Dissemination of results and application of lessons in the region¹⁰. Results of the scanning *Assessment of Resources and Gaps in Gender, Science and Technology in the Asia Pacific Area* was published¹¹

Despite the declarations, recommendations and action plans to be implemented, however, data and information demonstrated that women are still under-represented in science and technology education and training, in research and development (R&D), in careers, policy and decision-making positions as well as in the enjoyment of benefits emanating from science and technology development and application.

Therefore, two questions could be put to the fore, namely:

- (1) To what extent to which the existing policies related to the development and application of S&T are supportive to the commitments of gender equality and justice for sustainable development.
- (2) What strategic actions could be identified and are implemented to ensure the integration of gender perspectives in policies related to the development and application of S&T for sustainable development.

7 2nd RESGEST Meeting, Gender, Science and Technology, Yogyakarta, Indonesia, 21-22 September 2004, Conclusions and Recommendations

8 The 11 participating countries are China, Fiji, India, Indonesia, Kiribati, Korea, Nepal, Mongolia, Philippines, Samoa, and Vietnam. The five technology areas were: biotechnology, green health, information technology, renewable energy, and water (UNESCO, APGEN, UNDP, N.D., Assessment of Resource, Best Practices and Gaps in Gender, Science and Technology in the Asia Pacific Region)

9 "Green health technology for Women's Empowerment and Sustainable Development" implemented by the Chulaborn Research Institute, Bangkok, Thailand, and "Nutritional and functional foods for women's empowerment and sustainable development" implemented by APPROTECH Indonesia in the Philippines. (op.cit. p.5)

10 The website hosting APGEST materials and documents: <http://www.unesco.or.id/APGEST>

11 UNESCO, APGEN, UNDP Assessment of Resources, Best Practices and Gaps in Gender, Science and Technology in the Asia Pacific Region, N.D.

A comparative study is initiated to have a regional overview related to questions mentioned above.

Objectives of the study

The objectives of the study are:

- To assess the extent to which the existing policies related to the development and application of S&T are supportive to the Asia Pacific and world commitments.
- To identify a number of strategic actions to ensure the integration of gender perspectives in policies and implementation related to the development and application of S&T for sustainable development.

Scope of the study

To get a regional overview on:

- The gender perspective of policies related to the development and application of science and technology
- *The mechanism for the integration of gender perspective in policies related to the development and application of science and technology (S&T)*
- The mechanisms for the monitoring and evaluation of the implementation of such policies.

The countries covered in the present comparative study are People's Republic of China, Indonesia, India, Republic of Korea, the Philippines and Vietnam¹²

Justification of the study

The results of this study will serve as baseline information and a "documented knowledge-base" about what have been achieved by the respective countries in addressing gender issues in policies related to the development and application of science and technology for sustainable development.

Components of the Study

The components to be studied and analyzed are:

12 These countries have presented APGEST country reports in 2000-2001. Information on the legal provision, national policies and programs regarding the development and application of S&T, and the advancement of women were contained in the respective country reports. As far as possible, the information are updated, based on country reports presented in the 2nd RESGEST Meeting in 2004.

1. The legal and policy framework or government mandate on gender, science and technology:
 - The relevant constitutional, legislative and policy tools. What are the legal frameworks and policies that can be utilized and drawn on to support the achievement of gender equality in S&T?
 - National laws and decisions that are powerful policy instruments in providing support for gender concerns.
 - How do our policy environments contribute to ensuring that gender, science and technology are justly positioned?
2. Government machineries on gender, science and technology.
 - Ministries for Gender Equality
 - Ministries of Science and Technology and other relevant ministries
 - Education and research sectors.
 - Civil society participation (government, non-government, community and private sector)
 - Women's participation in S&T, decision-making and advisory positions in S&T .

Primary Sources of Information

- ♦ Country reports presented at the First Regional Workshop on Gender, Science and Technology, Jakarta 2000 from People's Republic of China, Indonesia, Republic of Korea, Philippines and Vietnam.¹³
- ♦ Country reports "Assessment of Resources, Best Practices and Gaps in Gender, Science and Technology in Asian and the Pacific" (APGEST) 2001, from People's Republic of China, India, Indonesia, Republic of Korea, Philippines, and Vietnam.
- ♦ UNESCO-APGEN-UNDP, *Assessment of Resources, Best Practices and Gaps in Gender, Science and Technology in the Asia Pacific Region*.
- ♦ Country papers presented at the Second RESGEST Meeting on Gender, Science and Technology, 2004, from People's Republic of China, Indonesia, and Republic of Korea.

13 Other participating countries of the Regional Workshop were Cambodia, Myanmar, New Zealand and Thailand.

II. COUNTRY SITUATION ON GENDER, SCIENCE AND TECHNOLOGY

THE PEOPLE'S REPUBLIC OF CHINA

Country Data

	2000	2002	2003
HDI (Human Development Index)	99		94
GDI (Gender Related Dev.Index)	79		71
Population (million)	1.255.7 million	1.294.9 million	
WLE (Women Life Expectancy)	72.3	73.2	
WLR (Women Literacy Rate %)	74.6	86.5	
SA (Surface Area Sq.km)	9.6 million		

(Source: Human Development Report 2000, 2001 and 2004)

Legal and Policy Framework on Gender, Science and Technology

Legal Framework¹⁴

Law of the People's Republic of China on Accelerating Science and Technology Progress, promulgated on July 2, 1993

The law aims to encourage scientific studies and develop technologies, disseminate the application of scientific results, reconstruct the traditional industries, develop high-tech industries.

Law of the People's Republic of China on Promoting Transformation of Science and Technology Results enacted on April 5, 1996 and put into effect from October 1996.

The law aims to enhance the application of science and technology results, regulate

¹⁴ Cheng Donghong and Jia Ziwen, Women's Participation in Science and Technology in China, Country Report to the Second Regional Workshop RESGEST, Yogyakarta, 21-24 September 2004, pp 5-7

the activities of the transformation of science and technology results, accelerate science and technology progress, and promote economy construction and social development.

Regulations on Promoting the Transformation of Science and Technology Results, to enforce the implementation of the two laws

The regulations encourage science research agents, colleges and universities, and science research teams to participate in R&D on high-tech industries and to transfer science and technology results.

Law of the People's Republic on Popularization of Science and Technology was enacted and put into effect on June 29, 2002.

The law aims to enhance the popularization of science and technology, promote science literacy, and push on the economic and social development. This is the first law on science and popularization in China.

Law on Protecting Women's Rights and Interests promulgated on April 3, 1992.

The law regulates that:

- Women have the equal rights and interests as men in politics, economy, and education, social and household life.
- Women have equal rights and interests in participating in the management of state, economy, education, and any other fields.
- There must be a certain proportion of women representatives in the National People's Congress as well as different local levels, and improve the participation step by step.
- The government and non-governmental organizations must be impartial in the selection and placement in decision-making positions of men and women leaders.
- The government and non-governmental organizations must protect women's rights in their participation in science and technology, literature, art, and in any other activities.

Policies for the Advancement of Women

Program for the Development of Chinese Women (1995-2000) - 1995

Program I includes:

- Gradually increase the rate of women receiving education, promote women's literacy, and cultivate women experts in all fields;
- Enhance the implementation of Nine-year Compulsory Education, and decrease the dropout rate of school-age girls;
- Reduce 3 million women illiteracy each year, and reach the goal of elimination of

all youth illiteracy by the end of 2000;

- Strengthen vocational education, staff training and practical skill training of women, to promote women's working ability.

Program II (2001-2010) – May 2000, includes strategies in promoting women's participation in science and technology:

- Enhance the equal education opportunities and channels for women, and narrow the gap between men and women;
- Ameliorate the proportion of female students in different subjects, and cultivate more women professionals and experts in new high-tech and modern management fields;
- Enhance women's ability in formal, informal education and training, and improve women's literacy and ability in using science and technology.

The National Working Committee on Women and Children under the State Council is in charge of the implementation of Program II. The China Association for Science and Technology (CAST) is a member institution of the Committee. Respective tasks have been appointed to different government and non-government organizations, and supervising and evaluation system have been set up.

Gender indicators added to the annual statistics of China Association for Science and Technology (CAST)¹⁵

In order to enhance the awareness of gender mainstreaming in science and technology, CASR added 4 indicators in the annual statistics. The 4 indicators are: female employed personnel, women in science and technology, female directors, and female individual members in various organizations. CAST collected related data in 2002 and 2003, within science and technology associations at different levels, and 168 national academic and professional societies.

Ministries and Other Governmental Agencies¹⁶

The State Commission of Development and Planning

Based on the recommendations the National Working Committee for Women and Children under the State Council, the State Commission of Development and Planning conducted a broader analysis of employment, compulsory education, basic medical treatment and protection of weaker groups related to the development of women and children. The objectives and measures in gender, science and technology are formulated in the five-year plan for the national economy and social development.

¹⁵ Ibid, p 10

¹⁶ China Association for Science and Technology, *Assessment of Resources, Best Practices and Gaps in Gender, Science and Technology in Peoples Republic of China*, pp 20-24

The Ministry of Education

In the ninth five-year plan and 2010 development program for the National Educational Cause, the Ministry of Education clearly puts forward the objectives to narrow the gap between boys and girls attending school. Document No. 11/1996 stipulates the reinforcement of the education of female children in poverty-stricken and minority areas. In 2001, the ministry clearly stated that all levels of government should include on their agendas the condition that female children must receive equal education.

The Ministry of Science and Technology

In the ninth and tenth five-year plans, state funding for the research and development of projects related to women's health and family planning were arranged. The Ministry of Science and Technology introduces new applied methods in the technology of agriculture in the rural areas, through the empowerment of women by training them to master some applied technologies. The ministry supports the Double Learning and Double Emulating campaign, initiated by the China Women's Federation.

The Ministry of Agriculture

According to the requirements specified by the National Working Committee for Women and Children, the Ministry of Agriculture researched and investigated the issues affecting women and children in rural areas. Based on the results of the investigation, the Ministry engaged in: (1) supports projects that target juveniles, especially girls, in poverty stricken areas, (2) reinforces training in appropriate technologies for women in rural areas, (3) a training project titled Rural Youth Leaping into the Next Millennium. The project focuses on technology in agriculture, including marketing and managerial skills, (4) supports projects that help poverty-stricken women in rural areas by extending small grants and loans.

The Ministry of Public Health

The key points of the development programs for women and children of the Ministry of Public Health in the 10th five-year development plan and the 2015 program for medical care, are to reduce the mortality rate among pregnant women and those giving birth, and to eliminate tetanus among newborn babies.

*Non-governmental Organization Related to Gender, Science and Technology*¹⁷

All-China Women Federation

The All China Women Federation was founded on April 3, 1949. Its aim is to protect women's rights and interests and to promote gender equality.

Over the years, the federation has done a lot of work to promote the development of women and children, especially in enhancing women's knowledge of science, and helping women out of poverty with science and technology.

To enhance women's knowledge, the federation with support of the government, has provided cultural education and skills training to eliminate illiteracy among young women in rural areas. It has been operating the Budding Spring Program to encourage dropouts to return to school. As for women in the central and eastern parts of the country, the federation mainly supports them to learn new technologies and gain knowledge of the market economy, leading them to increase their family income quicker.

At the start of the new millennium, the federation put forward new objectives to promote a female equality project and to actively participate in the development of science and technology. It calls on educated women in research institutions, universities and colleges as well as high-tech enterprises to make greater contributions to the development of science and technology, and to transfer and apply achievements from this field to production and the market. In rural areas, innovation and the extension of agricultural technologies should be widely promoted and encouraged to help a large number of female leaders become financially stable through the application of science and technology.

China Association for Science and Technology (CAST)

The China Association for Science and Technology (CAST) is a non-governmental organization of Chinese workers employed in science and technology. Founded on September 18, 1958, the organization is a combination of the Chinese Natural Science Union and the Chinese Association for Scientific and Technical Popularization.

CAST is a federation of 165 professional societies, including 31 provincial branches and their widely distributed grassroots organizations, which unites a total of 4.3 million members throughout China.

Its main targets are to organize academic exchanges with an aim to enliven ideas, promote the development of various disciplines, popularize scientific knowledge, propagate scientific ideas and methodology, disseminate advanced technologies and organize science-related activities. It also voices the opinions and demands of those employed in science and technology, safeguard their legitimate rights, encourage

17 Ibid, pp26-30

them to participate in science and technology-related decision-making as well as state affairs, organizes international exchange programs, maintains and develops collaborative relations with foreign scientific communities, and so on.

Chinese Academy of Agricultural Sciences and Local Agricultural Sciences Institutions

It is a state research and development institution in agriculture. Its biotechnology research institute has made achievements in agro-technology, such as in genetic engineering plant cell culture, hereditary transfers and high-yielding crops. These achievements have brought many benefits in generating women's family income.

Besides the state-run Chinese Academy of Agriculture Sciences, there are many local agricultural research institutes that have also made great efforts in developing and extending agricultural technologies, such as the Academy of Agricultural Sciences in the province of Shanxi and the Academy of Agricultural Sciences in the Xingjian autonomous regions.

China Agricultural University

This is China's highest educational institution in agricultural sciences. There are two institutions on women's studies, which have been pioneers in combining women's studies with science and technology in China. They carry out research related to agricultural mechanization and women, women's health, development of information technology, and women's development in rural areas. Female scientists also make up an important proportion of other levels at science and technology institutions. At the Chinese Academy of Sciences, female scientists with senior titles make up 20.68% of all research fellows. More than one-third of the entire science research community is female.

Women's Participation in the S&T Sector and in Decision Making Positions

Gender ratio of science and technology workers in the Chinese Academy of Sciences (end 2000)

	Total	Occupied by women	Female proportion
Full Senior Titles	4.600	490	10.65
Associate Senior Titles	9.900	2.510	23.35
Junior Titles	23.500	9.800	41.70
Total	38.000	12.800	33.68

Data Source: Personnel Department of CAST

Gender ratio of science and technology workers in China
(unit 1,000 person)

	Total	Occupied by women	Female proportion
Scientific Research	744	262	35.2
Technical Service	903	309	34.2
Total	1,642	571	34.7

Data source: Chinese Statistic Annals of 2000

Female personnel in science and technology have attained notable achievements in research, development and application. The achievements acquired by women can be observed from the top three awards in the areas of science and technology that were set up by the Chinese government to encourage personnel in science and technology. In all three awards, the proportion of females exceeds 12 percent.

Therefore, women have overcome social obstacles and the traditional bias to reveal their intelligence through their personal endeavors. Along with their male counterparts, female workers in science and technology have given their life and energy to China's scientific exploration. But there are still many obstacles to overcome. Female workers in science and technology normally do lower and mid-level studies, while male mainly do high level studies.

Female Leadership Ratio in the China Association for Science and Technology

Leading Bodies				Institution			
Titles	Number	Female	Ratio%	Titles	Number	Female	Ratio%
Director Generals	26	4	15.38	Directors	33	5	15.15
Director	57	34	59.65	Division Chief	143	41	28.67

Data source: Survey on Leadership in China Association for Science & Technology in 2000

According to the data collected in this survey, Chinese women have made obvious achievements in science and technology by way of their efforts and through the support of all.

**Female Academicians in the Chinese Academy of Science
by the end of 1999**

Subjects	Total	Female	Ratio (%)
Mathematics and Physics	115	8	6.95
Chemistry	109	8	7.34
Biology	108	7	6.48
Earth Science	113	5	4.42
Technology	180	9	5.00
Total	625	37	5.92

**Female Academicians in the Chinese Academy of Engineering
by the end of 1999**

Subjects	Total	Female	Ratio (percent %)
Mechanics and Delivery Technology	79	1	1.27
Informatics and Electronic Engineering	94	2	2.13
Chemical Metallurgy and Science Materials	74	4	5.41
Energy and Mining Industry Civil Engineering, Water	71	1	1.41
Conservancy and architectural Engineering	71	2	2.82
Agriculture, Light Industry & Textile and Environmental Science	75	9	12.00
Medical Science, Pharmaceutical Science and Healthcare	80	15	18.75
Total	544	34	6.25

Data Source: *Statistics from the Chinese Academy of Engineering and the Chinese Academy of Science*

Current Problems in Women's Participation in Science and Technology

In Education :

- ♦ Impact of traditional culture and ideology. China has a history of more than 5,000 years and has splendid culture. But part of the traditional culture and ideology has become obstacles to the progress of modern civilization, especially for women. The traditional ideology "*Boy is more important than girl*" has great impact in some places, especially in rural areas. The parents always prefer to give the chance of obtaining education to boys than girls. What is more serious is that some parents think that girls will get married and go out when they grow up. Therefore it doesn't matter whether they are illiterate or not. These old ideologies have been preventing girls from having better access to education, especially to higher education.
- ♦ Economic conditions. Nine-year compulsory education is prescribed by national legislation. The tuition fee and living cost in colleges and universities are relatively high for a common family. When parents can not afford all their children to go to school, boys usually have the first opportunity to enter into colleges and universities. Whereas girls are often asked to give up their education chance, and begin to work earlier in order to relieve household economic pressure.
- ♦ Occupation opportunity. The proportion of women students majoring in science and engineering is low. Girls majoring in languages, education and medical sciences are more likely to find a job than those majoring in science and technology subjects.

In science and technology occupation

- ♦ Employment pressure. China has a big population around 1.3 billion, and the surplus of work forces is a critical problem. Most organizations, including scientific institutions, prefer to employ men rather than women, when they are in some conditions. Women, therefore, are more likely to become unemployed.
- ♦ Traditional culture and ideology. It is a serious factor hampering women's employment, especially in science and technology fields. "*Men work outside, and women undertake homework*", affects women's participation in science and technology heavily. Some women scientists and engineers who have a promising future in science and technology, may prefer to engage in housework and take care of the child after several years' of hard work in research. It is regarded that the ideal occupation of women are as teachers, doctors, rather than working in science and technology fields.
- ♦ Physiological difference. Because of the physiological character, women have the holy responsibility of human reproduction, which in certain degree hampers women's employment. Some employers hesitate to employ women because pregnancy and nurturing baby take too much time, and women cannot engross in their work due to these.

INDIA¹⁸

Country Data

	2000	2002	2003
HDI (Human Development Index)	128		127
GDI (Gender Related Dev. Index)	108		103
Population (million)	1.000 million	1.049 million	
WLE (Women Life Expectancy)	63.3	64.4	
WLR (%) (Women Literacy Rate)	43.3	46.4	
SA (Sq km) (Surface Area)	3.3 million		

(Source: Human Development Report 2000, 2001 2004)

Provisions in the Constitution of India

The Constitution of India guarantees:

- Equality before Law for women (Article 14)
- The State not discriminate against any citizen on ground only of religion, race, caste, sex, place of birth or any of them (Article 15(i))
- The State to make any special provision in favour of women and children (Article 15(3))
- Equality of opportunity for all citizens in matters relating to employment of appointment to any office under the state (Article 16)
- The State to direct its policy towards securing for men and women equality the right to adequate means of livelihood (Article 39(a); and equal pay for equal work for both men and women (Article 39(d))
- The State to make provision for securing just and humane conditions of work and for maternity relief (Article 42)
- The State to make to promote with special care the educational and economic interests of the weaker sections of the people and to protect them from social injustice and all forms of exploitation (Article 46)

18 UNESCO-UNDP APGEN SPPD Project, Assessment of Resources, Best Practices and Gaps in Gender, Science and Technology in the Asia Pacific Region, India Scanning Project M.S. Swaminathan Research Foundation, June 30th 2001.

- The State to raise the level of nutrition and the standard of living of its people and the improvement of public health (Article 47)
- To promote harmony and the spirit of common brotherhood amongst all the people of India and to renounce practices derogatory to the dignity of women (Article 51(A)(e))
- Not less than one-third (including the number of seats to be filled by direct election of Panchayat*) to be reserved for women and such seats to be allotted by rotation to different constituents in a Panchayat (Articles 243 D(3))
- Not less than one third of the total number of offices of Chairpersons in the Panchayats at each level to be reserved for women (Article D(4))

The Policy Framework on Gender, Science and Technology

Science and technology has been accorded high priority in India, since 1947. The history of Indian science since independence can be divided into three phases: the first phase served to establish a scientific infrastructure, the second, beginning in the 1960s concentrated on capacity building and on establishing a firm basis of political support for science. Since the mid 1980s after the adoption of a liberalized economy in 1991, science has been striving to make production and manufacturing more demand-responsive and internationally competitive. A twin goal has been to channel public expenditure towards programs of rural development and the satisfaction of basic needs. India continues to pursue a program of applying modern science and technology for national development. At present the country spends about 0.83 percent of its GNP on scientific and technological development. The commitment of the Nation to promote socio-economic growth of the country through the use of S&T has shown significant success in a short span of five decades and ranks among the few developing countries with considerable S&T expertise and the benefits of S&T have permeated all walks of life.

On March 4, 1958 the Parliament passed the **Scientific Policy Resolution (SPR)**, which emphasizes the Government's responsibility "to foster, promote and sustain by all appropriate means, the cultivation of science and scientific research in all its aspects – pure, applied and educational" The SPR also intends "to secure for the people of the country all the benefits that can accrue from the acquisition and application of scientific knowledge". The expansion in the number of government departments and ministries funding S&T and their considerable autonomy is another reflection of the growing importance attributed by India to S&T for accelerating development. **The Department of Science and Technology (DST)**, plays the supplementary role of assisting in the formulation of policy statements and guidelines for S&T and acts as secretariat for the advisory bodies on S&T to the government. DST launched in 1971, was instrumental in the creation of the **Department of the Environment and**

*) Panchayats – the lowest elected body and includes Gram (village), Mandals (block), Nagar (town) – or traditional village institution like village councils and village development boards having statutory characters.

Ocean Development in 1981, the Ministry of Non-Conventional Energy Sources in 1982, the Department of Scientific and Industrial Research in 1985 and the Department of Biotechnology in 1986.

Other than these there exists a chain of nearly 200 national laboratories, and an equal number of R&D institutions in the central sector coupled with about 1300 R&D units in the industrial sector.

The university system comprising of 162 universities, 32 institutions deemed to be universities and 10 institutes of national importance It is a source of S&T human resources development, producing around 200,000 S&T personnel every year.

The Council of Scientific and Industrial Research (CSIR) is another R&D powerhouse, with its 40 institutes dedicated to research and development in well-defined areas and around 100 field stations.

Indian Council of Agricultural Research (ICAR) is the nodal agency at the national level for promotion of S&T in the area of agricultural research and education and demonstration of new technologies as frontline extension activities.

National Plan

In India, the Five-Year National plans have always been the directive principles to formulate National and State policies of the Government. The first five, Five-year Plans were gender blind and did not specify or focus on women's needs and priorities. For the first time, during the Sixth Five Year Plan, a chapter on "Women and development" was introduced in the Plan document. A special scheme with application of science and technology for women was started in the Department of Science and Technology which has done very well and a large number of families in rural areas particularly have benefited which also drew attention to the needs of women.

Perspectives on the Advancement of Women in the Five-Year Plans

- Sixth Five Year Plan (1980-1985)

This plan is regarded as the landmark for women's development. The Plan adopted a multi-disciplinary approach with a three-pronged thrust, on health, education and employment of women. For the first time a separate chapter on women and development was included.

- Seventh Five Year Plan (1985-1990)

Development programs for women were continued, with the objective of raising their economic and social status and bringing them into the mainstream of national development. A very significant step there in was to identify and promote "beneficiary oriented programs" which extended direct benefits to women.

- ♦ Eighth Five Year Plan (1990-1995)

The plan is to ensure that the benefits of development from different sectors did not bypass women. Special programs were implemented to complement the general development programs. The flow of benefits to women in the three core sectors of education, health and employment were monitored vigilantly. Women enabled to function as equal partners and participants in the development process with reservation of membership in the local bodies. This approach of the Eighth Plan marks a definite shift from 'development' to 'empowerment' of women.

- ♦ Ninth Five Year Plan (1995-2000)

Empowerment of women and socially disadvantaged groups such as Scheduled Castes, Scheduled Tribes and Other Backward Classes and Minorities as agents of socio-economic change and development.

Promoting and developing people's participatory institutions like Panchayati Raj Institutions, cooperatives and self-help groups.

Strengthening efforts to build self-reliance

The convergence of services from different sectors

A women component plans at the Central and State levels.

Implementation of the Plan

The *Department of Women and Child Welfare* during, the eighth plan, has reset the priorities to accord special emphasis on employment and income generation activities for women and initiated Special Entrepreneurship Development Programmes for women. Women were trained in agriculture, animal husbandry, dairy farming, fisheries, handlooms, handicrafts, sericulture, social forestry, waste land development, and so on.

The *Department of Science and Technology* initiated the scheme "Science and Technology for Women" in 1981 with the objective of supporting projects aimed at the application of science and technology for the benefit of women, especially in rural areas. More than 500 projects have been funded across the country under the scheme so far. The programme serves as a common platform for the cause of developing technology for women, highlighting issues related to women's technology needs, and also issues related to women's health. A salient feature of this scheme is the involvement of women at all stages of the programme from identification to dissemination of technology. During the year 200-2001, 35 projects were approved in the priority sectors, such as post harvest technologies, land-based activities, women's health, income generation activities, drudgery removal, rural engineering, medicinal plants, pottery and natural dyes, etc. Some examples of the projects are:

- *Low cost processing and preservation of horticulture products.*

- *Development of Training cum service facilities for women on electrical, electronic, computer and information technology application.*
- *Cultivation, processing and marketing of high value medicinal plants*
- *Owning and sustaining rural water supply and sanitation programmes through rural women*

Women in science and technology

The representation of women in S&T fields is low. Data of 1997 showed that women represented 7.7% of scientists and engineers. Technician at 9.1% and ancillary personnel at 17%.¹⁹

19 Source: UNESCO (1997 Statistical yearbook 1997, in ibid p5

INDONESIA²⁰

Country Data

	2000	2002	2003
HDI (Human Development Index)	109		111
GDI (Gender Development Index)	90		90
Population (million)	206.3	217.1	
WLE (Women Life Expectancy)	67.5	68.6	
WLR (%) Women Literacy Rate	80.5	83.4	
SA (million km) (Surface Area)	1.9 million		

(Source: Human Development Report 2000, 2001, 2004)

Legal and Policy Framework on Gender, Science and Technology

The Indonesian Constitution

The Constitution of the Republic of Indonesia grants equality to all citizens, in line with the Indonesian state philosophy *Pancasila*.

- Article 27 paragraph (1) stipulates that: *“Every citizen enjoys equal status under the law and in government, and is obliged to uphold them without exception”* Paragraph (2) stipulates that *“Every citizen shall have the right to employment and to conditions of life commensurate with human dignity”*
- Article 28C stipulates that: *“Everyone has the right to develop his or her “own self” through the fulfillment of his or her basic needs, to education and to benefit from science and technology, arts and culture, in order to improve his or her quality of life and for the sake of human welfare”*

Law No. 25 year 2000 on National Development Programs (PROPENAS)

National Programs of Science and Technology: (1) the enhancement of science and technology activities for national production, (2) the enhancement of dissemination

20 UNESCO, UNDP, APGEST Project, Research Centre for Science and Technology Development, Indonesian Institute of Sciences (PAPPIPTEK-LIPI), 2000, Assessment of Resources, Best Practices and Gaps in Gender, Science and Technology in Indonesia, by Wati Hermawati, National Focal Point for APGEST

activities of technology information, (3) the enhancement of capacity and quality development of science and technology resources, and (4) the enhancement of the autonomy and superiority of science and technology.

National Programs of Women Empowerment: (1) the enhancement of programs and activities supportive to the actualization of gender equality and justice and the promotion of welfare and protection of children, (2) the enhancement of programs and activities on the empowerment of women and children's welfare and protection.

Law No. 18 year 2002 on National System of Research, Development and Application of Science and Technology

The aim of the law is to strengthen the science and technology resources to accelerate the achievement of international competitiveness for sustainable development

Presidential Instruction No. 9 of the year 2000 on Gender Mainstreaming in National Development

The President instruct all Ministers, Head of State Institutions, including the Armed Forces, Attorney General, Governors of all provinces, chief of districts and mayors of all cities, to mainstream gender in implementing their planning formulation, implementation, monitoring and evaluation of policies and development programs. The State Minister of Women's Empowerment is tasked with providing technical assistance to government agencies at the national and regional level, and report to the President concerning the implementation of the Presidential Instruction.

Presidential Instruction No. 4 year 2003 on the Coordination of Strategic Policy Formulation and Implementation of the National Development of Science and Technology

The strategic policy is intended to serve as a guideline for the utilization, development and mastery of science and technology for sustainable development of Indonesia. The strategic policy is focused on the incorporation of research, development and engineering activities as an internal part of national development, which will significantly promote national production sustained by a stable social environment.

The strategic policy specifically stated that *"national development in the field of science and technology also needs to be implemented with gender perspective, in line with international efforts to achieve gender equality"*

The strategic policy also stated that: (1) control and application of science and technology is humane, so as to be supportive to the realization of justice in national life; build upon community's potency and aimed at meeting their needs; (2) science and technology development's support is enhanced in order to strengthen socio political

order, including gender equality; (3) studies to be carried out on the weaknesses of institutional structure which need to be overcome immediately in order to reduce impact of socio political gap and provide support to gender equality through harmonious atmosphere in order to continuously strengthen the basis for social solidarity.

Government Machineries on Gender, Science and Technology

Ministry for Research and Technology

The State Ministry for Research and Technology is established since 1973. One of its functions is to coordinate research and technology development activities of all government agencies. The State Ministry for Research and Technology is responsible for the coordination, monitoring and evaluation of the implementation of the Strategic Policy for National Development of Science and Technology.

The Minister of Research and Technology is also Head of the Agency for Research and Assessment of Technology (BPPT)

In order to ensure the proper implementation on the gender dimension in S&T stipulated in the Strategic Policy, the Minister for Research and Technology issued a Decree of 23 July 2003 to establish a National Committee on Gender, Science and Technology. The Committee is chaired by the Minister for Research and Technology, and co-chaired by the Minister for Women Empowerment. The primary task of the Committee is to develop a synergy and network with all stakeholders in order to achieve gender equality and justice in the development, mastery and benefit of science and technology.

The Vision of Science and Technology Development

"... a wealthy and dynamic Indonesian Society, based on the capability to utilize, develop and master humane science and technology, to support the building of a just society, the improvement of the quality of life, the preservation of the environment and natural resources, to ensure their sustainable utilization"

The State Ministry for Women Empowerment

The State Ministry for Women Empowerment is established since 1978, with the primary task to formulate policies, initiate, coordinate, monitor and evaluate the implementation of programs and activities to enhance the status and role of women, in the family and in society. Formerly the function of the Ministry was the enhancement of the status and role of women in the family and in society. Presently the function of the ministry is focused on the formulation of government policies, coordinate, and integrate the planning, monitoring and evaluation of women empowerment programs; and to

initiate and coordinate programs and activities pertaining to the enhancement of the role and status of women, in the family and in society, in order to achieve gender equality and equity. The ministry is also tasked for the monitoring and evaluation of the implementation of gender mainstreaming in development policies and programs. The implementation of programs for the advancement of women in the sectors and regions remains the responsibility of sectoral ministries and regions. Beside the empowerment of women, the ministry is also responsible for policies and programs regarding the protection of the rights of the child.

The **vision** of women empowerment is the achievement of gender equality and justice within the family, community and state.

Specific programs on gender, science and technology

In the field of education and training, the programs are aimed at:

- Providing social support system to increase opportunities for girls to continue to higher levels of education and to participate in science and technology education and vocational education
- Increasing women's knowledge of the application of appropriate technologies with a gender perspective. Activities of this program incorporate: (a) the promotion and support for the application of appropriate technologies, (c) advocacy on the use of humane appropriate technologies.

The **Ministry of National Education**, through the Directorate of Research and Community Services and the Directorate of Higher Education, provide funding for research on women/gender issues conducted by young women and men lecturers in public universities. The agency also provides young lecturers research fund, funding for competitive research and basic research. It is encouraging to note that young men lecturers are interested to conduct research on women/gender issues, and that more and more young women are participating in competitive research and basic research.

Research on women/gender issues

	1999	2000	2001	2002	2003
Women	93	127	159	134	147
Men	73	74	84	86	90

Young Lecturers Research Fund

	2001	2002	2003
Women	603	579	625
Men	1033	1030	999

Competitive Research

	2001	2002	2003
Women	68	67	68
Men	140	105	184

Basic Research

	2002	2003
Women	20	100
Men	164	182

Source: Directorate of Research and Community Services, Ministry of National Education

The Ministry also provides fellowships for girls at the secondary level to enter or follow studies in "non-traditional" fields, such as technology and engineering. Campaigns are being conducted to socialize that science and technology is domain of girls and boys, not only of boys.

The **Women's Studies Graduate Program, University of Indonesia**

In November 1990, the University of Indonesia established its Women's Studies Graduate Program. Its main role is to conduct women's studies program at a master's level. The institute is also involved in conducting research and popularizing women's issues in the country. The Women's Studies Graduate Program of the University of Indonesia is the first of its kind in the country and was established to meet the need for professional people who had acquired a gender perspective to work in the government, private agencies and institutions.

The **vision** of the Women's Studies Graduate Program is to become a reference institution that is well informed about (1) women and gender issues in Indonesia, (2) women's position in the country and international community, and (3) all aspects related to the integration of gender perspective in human development, in order to achieve gender equality and justice.

The **mission** is to generate graduates that are capable of conducting gender analysis in their respective fields to support efforts to build gender equality and justice in all spheres of life and at all levels.

Women's Study Centers

With the encouragement and support of, at that time, the State Minister for the Role of Women, Women's Study Centers were established since 1989. Presently it has

grown to 119 WSCs in both public and private universities, all over Indonesia. The centers are responsible for conducting research and studies on the situation of women as well as identification of particular problems of women in the respective regions. They also conduct training for government officials, NGOs, women organizations and the community, on gender awareness, gender analysis, and gender mainstreaming in policy and planning, programs and activities.

The Agency for Agricultural Research and Development (AARD) of the **Ministry of Agriculture** promotes the integration of gender perspective in agricultural research. Training on the integration of gender perspective in their research projects and activities are provided to researchers. They are also trained to integrate gender analysis in their socio-economic analysis of agricultural programs. Social gender-specific indicators are developed and become important instruments to monitor and evaluate the overall socio-economic benefits to the concerned user groups.

The Indonesian Institute of Sciences

The primary tasks of the Indonesian Institute of Sciences (LIPI) are: (1) to conduct research and development activities in the 17 research centers in the area of Earth Sciences, Life Sciences including the Bogor Botanical Garden, Engineering Sciences, Social Sciences and Humanities, (2) to provide scientific services on calibration, metrology, standard and quality system, scientific documentation and information, and innovation. There is also a Center for Science and Technology Development Studies (PAPPIPTEK-LIPI). The task of the institute is to study the development and application of S&T, including studies on S&T policies, data collection and analysis on S&T resources including the formulation of S&T indicators.

Activities related to gender, science and technology are also being conducted in the institutes of LIPI, namely:

- **The Center for Information on Women in Development (PIWP) Center for Scientific Documentation and Information (PDII-LIPI)** was established in 1979. The primary task is the collection, documentation and dissemination of scientific information on women and children.
- **The Center for Science and Technology Development Studies (PAPPIPTEK-LIPI)** conducted a study in 2000, entitled "Towards the Formulation of Indicators on Gender, Science and Technology". The study identified variables for formulating gender, science and technology indicators. The implementation of input and output indicators on education and careers of women showed the under-representation of women in higher education, especially in the engineering and technology fields; the under-representation of women in research and development (R&D) activities in the public sector and manufacturing industries; and the under-representation of women in decision-making and advisory positions. The study was supported by the Canadian International Development Agency (CIDA).

In January 1996, PAPPIPTEK-LIPI in cooperation with the UNESCO Office, Jakarta conducted an International Workshop on Women and Technology in Southeast

Asia and the Pacific. The workshop recommended the establishment of a Regional Secretariat for Gender, Science and Technology in Southeast Asia and the Pacific. The Regional Secretariat was established on February 4, 2000.

In March 1998 the Center conducted a workshop on Gender, Science and Technology. The study and workshop were supported by CIDA. The papers presented at the workshop have shown the under-representation of women in higher education, career and decision-making positions in science and technology, in R&D activities, in manufacture production and in scientific services. The workshop urged that educational and S&T agencies consistently and systematically collect, document, and process sex-disaggregated data of S& T human resources. This will enable the development of S&T indicators, and indicators of gender and S&T in Indonesia.

- **The Institute of Appropriate Technology** was established 1978. The main activities of the institute are: food processing technology (fruits, vegetables, and tubers), animal feed (livestock, poultry and fish), agricultural technology (plant cultivation, water management, and mechanization), design of agricultural machinery, alternative energy technologies, environment technology, and production of *atsiri* oil. The institute is also active in community development in various areas in Indonesia.

Civil Society Participation in Governance

At present a number of strategic components to create a conducive environment for the enhancement of S&T contribution to the advancement of women are already in place in Indonesia, such as:

- A program called IPTEKDA - S&T for Community Development - was introduced by LIPI since 1998. The program is aimed at increasing economic empowerment of communities in rural areas through the application of appropriate technologies with a gender perspective.
- The creation of the Technology Information Shop called WARINTEK since 2001 by the State Minister for Research and Technology. WARINTEK is a computer database providing information on appropriate technology. It aims at providing information to user communities from big cities to down to the grass roots level on appropriate technologies, through access to electronic or other forms of information.

Participation of Women in Science and Technology

Women in S&T Decision-making and Advisory Positions

Data of 2001 and 2004 show that there is 1 woman out of 5 Deputy Minister for Research and Technology. There are 7 women out of 25 Assistant Deputy Minister of Research and Technology.

Data of 2001 and 2005 show that at the Indonesian Institute of Sciences (LIPI) there is 1 woman Deputy Chair out of 5 Deputies responsible for coordinating the 17 research centers and 4 technical implementation units in the Earth Sciences, Life Sciences, Engineering Sciences, Social Sciences and Humanities, and 4 Scientific Services Centers. The woman Deputy Chair is responsible for coordinating the work of the 5 research centers in the Social Sciences and Humanities. There are 5 women acting as directors of research centers, out of the 17 research centers and 4 scientific services centers. They are directors of research centers in limnology, population, regional resources, standard and quality system, and the scientific information and documentation center. In 2005 1 woman is appointed as Head of the Bureau of Cooperation and Promotion of Science and Technology, out of 5 technical and administrative Bureaus.

The situation of under-representation of women in decision-making positions is the same in the other S&T agencies, such as at the Atomic Energy Agency, the Space Agency, the Coordinating Agency for Survey and Mapping, the Agency for the Assessment and Application of Technology, and the R&D Agencies of various ministries.

Data of 1997 and 1999-2004 showed the under representation of women at the National Research Council. The primary function of the Council is to formulate priorities of national research programs in 4 areas namely (1) Human Basic Needs, (2) Natural Resources and Energy, (3) Industrialization, (4) Defense and Security, and (5) the area of Social, Economic, Culture, Philosophy, Law and Regulations. Data of 1997 showed that there were 19 women scientists out of 145 members of the Council. In 1999 – 2004, there were 19 women scientists out of 243 members of the National Research Council

The Indonesia Academy of Sciences was established in 1999 by Law No. 8 of 1999. The Academy consists of 5 Scientific Commissions, namely Commission on: (1) Engineering, (2) Medical Sciences, (3) Social Sciences, (4) Basic Sciences, and (5) Culture. There are 7 women scientists out of 49 members of the Academy.

REPUBLIC OF KOREA

Country Data

	2000	2002	2003
HDI (Human Development Index)	31		28
GDI (Gender Development Index)	30		29
Population (million)	41.1	47.4	
WLE (Women's Life Expectancy)	76.2	79.3	
WLR (%) (Women Literacy Rate)	95.9	96.6	
SA (million km) (Surface Area)	99,260		

(Source: Human Development Report 2000, 2001, 2004)

The Legal and Policy Framework on Gender, Science and Technology²¹

The Constitution

Article 127 states that: the state shall strive to develop the national economy by developing science and technology, information and human resources, and encouraging innovations.

Laws on S&T

- **The Science and Technology Framework Law** (Law No. 6353, 2001)

It is the basic law covering systematic promotion of S&T at the national level. Important provisions of this law include the establishment of policies and plans for S&T and the overall support mechanism for related projects and agencies. It also aims to provide the legal mechanism for inter-ministerial coordination of R&D activities and to establish an institutional system to foster an innovation-prone culture in Korean society.

Article 24 deals with the development of women scientists:

21 UNESCO-UNDP APGEN SPDP Project, Assessment of Resources, Best Practices and Gaps in Gender, Science and Technology, Korean Women's Development Institute, pp 6-8, pp 12-14

“The government shall draw out measures for development and utilization of women scientists in order to strengthen the national capacity in the area of science and technology and also shall develop and implement supportive policies so that they can sufficiently exert their capacity”

- ◆ **The Technology Development Promotion Law** (Law No. 2399, 1972)
The Law provides tax incentives to encourage and facilitate the technological development activities of private enterprises.
- ◆ **The Promotion of Engineering Services Law** (Law No. 2474, 1973)
It deals with the improvement of the engineering industry which, in turn, contributes to manufacturing enterprises and expedites the commercialization of R&D results.
- ◆ **The Promotion of Basic Science Research Law** (Law No. 4196, 1989)
The law provides financial support promoting innovative research in basic science at R&D institutes and universities to encourage innovations.

Government Machineries on Gender, Science and Technology

The Ministry of Science and Technology

The main functions of the Ministry of Science and Technology (MOST) include the followings:

- To formulate policies for S&T development and to perform technology forecasting
- To develop core technology, future-oriented and large-scale technology
- To pursue technological self-reliance for the safe use of nuclear technology
- To support basic and applied research conducted by government-supported research institutes, universities, and private research institutes.
- To formulate policies for R&D investment, human resources development, S&T information, and international S&T cooperation
- To promote the public awareness of S&T

MOST is fully responsible to coordinate S&T policy among the ministries and to oversee the compliance with the policy.

National Science and Technology Council (NSTC)

NSTC was established in 1999. Its primary function is to review and coordinate national S&T policies and R&D programs, and to set the priority for the allocation of S&T budgets. The NSTC, chaired by the President, is composed of ministers of S&T-

related ministries and representatives of the scientific community. Twelve ministers, including the Finance and Economy Minister and the S&T minister, the Chairman of the Planning and Budget Commission; the Minister for Government Policy Coordination of the Prime Minister Office; the Chairman of the Presidential Advisory Council for Science and Technology in national and economic development. The NSTC has the authority to prevent the occurrence of overlapping R&D investment and to allocate budget for crucial S&T fields. MOST serves as the secretariat for the NSTC.

The Presidential Council on Science and Technology (PCST)

PCST is also an advisory body comprising of leaders representing various areas of science and technology. The PCST reviews important science and technology policies and other related matters to advise the President.

The Ministry of Gender Equality (MOGE)

The Ministry was established in January 2001. MOGE aims to grant and promote the rights and interests of women and to develop their capacities through mainstreaming gender policies in all areas of Korean society. The Ministry's overarching aim is to promote women's status, prevent gender discrimination and to provide protection to victims thereof. An important part of its mission is to prevent sexual and domestic violence and to protect survivors of such violence.

MOGE has been emphasizing the empowerment of women in the area of science and technology through various policy measures, such as "Girls-Friendly Science Programs", a training program for middle and high schools girls, and granting scholarship to female students who plan to study in the field of natural science/engineering.

Women's Participation in Science and Technology

In university institutions (public and private)

It has been commonly observed that traditional family and cultural values do not support women's participation in S&T. Girls are reported to show less interest and lower achievement in science subjects in primary and secondary schools. At the tertiary level there is under-representation of women in the field of science, engineering and other technology-related fields. In 2000 women graduates of four-year colleges were 100,925 in total, which accounted 47.1% of all graduates. Among women graduates 10.9% were in natural sciences, 9.1% in engineering, while 21.4% were in humanities and 24.4% in social sciences.

Female graduates in S&T areas in 2000

unit: person(%)

Area		Bachelor's		Master's		Doctorate	
		Total	Women	Total	Women	Total	Women
S&T	Natural Science	21,172	11,000 (52.0)	3,241	1,119 (34.5)	637	141 (22.1)
	Engineering	51,673	9,176 (17.8)	12,513	1,024 (8.2)	1,538	68 (4.4)
Subtotal of S&T		85,546	28,193 (33.0)	17,574	2,973 (16.9)	2,637	420 (15.9)
Grand Total		214,498	100,925 (47.1)	47,226	14,971 (31.7)	6,153	1,264 (20.5)

Note: () represent the female ratio in each area.

Source: Ministry of Education, 'Educational Statistics 2000'

Concerning women faculty members in 4-year S&T related colleges, the 2002 data from the Ministry of Education (MOE) showed that full time female faculty member ratio in S&T related departments is lower as the ranks increase. Only 8% among full professors are female and 9.1% among associate professors are female, a higher percentage of women are assistant professors (11.3%) and as full time lecturers (19.7%)²²

In Research and Development

R&D personnel by gender and sector in 1999

unit : person

	Public institutes	University	Industry	Total
Total number of researchers (A)	13,986	50,151	70,431	134,568
Women (B)	1,484	7,173	4,352	13,009
B*100/A	10.6%	14.3%	6.2%	9.7%

Source: Ministry of S&T '2000 Report on S&T Research Activities'

The 2001 data from MOST shows that 19,930 women out of the total 178,937, which comprises of 11.1% were employed. Among those hired before 2003, 543 women out of 8,381 (6.5%) were employed in government financed R&D institutes,

22 Sea-wha Oh Ph.D., Country Report of the Republic of Korea: Progress of Gender Equity in Science and Technology, Second Regional Workshop RESGEST, Yogyakarta 21-24 September 2004

while 775 women out of 4,967 (15.6%) were employed in public institutes. Among those newly employed in 2003, 52 women out of 497 (10.5%) got jobs in government financed R&D institutes while 121 women out of 694 (17.4%) in public institutes. The anticipated employment in 2004 is 82 women out of 804 (20.4%) in public institutes. An overall increase in women employment is expected²³

In Decision-making Positions

According to data of 2003, among 299 scientific committees and councils in Korea, there are 1,262 women (19.4%) out of 6,505 members. National S&T Committees, both central and provincial, do include women members (95% of committees). However, when the total number of women committee members were calculated, only 30% of the total members were women. In Central committees which usually are given more importance than the provincial committees, the percentage of women are even less, being only 26%

In the Private Sector

At the lower decision-making positions (manager), 30.8% of the companies surveyed in 2002 have no women, while 42.3% of the companies studied showed less than 20% women as managers. 54% of companies surveyed had no women at high-ranked positions.

Strategies on Gender, Science and Technology²⁴

The Law for Women in Science and Technology 2002 aims at establishing basic strategies supporting women scientists and engineers by central as well as regional government offices every 5 years. The establishment of the Ministry of Gender Equality in 2001 has been an important turning point for women in Korea.

These two events prompted the Ministry of Science and Technology (MOST), the Ministry of Gender Equality (MOGE) and the Ministry of Education (MOE) to develop programs to support women in S&T.

MOST provides scholarship for girls to study S&T through the WISE program, provides research grants for women in S&T (in 2000: 91 recipients, 1.8 billion won; in 2001: 175 recipients, 2.2 billion won, 2002: 233 recipients, 3.6 billion won). In 2001 MOST set up an "Employment quota for women in S&T. The goal is to have 10% of women in government funded institutions, and public and private universities in 2002". MOGE provides scholarship for female students in S&T.

23 loc.cit

24 loc.cit

MOE provides the "Promotion of scientific education program for female children"; "Promotion of mathematics education program for female students"; "Information Olympiad for female students in S&T"; and an "Employment quota of female professors" in 2003. Through this employment quota, 200 female professors were newly employed in 4 year colleges.

The respective ministries also have other programs to support women in S&T. MOST provides "Starting funds for newly employed female researchers", "Women scientists/engineers of the year award", "Grants for expansion of Women's University Research Foundation". Most important is the support of MOST to the establishment of a database on women scientists and engineers in Korea run by the Association of Korean Women Scientists and Engineers (KWSE). In June 2003 KWSE established data of 6.600 women scientists and engineers.

Barriers to women in S&T²⁵

Socially, a constraint women face is the "glass ceiling" which is pregnancy and child rearing. All child caring and household responsibilities are laid upon women. Some institutions would assign less salary to women because they claim that women are less productive due to their divided attention and energy between work and family responsibilities.

Culturally, the traditional Confucian teachings in the family tend to separate men's work from women's work. S&T is normally recognized as a men's field, which makes it difficult for women to explore. High school teachers who counsel girls on college entrance also do not tend to encourage them to go into S&T.

25 loc.cit

THE PHILIPPINES

Country Data

	2000	2002	2003
HDI (Human Development Index)	77		83
GDI (Gender Development Index)	64		66
Population (million)	72.9	78.6	
WLE (Women Life Expectancy)	70.5	71.9	
WLR (%) (Women Literacy Rate)	94.6	92.7	
SA (Square km) (Surface Area)	300 thousand		

(Source: Human Development Report 2000, 2001, 2004)

The Policy Framework on Gender, Science and Technology²⁶

The highest law of the land, the Philippine Constitution of 1987, recognizes the role of women in nation building and ensures the fundamental equality before the law of women and men. The primary policy on the role of Filipino women in the nation's life has been concretized through legislation, policy and program measures designed to strengthen women's rights, enhance their opportunities for participation and facilitate their access to the benefits of development.

Republic Act (RA 7192) better known as the "Women in Development and Nation Building Act" is the landmark law to operationalize national policy on gender and development. It aims to promote the integration of women as full and equal partners of men in nation building and in other spheres of activity. Moreover, this Act mandates government institutions to create programs that encourage the participation of women in economic development.

The Philippine Development Plan for Women (PDPW) 1989-1992 served as the government's framework for integrating women's concern in national development. The PDPW was a translation of the Gender and Development (GAD) approach into workable plan of action for implementation by the government.

The Philippine Plan for Gender-Responsive Development (PPGD) 1995-2025 is the latest in a series of government initiatives to give Filipino women a more active and participatory role in the development process. This plan seeks to provide additional

26 Philippine Council for Agriculture, Forestry and Natural Resources Research and Development, Department of Science and Technology, Assessment of Resources, Best Practices and Gaps in Gender, Science and Technology, Full Report, UNESCO-UNDP APGEN Project, 2001, pp 5-15

infrastructure and support services, including policy reforms to mainstream gender concerns in all sectors.

At the Department of Science and Technology (DOST) three administrative orders have been issued to strengthen the mainstreaming of GAD in the Department's programs/projects:

- a) DOST Administrative Order 077, Series of 1994 provides the strengthening of DOST's participation in gender-responsive activities and the constitution of a DOST Focal Point for women's concerns.
- b) DOST Administrative Order No. 038, Series of 1996 requires the creation of a Committee on Women's Concerns in each COST agency and the collection and documentation of a gender disaggregated database for use in planning, policy, and training.
- c) DOST Special Order No. 334, Series of 2000 that provides for the creation of a Technical Working Group (TWG) to formulate DOST-wide Gender and Development Plan for 2001-2004.

Gender, Science and Technology in the Philippines

Over the years, the Philippines have experienced a significant increase in the participation on women in the Science and Technology (S&T) sector, especially in research and development. However, there is still the existence of gender-tracking that fit women in pre-determined areas of specialization, i.e. scientists, educators and in research and development. Traditional attitudes, that fieldwork and technical tasks are for men, and perceptions regarding the disadvantages of women's biological difference with that of men continue to hinder women's access to S&T education, hiring and promotions. With the onset of high-level technology and mechanization, the marginalization of women in economic and productive work might increase their need to have access to S&T is not addressed.

The general objectives of the GAD Plan of DOST are: 1) to promote women's active participation in S&T; 2) develop technologies which will respond to Filipino women's needs and help them to be more economically productive and ease housework for the poor; 3) provide S&T structures for appropriate support and incentives to enable women to be active agents in S&T developments; and 4) develop educational systems that include popular literacy in S&T.

The specific objectives are: 1) integrate the gender perspective in the development planning process of the Department; 2) institutionalize gender-responsive programs and projects in the DOST; 3) develop/enhance capability-building/training programs/activities on GAD; and 4) develop and institute gender-responsive database and information materials.

Government Machineries on Gender, Science and Technology

National Commission on the Role of Filipino Women (NCRFW)

The NCRFW is the national machinery on women created by Presidential Decree 633 dated 6 January 1975, which assumes the following functions:

1. Advising the President and the Cabinet in formulating policies and implementing programs for the full integration and mobilization of women in national development.
2. Undertaking a regular review and evaluation of the extent to which women are integrated in all sectors of social, economic, political and cultural life at all levels on a basis of equality with women.
3. Taking measures to obtaining the enjoyment by women and men alike of full equality before the law in all fields where they do not exist.

More specifically, the NCRFW:

- ♦ Coordinates the preparation of the Philippine Development Plan for Women as a companion Plan to the National Development Plan as well as its monitoring assessment and updating in cooperation with the national planning body;
- ♦ Monitors compliance with and implementation of provisions of laws granting equal treatment and giving protection to women;
- ♦ Acts as a clearinghouse and data base for information relating women;
- ♦ Conducts gender-consciousness raising program;
- ♦ Implements pilot projects for the delivery services for women as basis for policy formulation and program recommendations; and
- ♦ Acts as a major link between government and non-government organizations.

Among its major programs to date are:

- ♦ Establishment of Institutional Mechanism for WID Concerns

Executive Order 348 approving and adopting the PDPW on February 17, 1989 also mandated the NCRFW to establish appropriate institutional mechanism in government agencies to ensure the implementation, monitoring and updating of the Plan. This mechanism, which is called the Women in Development (WID) Focal Point, will be provided by the NCRFW with technical assistance, training and implementing guidelines.

- Training in Gender and Development

This program aims to enhance the capabilities of government to respond to gender issues, policies, programs and projects. It involves the conduct of seminars for gender-consciousness raising and for technical training on gender responsive development planning and programming. It targets key persons in government,

namely: WID Focal Points, policy-makers, planners and trainers.

- ◆ **Research and Policy Studies**

This program is geared towards the conduct of research and policy studies on women's special concerns such as violence against women, migration, prostitution, family, peace, media, arts and culture.

- ◆ **Development of Philippine Data Base on Women**

This involves development of gender-based indicator system, assessment of gender-disaggregated statistics, generation of gender-based data, computerization of data system, and formulation of data improvement plan in coordination with National Statistics Office, National Statistical Coordination Board and major data producers.

Department of Science and Technology (DOST)

The Department of Science and Technology (DOST) is the premiere science and technology body in the country charged with the twin mandate of providing central direction, leadership and coordination of all scientific and technological activities, and of formulating policies, programs and projects to support national development.

For the period 1999-2004, the Medium Term Plan of the Department of Science and Technology is anchored on *Competence, Competitiveness and Conscience*. This vision calls for a more equitable distribution of opportunities, income and wealth; a sustained increase in the amounts of goods and services produced by the nation for the benefit of the people; and an expanding

Development (PCARRD) – Department of Science and Technology (DOST)

The Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) serves as the government's main aim in planning, coordinating, evaluating and monitoring the national research and development programs in agriculture, forestry and natural resources.

As a national policy planning and coordinating council for agriculture and forestry, PCARRD is tasked to strengthen the capability of the Philippine agriculture and forestry in R&D system to address gender issues and build institutional mechanism for GAD. Along this line, PCARRD spearheads the following interventions:

- *Gender Advocacy and Training*

This includes training and advocacy, which may take the form of orientation seminar/training for key officials, policy-makers, planners, program implementers and development workers in the Philippine National Agriculture Research System. This also involves the creation of a pool of resource persons and trainers to undertake the training on GAD in the regional level.

- ♦ *Creation of a Gender Disaggregated Database*

This includes design, production and distribution of relevant communication materials in gender, particularly in the S&T sector

- ♦ *Publication of Gender-related Communication Materials*

Focal points/groups are established to provide leadership in gender-related activities within a region or agency.

- ♦ *Design of Programs/Projects Integrating Gender Concerns*

Researchers, extension and development workers, communicators and others in the Philippine agricultural research system are provided expertise and gender analytical tools to develop banner programs on GAD, and integrate the gender perspective in R&D programs/projects.

Civil Society Participation in Governance

There are several women NGO's and foundations involved in S&T development: (1) Women Inventor's Association in the Philippines, Inc. (WIAPI); (2) Women's Association of Scientists in the Philippines (WASP), which aims to activate women scientists in researches geared towards national development, facilitate networking and incorporate them into different S&T programs, and (3) Women in Science and Technology Development Foundation, Inc. (WISTDR), which aims to sponsor, promote and conduct S&T programs and projects in support of women's concerns and contribute to the country's economic upliftment.

Within the formal education system, the formation of Women's Studies Association of the Philippines (WSAP) in 1987 is a good example. A national network of schools and teachers promoting gender perspectives in the Philippine educational system, WSAP has been successful in institutionalizing gender and women' studies subjects and courses in classrooms all over the country. WSAP also catalyzed the formation of women's libraries and resource centers in many schools.

Women's participation in decision-making in the S&T sector

Composition of DOST Officials by Gender, CY 2001

Position	Total	Male	Female
A. Central Office			
Secretary	1	-	1
Undersecretary	3	3	-
Assistant Secretary	3	-	3
B. Sectoral Planning Councils			
Executive Director	7	4	3
C. R&D Institutes			
Director	7	4	3
D. S&T Service Institutes			
Director	7	4	3
C. Advisory Services			
Executive Director	2	-	-
D. Regional Offices			
Director	14	9	5
Total	42	23 (55%)	19(45%)

Source: DOST Profile of Agency Heads

Women's capacity to handle top position particularly in the S&T sector and their participation in the decision-making is gaining wide recognition. Currently at the Department of Science and Technology (DOST), a woman secretary is appointed to lead the whole department while 3 women were appointed at the post of the assistant secretary. In the sectoral planning councils, 2 out of 5 executive directors are women (for the sectoral council on health, and advanced science and technology) and 3 out of 7 were appointed women Directors of both R&D institutes (for food and nutrition, industrial technology development and nuclear research) and Service Institutes (i.e. Philippines Science High School, Science Education Institute, and Technology Application and Promotion Institute)

The 2 advisory bodies of the DOST namely the National Academy of Science and Technology (NAST) and National Research Council of the Philippines (NRCP) are both headed by women. Of the 14 DOST Regional Offices nationwide, 5 regions are led by women Regional Directors. This data show that 45% of the total number of DOST officials are women and 55% are men, indicating that an almost equal opportunity is given to both sexes to hold management positions and participate in S&T decision making.

VIETNAM

Country Data

	2000	2002	2003
HDI (Human Development Index)	108		112
GDI (Gender Development Index)	89		87
Population (million)	77.6	80.3	
WLE (Women Life Expectancy)	70	71.4	
WLR (%) (Women Literacy Rate)	90.6	86.9	
SA (Square km) (Surface Area)	331.7 thousand		

(Source: Human Development Report 2000, 2001, 2004)

The Legal and Policy Framework on Gender, Science and Technology²⁷

The Constitution

Article 63

Men and women have equal rights in all fields: politics, economy, culture, society and family

All acts of discrimination against women and all acts that are injurious to women's dignity are strictly banned

Men and women shall receive equal pay and benefits for the same work.

Women workers are entitled to have time off for having children. Women who are state employees and wage earners shall enjoy a paid maternity leave during which they shall receive the full wage and allowances as determined by law

The state and society shall create all necessary conditions for women to improve their qualifications in any field they choose and to allow them to fully play out their roles in society

The Law on Education

Article 9

27 UNESCO-UNDP APGENT SPPD Project, Assessment of Resources, Best Practices and Gaps in Gender, Science and Technology in Vietnam, Hanoi, 9-2001, pp 5-17.

Every person, without discrimination of their nationality, belief, religion, sex or social background, has an equal right to participate in training opportunities.

The Law on Science and Technology

Article 35

Utilization of human resources in science and technology

The state shall attach an important function to skills, creating a favorable environment for personnel to nurture and devote their talent in this field. There shall be policies and measures to attract the skills for the fields of prioritized and pivotal science and technology of the state. There shall also be policies to encourage the training and recruitment of female human resources in scientific and technological activities.

National Strategy for the Advancement of Women by 2010

Overall Objective

Improve the quality of women's material and spiritual life, as well as establishing the conditions necessary for women to experience their fundamental rights, and to fully and equally participate in and benefit from all aspects of political, economic, cultural and social life.

The **Specific Objectives** are: (1) Achieve women's equal rights in labor and employment; (2) Achieve women's equal rights in education; (3) Achieve women's equal rights in health care; (4) Enhance quality and efficiency of women's performance in the political, economic, cultural and social fields; (5) Strengthening efforts to build the capacity of the machinery for the advancement of women.

Government Machineries on Gender, Science and Technology

In Vietnam, the government focuses a lot of attention on women's affairs. This will foster a vast amount of potential human resources for socioeconomic development in our country. Therefore, the government has established a special system that includes ministries and equivalent organizations, which assume responsibility for development issues.

The National Committee for the Advancement of Women (NCFAW) recommends to the government the necessary measures for implementing general policies and laws related to women, gender and development.

The Ministry of Science, Technology and Environment (MOSTE) formulates strategies and plans for science, technology and the environment and draft legislation and policies in science and technology. It also disseminates information on science, technology and the environment and recruits human resources in this field. It also cooperates with international agencies in science, technology and the environment and implement activities for the sustainable development in Vietnam.

The Ministry of Education and Training (MOET) oversees education and training including kindergarten, primary and secondary schooling, university and post-university education, which contribute to the quality of national personnel in science and technology.

The Ministry of Agriculture and Rural Development (MARD) oversees the development of rural and agricultural areas, including water, irrigation and husbandry.

The Ministry of Health (MOH) oversees the management of public health, medicine and reproductive health.

Local Services of Science, Technology and the Environment (LSSTE) is present in all 61 provinces in Vietnam, and implements activities under the direction of the ministry in charge and MOSTE.

The National Center for Natural Sciences and Technology (NCNST) is one of the two largest scientific centers in the country, and it researches natural science and technology.

The National Center for Social Sciences and Humanity (NCSSH) is one of the two largest scientific centers in the country, and it researches social sciences and the humanities, including women's issues.

The Center for Women's Studies (CWS) at the Hanoi University was established to develop women's potential and encourage their participation in studies and further development. The center conducts research studies and projects in a variety of issues related to women, particularly in the scientific sector.

The Institute of Sociology (IOS) was established in 1983 as a specialized research department of the National Center for Social Sciences and Humanity. The current major research focus of IOS is on the social and cultural changes taking place during industrialization and modernization in Vietnam.

The Center for Family and Women's Studies (CFWS) was formed in 1987. It was the first research institution in Vietnam to specialize in gender issues. The main activities of the center are conducting research projects related to women and the family, gender training for policymakers and planning and conducting seminars and workshops. They publish a bimonthly journal titled *Women's Studies* in Vietnamese, with summaries written in English.

Civil Society Participation in Governance

In Vietnam, there are several civil society organizations. They are actively participating in the governance of gender, science and technology.

1. Vietnam Women's Union (VWU)

The VWU is a mass organization that brings together women from all walks of life to carry out policies on national development. In addition, the

VWU is also an organization that gathers and documents the needs of women to put before the government with the aim to improving relevant policies on gender equality, women's development and support of women in their social life.

2. **Vietnam Union for Science and Technology Associations(VUSTA)**

VUSTA groups male and female scientists and technologists to carry out research and development activities in all areas of social life.

3. **Center for the Promotion of Education and the Empowerment of Women (CEPEW)**

Established in 1997, CEPEW seeks to empower women to achieve gender equality and enhance their status at home and within the family. Its main tasks include capacity building and developing and disseminating learning resources for women, while implementing community-based projects to improve women's quality of life. CEPEW carries out research work in the area of youth education and female leadership. The training programs conducted by the center include empowering men and women to be local leaders in gender issues, vocational training for poor local women, and skills training to help rural women start small businesses.

Women's Participation in Decision-making in the Science and Technology Sector

In the science and technology sector, it can be said that the number of women scientists and administrators as well as their role in activities in this field are increasing. However, in general, the number of women participating in decision-making administrations in the science and technology sector is low. This is illustrated through data from MOSTE, the National Center for Natural Sciences and Technology (NCNST) and the National Center for Social Sciences and the Humanities (NCSSH).

The percentages of women in the top positions at MOSTE

Top Positions	Female (%)
Director or equivalent	8.11
Vice Director or equivalent	6.25
Head of Division	14.55
Deputy Head of Division	13.42
Overall	11.94

Source: Science and Technology organizations and their personnel departments, MOSTE, 2000

National Center for Natural Science and Technology (NCNST)

There are 647 women scientists and administrative personnel that account for 27.7 percent of the total scientists and administrative personnel at NCNST. The rate of women personnel occupying the top positions is as follows:

Top Positions	Female (%)
Director or Vice Director	6.8
Head or Deputy Head of Division	13.2
Professor or Associate Professor	5.2
Doctor	16.5
Master	40.0

Source: Dr. Bui thi An: "The real situation of women scientists", 1997

National Center for Social Sciences and Humanities (NCSSH)

There are 583 women scientists and administrative personnel that account for 47.4 percent of the total scientists and administrative personnel at NCSSH. The percentages of women personnel occupying leadership positions are as follows:

Leadership positions	Female (%)
Director or Vice Director	10.8
Head or Deputy Head of Division	68.3

Source: Nguyen Thi Thu, Chief of the Domestic Science Board, Vietnam Civil Servants Trade Union, 2001

In the opinion of researchers, the number of women making decisions in the science and technology sector should be increased in a new context:

- ♦ The central and local governments and society should focus more attention on gender, science and technology; the number of programs, projects and services should be increased as well as the number of women participating in those programs, projects and services, and training for women should be strengthened. Through the activities mentioned above, more women will be chosen for decision-making and leadership positions.
- ♦ Women should try to recognize and promote their abilities, as well as affirm their important positions in decision-making administrations in the science and technology sector.

III. FINDINGS

Data and information presented in the Country Situation on Gender, Science and Technology show varying legal and policy frameworks to ensure gender equality and justice in all spheres of national development, including in science and technology. The provisions of gender equality are reflected in the stipulations embodied in the Constitution, national laws, Presidential and Ministerial decrees, and national development plans. The legal and policy stipulations are important instruments for the implementation of strategic actions, not only for the promotion and attainment of equal rights of women, but also for the enhancement of the development and application of science and humane technologies for the benefit of humankind.

The Legal And Policy Framework of Gender, Science And Technology

Constitution:

Indonesia, the Philippines, and India ensure the fundamental equality of all citizens before the law. **Indonesia** specifically states the equal rights to education and to benefit from science and technology in order to improve his or her quality of life.

Republic of Korea states that the state shall strive to develop the national economy by developing science and technology

Vietnam states the men and women have equal rights in all fields, and that all acts of discrimination against women and all acts to women's dignity are strictly banned.

Special laws, including Presidential and ministerial decrees regarding S&T

China, Indonesia, Korea and Vietnam has special laws regarding S&T.

China has S&T laws regarding the acceleration of S&T progress, promotion of the transformation of science and technology results and the popularization of S&T.

Indonesia has Law on National System of Research, Development and the Application of S&T. Law on National Development Programs states the national programs of science and technology, which include the enhancement of science and technology activities for national production, and the enhancement of the capacity and quality of the S&T resources development. Indonesia also has a Presidential Instruction concerning the Strategic Policy for National Development of Science and Technology. The strategic policy specifically stated that national S&T development needs to be implemented with gender perspective.

Korea has a Science and Technology Framework Law. One article of this law states that to strengthen the national capacity of S&T, there should be measures for development and utilization of women scientists, and implement policies so that they can sufficiently exert their capacity. There are also a Technology Development Promotion Law and a Promotion of Engineering Services Law. In 2000 **Korea** enact Law for Women in Science and Technology.

The Philippines In 2002 there was a Memorandum Order No. 67 signed by President Gloria M. Aroyo, directing the Secretary of the Department of Science and Technology to coordinate and oversee the implementation of a comprehensive and responsive Philippine platform of action on gender, science and technology.

Vietnam has a Law on Science and Technology. The law specifically stated that there should be policies to encourage the training and recruitment of female human resources in scientific and technological activities.

Special laws, including presidential and ministerial decrees regarding the equality of women

China has a Law on Protecting Women's Rights and Interests. The law guarantees the equal rights of women in politics, economy, education and household life. The law also states that government and non-governmental organizations must protect women's rights in their participation in science and technology, literature, art, and in any other activities. **Indonesia's** national programs of women empowerment are stated in the Law on National Development Programs. The primary programs are (1) the enhancement of programs and activities supportive to the actualization of gender equality and justice, and the promotion and welfare and protection of children; (2) the enhancement of programs and activities on the empowerment of women and children's welfare and protection. There is a Presidential Decree on Gender Mainstreaming in National Development. The President instruct all government apparatus, including the armed forces, attorney general, governors of all provinces, chief of districts and mayors of all cities, to mainstream gender in their planning formulation, implementation, monitoring and evaluation of policies and development programs.

Philippines have a "Women in Development and Nation Building Act". It is a landmark law to operationalize national policy on gender and development. It aims to promote the integration of women as full and equal partners of men in nation building and in other spheres of activity.

National Development Plan and National Policies on Gender, Science and Technology

China's Program for the Development of Chinese Women (2001-2010) of May 2000 - also called Program II, includes strategies in promoting women's participation in science and technology. They are: (1) the enhancement of equal education opportunities for women, (2) ameliorate the proportion of female students in different subjects, and cultivate more women professionals and experts in new high-tech and modern management fields, and (3) enhance women's ability in formal, informal education and training, and improve women's literacy and abilities in using science and technology.

In **India** the Five-Year National Development plans have always been the directive principles to formulate national and state policies of the Government. In the Sixth Five-Year Plan, a chapter on "Women and Development" was introduced in the Plan document. Since then the perspectives on the advancement of women is mainstreamed in national development. The objective is raising the economic and social status of women in all fields, with priorities on health, education and employment of women; promote "beneficiary oriented programs" which direct benefits women, and the empowerment of women and socially disadvantaged groups.

The **Philippines** Plan for Gender-Responsive Development (PPGD) 1995-2025 is the latest in a series of government initiatives to give Filipino women a more active and participatory role in the development process. This plan seeks to provide additional infrastructure and support services, including policy reforms to mainstream gender concerns in all sectors.

The overall objective of the National Strategy for the Advancement of Women by 2010 in **Vietnam** is the improvement of women's quality and exerts their fundamental rights to fully and equally participate in and benefit in all aspects of political, economic, cultural and social life.

Participation of Women in S&T, S&T Decision-Making and Advisory Positions

China showed the under-representation in the Chinese Academy of Sciences by the end of 2000.

Data on the participation of women in S&T in **Indonesia** is scarce and fragmented. Data from the Ministry of Science and Technology (MOST) **Korea**, 2000, showed the under-representation of women R&D personnel in public institutes, university and industry. The Association of Korean Women Scientists and Engineers (KWE) established a database of 6.600 women scientists and engineers, 2003.

The data and information presented in the country situations generally showed the under-representation of women in S&T decision-making and advisory positions, except in the **Philippines**. In the case of the **Philippines**, the number of women holding

senior academic positions and directorship of science departments is almost equal. **China** showed data on women leadership in the China Association for Science and Technology, 2000. **Indonesia** showed data on the membership of the National Research Council and the Indonesia Academy of Sciences, 2003. **Korea** showed data on the membership of Scientific Committees and Councils, 2003. **Vietnam** showed data on the profile of positions in the Ministry of Science and Technology and Environment, 2000, the National Center for National Sciences and Technology (NCNSR), 1997, and the National Center for Social Sciences and Humanities (NCSSH), 2001.

Problems in Women's Participation in Science and Technology.

The key issues identified regarding problems in women's participation in science and technology are:

- **China, India, Indonesia, Korea and Vietnam** state that traditional culture and values do not support the participation of women in S&T. **China** identifies gender stereotyping as a serious factor hampering women's employment in S&T. It is regarded that the ideal occupation of women are as teachers, doctor, rather than working in science and technology fields. Although changes are taking place in the countries studied, overcoming gender stereotyping, traditional culture and values, especially in education and S&T still need attention and still need to be enhanced.
- Women are still under-represented in S& T decision-making and advisory positions in the countries studied, except in the **Philippines**. Lack of gender-responsive women's environment, limits provision of women's career development in science and technology. The implication of the absence of women in decision-making and advisory-positions in the S&T system are very significant as it marginalizes women in the decisive chain in the priority setting of national research areas and programs, the allocation of research funding and the design of research projects.
- The available sex-disaggregated data on the situation of women in S&T are fragmented and scarce. The available data, therefore, make it impossible to adequately reveal insights of key issues in the situation of women in S&T in the countries studied.
- The lack of awareness, commitment and capacities of S&T policy and decision-makers and the scientific community regarding the implementation of gender-mainstreaming in S&T. This situation makes it not easy to "engender" the S&T based agencies. "Engendering" means the systematic application of gender equality and justice analysis into policies, agendas and programs. The realization of gender mainstreaming is a long process. It requires continuous monitoring and coordinated efforts. If "gender" is not included in the planning stage, it is likely to be absent in all subsequent stages of the project.

Strategic Actions Taken and Implemented to Ensure the Attainment of Gender Equality and Justice in S&T Development and Application

Various strategic actions are being taken and implemented by the respected countries to realize gender equality and justice in science and technology development and application.

China

Supervision and evaluation system have been set up and implemented by the National Working Committee on Women and Children under the State Council in the implementation of the strategic actions stipulated in the Program II of the Development of Chinese Women (2001-2010) by various government and non-government organizations. Strategic actions are implemented regarding the enhancement of (a) the participation of women in educational attainment in S&T, (b) the participation of women in decision-making and advisory positions in S&T, (c) the expertise of women scientists and engineers, and (d) the empowerment of women's skills in S&T implementation. To enable the "visibility" of women's participation in S&T, and enhance the awareness of gender mainstreaming in S&T, CAST (China Association of Science and Technology) added 4 indicators in the annual statistics. The statistics and indicators are related to (i) female employed personnel, (ii) women in science and technology, (iii) female directors, and (iv) female individual members in various S&T associations at different levels, and 168 national academic and professional societies.

India

Based on the directions stipulated in the Sixth Five-Year Development Plan (1980-1985), strategic action is taken and implemented since 1981 by the Department of Science and Technology through initiation of the scheme "Science and Technology for Women". Within the scheme, projects are being supported and implemented, which aimed at the application of science and technology for the benefit of women, especially in rural areas.

Indonesia

In 2003 a Presidential Instruction No. 4 of 2003 on the Coordination of Strategic Policy Formulation and Implementation of the National Development of Science and Technology was issued. The strategic policy specifically stated that "*national development in the field of science and technology also needs to be implemented with gender perspective, in line with international efforts to achieve gender equality*". The strategic policy also stated that (a) science and technology development's support is enhanced in order to strengthen socio political order, including gender equality, (b) studies to be

carried out on the weaknesses of institutional structure which need to be overcome immediately in order to reduce impact of socio political gap and provide support to gender equality through harmonious atmosphere in order to continuously strengthen the basis for social solidarity. To effectively implement the strategy, a National Committee on Gender, Science and Technology was established. The primary task of the Committee is to develop a synergy and network with all stakeholders in order to achieve gender equality and justice in the development, mastery and benefit of science and technology.

Republic of Korea

The establishment of the Ministry of Gender Equality in 2001 and the promulgation of the Law for Women in Science and Technology in 2002 prompted the Ministry for Science and Technology (MOST), the Ministry of Gender Equity (MOGE) and the Ministry of Education (MOE) to develop programs to support women in S&T.

MOST provides scholarships for girls to study S&T and provides research grants for women in S&T. In 2002 MOST set up an "Employment quota for women in S&T". The goal is to have 10% of women in government institutions, and public and private universities. MOE provides scholarships for female students in S&T, and "Employment quota for female professors" in 2003. Through this employment quota 200 female professors were newly employed in 4-year colleges

The respective ministries also have other programs to support women in S&T. MOST provides "Starting funds for newly employed female researchers", "Women scientists and engineers of the year award", "Grants for expansion of Women's University Research Foundation". To enable the "visibility" of women scientists and engineers, MOST supported the Association of Korean Women Scientists and Engineers (KWSE) to establish a database on women scientists and engineers in Korea. In June 2003 KWSE established data of 6,600 women scientists and engineers.

Philippines

The "Women in Development and Nation Building Act" is a powerful instrument that advances gender equality in all spheres of activity. For example, the Philippines annual budget law sets aside funds for gender programs. The Civil Service Commission of the Philippines enhances career opportunities of women in government services. The Science Education Institute of the Department of Science and Technology provides scholarship programs for science, science teaching, engineering, three-year or two-year technical courses for students who completed their secondary education. The mass-based scholarship program benefits students who compete in a national examination. As the result of this program, for the years 1994-1997, the proportion of male and female scholars was almost equal.

Based on the directions of the Plan for Gender-Responsive Development (PPGD) 1995-2025, the Department of Science and Technology (DOST) implement strategic actions related to (1) DOST's participation in gender-responsive activities and the

establishment of DOST's Focal Point for Women's Concerns, (2) the creation of a Committee on Women's Concern in each DOST agency and the collection and documentation of gender disaggregated database for planning, policy and training, (3) the creation of a Technical Working Group (TWG) to formulate DOST-wide Gender and Development Plan. The specific objectives are: (a) to integrate the gender perspective in the development process of the Department, (b) to institutionalize gender-responsive programs and projects, (c) to develop/enhance capability-building, training programs and activities on GAD, and (d) to develop and institute gender responsive database and information material.

In 2002 there was a Memorandum Order signed by President Gloria M. Arroyo, directing the Secretary of DOST to coordinate and oversee the implementation of a comprehensive Philippine Platform of Action on gender, science and technology.

Vietnam

The overall objective of the National Strategy for the Advancement of Women by 2010 is the improvement of women's quality and exerts their fundamental rights to fully and equally participate in and benefit in all aspects of political, economic, cultural and social life, including S&T.

IV. CONCLUSIONS

1. Concerning policies and implementation of strategies in gender, science and technology

The stipulations contained in the laws and regulations are important instruments for the formulation of policies, strategies and special measures to enhance the achievements of gender equality and justice in all spheres of activity, including in S&T. There should be a full commitment for its effective implementation not only by the relevant government agencies, policy/decision makers and planners, but also by the scientific community, women and men scientists and technologists. The process of “engendering” the development and application of S&T should be continuously implemented. “Engendering” means the systematic application of gender equality and justice analysis into policies, agendas and programs. This could be done, not only through awareness raising and political commitment, but most importantly by establishing technical capacities and infrastructure for effective realization of gender mainstreaming in the development and application of S&T, such as the provision of capable human resources and ICT, as well as continuous monitoring, evaluation and coordinated efforts

2. Concerning the sex-disaggregated data in science and technology.

A comprehensive sex-disaggregated data in S&T provides insight on key issues on women and gender in S&T. Therefore, there is a need to set priority on the establishment of a comprehensive sex-disaggregated data and gender indicators as a necessary instrument for the inclusion of the gender dimension in policies related to the development and application of S&T. The more complete the data set, the more useful it will be to policy-makers seeking to ensure inclusiveness for gender in the development and application of S&T. *No data, no visibility. No visibility, no policy*

3. Concerning the constraints in gender, science and technology.

It is most crucial for all stakeholders, governments and the scientific community themselves, men and women scientists and technologists, to create gender responsive environments and to continuously promote and enhance the participation

of women as actors and beneficiaries of S&T. It is also crucial to also implement special measures to facilitate the enhanced participation of women in S&T and in S&T decision-making and advisory positions.

4. Concerning the role of non-governmental organizations.

The increasing crucial role of non-governmental organizations (NGOs) as major players in the formation, development and application of humane S&T, and their role in bringing S&T to the grassroots and mainstreaming women in S&T. It is, therefore, most crucial for governments and the scientific community to work in partnership with NGOs in the formulation of engendered policies, planning and application of S&T to sustainable development.

5. Concerning the role of universities, R&D agencies and institutions.

The crucial role of universities, R&D agencies/institutions and the scientific community in the development and application of humane S&T toward gender equality and justice, people's welfare and sustainable development. They also have a crucial role, to work in partnership with NGOs, in providing support to needed policy interventions to ensure the adequate evaluation of gendered of technology, thereby providing an opportunity to avoid or mitigate negative impacts of technology. While it is not always avoidable, it is important to predict and where possible mitigate the negative social consequences of S&T development and application. This is especially critical in cases where these negative effects have a disproportional larger impact upon already disadvantaged groups in society.

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