GENDER SENSITIVE AGRICULTURAL TECHNOLOGY DEVELOPMENT IN THE INDONESIAN TIMOR SEMI-ARID FARMING SYSTEM

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Abstract
In the East Indonesia semiarid farming, the role of woman farmers covers work varying from management to labour. However, in the development program, gender internalization ignored woman farmers due to invisibility of women’s role. This occurs despite their significant contribution in the production and post harvest. Woman farmers are invisible before the policy makers, planners, and practitioners. As they are excluded from both the development program as well as that from the routine agricultural program, they do not benefit equally to the men when agricultural technology is introduced. Within the realm of gender main-streaming to promote the women farmers’ status as an equal partner to the men a research methodology with feminist perspective to find out the women’s farmers vision about their agriculture food production. This paper discuss needs identification of agricultural technology by women farmers. The result is amazingly challenging for the agronomist to fulfill.

Keywords: gender, appropriate technology with women’s perspective, traditional agriculture technology, women friendly technology development

INTRODUCTION
In the patriarchy culture and the related current gender ideology, women are the less fortunate human being than the men are. This problem has been manifested in various ways. For example in the development era, disregarding statistical fact that women constitute one-half of the world population, in Indonesia, like elsewhere in the world, in most cases they are classified as the neglected human resource in development. In agriculture development, although their roles and contribution in farming are considerable, the gender ideology and patriarchy culture result in sticky consequences on women farmers, such as that they have become the missing human resource. Their roles in agriculture activities are invisible and ignored. Several research works in the semi-arid farming of the East Nusa Tenggara, confirmed this conditions: i.e. the missing women in development [1,2,3]. They are neither listed as participants or target groups in the existing agriculture development program, nor they are invited as the men are in the routine agricultural extension activities. Hill [4], and Javier [5] also noted women invisibility. They are unrecognized because their number hardly appear in the
document entitled the Nairobi Forward Looking Strategies for the Advancement of Women (FLS) has covered an issue that agricultural research aimed at technology development should involve women. Furthermore in Agenda 21, the 1992 UNCED document regarding Women, Environment and Development. Once more it is reiterated. Castillo [14] was one among the very few who was quite clear in putting it into perspective, although it was limited on rice farming system, followed by Saito & Spurling [15] who describe women activities in their research.

However, in many cases, research on women farmers using gender analysis gets nowhere as far as appropriate technology development is concerned. Typically, using the Harvard method of gender analysis, research works conclude that women play important roles in agriculture. The emerging recommendations limited to the extent of the role of women, credit provision policy [16], training and extension directly to women farmers [17], while gender sensitive technology remains untouched. It must be bear in mind that without gender sensitivity the newly introduced technology may be resulted in harsh impact to the women farmers. This has been the case in the 70’s about rice farming and the green revolution. The introduced new technology became a labour displaced technology for women [18,19,20]. It went on until the 90’s. The in-depth analysis of Shiva [21] concludes that the Green Revolution results in violence against women farmers. Involving women farmers in the agriculture technology development therefore is a necessity. Undoubtedly this research work aimed long term goal to produce a new technology which is gender sensitive is highly urgent. Its short goal is to identify the specific technological development that meet the needs of the women in her roles as farmers and as homemakers a long the line with gender theory of nurture. This paper explores feminist praxis as a new approach highly gender sensitive. A suggestion is proposed on how to conduct gender analyses leading to identification of women friendly technology development.

A Gender Sensitive Appropriate Agricultural Technology Development

Generally, male biased attitude of the society results in neglected women in technological development is common. This can be explained using the nurture theory of gender. The men is dictated to play important roles as income earners, while the women should stay home as homemakers. This main ideas developed further with stereotyping the men and the women, which is necessarily opposites. These lead to the lower status of women than men in various ways. This also true in the public sectors. Take agriculture sector as an example. In agricultural development literature, women farmers are missing [22]. Within the gender ideology framework, the patriarchal society is responsible as blindness on the women’s issue making women farmers invisible. Researchers are on the list. Without gender conscientization on the side of the researcher, and hence capacity to employ appropriate gender analysis as well as praxis capacity, women remains to be neglected in dealing with technology. While Moser’s approach to gender analysis using women’s specific needs, women’s practical needs and activity profile [23,24] are inadequate up to surface the gender issues. I believe that one more component, name it “Technological practices analysis” is neccessary.™ The proposed questions for this analysis are:

1. What are the technological practices and procedures undertaken in agriculture production and post harvest activities presently put into practice?
2. What are the tools available to the women farmers and that to the men?; and What are the needs of the women farmers relating to the production process, product, postharvest, marketing and their other needs in domestic gender roles and needs on public roles as professional farmers.

Analysis could be focussed on the appropriateness of technological practices, tools, work that is strenuous to women, time consuming, low productivity, and whether it has met women’s needs. The technology must be appropriate to rural women, and it necessarily should ease women’s burden; available to women, it is not displacing women, it improves agriculture productivity, and for sure it ought to benefit the women. The methodology uses Feminist Research Methodology where women should be involved in a participatory manner.

From 1985, the FLS is a good source to set a standard involvement of women in technological development and technology dissemination (see FLS paragraphs 174, 181, 183, 184).
"Women should be fully integrated and involved in technological research and energy aspects of food and agricultural development" (FLS paragraph 174).

"the participation of women farmers in research and information campaigns; and the involvement of women in technical co-operation among developing countries and the exchange of information (FLS Paragraph 181)

While to avoid missing women, it stated that women farmers should be integrated in the modern technology programmes and be involved in all technical schemes:

"Women should be integrated into modern technology programmes that introduce new crops and improved varieties, rotation of crops, mixed farming, mixed and intercropping systems, low-cost soil fertility techniques, soil and water conservation methods and other modern improvements. In this connection, women's involvement in construction, management and maintenance of irrigation scheme should be promoted“ (FLS paragraph 183)"

Up to the present time, a quarter of century has gone. One may wonder how far is this strategies has been implemented to women farmers.

Appropriate food processing technologies can free women from time and energy-consuming tasks and thus effect improvements in their health. Appropriate technologies can also increase the productivity and women’s income. Such technologies should be designed and introduced, however, in a manner that ensures women’s access to the new technology and to its benefits and does not displace women from means livelihood when alternative opportunities are not available. Appropriate labour saving technologies should utilize local human and material sources and inexpensive sources of energy. The design, testing and dissemination of the technology should be appropriate also to the women who will be the users. To ensure appropriate technology development sensitive to women farmers, participatory approach should be applied all the way through out the research process. This can be done using the following technique:

1. Working through their local groups;
2. Focus Group discussion on the areas of their traditional agricultural work, household work, and tools could benefit from improved technology;
3. Viewing or hearing description of the technologies that address their problems, the women should be allowed to choose their situation.
4. Depending on the nature of the technology in need, the women themselves should be given opportunity in decision making in appropriate new tools/equipment/technology used, as well in technology generation
5. The researchers must be responsive to the women’s need to solve their problems, and women should be participated through out the research process.

For the researchers, their experience showed that involving male farmers in the research process is difficult. In the words of Saito and Spurling [15]

"It goes against the scientist’ culture and to concede respect for farmers’ logic and indigenous knowledge" (p.37).

So, involving women farmers may even be more difficult to handle. With a new method which is interdisciplinary, a process is required. Women’s Studies specialists, which are scarce human resource (at least in Indonesia) should be invited to join the research team. All involved must learn to accept each other, to respect each other, working mutually to involve women farmers from the beginning to the end. Employing female researchers/staff might increase the involvement of women and better address women’s particular needs. However, without gender sensitivity it will not work. It surely is not an easy task, but implementable. At least it has been empirically proven in the Semi Arid farming of East Java within our work on (1) SELANI™ Model [25], and (2) Enhancing the Role of Women Farmers in the East Java Rainfed Agriculture Project [26]. In addition, the impact of technology on women farmers should be evaluated for its direct and indirect effects. The finding of Fresco [8] regarding factors affecting the impact of agricultural technology to women may be noted:

1. The role and status of women in specific agricultural systems, including their access to resources and the intra
household patterns of resource and income distribution;
2. External factors such as the prices of agricultural products and inputs, environmental constrains and government regulations;
3. The nature of the technology e.g technology that is land saving and labour demanding; such as biochemical inputs, tube-well irrigation, post-harvest labour saving technology such as threshers, dryers, mills; technology that leads to land hunger, and changes in cultivation techniques such as changes in type of crops, and cropping patterns (supplementary crops, early maturing varieties, etc.).

The negative impact should be carefully examined, anticipated and ways out should be put forth. Last, but not least, is the agricultural extension activity when the new technology is going to be disseminated. Because of the male bias attitude, agricultural extension officials do not target women farmers in their work. Effort should be made to make women farmers be respected and taken into account as the men are. All related development agencies should be made aware of the issues [27]. Accepting and understanding Women’s Studies as an independent academic discipline is a must preparatory steps, similar to changing the mindset of the researchers to become gender sensitive.

Changing the Traditional Farming System
Meeting Women-Farmers’ Needs: Exercise Using the Timor Semi Arid Of East Nusa Tenggara*, Indonesia:

RESEARCH METHODOLOGY
The selected island to conduct the study is the Indonesian territory island namely Timor. Since no secondary data is available on the traditional farming practices, a random walk sampling was conducted on all local regencies of Timor. Field observation was conducted at the first place, followed by an in-depth interview on the farming practices as well as the role of women farmers and the men in the traditional farming practices intact for centuries. Eventually, slash and burnt traditional farming system was selected for the purpose of this study. An in-depth discussion with a group of women farmers was later conducted in the Timor Tengah Utara regency. Taking into account of the language barrier, to make the communication work well, the choice is based on the capacity of the women farmers to speak Indonesian. The result is verified with three other groups in the closes proximities.

RESULTS AND DISCUSSIONS
To understand gender issues, and the way to address the issues, the most popular gender analysis in development [23] comprises activity analysis, access to and control analysis and benefit analysis in which qualitative and quantitative information is required. It turned out that this analysis is only capable to identify gender roles of women and man and hence the status of women. Suffice to say that it is inadequate to identify the gender needs of women farmers to develop an agricultural technology. This is similar with the experience of Saito and Spurling [15], who concluded the immediate technological needs of women farmers are often not adequately addressed. Too, exploring research works done, we found that regardless the gender analysis, in East Nusa Tenggara [1,2,3], neither research implications nor recommendations touch improvement of agricultural technology to meet the gender needs of women farmers. My speculation on the possible reasons for it are:

a. the inadequacy of the available component to conduct gender analysis meant to unfold the need of development of agricultural technology;
b. lack of qualitative information;
c. no gender sensitivity on the parts of the researchers.

The degree of gender sensitivity on the parts of the researchers would certainly depend on the quality of the gender awareness training the researchers underwent. Involvement of women researchers does not automatically lead to a gender sensitive research work when they have not any awareness to the gender problems. Falls into academic science namely Women’s Studies (or Gender Studies, also popular as, namely, Feminist Studies), gender awareness, gender analysis and the sensitivity must be learned. Gender sensitivity plays important function to identify problems regarding gender relations between men and women. Lack of sensitivity resulting in blindness or myopia to handle the women’s issue. When understanding gender roles in agricultural production which is essential develop research research agenda is absent, gathering information
to improve agricultural research needs with a women perspective is also absent. Thus, no issue revealed on agricultural technology gender sensitive.

In Timor, the traditional farming system is slashed burnt. Opposite to the perception of many, it has been discovered that the slash-burnt indigenous agricultural technology has been sustained, said so, for centuries. No one knows when it was started, but the word of mouth concluded that it has been the practice by ancestors for generations Falls within category of shifting cultivation with a rotation of minimum 3 years, among us we name it Salome (Satu Lobang Rame-rame) which can be literally translated as merrily planting in one hole which means mass seeds in one planting hole. This practice is not only unknown by the modern farming technology, but also condemn. However, it goes that the indigenous practices involving both men and women farmers in all farming activities is essentially organic farming, in which neither pesticide nor chemical fertilizer is applied. Through this technology, the farmers produce a nutritious products of grains, green leafy vegetables and beans, plus yellow pumpkin fruits. Its practice is Phylosophical, logical and environmentally sound. First of all toward the end of the long dry season the land is slashed and burned by the men, believed so to purify the land. The farm land is perceived and glorify as the maiden of the earth, to be impregnated with seeds. Unlike in the usually recognized planting technique in the dry, non-irrigated land, the planting would not start until rain falls continuously 3 days in a row. The decision of the day to seed sowing is critical and full of local wisdom based on both the experience and the feelings of the farmers, men and women jointly. The beliefs goes that . the first rain drops is supposed to cool down the maiden earth which is just undergone the agony of burning. Rain of the first day is meant to wash away existing pests and diseases. Rain day two is meant to heal the mother earth which is wounded, cracking due to the harsh of the dry season. Rain day three is for plant growing. Planting is perceived as reproductive system, involving man and woman. The man bores hole using a long stick which symbolizes the male part. The women drop seeds, symbolizing the female part. Unlike the standard practices in which one type of seeds is planted in one hole, in seeds of three different crops (corn, pumpkin and beans), which total is around 9 seeds, are necessarily placed all in one whole.

With the local expert (Pellokilla, Nusa Cendana University, Kupang) I have better understanding on the beatitudes of this indigenous farming system including(1) low cost farming, (2) efficient technology e.g the case of intertwining roots to hold the plants stronger together against the storm; (3) high survival plant rate such as one or two corns’ stalk survive over storm; (4) having corns’s stalks stay erect for the beans' stem creeping up encircling, and, at the same time, maintaining the stalks of the corn to strongly raising up; (5) practical technology, the corn stalk function as the pole for the beans to creep up; (6) having enough grains, beans and vegetables year round in their diet, and (7) soil conservation as the layers of pumpkins leaves covers the soil from erosion due to heavy rain; (8) Food security is insured by cassava planting as hedge or intercropped as alternative carbohydrate in case of crop failure. Successful corn production is deemed important as otherwise there will be famine in the following year. Severe thunderstorm usually strikes during flowering time is the major source of disaster for corns. At least 3 stalks of corns are expected survive, because one is meant for hoarding to be used during the dry season, the second one is for the diet after harvest, and the third one is for the seeds next planting season. Thus from the number of surviving corn stalk the farmers could predict the future incidence of famine and its extend.

The corn stalk double function as readily available “stand or “poles” for the beans to creep up without extra work and extra costs. The local corns distinct quality is that it can be stored for a year. The high yielding corn varieties usually are to pests resistance during storage. Beans, the sort of snake beans is a multifunction one its green leaf is a source of green leafy vegetables, while the beans serve as a source of protein in the diet all year round. When there is enough rain they would have plenty of green leafy vegetables, and otherwise although not enough green leaves maybe consumed, but they would have plenty of beans. The crops also function as nitrogen provider through the N fixation by the soils bacteria. As with the pumpkin, due to its nature the leaves function as cover-crops to conserve the soil on the slope from erosion caused by the heavy rain. The pumpkin itself serve as the source as yellow
vegetables in the diet all year round. The farmers also use the length of the spiral vine to predict the future famine. When it is long, a damaging strong-wind and heavy-rained thunderstorm which practically ruins the crops, would result in low food production. After a cultivation which is perceived as a reproduction activity, the land, the mother of the earth have to be allowed to rest and recover. They let 3 years time at minimum to turn it to a maiden, judged to be strong enough to undertake reproductive role again. This way the land is preserved, and the farming is sustainable.

Throughout the production process, women play important roles, more than the men do, in plant tending, harvesting, and during the post harvest activities. Under the political will to increase economic growth, and increasing the living standard of the population, the farmers are expected to improve their technological practices. Say, when a focus group discussion with the women farmers come to a conclusion that they need the following characteristics:

a. high yielding crops, e.g. for corns several knobs per plant and longer knobs;
b. all products must survive up to the next year reaping season;
c. the crops endure harsh weather especially against a strong stormy wind;
d. fertilization occurs even when heavy rain and strong wind prevails;
e. soil conservation is not neglected;
f. the technology is not more expensive than the present practices;
g. the technology is labour saving, but it does not displace women.

The characteristics and the conditions set to be fulfilled indeed comprehensive indeed. Amazing how by their life experience, the women farmers would not take the risks of crop failure with the newly introduced crop from outside the area such as when Arjuna corn National variety was introduced in a monoculture technology in the 80’s. Crop failure and corn damage to pests within less than 3 months in the product storage, and no beans production led to the worst famine ever. Furthermore, the underlying local philosophical wisdom that in crop production system, the reproductive capacity of the mother earth must not be wounded ought to be respected. As well, sustainability must be assured through soil preservation and allowance for recovery after each reproduction for 3 -5 year time. Are the scientists and researchers ready to undertake this assignment in a participatory manner with the women?

CONCLUSION
Exclusion of women in the agricultural development project and in the routine extension programme women should be taken seriously in the appropriate technology development. To do it, the gender analysis should not miss the hit in identifying agricultural technology development with a women perspective. A relevant gender analysis is proposed, namely “Gender Analysis on Technology Practices”. The necessary questions within this analysis are:

1. What are the technological practices and procedures undertaken in agriculture production and post harvest activities presently put into practice?
2. What are the tools currently available to the women farmers and to the men?
3. What are the needs of the women farmers related to the production process, the product, post-harvest, marketing and other needs in her domestic gender roles as well as her personal needs as a professional farmers.

A comprehensive approach in the analysis should incorporate gender in broader technology related in overall development planning. An explicit statement should be made concerning women participation in agricultural technology development research; that women should be allowed to experiencing the technology, in the technology adoption process and in the dissemination process. The key component of women participation in agricultural technology development is gender awareness and acceptance that women are equal partners. Learning Women’s Studies as science and a gender awareness training is a prerequisite for the Project Staff/researchers.

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