

The Culture of Technology in Barani (Rainfed) Areas of Potahar: An Analysis of Farming Tools and Technologies from Gender Perspective

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Abstract

Pakistan is signatory to various international agreements and universal declarations including declaration of human rights, women's rights, gender equality and most importantly "Convention on the Elimination of All Forms of Discrimination Against Women" (CEDAW) which Pakistan ratified in 1996. The paper reviews women's situation in the light of these important human rights documents, Articles and Declarations, including CEDAW, CRS Report for Congress (United Nations System Efforts to Address Violence Against Women: 2008); Article 14 and Resolution adopted by the General Assembly on "improvement of the situation of women in rural areas" and the United Nations Millennium Declaration. The paper explores the culture of farm technology from a gender perspective in barani (rainfed) areas of Potohar, in Punjab, Pakistan. The findings are based on my Ph.d research conducted in a small village in district Chakwal, Rajgarh (pseudonym). As per anthropological understanding of the term, technologies are not only machines and tools but technological systems are also systems of meaning for their users, which I examined in-depth in this paper. Technology has a culture of its own and the manual and mechanized tools used in various wheat (staple crop) and groundnut (cash crop) operations (the two major crops of barani area) as studied in Rajgarh, symbolize the deep rooted gender ideologies and a hierarchical structure of the farming enterprise. An in-depth analysis of major wheat and groundnut tools and mechanized technologies used in selected crop operations of wheat and groundnut make it clear that not only certain operations are gender-specific but the very nature of these tools technologies have a gendered identity. Men monopolize all mechanized operations using powerful machines symbolizing superior, high-skill male areas of work as compared to women who do most of the post-harvest processing work using primarily manual low prestige hand-held tools and implements showing their low-skill and inferior position in social hierarchy of work, Malik and Majid (2004). This has negatively affected farm women and needs to be brought at par with men through implementing various proposed measures including access to productive farming land, mechanization in the areas of women's work, and enforcement of UN protocols addressing [rural] women.

Keywords: Farm technology, potohar, barani, gender, Human rights, wheat, groundnut, crops

1. Introduction

Women comprise 47.5 per cent of the total population of Pakistan. According to the Economic Survey of Pakistan (2009-10) 62 per cent of the population of Pakistan lives in rural areas and is directly or indirectly linked with agriculture and its related fields and women form a major part of this labor force. Jamali's recent study on role of women in agriculture notes that in Pakistan employment rate for women is 20.14 per cent. She further notes that in rural and urban areas women's participation is 23.63 and 12.53 per cent respectively, Jamali (2009). While talking about how to improve women's situation she notes, "in order to develop social standards of women and to enhance their participation in all economic activities, there is a need to equip them with quality education in the areas of latest technology... information technology, service sector and of course, agriculture and industry, Jamali (2009). In the last few decades due to machinery influx in *barani* areas of Punjab and resulting crop intensification, the work of farm women has increased manifold. The mechanized farm technology is an exclusive male domain; women do most of the post harvest processing work using simple hand-held tools and implements as highlighted in subsequent pages.

This study focused primarily on identifying, explaining, and depicting various aspects of social hierarchies in the use of, and access to, farm technologies used in the *barani* areas and to examine what are its implications for agricultural development and gender equality, on the one hand, and for increased productivity of rural farm women on the other hand. The reason this issue is important for gender studies is because it points to the different and unequal access to productive resources for men and women that needs to be addressed on a priority basis. Although, gender equality debate has been going on for a long time, and a considerable body of anthropological work has been contributed to the subject, Valle (1992), in rural women's case it is clear from this analysis that not much has been achieved so far. The human rights instrument CEDAW under Article 14 (that primarily deals with rural women's issues) states that "parties address the specific problems faced by rural women. They act to ensure that women have, equal access to land as well" FAO (2005). Yet in case of Rajgarh reality shows a contrary pattern: only eight women (22%) out of 37 sampled households owned any farming land. Article 14 clearly points to this position when it states that "despite the near universal acknowledgement of gender equality, women's rights as human beings are daily and continuously violated despite women's fundamental contribution to the economic, social and cultural development of their families and their countries" CEDAW, FAO (2005).

The findings and analysis of this research are primarily directed towards informing national [international] policy and those avenues of public action that may influence the future for rural women in this key area of economic [agricultural] relevance to the country in positive and constructive ways.

1. Women's Rights Context: International Standards

1.1. Accordig to 2007 United Nations Resolution (A/RES/62/136) titled "*Improvement of the situation of women in rural areas*" (part II section 2m): Government must ensure that rural women have access to "Taking steps towards ensuring that women's unpaid work and contributions to on-farm and off-farm production, including income generated in the informal sector, are recognized and supporting remunerative non-agricultural employment of rural women, improving working conditions and increasing access to productive resources"

2.2.The (1979) *United Nations Convention on the Elimination of all Forms of Discrimination against Women (CEDAW) Article 14 (Section g) ratified by the government of Paksitan in 1996, states that* rural women are entitled "To have access to agricultural credit and loans, marketing facilities, appropriate technology and equal treatment in land and agrarian reforms as well as in land resettlement schemes."

3. Research Methodology

The data for this research was collected over one year of fieldwork (March 1992 to April 1993) using participant observation as major anthropological tool of research, in village Rajgarh in district Chakwal. Out of total 130 households in the village, 37 from various strata of farm households were selected as a sample. In-depth interviews of men and women from sampled households were conducted to collect statistics on various topics related to gender and technology issues in the selected crop operations of wheat and groundnut. Travel with farm women to various places of social and economic importance to them, including visits to shrines, attending marriages and visits to local grain-market (*ghallah mandi*) were also made during this time. Visual research including, video-recordings, photographs and slide-prints were also used to highlight activities involving gender division of labor in various crop operations and to show actual farm-implements and machinery use, specifically by women on selected operation sites. The word "technology" for the purpose of this study, refers primarily to implements and machinery used in selected operations of wheat and groundnut. The comparison here is between conventional technology (especially hand-held tools and implements) and mechanized ones (tractors and threshers).

Women farmers refer in this study to those rural women who are managers of their own farms, and not every woman working in the field. This study uses the anthropological definition of technology as "the system of knowledge, tools and skills for production viewed in their social and economic contexts," Stewart (1977). The present analysis are undertaken using the Social Construction of Technology or SCOT Approach.

4. Gendered Terminology in Agricultural Artifacts

The persisting profiling of women being weak and fragile and men being strong and powerful also permeate into agricultural artifacts. In an article in *Alam-e-Niswan* (women's world) titled Anti-Feminism in Urdu, Jafferri notes that in Urdu language, the objects and qualities that have ephemeral or weak nature are feminine. He also notes that the above mentioned article "attempts to discover the subconscious sexism of the speakers through their use of nouns, proper names and the taboo words," Jafferri (1995). Judy Wajcman's (1991) book *Feminism Confronts Technology*, is the first major study of its kind, in which she challenges the common held assumption that technology is gender neutral, and notes "the masculine culture of technology is fundamental to the way in which the gender division of labor is being reproduced today." An analysis of names of farming tools and implements in Rajgarh support this finding by Jafferri. Most of the major implements for power and traction are gendered as masculine and weaker and lower hierarchy implements as feminine. For example in conventional implements, *hal* (plow) has masculine character, whereas *datri* (sickle) most extensively used by women in day-to-day work has feminine character. The modern machine parallel of the plow-- the "tractor" has a masculine character, and the word for "thresher" is masculine whereas the word for "trolley" used for carrying loads is feminine. Trolleys are just used as dump for weight, whereas haulage is performed by powerful (masculine) tractors that pull trolleys when they are loaded.

The words for "rake" (*tringle*), and "mould-board" (*krrah*), most commonly used conventionally by men, are masculine, whereas the word for "spade" (*krrai*), extensively used by women is feminine. The question that arises at this point is whether size of a particular machine or implement matters in this feminization or masculinization of technological artifacts or whether the biological roles of men and women in real life contribute towards such gendered categorizations? I suggest that the attributed qualities of both culture and biology play some part in determining gendered categorization of agricultural technologies, their naming and usage (my emphasis).

The more voluminous an object the more likely it is that it falls into masculine category of artifacts and men, being stronger and more energetic stereotypically in conventional perception, happen to be the one using it. The widely held view that women are low-skilled, weak and incompetent in the use of heavy objects, is one of the primary reasons behind such division of technological artifacts and their users. Cockburn and Ormrod discussed the attributes of women and men drivers and noted that "if in some sense we 'gender' artifacts, so also do we gender skills. Women as a sex drive 'better' than men in a certain sense of the word, less aggressively and less fast. Yet such performance is not counted a skill: men's abilities are skills" Cockburn and Ormrod (1993). Wajcman in her work on feminism and technology notes:

The very definition of technology has a male bias. This emphasis on technologies dominated by men conspires in turn to diminish the significance of women's technologies, such as horticulture, cooking, and childcare, and so reproduces the stereotype of women as technologically ignorant and incapable. (Wajcman 1991)

It seems that the terminology of agricultural implements and their uses also follow the same lines of strength/fragility and competence/ incompetence correlated to conventional gender themes. While naming agricultural implements, the ones that are more hefty and powerful are gendered as masculine and also correspond to men's roles in real life, for instance, plowing and planting done by tractor. Once the seeding is done by men, and germination takes place, women take over the major responsibility for the care and nurturance of the crop, then harvest it and do most of post-harvest care until the crop is ready to market, just as they do in bringing up a human crop-- their children. Table 1. highlights the gender characterization, naming and function of farming technologies as observed in village Rajgarh.

The above discussion shows that technological implements in farming are gendered according to their function, quality and character, more or less based on real gender roles observed in day-to-day life of men and women in farming communities. This is not only true in conventional classification system of old implements, as many of the above listed implements are, but in the most modern electronic technologies certain things are gendered, based on biological gender function imagery. For instance, computer cables are identified as male/female and master/slave.

Even the functions of machines are modeled after functions of human body and its organs, as Springer (1996) described in her book *Electronic Eros: Bodies and Desires in the Postindustrial Age*, Cockburn and Ormrod's study of 'brown goods' and 'white goods,' is also indicative of similar notions of gender and technology symbolism, Cockburn and Ormrod (1993).

5. Physical Aspects of Manual Implement Use in Farming for Rural Women: Weight of the Manual Implements and its Implications for Gender

The most extensively used agricultural implements by women, both in wheat and groundnut harvesting, processing and in day-to-day farm tasks are wooden and metal *tringles*, *krrai*, *sangle* and *datri*. *Datri* is the most widely and extensively used implement in *barani* farming for daily livestock and crop chores by women. Men also use *datri* but much less often, as they do not do most of daily cutting of fodder or the maintenance of growing crops. The sickle or *datri* occupies a unique place in everyday work of a farm woman, and if there is any single technology that could undisputedly be termed in a real sense as woman's technology, I would suggest it is *datri* or sickle. It has been extensively used by generations of farm women the year-round in all sorts of farming activities, and continues to be so used.

When looking at extensive use of manual implements primarily used by women over long periods of time, their materials and corresponding weight becomes crucial for analyzing the levels of energy consumption and health hazards women are exposed to, while constantly using these implements. In an effort to determine the weight of these processing implements, to see how much energy a woman spends while lifting and bringing it down for an entire day, that might stretch over 10 to 12 hours in busy crop season. I weighed various tools in their different forms, both in metal and in wooden form. The weights show that on an average any *krrai* (spade with a long wooden handle) weighs 1kg & 450 grams, a 5-tined *tringle* weighs a little above 1-1/2 kg (1kg & 600 grams) and approximately same is true of a *sangle* (wooden-fork). If a woman continues lifting that much weight (1-1/2 kg in case of a *tringle*) every time she lifts her arm plus the weight of the crop she is processing, it can be seen that it is strenuous and involves much expense in terms of energy when done over longer periods of time. This is especially true of those who are weak as majority of women happen to be. To know exactly how women feel about using these manual technologies, and the degree of difficulty they face in getting through with these operations, women were asked questions about each major tool they used and which one they found most difficult to handle. Most of them said, *tringles* were the most difficult to use as they feel totally exhausted after using them hundreds of times during a day's work in peak groundnut processing season. Table 2, also shows the main features of agricultural implements frequently used by women farmers in village Rajgarh.

In groundnut operations, especially post-harvest processing women were using *tringles* and *sangles* extensively. In Rajgarh many farm households did not own even these small but essential farming implements and borrowed them from neighbors when needed. But at peak work season essential tools like *tringle* and *krrais* could not be spared by any household resulting often in idle hands and loss of productivity.

6. Case Study

A relevant case in point was of my host-family. In that particular household all farming work was done by two daughters. Both were observed beating groundnut shrubs over a prolonged period of time with a very old broken *sangle*. They had tied the broken *sangle* with a piece of cloth and used it for the entire groundnut husking season. See Figure 1. They would sometimes borrow a friend's or a relative's *tringle* for a while but it would not take long for the lender to claim the tool back for their own use. The *sangles* are meant for light jobs, like sorting crops or picking things. So while husking many times these *tringles* and *sangles* would breakdown and a replacement would be needed immediately to continue with the operation. But a replacement would not be readily available. A *tringle* generally costs Rs.60 to Rs.100 depending on quality. Farmers were reluctant to buy new ones and tried to use the broken ones with minor repairs that would not last very long, frustrating the women-- the main users of these implements. Such non-accessibility of women to simple manual implements highlights the level of difficulty faced by them in acquiring even small low-priced tools and technological options in their areas of work.

It was noted that many such households had resources to buy new implements, including my host family, but when it comes to women's needs, a general lack of attention to their needs and health, both in the house and in the field was noticed to be pronounced.

In general, husking operations, which lasted sometimes for weeks and months in different strata of farm households, and involved bending, women, complained of severe backaches long after the processing was over. The weight of a five-tined *tringle* is about 1-1/2 kg, women reported that lifting a *tringle* to a certain height, bring it down and raising it again during beating of groundnut plants, made it the most arduous part of groundnut processing. Figures 2 and 3 show women's body positions while using manual implements in groundnut processing. The issue of manual use of tools and how it affected its users, though not brought up much in the past, has been taken up lately in a few studies. Bhatti, while talking about women and occupation related health hazards in India noted that "lifting heavy weights which, contrary to common belief, is very often a woman's job as brick carriers on construction sites or as cart pullers, cause menstrual disorders, prolapse of uterus and miscarriages," Bhatti (1993). The drudgery of this kind of heavy labor becomes routine for women who must undergo the hard regime seasonally year after year. Many women said, processing of major crops was previously the men's job, which had now become the women's lot. According to many respondents, this transition in male-female roles appeared in Rajgarh after women of the Mughal *patti* (lineage) started to participate in previously male-dominated crop-processing operations, never performed by women in this area in the past. Mughal women were blamed by women of other castes that they increased the workload for all women of the village. Surprisingly when Mughal women were asked about this blame, they were not embarrassed but felt proud of stepping into male areas of farm work.

According to Foster, this might be one of the reasons for difficulty of performance reported by women, whose motor patterns and customary body positions during their traditional work spheres did not adjust to match the new motor patterns that they were now having to use. Foster has highlighted the nature of development for such motor patterns and body positions and notes, that these could be viewed as anything that we learned in our childhood with ease but found difficult to adapt to in adulthood. As a result technologies that require changes in motor patterns may cause rejection of a technology by people, because "to have to change customary motor patterns is both difficult and tiring," Foster (1973). Thus contrary to commonly held belief that economic and socio-religious factors are the major reasons of non-acceptance of new and improved technologies; physical factors like body positions and motor patterns required by a specific innovation might also cause non-acceptance among its beneficiaries. Foster further notes that "when new tools and technical innovations can be adapted to traditional motor patterns, the probability of acceptance is greater than if no attempt at accommodation is made," Foster (1973). Bischoff noted in the case of Muslim women, that the way women usually cover their body and their dress-patterns might hinder their acceptance of tractor, as certain parts of their body might be exposed in a driving position, Class Paper (2002).

As mentioned earlier, all sampled household women (total 37) reported that 3-tined and 5-tined *tringles* were the most difficult implements for women to use because of their weight. Many reported that both *sangle* and *krrai* were also equally hard for women to use. Although, the operation of shelling with *krrai* is shorter in duration than actual beating and re-beating of groundnut with *tringle* and *krrai*, women reported that it demands a lot of energy and stamina, as the *krrai*, also weighed about 1.45 kg. The weight of hand-tools varies according to the wood used; some like bamboo, are lighter than other like *kikar* and *phulai*. Bamboo implements cost more money to buy because they are not indigenous to the area, so farmers prefer to grab any fork-like branch of a tree to prepare their own free *sangle*.

Due to their multiple uses in manual farm work, the 3-tined and 5-tined *tringles* of both wood and metal are most popular among women. They are used in most processing operations of groundnut and wheat. Currently due to rising prices for wooden-*tringle* and its short durability and repeated purchases, farmers have switched to metal-*tringles*. The other most frequently used implement is *krrai*, also used in groundnut processing, as shown in Figures 4.

7. Risks and Gender Implications of Using Conventional Manual Agricultural Implements

Risk and danger of injury to users, mostly women, of the conventional tools and implements is also ever present. The cuts and bruises and the exertion from lifting farm tools coupled with poor diets and under nourished physiques when health facilities are inadequate all combine to undermine women's lot in rural areas. A pertinent example is of wheat harvesting when women do most of the cutting in a squatting position. Holding a bunch of the crop in one hand and the sickle in the other she cuts the bunch in one stroke keeping the action close to the ground. This requires a lot of practice, strength and stamina. Cutting the wheat plants close to the crop floor is done for maximum yield of wheat straw (*poh*) which is an important part of cattle feed in *barani* areas. Having to squat for long hours continuously during harvesting days makes women suffer from aches of different kinds, and many become hunch-backed and look older in an early age due to extreme sun exposure during long cutting hours in scorching heat of the summer months (from April to June). Another common ailment is the nail fungus which develops in both hands and feet of the women farm workers when small wounds and even minor bruises remain untreated and become infected. Many young working age women become chronic patients due to persistent pains and other health problems related to heavy physical labor year round. Leghorn and Parker, talking about control of women's bodies, state that in several countries women are focusing directly on the protection of their lives and health "Japanese women for example, are working to have more of women's work-related illnesses accepted as occupational hazards." They further noted that work places in Japan are being held increasingly responsible for the neck and back pain called 'inflammation of the tendon sheath and cervical syndrome' that women develop from typing, keypunching, and doing childcare jobs, Leghorn and Parker (1981).

According to their study the Commission on Women in the Informal Sector found that due to long working hours in the same position, women suffer from posture related-health problems. Occupations like tailoring, *bidi*-making, paper bag making, paper rolling were found to be debilitating. Also, the study noted that a large number of women also come in contact with hazardous materials and "many women do repetitive work like shelling nuts, the fingers of these women get boils and abscess because they are not provided with gloves to protect their fingers," PAASS (1993). Similar cases were found in the study area where women shelled groundnuts by hand, in planting season for seeds. They reported that if one peels groundnuts with hands for a long time, one could get fever. According to them, groundnut has some hot-effects to it. To evaluate the basis of such conventional beliefs of women from a medical point of view need some more research in future.

8. Raw Materials used in Making Agricultural Implements and their Relevance to Gender

Raw materials used in agricultural implements have important implications for gender in terms of their weight and shape for the user as previously discussed. Some wood types are light weight, whereas others are very heavy. A study of (manually-held) wooden implements indicates that key factors in determining preference is weight, the lighter the weight the more popular the implement among its users. Many types of local trees are grown for this purpose, along the edges of fields. These trees have two important functions, first to provide shade and shelter to working farmers in summer and second, to provide material for wooden tools and implements. The usual practice is that farmers cut suitable wood from their field and give it to village *lohar* (iron smith) for making the implement. Women being predominant users of manual implements, materials used in certain tools have important gender implications. Among the light wood types; *bance* (bamboo), *ber* (*Zizyphus Mauritiana*) and *drek* (*Melia Azedarach*) are the popular choices. For making *sangle* (wooden-fork) farmers make use of any tree where they could find a natural fork-like branch. For handles and making fingers or tines of wooden-rakes, bamboo is extensively used. Bamboo is not locally grown and is brought from other areas. *Koh* is another popular tree used for rake-tines or fingers. *Koh* is also not indigenous to the area and brought from outside.

The additional feature of *drek* and *koh* is that in addition to being light, both are classified as bitter wood types and hence termite-proof and durable. For heavy wooden implements like the wooden-plow a popular local wood-type is *phulai* (*Acacia Modesta*). The *Phulai* tree usually has a natural curve in one of its big stems which has been used by generations of farmers for making *hal* or traditional plow. To have a look at major wood-types, their features and implements made out of them see Table 3.

9. Typology of Farm Implements

9.1. Gendered Technology: Mechanized (high prestige/ masculine) vs. Manual (low-prestige/ feminine)

The present farm technology scenario in *Rajgarh* represents two lines of agricultural technologies, mechanized (Type a): mainly for traction, planting and threshing like tractor, thresher, groundnut digger, trolley and manual (Type b): primarily for harvesting and post-harvest processing and storage. Looking at their main users, these two lines of technologies can also easily be classified as men's technologies and women's technologies, as outlined in Table 4. The technology in farming is gendered in a way that is easily discernible. Mechanized technologies and those powerful, in general, come under masculine domain whereas manual, less technical could be attributed to feminine domain in a wider sense, albeit, men also use them. In this connection Cockburn and Ormrod's case of 'brown goods' and 'white goods' in the study of *Gender and Technology In The Making* is worth mentioning. The term 'brown goods' in general refers to leisure and entertainment or the high-tech goods, thus more 'male stores' whereas 'white goods' are for domestic work or as the authors put it "where you buy what is deemed to be necessary," type or 'family stores' Cockburn and Ormrod (1993). In discussing the curious relationship of technology and gender, they note, "There is a prevalence of bald prejudice: women are expected and believed to understand and control engineered technologies less competently than men," Cockburn and Ormrod (1993). No women was ever seen using mechanized technology under any circumstances, whereas instances were referred where in adverse circumstances women did crossover into conventional male domain activities, like for example manual plowing with a pair of bullocks.

Two women out of the 37 sampled households have driven bull-drawn plow (*hal*) at some point in their lives, not a single case was found of any woman using a tractor under any circumstances. This portrays a strict margin of transgression in the area of modern mechanized agricultural technologies as compared to conventional technologies, which might be attributed to women's low skill level and technical capacity to operate the high-skilled mechanized farm technology. The conventional role expectation for women discourages their public exposure to unrelated men and hence, not getting into areas in crop operations involving male labor from outside as a general rule. An example is that reciprocal labor (*mang*) groups, are formed only by men of the village; women only participate in inter-village *mang* groups. The need for modern agricultural equipment has not replaced the need for reciprocal labor though, the volume of such labor use has reduced over the last three to four decades, following the influx of mechanized machinery.

In Table 5 manual technologies have been termed as women's technologies, because they were seen to be in areas of women's work in farming and possess qualities that carry low social and economic value. Men as a rule use prestigious modern capital intensive technologies that are high-skilled, high-powered and correspond to men's high socio-economic status and—keeping their upper hand on women as sole custodians of superior technical knowledge. Women in routine perform menial tasks where a mechanized crop operation is taking place, see *Figure 6 and 7*.

Case Study 2

A relevant case of such gender-bias and asymmetry of access and use of modern machinery was observed during groundnut harvesting of one of the sampled households. While harvesting of groundnut was mechanically performed by the tractor driver, the two women were pushing the tractor from rear, clearing the groundnut plants that would stuck in the groundnut digger's blade after every few minutes. They kept running behind the tractor pushing it from rear-end, clearing the plants every few minutes until the whole plot was harvested, as shown in *Figures 6 & 7*.

These figures clearly portray that mechanized technology has further marginalized women's areas of work, placing them at the lowest end of the gender division of labor. Their work is manual and laborious needing more physical energy than sophisticated technical skills, reserved for those highly skilled and highly placed in the hierarchy of work-- the men. Like any other field where skilled are at the top of the hierarchy of work, men are the real beneficiaries of new farming machines, having the knowledge, skills and culturally empowered to operate these high-prestige high-tech machines.

Women have become less effective, even those who had good grasp of traditional *hal* and other implements. No channels of acquiring new technical knowledge about farm machines exist to keep them abreast with changing technology scenario. The traditional sources of acquiring agricultural knowledge and skills-- the elders of the family and village are also losing their effectiveness in the new era of mechanical farming. Their skills have also become obsolete and incompatible with new demands of mechanized farming. Age that used to be an important criterion for conventional wisdom and elders who had a prestigious position in the farming community are losing their utility in the wake of the social changes that accompany the new agricultural machinery. Older farmers could no longer effectively play the role of channels of precious indigenous knowledge, as the technical complexity of mechanized farming requires more than knowing how to handle a pair of bullocks or a wooden-plow.

10. The Social and Symbolic Functions of Farm Technology

Apart from its usual physical functions, farm technology in a usual village set-up, based on agricultural economy, performs a variety of other crucial social and symbolic functions. Under various conditions a technology plays multi-faceted socio-cultural and aesthetic functions for which it is not primarily designed. Here comes what the SCOT approach calls the 'interpretative flexibility' aspect of a particular technology. Kline and Pinch (1996) discussing the multi-function automobile in rural United States in the early 1900s hold that "different social groups associate different meaning to artifacts, as agents of change, leading to interpretative flexibility appearing over the artifact."

The tractor, for example, as the most expensive machine used at present in *barani* areas (ranging from about rupees 200 to 300,000 for a small tractor to 500,000 for a medium size and 925,000 for a large tractor), has variable functions. These are ecological, infra-structural and cultural in nature, devised by various social groups like farm-men, women, *lohars* (iron smiths) who directly or indirectly use or benefit from tractor. In the absence of a developed road-system and transport facilities villagers frequently use tractor for both travelling and haulage. If there are more people and goods to be transported, a trolley is attached to the tractor for greater accommodation. On social occasions like weddings, marriage processions (*Junj*) are also transported within small distances on tractor trolleys. Those who do not own trolleys use donkey-carts, as shown in Figure 8. Women also play dominant role in such manual transportation.

One of the basic features of the existing socio-cultural system in *barani* areas of *Potohar* is that it values technology items as symbols of high economic status and as having prestige functions. The tractor, being an expensive machine, is a symbol of a farm family's wealth and asset ownership in a resource scarce *barani* community of small farmers. Hence, it carries a lot of social and economic prestige for its owners. Figure 11 shows a tractor parked in specially constructed garage of a *barani* farm household. Other than the use-value of tractor for men as its primary users, the tractor is a powerful symbol of masculinity in a small village where few own one, which is secretly praised and cherished by women. In the old traditional set-up a pair of bullocks (*jori*) had the same masculine power value as tractor for today and women sought men who kept bullocks as their pet-animals.

Keeping quality bulls in rural areas was traditionally and is still to some extent, a symbol of wealth and masculinity, equivalent of keeping expensive high-end automobiles (like BMW or Porche) by men in the Western countries. These men are sort after by the best village women as their ideal mates. Women even today take great pride in telling their friends that their prospective mate has a passion for bulls, *dandan-na-shoki*, which translates into his being wealthy and masculine. Currently the culture of technology in rural areas is undergoing a transition of symbols of masculinity and prestige, where the traditional wealth symbol, livestock or *maal* is slowly replaced by a new form of wealth symbol-- the farm-machines. This changing nature of symbols of prestige and wealth, has posed new threats and challenges to its conventional possessors-- the men, who have to compete to acquire these new status symbols by exploiting unconventional avenues of income, outside the village confines. Families that own tractors also own many other agricultural implements that are used with tractors costing thousands of rupees. A farm household with a tractor and few implements show an investment level on prestige-laden modern capital intensive technologies as something that differentiates them from other average farm families.

A total of 12 households out of total 130 (9%) in village Rajgarh own tractors and other modern farm implements. This is a low percentage of machinery owners and shows lower prosperity levels of Rajgarh.

There is a tendency among machinery owning households to develop their pool of improved farm implements slowly after acquisition of tractor-- the core modern-machine used in the study area. Village families with agricultural machinery enjoy prestige in the community due to their ability to accumulate modern technology and the dependency on them of households without any machinery. Generally, villagers would not admit the machinery-owning households enjoy any special status in the village and most scoffed at the suggestion, particularly women resented my asking them this question and retorted "why would they be superior to us, machines do not make anyone bigger than anyone else." But deep down people do resent the machinery owning well-off households and envy their comfortable life style, wider mobility and recreational potential.

The income gap between machinery-owning and non-machinery owning households are considerable in Rajgarh. Though the households with modern machinery do not behave proudly in public they do entertain notions of superiority. The factual position is that the overall economic position of households who own machinery is a lot better than those who rent machinery. Women in these households enjoy more work facilities than an average farm woman. They have more leisure, more money and more provisions of life, and almost all the twelve tractor owning households had big spacious houses. The machinery owning households in Rajgarh rented their machinery to non-machinery households. Machinery renting is a profitable business bringing added incomes to its owners, who use it for buying more farm equipment. Whereas families without any machinery not only do farming below their full potential, due to rent expenses, but also pay a considerable portion of their crop earnings back to machine owners in the form of cash rent-payments. As a consequence households with farm machinery are more prosperous with a high standard of living. They can plough big fields, not worried about machinery renting, whereas poor farm households look at machinery use in terms of rent-hours rather than time-saving or greater yields.

The combination of traditional and modern technology use has put women into a further marginal position, as they are struggling to cope with both at the same time. They are not fully out of tradition and they can not avoid being dragged into the new culture of machine farming, cash economy and changing symbols of social and economic prestige. It is hard for them to converge without having a knowledge of how to achieve it. Where men have gone much ahead of women in terms of education and skill level, women have lagged further behind. This gap has to be bridged by introducing skills and technologies in all major areas of women's work and along with managerial knowhow to make them more compatible with the emerging technologically oriented farming scenario in *barani* areas. Their future social and economic empowerment also heavily depends on making such shift in their present more manually oriented and less productive crop production activities.

11. Recommendations

11.1 First and foremost step towards increasing rural farm women's socio-economic status is giving them access to productive resources, especially farming land. That would not only encourage more women to enter in farming enterprise but also promote an increased use of modern mechanized technology in their areas of work for increased productivity and income. Also, the only cash crop (groundnut) should have value added pricing to give them higher returns for their economic empowerment.

11.2 Crop operations should be fully mechanized to increase efficiency and productivity of farm women. Right now due to partial mechanization of wheat and groundnut operations women's workload has increased many-fold as they have to do more non-mechanized manual work as part of major mechanized crop operations.

11.3 With the opening of ICARDA's (International Center for Agriculture Research in the Dry Areas) country office in Pakistan, it should be made part of technology development, training and dissemination programs especially for women in farming. This should be done in collaboration with Pakistani counterparts like Pakistan Agricultural Research Council (PARC/NARC), agricultural universities and public-private partnership for a greater impact.

11.4 The situation of farm women has not improved in spite of mechanization of major farm operations, as this study highlights. Rural farm women's heavy involvement in manual processing over long periods of time with very simple hand-held implements, as shown in this study, is an open violation of the CEDAW, VAW and United Nations Article 14 that address the specific problems faced by rural women and the Resolution adopted by the General Assembly on "Improvement of the situation of women in rural areas."

These protocols provide a guideline and framework to protect the women against these violations. They now need to be implemented with full force in Pakistan's rural [*barani*] areas for protecting women's rights and improve their work environment which currently does not comply with any human rights charter.

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Table 1.

Gendered characterization, naming and functions of agricultural implements and machinery in village Rajgarh

Word for the Implement/Machinery	Gender of the Word	Function of the Implement
<i>Hal</i> (plow)	Masculine	Plowing/Planting
Tractor	Masculine	Plowing/planting/traction
Trolley	Feminine	Carrying loads
<i>Datri</i> (sickle)	Feminine	Cutting/manual harvesting
<i>Krrah</i> (mould-board plow)	Masculine	Land-leveling/making field boundary
<i>Krrai</i> (spade)	Feminine	Cleaning
<i>Tringle</i> (rake)	Masculine	Processing
<i>Panjali</i> (yok)	Feminine	Attached to the necks of draft animals during plowing
<i>Rehra</i> (donkey-cart)	Masculine	Traction
Thresher	Masculine	Processing

Table 2.

Weights and materials of manual implements frequently used by women farmers in village Rajgarh

Tool	Local Name	Material	Weight	Price (Rs.)
Rake (5-tined)	<i>Tringle</i>	Wood	1kg & 600gms	30-35/wood 40-45/metal
Spade	<i>Krrai</i>	Wood/Metal	1kg & 450gms	30 to 50
Muttock	<i>Kaai</i>	Wood/Metal	2kg & 500gms	45 to 55
Serrated Sickle	<i>Datri</i>	Wood/Metal	¼ kg	35
Fork (2-tined)	<i>Sangle</i>	Wood/Metal	1-1/2 kg & above	Made with local trees

Table 3***Farm implements, wood types and their features***

Tree Type	Scientific Name	Wood Features	Implements Made
<i>Drek</i>	Melia Azedarach	Bitter/pest-resistant/light weight	<i>Tringle, sangle</i> (rakes)
<i>Kikar</i>	Acacia Arabica	Ordinary/cracks easily	<i>Sangle</i> (wooden-fork)
<i>Phulai</i>	Acacia Modesta	Natural curve	<i>Hal</i> (wooden-plow)
<i>Ber</i>	Zizyphus Mauritian	Light weight/ does not crack easily	<i>Dastay</i> (handles)
<i>Kreen</i>	Cactus-like local tree	Cracks easily	----
<i>Shreen</i>	Cactus-like local tree	Light wood	<i>Kruga</i> (lid of a milk churner)
<i>Koh</i> (not local)	Olea Cuspidata	Light weight/pest resistant	<i>Anglian</i> (tines of rakes)
<i>Bance</i> (not local)	Bamboo	Light weight	<i>Dastay/anglian</i> (handles/tines of rakes)

Source: Survey Data

Table 4***Typologies of farm technologies***

Type a. Technologies	Type b. Technologies
Men's Technology Mechanized/ Capital-Intensive/ High-Prestige	Women's Technology Manual/ Labor-Intensive/ Low-Prestige
Traction purposes	Harvesting/ processing
More productive	Less productive
Less time-intensive	More time-intensive
High in social hierarchy of skills	Low in social hierarchy of skills
Prestigious, superior	Low prestige/inferior
Tractors/threshers/groundnut diggers and other front and rear-mounted implements	Sickles/rakes/spades/ forks of various shapes and weights
Primarily cash crops	Primarily traditional crops