Empowerment through technology uptake: gender dimensions in social capital build-up

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This paper explores how and to what extent women and men have benefited from the social capital build-up (referred to as the ability of men and women farmers to develop and use various kinds of social networks and the resources that become available thereof) in technology uptake, and the role of women in this process. Using a case study of ICRISAT's Groundnut Production Technology (GPT), the process by which farmers – both men and women - as well as the whole community became empowered through the build-up of social capital is systematically documented. The focus of the paper is on collective action as a mechanism to stimulate gender-equitable change processes.

Our evidence suggests that the technology uptake process was enhanced with the build up of social capital, whereby the men and women from all class and caste groups came together for improving their livelihoods. Collective action was enhanced with the increased involvement and participation of women. Strong kinship ties were developed among diverse classes including the landless tribal women, which formed the major labor force for this technology. Reference to the Umra case study illustrated in the paper presents the process of empowerment whereby the marginalized group including women gained better access to resources, information, knowledge and some opportunities for political participation.

The paper concludes that social networks played a crucial mediating role in the process of technology uptake. The build-up of social capital played an important role in influencing the distribution of benefits from the technology because of the ways in which social networks and social relationships facilitated technology dissemination. Gender relations played a significant role in mediating the translation of economic benefits into well being of the individual, the family and community. Finally, it is suggested that further insights into the role of social networks and power relations in the village may be examined in greater detail by establishing the village network architecture especially including the marginalized groups.

Keywords: social capital build-up, gender, impact, social networks, empowerment

1. INTRODUCTION

Agricultural research during the past 30 years has been successful in boosting productivity and providing enough food to feed the world. However, problems of poverty, food insecurity, and natural resource degradation are persisting. Producers in agricultural communities both men and women, are confronted by production challenges associated with changing population situation, a degrading natural resource base, new technologies and accelerated global economic integration (Asian Productivity Organization 2002). So going beyond the physical, financial and human capital, recent research is exploring the significance of 'social capital' and its effects on development outcomes.

Social capital, as Michael Woolcock (2001) holds, refers to the norms and networks that facilitate collective action'. Social capital is also referred to as the ability of men and women farmers to develop and use various kinds of social networks and the resources that become available thereof. It also means the voluntary action taken by a group to achieve common interests within this context.

There is currently considerable interest in the role of social capital in society and, in particular, it's potential to foster sustainable development. In keeping with the primacy of gender in socio-economic development issues, the gender-related dimension of social capital is one of the emerging themes. The family as the main source of economic and social welfare is identified as the first building block in the generation of social capital for the larger society. Women as primary caregivers are seen as playing a critical role in the process. Build-up of social capital is an important means by which women gain

access to resources and economic opportunities helping them to contribute to the family's exit path out of poverty.

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), with a mission to improve the well-being of the poor in the semi-arid tropics (SAT) through agricultural research for impact, has a commitment to equity in its pursuit of poverty alleviation. Recognizing that gender related benefits of particular technologies would differ among the diverse groups, ICRISAT uses its comparative advantage in the identification of globally applicable principles and methodologies in addressing the achievement of equity goals. For example, analysis of gender impacts from the improved groundnut production technology introduced in the state of Maharashtra, India during the late 1980's led to the conclusion that gender is a key discriminant in relation to labor activity pattern & time use, decision making behavior concerning resource use and crop product utilization and perceptions of needs of new technology development (Kolli R D and Bantilan, 1997). Information of this kind provides evidence that gender makes a difference in economic circumstances.

This paper explores how and to what extent women and men have benefited from the social capital build-up in technology uptake, and more specifically the role of women in this process. Illustrating the learning processes experienced at ICRISAT from the results of the studies of impact using the case of a specific Natural Resource Management (NRM) technological innovation generated through research on the poor in water-limited environments of the semi arid-tropics (SAT), the paper focuses on collective action as a mechanism to stimulate gender-equitable change processes. It provides an understanding of the implications of social capital for facilitating access to information, credit, institutional support, common property resources, and community participation. The changing dynamics of social capital in such situations is likely to yield gender related insights for better understanding the processes of technology uptake and diffusion.

2. METHODOLOGY AND APPROACHES

The following section gives the details of the technology and the different approaches adopted to assess the impact of the technology, featuring the various phases of learning in terms of new impact dimensions and methods.

GROUNDNUT PRODUCTION TECHNOLOGY (GPT)

GPT is a package of practices for dryland cultivation of groundnuts. It is essentially a natural resource management (NRM) innovation. The GPT was specifically developed for cultivation of groundnuts in dry areas, especially to promote cultivation in summer using improved package of practices which included improved cultivars, as well as soil, water, and nutrient management options. The GPT encompasses several components related to soil, nutrient, crop, water, and pest management. The components of the GPT can broadly be divided into:

- land management: preparation of raised-bed and furrows (BBF) using a marker for groundnut production;
- nutrient management: efficient application of macro- and micro-nutrients;
- improved varieties: high-yielding variety seeds, seed rate and seed dressing/ treatment;
- insect and pest management: effective control of insects, diseases, and weeds; and
- water management: Use of sprinkler sets to improve efficiency of irrigation.

The GPT was introduced in Umra village of Nanded district in Maharashtra, India (along with other villages in the groundnut growing regions of seven other states of India). This is a part of Legumes On-farm Testing and Nursery Unit (LEGOFTEN), an initiative supported by Government of India,

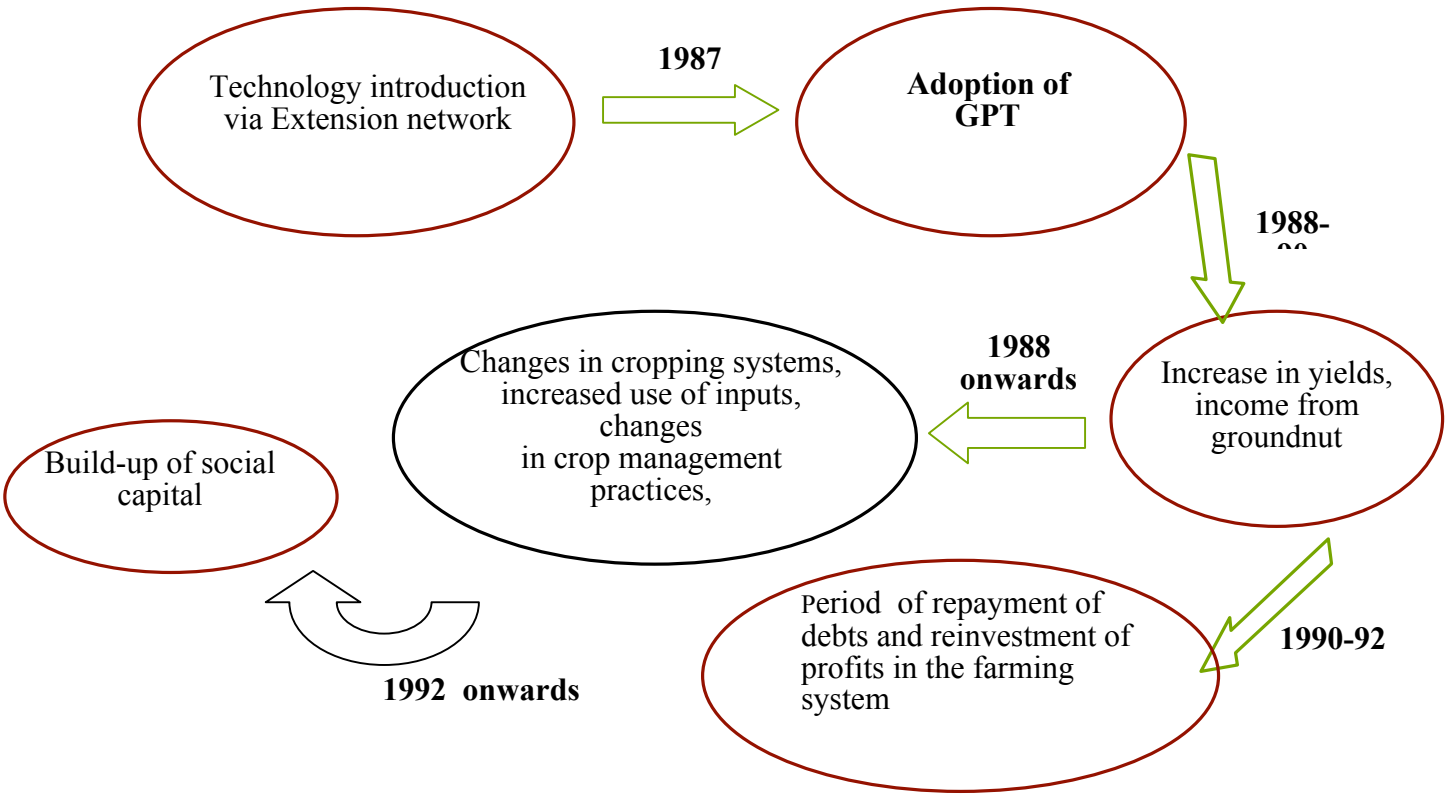
and ICRISAT, in the late 1980s. The development of GPT in India was initially motivated by the need to enhance groundnut production and yield to meet the rising demand in the country during the 80s and to reduce the import of edible oils.

APPROACHES

Using the case study of ICRISAT's GPT, a systematic documentation of the process by which farmers – both men and women - as well as the whole community became empowered through the build-up of social capital as presented in figure 1. An assessment of technology uptake process and the benefits thereof is illustrated in this monitoring and evaluation exercise which evolved into a learning process, emphasizing the empowerment of marginalized and vulnerable groups and operationalizing new methods and approaches.

As is seen in figure 1, a survey conducted during the early 1990s in Umra village in Maharashtra, Central India showed that there was fairly widespread adoption of the technology in the late 80's, but did not reveal any appreciable impact. A parallel ex-post evaluation of the technology with a gender perspective revealed significant changes especially in the intra-household distribution of benefits, and changes in access to and control over different post-harvest products. After a decade of technology introduction, significant impacts on a number of indicators to diverse social groups became evident. It was observed that a stream of benefits flowed to adopters due to changes resulting from adoption of the GPT innovation. These are direct benefits (i.e., benefits measured in terms of increases in on farm groundnut yields and income), and indirect benefits (i.e., changes in community welfare and farming system viability).

Figure 1: Technology adoption-impact linkages: the case of Groundnut Production Technology in Umra, Maharashtra, India



Three phases depict the results of ICRISAT's investments from the perspective of the various actors – farmers, socially marginalized groups, agricultural workers and women as shown in figure 1. Correspondingly, evolving approaches in assessing the economic, social and environmental impacts over time are similarly presented in three phases shown in figure 2.

Figure 2: Learning phases for ICRISAT impact study: the case of GPT, 1992- 2003

Early 2000: Case study- Gender and social capital mediated technology uptake assessment

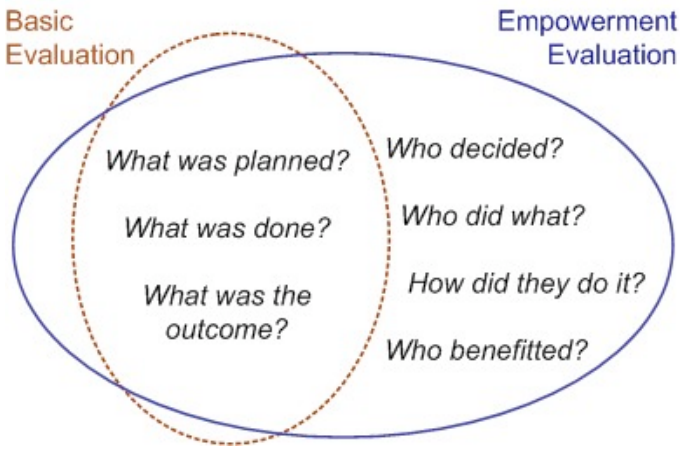
Late 1990s: Focus of assessment - Flow of benefits to diverse groups, particularly role of social capital

Early 1990s: Focus of assessment- to assess differential perceptions and gender-related impact indicators

Early 1990s: Focus of assessment - Economic and Environmental impacts

A combination of quantitative and qualitative methods of data collection were used during these three phases of learning. Qualitative results are presented through the monitoring and evaluation exercise showcasing the process of empowerment in a similar manner as presented in figure 3. Phase 1 was initiated with an objective of tracking and assessing adoption of GPT. The gender analysis in phase 2 was focused on identification of the inter and intra-farm household dynamics. In all the above studies ICRISAT did not specifically adopt a social capital approach, it just emerged from the exploratory studies as an embedded hypothesis. The case study in phase 4 examined the interplay of factors with a gender dimension in the villages where the technology was adopted attributable to specific nature of the technology, mediated by social capital.

Figure 3: Evaluation questions.



Source: Bartlett, 2005

It many of our earlier case studies it was

observed that people were developing various kinds of networks and norms of sharing and reciprocity in adopting the technology. Some of the networks were based on kinship networks and so on, but some of them were actually built for a specific purpose (Parthasarathy and Chopd, 2000). This finding has lead to look more closely into how the networks are built, who is benefiting and how are they benefiting, and the role of different members in the group.

3. FINDINGS

LEARNING PHASE 1 – ECONOMIC IMPACT ASSESSMENT OF GPT: QUANTIFYING RETURNS TO INVESTMENT

Method

This assessment of GPT in the early 90's is a part of a series of case studies on adoption and impact have been carried out by ICRISAT in Asia and Africa. They helped in identifying constraints to adoption and characteristics preferred by farmers that were also important contributions to formulation of ICRISAT overall research strategy. In this process, the tangible benefits from ICRISAT crop improvement and natural resource management research were identified. These included quantifying the returns to investment, and looking at the economic and environmental impacts of GPT among other technologies developed. The GPT impact study was also concerned with adoption tracking of the different crop and resource management options and estimation of research cost and evaluation of research benefits. Focus group meetings (FGM) were conducted between late 1994 and mid 1995 to track the adoption of different components of GPT. Relevant information were also collected from selected farmers using structured questionnaire.

Findings

Adoption of the technology had positive impact in terms of higher gains in yield and incomes, better farm prices, and saving of important inputs. The technology generated employment (particularly female labor force) and improved labor productivity. Joshi and Bantilan (1998) observed a partial and step-wise adoption of different components of the technology that range between 31% to 84%. Farmers also modified the technology options according to their needs, convenience, and resource endowments. In comparison to the prevailing technology, the groundnut production technology gives 38% higher yields, generates 71% more income and reduces unit cost by 16%. The technology also contributes in improving natural resource base, and eases certain women specific agricultural operations. The total net present value of benefits from collaborative research and technology transfer is more than US$ 3 million, representing an internal rate of return of 25%.

Learning

The BBF method of cultivation was becoming popular amongst farmers. It was noted that the adoption of different components of the technology was associated largely with the BBF method, with adoption of all components being significantly higher among those who had adopted this method. The probability of adopting the BBF was high when farmers had access to technology-generating and technology-transfer system. Availability of appropriate implements, capital, and irrigation also determined the adoption of the BBF option. The other components, especially the sprinkler method of irrigation need better market access for its adoption. Also, there is a need for well-designed cost-effective suitable implements that will facilitate easy maintenance of the BBFs. The technology generated modest economic surplus for consumers and producers, with the latter being the primary

beneficiaries. Identification of constraints to adoption of different components of the GPT is suggested to propose an appropriate strategy for the wide-scale adoption of the technology. Labor productivity and gender implications are also important impact indicators that require further attention. Lastly, the study focused on quantitative indicators alone and qualitative benefits from the technology were not looked into.

LEARNING PHASE 2 – GENDER ANALYSIS OF GPT: IDENTIFICATION OF GENDER-RELATED IMPACT INDICATORS

Method

An ex-post gender analysis of impact of GPT to examine the differential effects of groundnut crop production technology on men and women farmers were undertaken in the early 90's. It focused on labor and resource allocation and the distribution of the benefits of this technology across farm and labor households and among different men and women members. The study team was inter-disciplinary in composition and non-conventional methods of data collection like PRA's, and RRA's were adopted along with individual interviews, to interact more closely with male and female farmers to assess their perceptions regarding the new technology and evaluate their needs in view of the changes as a result of technology introduction. Gender analysis examined considerations beyond gender roles, and evaluated differences in the priorities men and women attach to alternative grain and plant traits.

Findings

Kolli and Bantilan (1997) identified the following indicators with strong implications on gender due to the introduction of the GPT. These indicators are - a) labor-activity pattern and time allocation, b) decision-making behavior of men and women with regard to resource use and utilization of crop products; and c) user perspective - differential perceptions of men and women with implications for technology development.

A gender analysis of the technology revealed that adoption of new technologies enhanced task specialization where activities were performed exclusively by a particular gender in order to optimize available household labor resources. The new technology also required more labor input by both men and women, about 26 hours in male labor requirements and 16 hours in female labor requirements for the summer crop. The adoption of the GPT package also significantly increased the use of female hired labor as shown in Table 1. Gender roles are segregated into types of work (men do heavier jobs and women do lighter jobs) and into market and domestic activities where men gain greater control over market-related activities and women over the domestic realm.

The qualitative implications of higher yields were also examined. Higher yields from GPT allowed households to diversify use of the products of the groundnut crop. In this process, women gained control over the products retained for household use. Men were mostly concerned about financial viability of the technology while women were found to perceive the advantage of the new technology options in terms of workability and implications for drudgery and occupational hazards.

An evaluation of the grain and plant traits indicated that women in the survey villages prefer varieties which are easier to uproot and shell; that offer high grain yields and good taste. Men seemed to prefer varieties with better fodder yield and larger seeds attracting better market prices.

Learning

The lessons learned from the above findings indicate that to ensure effective involvement of men and women in agriculture, there is a need to incorporate views and perceptions of both men and women members of the farming communities during technology generation and development. The findings also highlight the consideration of the distinct needs of both men and women in prioritizing varietal traits. Similarly these differences may also affect varietal adoption patterns and seed marketing strategies. Important qualitative data adds the dimensions on how men and women assess the benefits as well as how decision making power is shared among household members. These are useful indicators of real gains enjoyed by different household members. Integration of gender-differentiated quantitative information with qualitative information provides a holistic basis for capturing the effects of technology intervention in terms of balance of efficiency and equity consequences .A research and development agenda which incorporates analysis of gender disaggregated farmer perspectives is likely to lead to a more appropriate and acceptable technology which will gain further and wider adoption.

Table 1. Operation-wise use of male & female labor time, summer groundnut crop activities, Maharashtra 1991/92, (Hrs per acre)

Activity	Family Labor				Hired Labor			
	Male		Female		Male		Female	
	U	K	U	K	U	K	U	K
1. Land preparation (Field cleaning, clod crushing, ploughing & harrowing)	18.38	25.16	9.08	13.57	21.98	23.25	25.95	25.98
2. Soil preparation (Preparation of broadbed & furrow / Ridges & furrow)	1.88	6.43	0.07	1.16	2.58	11.35	0.00	0.00
3. Transport & application of manure / fertilizer - basal & top dressing	11.03	6.50	6.27	3.93	12.94	9.91	18.90	4.10
4. Seed treatment & sowing operations (Hand dibbling / seed drill)	7.27	9.57	6.78	10.05	3.93	4.55	59.19	57.68
5. Irrigation (Sprinkler / Traditional method)	14.64	43.56	2.69	5.78	13.88	32.96	1.06	0.00
6. Intercultivation & hand weeding	6.48	10.19	24.37	19.21	6.02	5.74	116.78	126.9
7. Plant protection (Application of gypsum, micronutrients, spraying of pesticides & crop watching)	117.73	78.26	20.92	10.36	30.28	7.01	6.48	0.41
8. Harvesting groundnut (Pulling/uprooting plants, stripping pods from plant & drying/cleaning pods)	23.98	28.79	28.64	35.08	14.65	24.07	151.98	105.4
9. Transport & marketing of main product, purchasing inputs, transport of fodder	20.09	19.08	1.50	0.21	13.59	9.26	0.12	0.00
10. Collection, stacking & storage of groundnut fodder	6.14	10.50	4.67	4.92	14.05	7.25	1.61	0.82
11. Storage & processing of groundnut (includes shelling pods and sorting kernels for seed)	4.73	4.48	22.05	5.26	0.88	0.00	14.62	6.38
12. Supervision	79.10	42.53	16.34	16.89	0.00	0.00	0.00	0.00
TOTAL	311.43	285.05	143.38	126.42	134.77	135.35	396.69	327.7

U – Umra (experimental village), K – Karanji (Control village); Source: Kolli and Bantilan, 1997

LEARNING PHASE 3 – SOCIAL IMPACT ASSESSMENTS:BUILD-UP OF SOCIAL CAPITAL

Method

Dimensions of impact analysis during the late 1990's went beyond productivity gains and internal rates of return from GPT. It included benefits to women, impact on sustainability, food security and social dimensions of poverty eg. the build-up of social capital. Exploratory surveys and the case study on gender and social capital mediated technology uptake not only documented clear impact in terms of increased yield and income, but also gave insights on understanding the processes whereby technology adoption leads to welfare changes. An assessment of the magnitude to which these impacts have actually translated into welfare changes were also undertaken. Using gender and social impact assessment tools, the study takes into account the complex social relationships as well as the changing perceptions of status within the family and community.

Findings

An interesting feature that was observed in the experimental village of Umra was the build up of social capital as a result of adoption of the GPT. The widespread adoption of the GPT package was attributed to the strong cooperation that evolved among the landholding farmers, the landless laborers, tribal groups and women. Focus group meetings and social analysis revealed that the technology uptake process was increased in Umra with the build up of social capital, whereby the men and women from all class and caste groups come together [for example, in the formation of the farmers group called as Krishi Vikas Mandal (KVM) and Self-Help Groups (SHGs) among small and medium land holding, landless and tribal women] and overcame problems of institutional access to information, credit etc, as well as seed supply and provision related problems arising out of government and private sector inefficiencies. It also enabled large-scale adoption and resulted in positive impact in terms of higher yields and incomes for farm and labor households, as well as other less tangible and indirect gains. Ultimately, sharp class and caste distinctions were shattered.

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Multiplier effects were observed through time, showing improvement in various dimensions: farm production, cropping pattern, consumption, and ownership of assets,

Farm production: Collective action was extensively used for procuring inputs for crop production (especially Gypsum and culture for seed treatment), access to resources (implements, BBF, seed drill), knowledge sharing and dissemination, and empowerment of both men and women farmers. Credit access, provision of health and sanitation facilities, investment in children's education and almost every sphere of life improved in dynamic proportions. An overall effect of the social capital mediated GPT adoption was the community emerging out of poverty.

Cropping pattern: The cropping pattern changed from one crop a year to three crops a year, more so in the case of groundnut cultivation as shown in table 2. As a result of year round agricultural activities in Umra, the people also have year round employment, especially women. More employment meant more income. Out migration of labor was replaced with in migration. Cultivation of high-value crops like soybean, and chickpea has also increased.

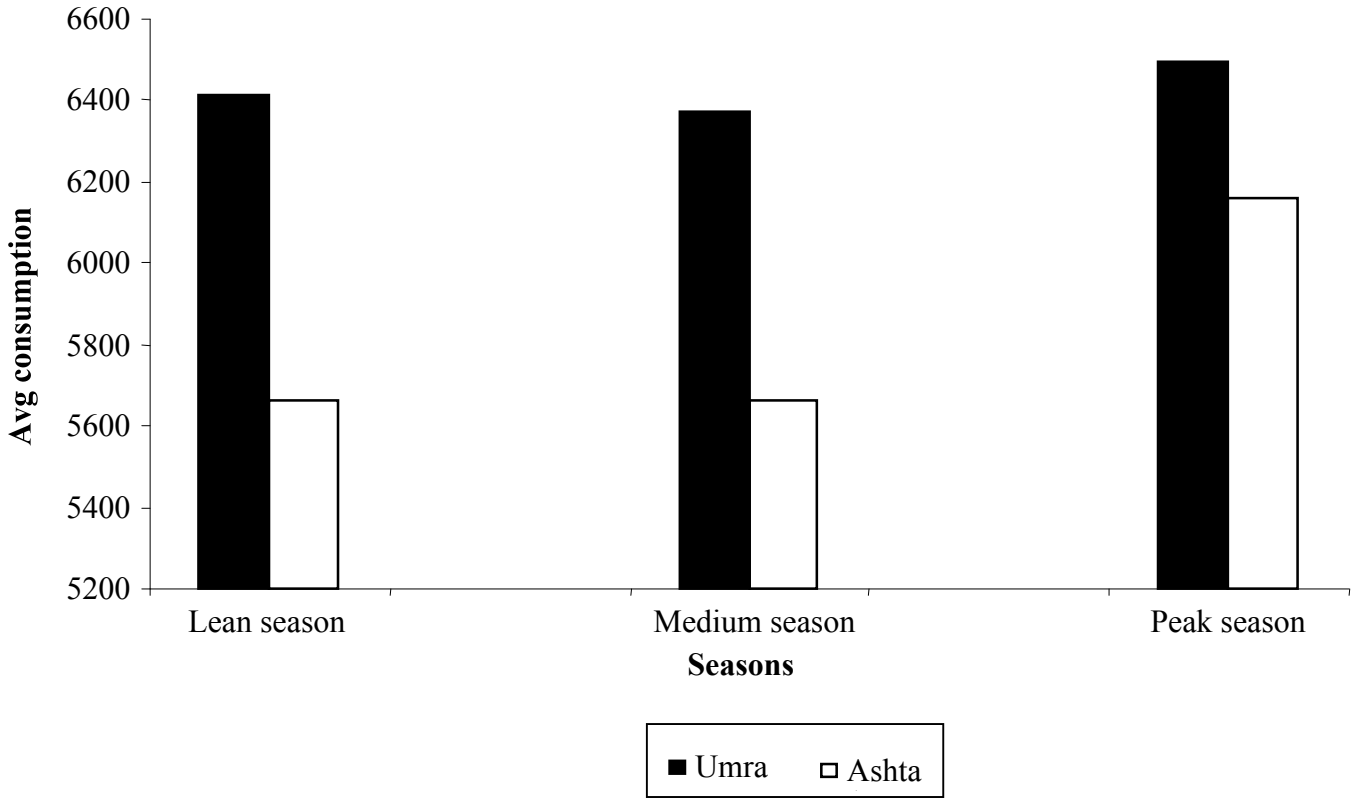
Table 2 – Changes in cropping pattern across seasons

	Umra –1992-93	Umra – 2002-03	Ashta - 2002-03
Kharif:	Cotton (146 ac), Sorghum (54 ac), Pigeonpea (14 ac) Others (25 ac)	Cotton (108 ac), Soybean (69 ac) Sorghum (33 ac), Groundnut (23 ac) Black Gram (20 ac) Others (8 ac)	Cotton (153 ac), Sorghum (79 ac), Soybean (24 ac) Groundnut (7.5 ac) Others (13 ac)
Rabi:	Chickpea (35 ac), Wheat (20 ac) Groundnut (6 ac)	Chickpea (58 ac) Groundnut (36 ac) Wheat (6 ac) Others (6 ac)	Chickpea (31 ac) Groundnut (10 ac) Wheat (12 ac) Others (5 ac)
Summer:	Groundnut (57 ac)	Groundnut (47 ac)	Groundnut (16 ac)

Consumption pattern: An analysis of the consumption pattern of households reveals that fluctuation in consumption of small land holding farmers and landless labor households across the seasons is less in Umra compared to the control village Ashta (Figure 4). This is so because of the maintenance of the food security status of the household through Self-help Groups (SHGs) and kinship networks by women. Social capital supports this role of women through sharing of knowledge related to food and nutrition as well as sharing of essential consumption items during times of crises. While women from the landless and small landholding households contribute to family food security through direct wage earning and domestic activities, women from the medium and large landholding households do so through increased income from the year round farm activities.

The food platter of the large and medium land holding farmers improved; they had more variety and the quality of life also improved. The landless labor and small land holding farmers have more food as they have enough money to buy sufficient food and they are able to pay off some their debts because of GPT. Children of labor families are also attending school. It was noted that men and women of the control village of Ashta lacked year round employment, and hence food insecurity prevailed, especially among the small land holding farmers and landless labor.

Figure 4 – Fluctuation in consumption across seasons

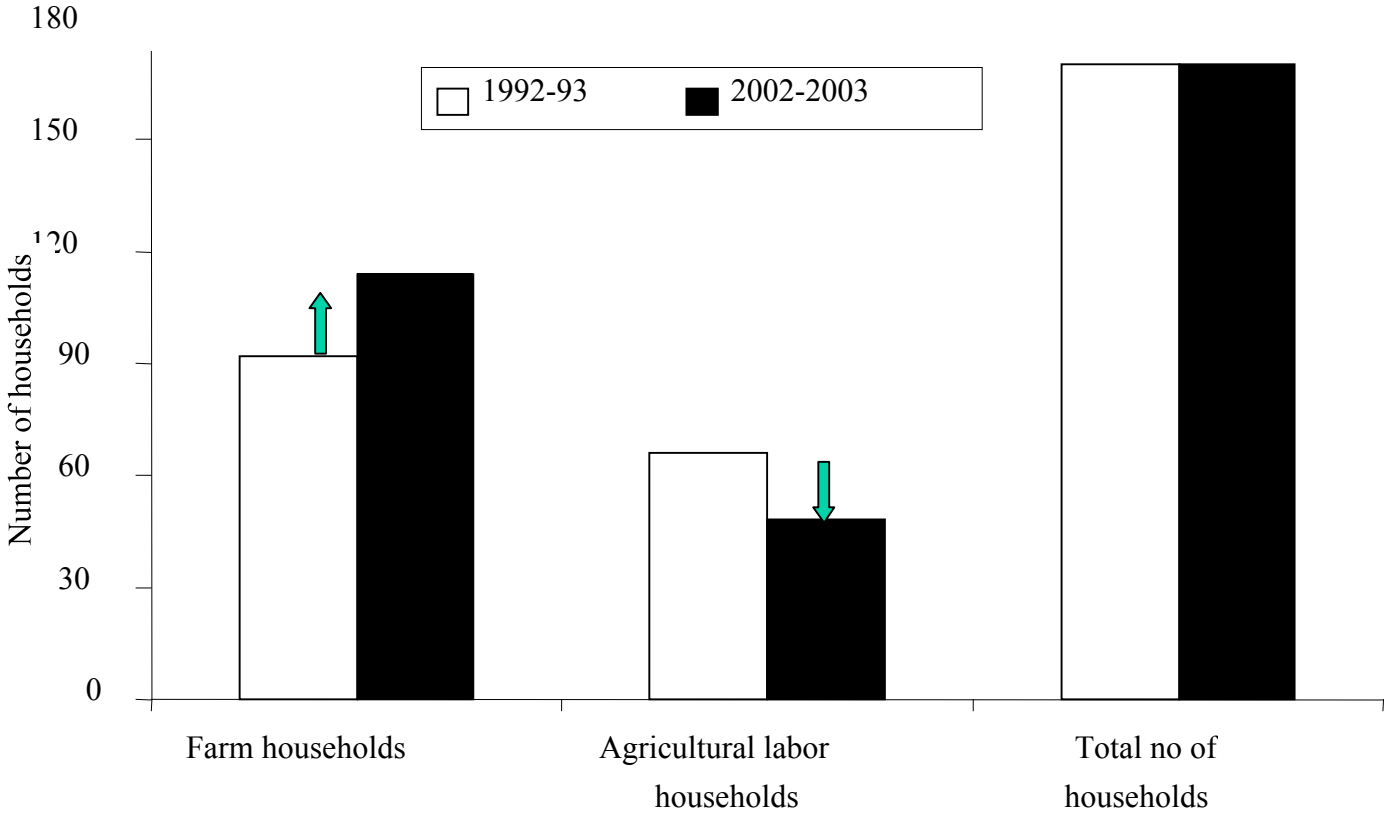


Asset ownership: An upward mobility in terms of land ownership was seen in Umra when compared with benchmark data of 1992-93 (figure 5). It was observed that while there is an increase in the number of land owning farm households the total number of households remained the same. Focus group meetings corroborated this finding, indicating that increase in employment opportunities due to GPT adoption has led to many of the labor households acquiring land.

Because of increase in income, through crop cultivation or wage earnings, housing and amenities in Umra saw an improvement. The large and medium land holders renovated their houses, purchased television sets, refrigerators, air coolers, gas stoves, grinders, and dug bore wells at home for domestic consumption, apart from sending their children for higher education. The small land holders and the landless labor also improved their housing, purchased television sets, were sending their children to schools in nearby town, and were also investing in vocational training for the children like tailoring, and computer training.

A synthesis of lessons learned in phase 3 is discussed in detail in the following section.

Figure 5 – Changes in class levels of households



4. SYNTHESIS OF LESSONS LEARNED

IMPACTS OF COLLECTIVE ACTION ON GENDER RELATIONS

Adoption of groundnut production technology in Umra village, given that the GPT is a complex technology requiring more supervision, care, and labor, its adoption motivated group action and the development of better relations with the members of the community, especially adivasi (tribal) women and men in the village who were the main source of labor. Better social and political relations were an outcome of technology adoption since everyone stood to gain from it. The men and women farmers in the village also displayed a rare willingness to join hands in repaying their long-term debts, and investing in production enhancing assets to improve their creditworthiness.

GENDER DIMENSIONS IN BUILD-UP OF SOCIAL CAPITAL

Several studies have found that men and women's personal networks differ in composition, although they are similar in size. Men's networks tend to be more formal since men are more often involved in formal employment. Moore (1990) highlights that male networks include more fellow workers and fewer kin than women's networks. This was a feature observed in Umra with the formation of the farmers group called as Krishi Vikas Mandal (KVM). This was a formal organization to strengthen the weak social ties between the farmers and the labor class. Women's networks tended to be informal (eg. pooja group, mutual finance group/chit fund group, the mahila mandal) and included more kin relative to male networks. Contrary to evidence from the literature, it was found that women who were working on the farm as family labor or as paid labor were more aggressive in coming together as a group and discussing their problems and trying to find some solutions to their problems. Women through their participation in different groups also were involved in decisions on how the household spends the extra income gained - whether to invest in the farm, purchase consumption goods, and/or invest in health and education of children.

Among income groups, it was observed that women from low-income category were the one who had the strongest kin and communities ties. Group formation in SHGs strengthened women's negotiating position and a change in their role in household decision-making was observed. Focus was placed on the diversification of skills through developing horizontal networks in the community. An example seen in Umra was vocational training classes for women esp. tailoring .

Exploring the gendered power relations in the community, it was observed that social networks benefited women and expected contributions in different ways. Initially, women were excluded from male-dominated networks e.g., KVM, and the gram panchayat meetings of the village. With the formation of Self-help groups and other informal groups, women's agenda and problems began to be considered as important and they were gradually invited to participate in the meetings of the formal groups. Women also were able to hold key positions in the gram panchayats as a result of the enforcement of government reservation for women. While the impact of this legislation is still marginal, the women, who belong to the scheduled castes, have gained self-confidence and acquired a number of skills including community management, financial management and negotiating capabilities with local authorities.

In Umra, it was observed that woman's access to networks outside the household depended greatly on whether other household members, particularly her husband, support their outside linkages. The focus group meetings also indicated that women's groups are also an important source of social cohesion, which in turn is essential for group formation.

Social networks were used to access resources (such as sprinkler sets, BBF markers) especially among female-headed households, who were earlier marginalized.

ROLE OF SOCIAL NETWORKS IN EMPOWERING WOMEN

The findings from Umra suggests that women participating in multiple networks (eg. mutual finance, vocational training, religious groups etc) are likely to be empowered and are inclined to seek greater decision making roles. In other words, individual and other characteristics that influence women's participation are family and kinship ties and marital status. The Umra study showed that married women are likely to be in positions of decision making and take an active role in collective decision making meetings because they are better trusted and respected. They are also able to indirectly influence higher-level decisions through their husbands and their own kinship networks. Their marriage status allows them access to more networks and thus enables them to generate more social capital.

Social networks were observed to operate along gender lines and that they reflect the gendered nature of power relations between men and women. Women and men of Umra, traditionally separately, belong to different networks, and many programs are set up or operate through "women-only" or "men-only" groups. While groups ensured participation and improved self-confidence, the "women-only" networks were observed to often lack the command and authority compared to men's networks. As a result some women groups have begun to invite participation and support of male members to strengthen their collective position.

Networking requires time, especially when formal group meetings are required. FGM interactions found that this presents a binding constraint especially for women from poor households because of their various livelihood activities and childcare responsibilities.

5. RECOMMENDATIONS AND CONCLUSIONS

The findings of this study confirmed that the build-up of social capital mediated the technology uptake process for GPT. It facilitated procuring inputs for crop production (especially Gypsum and culture for seed treatment), access to resources (implements, BBF, seed drill), knowledge sharing and dissemination, learning, diversification of farm activities and empowerment of both men and women farmers.

The study observed that social networks, developed either through formal organizations, kinship, neighborhoods, work groups, or informal interactions, are a critical component of social capital. Women's networks facilitated communication, coordination, and the provision of information/knowledge regarding agricultural production, income generation, skill enhancement and food security of family. They created obligations and expectations of reciprocity among their members. The trust, common understanding and knowledge generated more social capital and hence it can be said that social networks facilitate group action and new institutional arrangements.

Findings and discussions through FGMs spanning different groups in the community – men and women, farmers and laborers, tribal and landless laborers – showed that women of Umra drew upon a range of social networks for personal and family livelihood. The Umra case study illustrates that women's groups are vehicles for both individual and collective women's empowerment in decision making. This suggests that networks do generate social capital for individuals, leading to more participation and trust.

Including women in decision making in the family and the community at large leads to empowerment. New knowledge regarding farming practices expands choice. Mobilizing social capital through participation helps in successful adoption and diffusion of technologies. As stated by Parthasarathy and Chopde (2000), participatory approaches and collective action are more likely to result in an enhancement of some forms of human or cultural capital – those related to knowledge regarding innovations, and the use of innovative techniques. Human capital enhancement in the form of knowledge regarding technological options expands choices available to farm households and is a key feature of the empowerment process. These choices relate to cropping pattern, investment strategies, and choices to better manage risk and instability. Expansion of choice, has the capacity to reduce constraints on economic and social decision-making.

Appealing to the concept of social capital as networks and relationships, further research on the types of social networks that marginalized groups associate with, the networks that the powerful groups have access to, and the relationship between the two groups is underway. Establishing the network architecture (including networks developed either through formal organizations, kinship groups, neighborhoods networks, work groups, self-help groups, or informal interactions), it is envisaged to look into the role of social networks and power relations in the village in ensuring any risk and poverty reducing impacts of particular programs / interventions apart from the role of mutual support networks in risk management by poor rural households, including via migration or other strategies. The research will also use a social lens on the dynamics of shocks and how social networks are essential in developing coping mechanisms

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