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Sugarcane

Rice (Paddy)

Wheat

Cotton

Mission Statement of API

To provide professional inputs to agriculture policy and recommendations relating to major and minor crops for meeting long-term objectives towards enhancing production.

Agriculture Policy Institute
Government of Pakistan
Islamabad

Table of Contents

INTEGRATION OF AGRICULTURAL RESEARCH AND EXTENSION IN PAKISTAN: DEVELOPMENTS AND PROSPECTS

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Abstract

The article discusses Agriculture Research and Extension in Pakistan and the changes that took place in the system over time at Federal and Provincial level. Experience of regional countries in this respect has also been discussed. In the end a way forward has been suggested that market driven research and extension service agenda should be adopted. It will take all the stakeholders on one board and will improve the level of integration.

1. Introduction

1.1 Pakistan comprises of 796,096 km^2 lying between 24° N and 36.5° N latitudes and 61°E and 75.5° E longitudes. It is populated with 173 million peoples. China is situated on northern side while India is on eastern border of Pakistan. Afghanistan and Iran are towards west. There is more than 1000 km long coast line of Arabian Sea towards south. Pakistan has a highly diversified terrain. It ranges from high snow covered mountains, plains, deserts and a long coastline. Significant variations in the soil are quite evident across the country.

1.2 Pakistan has a very diverse climate that ranges from arid to tropical and temperate owing to its topography. The mean annual rainfall varies from less than 250 mm to over 1250 mm. The rainfall is characterized by monsoon and winter rainfall patterns. The mean annual temperature varies from 16°C to over 32°C. Pakistan is divided into ten agro ecological zones developed on physiographic, climate, soil type and agricultural land use basis (PARC 1980). With regard to land utilization, total cropped area is 23.67 million hectares out of total 79.6 million hectares. Forest cover is only 4.2 million hectares (Economic Survey of Pakistan 2010-11).

1.3 Agriculture sector is a vital component of Pakistan's economy. It contributed 22 percent to GDP and provided productive employment to

around 45 percent of the labour force. More than two-thirds of the rural population still depends on agriculture for their livelihood. About 60% export of Pakistan is agriculture based. Relative share of crops, livestock, fisheries, and forestry sub-sectors in agriculture sector GDP in 2009-10 was 43.8, 53.2, 1.8, and 1.2 percent respectively. Crop and livestock sub-sectors are dominated by large number of small producers. Agriculture crop sector comprises of field crops and horticultural crops i.e. fruits and vegetables while livestock contains buffaloes, cattle's, sheep, goats, and poultry. Fisheries both inland and marine and forestry are other contributing factors. Irrigated agriculture comprises of 85% while rest is rain fed. Average water availability is around 137 MAF of which two third is supplied by surface irrigation water by well developed world's largest contiguous Indus based irrigation system (Economic Survey of Pakistan 2010-11).

1.4 Agriculture production in Pakistan has remained sound due to vertical and horizontal expansion. Increase in crop sector: wheat 6.1, rice 6.9, cotton 7.5, sugarcane 4.6, and maize 7.3 times during the past fifty years time speaks about its encouraging performance. Increase in productivity of meat, poultry and milk by 2.6, 13.6 and 3.8 times is also commendable. However, overall growth rate of the sector decelerated from 5.4 percent in 1980's, to 3.2 percent in decade of 2000 (Agriculture Statistics of Pakistan 50 years & 2009-10). The most important and critical issues in the agriculture sector growth are: low agricultural productivity, poor food security, deficient marketing infrastructure and system, regulatory arrangements and sustainability of the whole system. Agricultural productivity of any country can be explained by agriculture research and extension services among others.

2. National Agricultural Research System

2.1 National agricultural research system in Pakistan consists of federal research establishments, provincial research institutes and agricultural universities. Private sector although insignificant but is part of whole research system. At federal level various agencies as given below are involved in agriculture research irrespective of their affiliation with the federal ministry.

a. Pakistan Agricultural Research Council (PARC)
b. Pakistan Central Cotton Committee (PCCC)
c. Soil Survey of Pakistan
d. Pakistan Forest Institute
e. Pakistan Atomic Energy Commission

f. Pakistan Council for Research in Water Resources
g. Pakistan Council for Scientific and Industrial research
h. National Institute of Oceanography
i. Water and Power Development Authority
J. International Water Logging and Salinity Research Institute
k. Pakistan Tobacco Board
l. Pakistan Institute of Development Economics
m. National Fertilizer Development Centre
n. Agriculture Policy Institute

2.2 There are five agricultural universities with some satellite colleges working in Pakistan. Several other general universities have full-fledged faculties and departments on agriculture. Each province has a central multidisciplinary research institute on crops and livestock. These institutes comprise many research centers, station and sub stations depending upon the commodity and geographical requirement of each agro ecological zone of Pakistan (Planning Commission 2006). Private companies working in agriculture sector such as fertilizer, pesticides, seed, farm machinery, food processing and some commercial banks are doing agriculture research to enhance their profit margins. Overall research activities undertaken by them are very limited in Pakistan. Local companies neither have well developed infrastructure nor trained manpower to undertake agriculture research which usually take long time before to yield some profits. The multinational companies mostly rely on their foreign research establishments and in Pakistan their main interests are of marketing of their products. They only indulge in research where urgently needed otherwise they try to avoid such venture.

2.3 The role of Pakistan Agriculture Research Council (PARC) is very important and central in the National Agricultural Research System. The PARC is mandated to undertake aid, promote and coordinate agriculture research in Pakistan. It has to make arrangements for expeditious utilization of research results by all stakeholders. Provincial research capabilities with regard to financial and human resources are erratic among provinces. It has to establish research establishments mainly to fill in the gaps in existing programme of agricultural research. To develop human resources in the sector, PARC arranges the training of high level scientific manpower in agriculture sciences for all agriculture research organizations working in Pakistan. It also generates, acquire and disseminate information relating to agriculture. PARC maintains an up-to-date reference and research library accessible to all agriculture research organization of Pakistan (Afzal 2002).

3. Agriculture Extension Services System

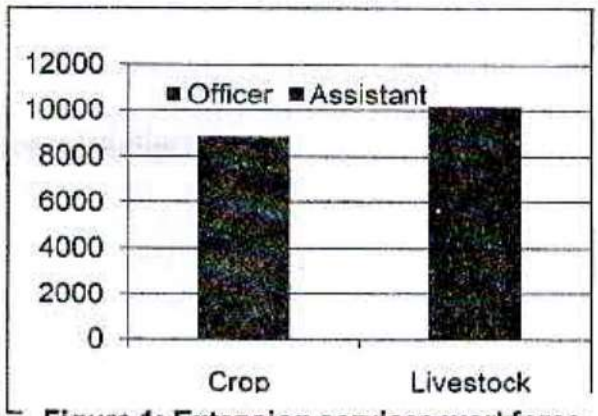


Figure 1: Extension services workforce

3.1 Pakistan is a federation which comprises of five federating units. Agriculture is a provincial subject where respective governments are mainly responsible for agricultural education and extension. All provincial governments have maintained a well developed agricultural extension system. Major function of agriculture extension departments are to carry out adaptive research, impart trainings, develop production technologies of crops, handling production targets interaction with research institutes and other provincial and federal agriculture related organizations. Extension departments help implementation of development projects' and agriculture laws, rules and regulations. It also provides feedback to scientists on researchable problems. To work on these functions Pakistan maintains a well organized work force for both crop and livestock sector. There are about 8842 personals engaged in extension activities in crop sector in whole of Pakistan. The workforce for livestock is comparatively bigger than crop sector having strength of 10171 (Afzal 2011) as explained by the figure 1.

3.2 Along with provincial agriculture departments there are several other parallel arrangements working in Pakistan to interact with farmers. Some time development projects funded either from local or foreign sources have to develop system like extension services to execute the projects. There are several public sector companies such as Zarai Taraqiati Bank Limited (ZTBL), Pakistan Horticulture Development and Export Company (PHDEC) and Pakistan Dairy Development Company (PDDC) doing extension services in Pakistan. They have strong linkages with farming community. Five agriculture and veterinary universities and other general universities have also developed association with farming community especially of their adjoining areas. Likewise research institutions also run some farmers level activities like on campus advisory services to help improve agriculture productivity of surrounding farmers. All organizations engage in extension activities invariably try to maintain linkages with provincial agriculture extension departments owing to sole specialized institution for the task. Furthermore agriculture extension departments have grass root level access

and contacts with farming community. Their reach and access is invariably used by other institution to execute their agenda effectively and vehicle already available prove cost effective and efficient.

3.3 Private sector extension services machinery includes private seed, pesticide, fertilizer companies, banks and agro industry such as dairy, poultry, livestock, oil, sugar, tobacco, maize etc. They have specialized extension services. They engage agricultural graduate to extend services. Mostly their activities revolve around their products promotion. So their activities can be declared marketing cum extension services. According to some rough estimates 70-80% of the advisory services are provided by private companies (Riaz 2010). They are equipped with better conveyance facilities and appropriate operational budgets. Usually most of the ground level staffs are not provided with office premises, perhaps to promote their active interaction with the farmers and to be cost effective. The performance of the staff is strictly monitored with random spot checks and incentive packages. The field staffs maintain liaisons with stakeholders like research and public extension personnel for information sharing. They also participate in each other activities. The input supply companies such as pesticides and fertilizers mainly focus towards promotion of their company's products while the processing companies such as sugarcane and maize focus mainly on overall crop productivity which they expect to use as raw material (Riaz 2010). It makes services more specialized and more effective. To reach their clienteles they use demonstration plots, field days, farmer visits, farmers meetings, farmer's faire and promotional material and use of media both electronic and print. Some media houses also entail dissemination of agriculture knowledge and technologies and are operating satellite television channels and agricultural programmes. Likewise there are many periodicals on agriculture subject exclusively. Another important component of agricultural extension system is the involvement of Non Governmental Organizations such as rural support programmes. They mainly focus on community based schemes and try to organize community organizations to improve their livelihood. The rural support programmes (RSPs) are national or regional developmental organizations, operating in 72 out of 120 districts in the country, and base their activities on partnerships with local community organizations (Bajwa nd). These rural support programmes like National Rural Support Programme, Provincial Rural Support Programmes and Agha Khan Rural Support Programmes have contributed significantly in improvement of life of poor rural peasants in Pakistan.

4. Agricultural Extension Programmes

4.1 Overarching goal of extension programmes was the rural development by improving agricultural productivity which was considered main stay of rural economy of Pakistan. In order to achieve the goal various rural development programme were started in Pakistan. Since agriculture was the major rural activity so agriculture remained the centre point of all those programmes. Although many programmes were attempted but major out of them are briefly reviewed below.

4.2 **Village Cooperative Movement:** This movement was spearheaded by Cooperative Department in Pakistan during early days of Pakistan's independence. It called for unity of farmers in villages and by forming village cooperative societies. The society had to choose their own management committees and to carry out developmental activities on cooperative basis. Major thrust of this movement was the education of farmers about new technologies and to arrange agriculture inputs supply on soft-term loan basis. This movement however had not achieved full scale success largely because of weak local leadership, ineptness and insincerity of cooperative department's staff (Memon 2005).

4.3 **Village Agricultural & Industrial Development Program (Village-AID):** It was a community development and extension services programme undertaken in 1952 to solve rural problems through the mobilization of resources of the government and the people in a coordinated manner. It served as the extension agency of all the nation building departments at the village level. The scope of the Village Agricultural Industrial Development Programme (V-AID) depended mainly upon the programme content of each department. Method and result demonstrations were the teaching methods used to encourage adoption of improved varieties of crops, fertilizers, cropping practices, and livestock production. A village council of elders was organized and rural youth were engaged. Credit, production, and marketing facilities were provided through cooperatives. Social centers provided opportunities to women for skill formation in food and fruit preservation, sewing, knitting, maternal and child care, and home management (Memon 2005).

4.4. **Basic Democracies System:** In the Basic Democracies System in 1959, an attempt was made to involve the people in social, economic, and political development. Primary feature of this system was the decentralisation of authority in the favour of lower tiers of organisation. It delegated various functions to union councils for promoting agriculture, and

several other facilities to the rural population. However it largely failed to make any enduring change in the agricultural sector (Asian Productivity Organisation, 1994). The Rural Works Programmes in 1963 followed by two subsequent schemes as People's Works Programme and Agrovilles were launched in 1972. Because of lack of coordination, these initiatives also failed and government gradually withdrew its support and gave more emphasis to Integrated Rural Development which was also launched simultaneously with Agrovilles and the People's Works Programme (Memon 2005).

4.5 **Integrated Rural Development Program:** Changeover in government in early 1970s brought a new development approach by the name of Integrated Rural Development Programme. Agriculture remained a central activity of this program hence placed under Agriculture Department. Local Government Department was given the control of rural development funds. Agricultural graduate became the main force to implement this programme. It had to integrate various line departments and facilitate farm service delivery to the farmers. The working arrangement of two collaborating departments created rift between the two agencies while the programme was in infancy which ultimately merged IRDP into the Local Government Department in 1978 (Memon 2005).

4.6. **Agriculture Development Corporation:** Agriculture Development Corporation (ADC) was established during the Basic Democracy System time. It sought to improve overall performance of the agricultural sector in Pakistan. The ADC was liable to promote cooperatives, disseminate agriculture information, establish seed farms, procure and distribute improved seed and fertilizers, soil conservation, land development and run rental services for farm equipment. The ADCs established a good input supply system. Lack of coordination between ADC and Agricultural Extension Services was reported which made them inept to communicate timely information to farmers (Khattak nd).

4.7 **Inputs at Farmers' Doorstep Approach:** Extension departments started this scheme to supply agricultural inputs such as fertilizer, seed and pesticides at farmers door step to popularize them among farming community. The agricultural inputs became popular soon and created heavy demands. However this could not become sustainable as it achieved its intended objectives soon and also because of limited finance supply and socio cultural obstacles. Also the input business was privatized and this was replaced in 1978 with a new system of extension known as the Training and Visit system (Davidson *et al* 2001).

4.8 **Training and Visit (T&V) Programme:** Under this system technology transfer activities were separated from provision of inputs in 1978. Technology transfer was kept with agriculture extension in public sector and commercial organizations were involved for supply of inputs. The concept adopted for T&V was triangular relationship based among research extension and farmers. Characteristics of T&V system were exclusive focus on extension, direct line of organization, fixed schedule of visits, and good extension to farmer ratio, continuous training and continuous link with research through field trials. The system could not sustain due to non provision of envisaged operational budget (Memon 2005).

4.9 **Barani Area Development Program:** Different projects were started with local and foreign assistance to improve the economic and social well-being of the rural population in rain fed farming areas of Pakistan. The projects activities mainly consisted of strengthening of agricultural support services, expansion and improvement of physical and social rural infrastructure, establishment of village organizations, and credit line to rural peoples. The main activity areas for the projects were Punjab and Khyber Pakhtoonkhwa. The Punjab has established a specialized agency to undertake the activities in its area by the name of Agency for Barani Area Development (ABAD). The venture of barani area development went well and significantly enhanced the livelihood opportunities of the peoples of the programme area.

4.10 **Transformation and Integration of Provincial Agricultural Network (TIPAN) outreach programme:** This was initiated in Khyber Pakhtoonkhwa as a component of integration education and research programme. Through application of this concept the University was to obtain the capability to supply technology for crops and animal husbandry to farmers. Extension department was ignored and not made part of the whole programme. This programme could not succeed highly because of non cooperation of extension department (USAID 1994).

4.11 **Farmers Field Schools:** Farmers Field School (FFS) approach has been extensively used in different agricultural activities especially in development projects. For example Integrated Pest Management based FFS contains 25 farmers where they carry out agro ecosystem analysis under direct supervision of trained facilitator. They observe the field, crop growth, pest problems, draw their results and present them on the basis of which further cultural practice and action are decided collectively. Thus, the farmers become well organized, learn to work in community, become able to

make their own day to day decisions and develop expertise to the extent that they can mange crop production issues without external support (PARC nd).

4.12 **Farm Services Centers:** Agriculture extension department of Khyber Pakhtoonkhwa province has established twenty four farm service centres to enhance interaction between extension, research and farmers under one organization with proper mechanism for feedback. Farmers raised funds themselves and government has given matching grants to them. All inputs and advisory services needed by small subsistence farmers are provided under one roof. These centre are managed by farmers itself through management committees while all agriculture related departments are helping them technically. This is a successful venture and still continuing (Khattak nd).

4.13 **Crop Maximization Programme:** Federal government initiated a project of Special Programme of Food Security (SPFS) to improve crop productivity in Sargodha district of Pakistan. Under this project farmers were organized in village organizations, trained and created a revolving fund with provision of technical assistance. It went well initially but, however, its impact diffused when it was scaled up to the level of national scale.

4.14. **Agriculture Helpline:** The traditional method of person-to-person contact gets transformation by the introduction and spread of electronic means. Since most of the farmer's household are connected through telephone service so "agriculture helpline" was started. This helpline is free of charge and agriculture experts become available during day time to guide and advise farmers. This programme proved very successful and still in place.

4.15 **Devolution plan:** A new paradigm shift emerged when provincial setup underwent into major devolution programme. Before that each provincial department of agriculture has a Directorate- General of agricultural extension administering a large extension network down to the lowest tier of the local government i.e. union council level containing 3-5 villages depending on the size of population. To give more authority to the elected people representatives, the government announced its devolution plan on August 14, 2001. According to the plan, "functions of all service delivery line departments including agricultural extension were transferred from provinces to the elected district governments. Under this system each district of Pakistan is managing its agricultural extension activities where the functions of all sister organizations such as water management, fisheries, livestock, soil conservation, forestry, etc; are put under one manager called

as Executive District Officer of Agriculture (EDOA). The EDOA reports to the District Coordination Officer (DCO) who is answerable to the elected District Nazim (administrator). The provincial agriculture extension set-up in the form of Directorate General of Agriculture Extension continues to work and coordinates with the District Extension Services and provides technical support. DG Agriculture Extension retains the subjects of agricultural training and information, adaptive research, in service training, plant protection and quality control, agricultural planning and statistics and coordination" (Riaz 2010).

5. Communication Route

5.1 Agriculture knowledge and technologies typically communicate from international research institutions to PARC. PARC either itself works on it or passes on to collaborating research institutions including other federal institutions, provincial research institutes and to some extent to universities. After developing technology or fine tuning or adaptation studies the technology become ready to be tested at adaptive research farms working under agriculture extension departments. After considerable period of testing and adaptation and rigorous evaluation, the technology packages are communicated to the farmers for wide scale application. With regard to private system, mostly companies working in Pakistan rely on their international experience and research infrastructure. They just import technologies and pass on to the farmers. The feedback loop is same from where information travels.

6. Constitutional Evolution

6.1 **Federal Level**: At the time of partition in 1947, the tradition of federal research in agriculture in Pakistan did not exist since research centers/institutes developed by Imperial Council of Agricultural Research were left in India. Realizing the importance of agricultural research and the need for coordination at the federal level, Federal Agriculture Committee of Pakistan was established in 1951. This Committee was upgraded to Federal Agriculture Commission in 1960 that was renamed as Agricultural Research Council (ARC) in 1964. ARC was primarily a funding agency for promotion of agricultural research in the country and was deriving its resources from the Cess fund levied on different crops. A review of agricultural research in the country was carried out by a Pak-American Agricultural Research Review team in 1968 and an Agricultural Inquiry Committee was deputed by the Federal Government of Pakistan in 1973 to improve the agricultural

production in the country. Following the recommendations of different committees and review teams,

6.2 Federal Government reorganized ARC as Pakistan Agricultural Research Council (PARC) in 1978. Realizing the difficulties agriculture research was facing in the country and to expedite decisions for the improvement of agricultural research in the country, Agricultural Research Division (ARD) was established in 1980 as part of the Federal Government in MinFAL and Chairman, PARC was designated as Ex-officio Secretary, ARD. PARC Ordinance was promulgated in 1981 defining its functions, governing method and modes of funding. ARD was, however abolished and reduced to Agricultural Research Wing in 1993 and Chairman, PARC no longer worked as Secretary to the Federal Government (Afzal 2002). Since then agricultural research has been dealt in MinFAL by agricultural research Section until the MinFAL was abandoned and task of agriculture research was given to Ministry of Science and Technology on June 30, 2011. Under this devolution the PCCC was placed under Ministry of Industry and Production. Yet again a federal ministry by the name of National Food Security and Research has been created in last week of October 2011 and PARC and PCCC were placed under this new Ministry. However afterwards, the PCCC was attached with the Ministry of Textile Industry.

6.3 **Provinces Level:** Initial ten years after independence of Pakistan in 1947, agriculture related infrastructure and establishments were limited. All line institutions were working collaboratively under one umbrella. With the creation of new institutions such as agriculture universities, research institutes etc a need was felt to separate them for better management. So from 1958 to mid 1970s education, research and extensions were disintegrated in provincial administrative set up. Soon after doing this it was felt that this disintegration is counterproductive and since then several efforts have been made to reverse the wheal but all remained unsuccessful. TIPAN program in one province was glaring example in which university agriculture education and research were integrated in 1984. Several success and developments can be attributed to this merger but at the end this practice was abandoned and again both research and extension were given independent status. Presently education, research and extension activities are separately being handled in all provinces of Pakistan.

7. Issues in Research and Extension

7.1 Management

7.1.1 **Governance:** The dynamic nature of research requires flexible set of rules which enable the scientists to perform their duty to achieve research goals without having to secure higher level approval for routine matters. Stringent and dilatory procedures involve in bureaucratic system of Pakistan that tend to strangle the development and progress of both federal and provincial agricultural research system. Situation of the provincial research and extension system is most unsteady. The style of management is highly centralized. No sufficient administrative and financial autonomy is available to even heads of organizations. All powers rest with secretaries who happen to be administrative and principle accounting officers of the departments which they seldom like to delegate to lower tiers of the administrations and especially technical personnel.

7.1.2 **Career progression:** There is great disparity among the provincial and federal agricultural research institutions. Federal institutions have better chances of carrier progression and more remuneration packages compared to provinces. The major scientific contributions however come from provincial setup. This disproportion has disturbed scientists and they preferred to work abroad being de-motivated. This has become a major reason of brain drain from Pakistan.

7.1.3 **Incentive mechanism and accountability:** One of major flaws of Pakistan agriculture system is nonexistence of stick or carrot policy. A government employ willing to work or not does not make any difference and affect his job. The system of salary and promotion is fixed which is not affected by any way. So performance of them hardly matters which make researchers and extension worker lethargic and effortless.

7.1.4 **Investment:** Public sector funding towards agriculture research is going down. In year 1991 total research allocation was 223 million US dollar which drastically reduced to 171 million dollar in 2002. The funding is significantly less than other regional countries like India, China and Malaysia. Most of the available funds used on established expenditures and operational funds left for research are only 3-9%. The share of livestock and crop sector is almost equal in agriculture GDP, whereas the allocation for livestock and fisheries is only 14%. More number of high qualified human resources is engaged at federal level compared to provinces contrary to their research output (Beintema *et al* 2007).

7.1.5 **Training opportunities:** Most of researchers working at provincial level are not highly qualified and also do not get sufficient trainings to update their knowledge. Maximum opportunities both foreign and local are available to personnel working in federal institutions. Provincial employees mostly remained deprived of such facilities largely because of poor process of training opportunities circulation and subsequent processing at federal level.

7.1.6 **Facilities and access to literature and equipments:** As already mentioned that most sophisticated research workforce is at federal research institutes and they have convenient access to facilities such as scientific literature and high tech scientific equipment. Compared to them scientists working at provincial level are not provided with sufficient literatures and laboratory equipments.

7.1.7 **Mobility and flexibility:** Administrative system of agriculture department is very strict and inflexible. A specialized scientist is forced by law to work where the position is vacant irrespective of his qualification and expertise. With regard to extension set up the workers are not fully equipped with conveyance facilities making them disable to reach the farms situated at far flung areas.

7.2 Productivity

7.2.1 **Priority setting:** Most of the research agenda and extension work programmes are designed by worker themselves without involving much farming community or keeping in view their farm level issues. Annual work programmes formed so are discussed in their community and approved. Market driven work programme seldom exists for both research and extension activities. Most of research is agronomic based and no headways are made in high technology and field of agriculture policy and economic research. So these areas are weakest in Pakistan.

7.2.2 **Coordination with internal agencies:** The pluralistic nature of NARC requires a well thought of mechanism for lateral and vertical flow of information and collaboration. The linkages have been weakened overtime. PARC which is basically mandated to maintain linkages has undertaken itself research activities and established parallel research set up against provincial institutions. Hence departmental rift hinders to establish proper linkage among competing institutions. Isolation of scientists and even their institutions results duplication of activities leading to loss of resources.

7.2.3 **Collaboration with external agencies:** Pakistan is not a contributing member of many research organization even of CGIAR. It gives a weak starting pointing for Pakistan to be an active collaborative with those organizations. There is comparatively low representation of Pakistani scientists in international research establishments. Participation of Pakistani experts in the research activities of international organizations is also weak. It reduces exposure and personal interaction with contemporary community around the globe. This all negatively affected the chances and capacity to acquaint with and acquire modern technologies and advanced germplasm.

7.2.4 **Linkage with industry:** To commercialize technologies there must be a close interface between scientists and R&D managers in the corporate world. In Pakistan scientific faculty generally is not allowed to participate in private sector R&D undertakings. Universities and research institutions belong to state and have minimal contact with industry. There is no support for developing Intellectual Property Rights in commercial products for private sector. Economy is not flexible enough to support the rapid addition and diffusion of new technologies. There are no venture capital funds available to innovative firms to commercialize new technologies.

7.2.5 **Research extension disharmony:** Technology component of yield gap is very high in Pakistan. It is estimated that out of overall 26% yield gap in major crops, 24% is attributed to technical inefficiency alone. Agriculture research and extension operates in disharmony. The linkage and interfacing between them have been extremely week. Presently extension programme is in frenzy. The 2001 decentralization of extension services to districts had weakened the linkages further and thus aggravated the technical updating mechanism for extension workers.

7.2.6 **Independent review of work:** The work programme and performance of both research institutions and extension departments has never been reviewed independently in Pakistan. There is system of discussion on their works but that is limited to only other experts of the same organizations. There is no third party review system. Nonexistence of independent review system does not provide ample chances to give challenging task and market driven demand based work.

7.2.7 **Duplication of work:** Two entities i.e. public sector provincial extension departments and private sector are undertaking extension activities simultaneously in Pakistan. The agenda of both is sometime different in a way that private sector emphasizes towards the marketing of their products and hence are profit oriented. Whereas public sector services are not profit

oriented so does not have such targets. Sometime both are working for the same objective because of nonexistence of specialized system of extension services by the public sector. In this situation public and private extension systems offer competing, conflicting and overlapping programs.

8. Research Extension Integration Practices

8.1 Agriculture extension is a provincial subject so there is no entity or mechanism exists at federal level for agriculture extension. Provinces have agriculture and livestock departments which have distinct research and extension activities under their administrative control. So research and extension are two wings of one administrative department. It is the first level of integration of both activities. There are several coordinating committees and working groups established for different purposes such as crop management groups, production plans committee, annual research plan committee and varietal evaluation committee etc. In these forums both research and extension experts are members and they interact frequently and share their knowledge and expertise and experience. Sometime in the wake of emergency some committees are formed containing both researchers and extensionits to integrate their work activities. Provincial governments undertake various campaigns such as crop sowing campaigns; livestock health services campaigns, pest management campaigns. In these campaigns relevant departments take parts including extension and research. Development projects initiated by federal or provincial governments include participation of both extension and research staff to execute the projects. Federal level projects take on board all provinces to implement the component of the scheme in their respective jurisdictions. In these developmental activities the role of research institutions is of mainly of technical backstopping nature while extension staff operates at field level. These projects generally cover variety of subject of agriculture like seed fertilizers, plant protection, livestock health coverage, irrigation etc.

8.2 There was one project i.e. "Integration of Agriculture Research & Extension" that was undertaken exclusively to improve linkages between these two important components of agriculture system. The Ministry of Food and Agriculture & Livestock (MinFAL) initiated this project in 2002. The MinFAL implemented this project with the collaboration of PARC and provincial agriculture departments (both research & extension wings). A wide yield gap between progressive growers and natural yield was anticipated while conceptualizing the proposal. The idea of the project was to take technologies available at agricultural research institutions to farmers fields and demonstrate to the farming communities through participatory

approach and ultimately to raise farm productivity. The objective has to be achieved by integrating research and extension activities at farmers' field. Project activities were: demonstrations of yield potential blocks of various crops, market trainers' programme, farmers' field school, technology transfer units, exhibitions and use of media.

8.3 There are ample opportunities available like seminars, workshops where experts of agriculture education, research and extension interact and share their experience. Various institutions of education, research and extension frequently hold farmer's fairs. In those fairs all stakeholders participate very actively. Some organizations public and private and NGOs arrange expos to promote trade and show of the technologies developed by various public and private organizations.

8.4 All agriculture extension departments have arrangements and activities of adaptive research. For example there are eight adaptive research farms in Punjab where research output and technologies are tested or adapted before transmitting them into farmer's field. This is very unique type of platform which provides opportunity to scientists and farmers to interact. There is a joint technical advisory committee headed by the director research of nearby research institute. Subject specialists of agriculture extension department act as secretary of the committee. Here both research and extension test technologies and discuss threadbare before handing over to farmers.

9. Research Extension Integration Analysis

9.1 There are varieties of issues which relate to integration of two important components of agriculture knowledge system. An attempt has been made to analyse the situation that may help understand the situation for better planning in future.

9.2 **No institutional arrangement:** Study of the system suggests that no formal institutional arrangements have been made to integrate these two distinct institutions. Staff of each wing of agriculture or livestock department operates in isolation. Some loose arrangements as mentioned above in the form of committees and working groups do not compel any one to participate. If institutions are weak it usually becomes difficult to set up useful and sustainable relations. The weakness of the institution is not solely because of weak linkage but also is the reason of this phenomenon. It is a vicious circle. The weakness prevents operational linking and thus lack of operational linkage fosters weakness.

9.3 **Financial issues:** There is no earmarked budget for the activities requiring collaborative exercise. Every time finances have to be arranged in hurry and as contingency grant to settle affairs. This invariably causes extraordinary delay and consequently the outcome of the activities compromised. Since there is no compulsion on each party so they first question about the benefits of maintaining the linkages. Maintaining linkage is a time and resource consuming exercise. It can be done only if there is an expectation of some kind of tangible benefit. Without any incentive both parties tend to avoid and are reluctant to communicate with each other. Since there are no reciprocal benefits and sustainability mechanism of the loosely made arrangements so the system is in disarray as for as the integration and linkage and joint activities are concerned (Talug *et al* 1989).

9.4 **Difference in orientation:** The orientation and values in the research system restrains researchers develop a real interest in the application of research findings, and thus discourages linkages with the extension. Scientists generally are more inclined towards publishing articles in journals as the end product of their research activities compared to the utilization of these findings in farmer's field. Chambers (1985), consider this behaviour quite logical one and says; "scientists like other human beings are motivated by rewards". Since farmers are not involved at start point, therefore their indigenous knowledge and experiences are infrequently utilized and benefitted in the scientific research processes. Also there is no common sense of mission in both the departments (Talug *et al* 1989).

9.5 **Difference of status:** Another reason for weak integration between research and extension is disparity between the remuneration policies for the staff of both services in the public sector. The salaries and other benefits are much higher for researchers especially working in federal research institutions compared to extension workers. Also opportunities for professional development and carrier progression are different for both quarters. This highly differentiated remuneration policy may originate anxiety and cause cultural gap (Talug *et al* 1989).

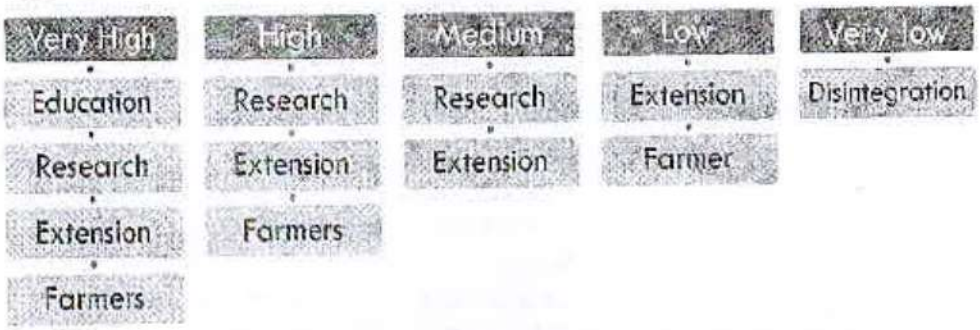
9.6 **Linear research extension farmer's linkage:** Linear interaction of three stakeholders i.e. researchers, extension workers and farmers in Agriculture Knowledge System is restricting to enhance integration among them. Researcher considers that his duty is to only create knowledge or technology while extension worker deem himself duty bound only to pass on information to the farmers. Likewise former has the view that he is only a passive receiver or user of the technology.

9.7 **Farmer's participation:** Existence of research and extensions departments is merely because of the presence of farmers. They both had to solve the problems of farmers. In Pakistan however both research and extension wing follows top down approach so minimizing farmer's participation effectively at any level. This single factor make the whole process lopsided as the ultimate beneficiaries has no voice in the process. The common mode of farmer participation in Pakistan is confined to only appearance of progressive farmers at meetings arranged by different agencies on agriculture subject. In some committees they are regular member while in some cases they participate on special invitations. Small farmers are usually only called in masses form without any meaningful participation.

9.8 **Monopoly gap:** Extension workers understand that researchers do not have solution against the problems of the farmers. Since there are no strong technology packages available for the farmers so their extension activities are limited. They do not have anything special to offer to farmers. This type of understanding restricts extension workers to integrate effectively with scientists. Hence weak research leads to weak extension activities.

9.9 **Participation and impact of integration:** Experience in different countries and even in Pakistan shows that level of participation has strong impact on overall effectiveness of the integration. Integration of all four tiers i.e. education, research extension and farmers is considered most successful. In case of elimination of one or more institutions in an integrated entity gradually reduces the impact and even sustainability. The situation can be understood from the below given figure.

Figure 2: Participation and impact of integration



9.10 **Organizational approach of integrated institution:** The experience further explained that sustainability and effectiveness of integrated institutions will depend on that who is leading it and what the approach it is following? For example if the integrating institutions are research, extension

and farmers, the research must lead this exercise. In this format lead role by extension or farmers will not yield anticipated result and also the sustainability may be in high doubt. However with regard to the working they must follow the bottom up approach i.e. farmers voice must be heard effectively and the agenda of activities must be developed focusing farmers issues.

10. Experience of Regional Countries

10.1 Different countries are making efforts in their own style, available administrative set up and environment to integrate agriculture research and extension services. The system of four countries have been reviewed and briefly presented below.

10.2 Iranian experience also indicated that the presence of separate research and extension organizations/authorities would not be fruitful. The methods that have been adopted in order to achieve an increasing cooperation between research and extension includes joint research-extension projects, comparative "on-farm" projects, participation of extension personnel in research activities, devotion of 20 percent of researcher's time for extension activities and appreciation of the transfer of research findings through holding festivals (Ghareyazie and Ranjbar 2002).

10.3 In Bangladesh the government have established specific research and Dept of Agri. Extension linkages committees, annual joint workshops, formal department of agriculture, extension and nongovernmental organizations liaison committees. Linkages are also maintained with the universities (Amin 2002).

10.4 Nepalese research and extension is integrated by regional and national seminars and workshop and review meetings, joint program monitoring, curriculum development and trainings, outreach research, joint extension activities and technical working groups (Manandhar DN 2002).

10.5 India is a country which has very diverse agricultural systems and communities. There are several set up to integrate agricultural activities. Significant among them is Krishi Vigyan Kendra (KVK). It is type of Farm Service Centre the number of them now reached up to the figure of 461 in all over India. The KVK is spearheaded and institutionalized by Indian Council of Agriculture Research in early 1990s. Major activities of KVK are arranging short and long term trainings which are organized on and off campus, demonstration of agricultural technologies, on farm trials, need

based production packages, provision of critical inputs to some needy farmers, formation of farmer's interest, self help groups and formation of innovative farmers club. It also provides services such as market Information, weather forecast, disease forecast, nutrition diagnosis, products and inputs and maintains farmer's database (KVK website).

11. Way Forward

11.1 The review of local research and extension system and understanding of the systems around advocated that the survival and effectiveness of both institutions is in enhanced coordination, linkage and integration between them. Despite the individual importance of each, neither of both can be effective while operating independently. Solo flight of research without extension will lose its significance and may even gradually deviate from its original course and vice versa. Under this situation efforts must be made to integrate both the institutions. For the purpose following suggestions have been made which may help support the process of integration effectively.

11.2 The peoples engaged in both the systems must understand that they are like one family having different functions just to achieve one goal which is enhancement of productivity on sustainable basis and hence profits of farmers engaged in agricultural activities. To get all in one wavelength the co housing policy of offices of two distinct institutions may be adopted. Parity in recruitment, facilitation and career progression among all employees of agriculture related public sector organizations may reduce the difference of orientation and cultural gaps and hence may enhance the integration.

11.3 It is very important to build a common sense of mission in all stake holders. Usually researchers understand that the extension workers do not have proper access to farmers while conversely extension workers put pressure on scientists for prompt response, setting aside the long-term time required to give reliable solutions of the farmer's problems. This type of attitude hinders in mutual cooperation. So both of them must understand, acknowledge and appreciate each other missions. In most of instances no effective institutional arrangements are made for integration of agriculture research and extension. Hence by making these arrangements and using administrative measures, the integration between two can be promoted on sustainable basis. Forums like meetings on different subject and discussion groups provide a good opportunity for both professionals to share their views and experience. To handle emerging issue like pest flare up and other yield and production enhancement campaigns, formation of joint issue based teams can significantly enhance linkages among all stakeholders.

11.4 The farmers which are ultimate user of technologies should be consulted at the starting point of research. This can be enhanced by adopting the policy of participatory decision making process. Farmers in their individual capacity cannot effectively interact with research and extension departments. So to improve their effective voice, it is imperative to organize them through building Farmers Organization. It is also deemed necessary to adopt the policy of decentralization, devolution, of decision making. The system of research system should be deregulated adequately to involve private sector effectively. No focus towards any of the research or extension separately and independently can bring change or improve effectiveness. Therefore holistic approach should be followed and balanced investment be made in all wings of agriculture for synchronized development.

11.5 Linear interaction of agriculture knowledge system is not effective in present diverse nature of agriculture business. Experience suggests that technology transfer should run through a range of mechanisms adapted to specific environment and harmonizing to opportunities as they become evident. Reliance solely on a linear approach of scientists to extensionists and to farmers has proven to be ineffective as the system consists of a complex set of components and functions although with designated role of each of research organizations, extension services and farmers. A dynamic interaction among the components of the system is inevitable if the common objective, to improve the productivity and income of farmers, is to be reached. Centralized governance and management structure of both agriculture and extension departments restrict them to cooperate effectively. The management should have flexibility to the extent that they can effectively increase their linkages and coordination. Market driven research and extension service agenda should be adopted. It will take all the stakeholders on one board and will improve the level of integration.

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PROSPECTS FOR AGRICULTURE COOPERATIVES IN PAKISTAN*

Abstract

This study has been undertaken on the directive of Senate Standing Committee on National Food Security and Research to review the past efforts for cooperative farming done in Pakistan and cooperative farming prospects. The Food and Agriculture Organization (FAO) has recognized the importance of cooperative farming to cope with the emerging issues of Food Security on the World Food Day 2012. The United Nations Organization has also declared 2012 as the International Year of Cooperatives. Agriculture Cooperative is a cooperative where the farmers pool their resources to perform certain activities together. In several situations, it is too expensive for farmers to undertake a service on individual basis. The cooperatives provide a forum for the farmers to join hands in an association by which they can acquire a better financial outcome through the economics of scale.

Pakistan inherited the cooperative philosophy and structure essentially developed for tackling the problem of rural indebtedness through the supply of credit. A striking feature of cooperative development in Pakistan is that it did not start from the grass roots level as in the Western Countries. Instead, it was sponsored by the Government in consequence of which it became over-dependent and its effective coverage and performance remained poor. Another reason of ineffectiveness may be the absence of much desired linkages both horizontal and vertical. Social traditions and individualistic attitude of the people, vested interests, lack of public commitment of policy makers and authoritative attitude of administrators were the basic cause of its gradual decline. Besides structural and operational shortcomings, the major defect of the last efforts was that the cooperative societies were non-genuine and non-viable. It thus requires changes in the organizational structure, policy strategy and operational modalities specifying the role of each component of the cooperative system.

The review of past efforts indicate that the performance of cooperative system in the country has been quite un-satisfactory. Despite various efforts, major components of the system remained underdeveloped because these efforts did not address to the basic issue of sustainability. In order to achieve meaningful cooperative development and to improvise viable organizations, there is a need to create climate conducive to their establishment and growth through policy framework and institutional infrastructure on the pattern of Japan/Egypt.

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* A study conducted by the Agriculture Policy Division of Agriculture Policy Institute, Ministry of National Food Security and Research, Islamabad.

1. Introduction

1.1 An agriculture cooperative is a cooperative where farmers pool their resources in certain areas of activity. There are two broad categories of farming cooperatives:

a. Agriculture Production Cooperative
b. Agriculture Service Cooperative

1.2 In the Agriculture Production Cooperative, the production resources (land, machinery) are pooled and the members jointly perform the farming practices. Examples of agriculture production cooperatives include collective farms, collectively governed community shared agriculture and Nicaraguan production cooperatives.

1.3 Agriculture Service Cooperative is the dominant form of faming cooperatives in the world. There are two primary types of agriculture service cooperatives:

a) Supply Cooperative
b) Marketing Cooperative

1.4 The supply cooperatives supply the farm inputs to their members for agriculture production including seeds, fertilizer, fuel and machinery services.

1.5 The marketing cooperatives are established by farmers to undertake transportation, packaging, distribution and marketing of farm products (both crop and livestock). Farmers also widely rely on credit cooperatives as a source for both working capital and investments [10].

1.6 Farming cooperatives strive to maximize the benefits they generate for their members as zero-profit operation. Agriculture cooperatives are therefore created in situations where individual farmer cannot obtain essential sources from the financial institutions. Agriculture cooperatives provide the opportunity for the farmers to pool their production and other resources. In several situations, it is too expensive for farmers to undertake a service on individual basis. The cooperatives provide a forum for farmers to join together in an association through which they can acquire a better financial outcome through economies of scale [12, 14].

1.7 In crux, agriculture generally comprises four types of cooperatives:

1.1 Machinery Pool (Cooperative)

1.1.1 A family farm may be too small to justify the purchase of expensive farm machinery, which may be casually used like leveling, deep ploughing and harvesting, etc. Instead the farmers may get together to form a machinery pool that

purchase the necessary farm machinery for use of all the members. Such a farm cooperative provides mechanical services for deep ploughing, leveling and harvesting to their members.

1.2 Marketing Cooperative

1.2.1 A farm does not always have the means of transportation necessary for delivering its produce to the market. Small farmers cannot effectively negotiate in the open market due to small volume of produce. A cooperative will act as an integrator, collecting the output from members, and delivering it in large aggregated quantities downstream through the marketing channels [10, 15].

1.2.2 The farmers would have a more direct access to critical farm inputs like seeds and implements. The loans for these inputs are repaid when the farmer sends produce to the marketing cooperative.

1.3 Credit Cooperative

1.3.1 Individual farmer may not have access to institutional credit as the commercial banks do not entertain small loans due to high transaction costs. The credit cooperative can get loans from commercial banks in the name of a cooperative having a large farm size and distribute among the cooperative members. This will pay economical benefits to the member growers [16].

1.4 Supply Cooperative

1.4.1 Agriculture supply cooperatives aggregate purchases, storage and distribution of farm inputs for their members. By taking advantage of volume discounts and utilizing other economies of scale, the supply cooperatives bring down the cost of the inputs for the members. These cooperatives provide inputs required for agriculture production including seeds, fertilizers, chemicals, fuel, and implements. Some supply cooperatives operate machinery pools for use of all the cooperative members as well [12].

2. Critical Appraisal of Past Efforts for Agriculture Cooperatives

2.1 Pakistan inherited the cooperative philosophy and structure essentially developed for tackling the problem of rural indebtedness through the supply of credit. A striking feature of cooperative development in Pakistan is that it did not start from the grass roots level as in the Western Countries. Instead it was sponsored by the Government in consequence of which it became over-dependent. After independence in 1947, the Provincial Governments encouraged the establishment of cooperatives in different fields of activity. The number of cooperatives increased manifold, particularly in rural areas but their effective coverage and performance remained poor. The operational capability depended upon the performance of

officials of Provincial Cooperative Departments as the most of primary societies did not have their own managerial staff [1]. Another reason of ineffectiveness may be the absence of much desired linkages both horizontal and vertical. Social traditions and individualistic attitude of the people, vested interests, lack of public commitment of policy makers and authoritative attitude of administrators were the basic cause of its gradual decline [2].

2.2 Besides structural and operational shortcomings, the major defect of the last efforts was that the cooperative societies were non-genuine and non-viable. It thus requires changes in the organizational structure, policy strategy and operational modalities specifying the role of each component of the cooperative system [1].

2.1 Farming Cooperatives

2.1.1 Farming cooperatives in the country were first organized under Colony Cooperative Farming Scheme launched for the rehabilitation of refugees and tenants. In all, about 140 thousand acres of land was awarded to 132 cooperative societies. Of the total area, about 130 thousand acres were leased to 10,898 members at the rate of 12.5 acres per family. The remaining land was utilized for village sites, roads, public utilities. Being lease holders, these societies received 40 percent of members' produce for paying government dues and to meet the development and management expenses. The system was discontinued in 1960 and to meet the management expenses every member was asked to pay Rs.200/- annually [1].

2.1.2 Another experiment was undertaken in 1962 in enclave areas situated in the districts of Sahiwal and Sialkot. The project, however, could not accomplish the desired objectives due to financial constraints in the wake of wars of 1965 and 1971 with India.

2.1.3 The latest effort in this direction was undertaken through a special enactment called Cooperative Farming Act 1976. Main objectives of the scheme were:

a. Joint cultivation of land by using farm machinery;

b. Managing government support in the form of grants; and

c. Establishment of federations of farming societies at district and provincial level

2.1.4 Only 11 such farms were set up. The scheme was at its beginning when shelved because of change of government in 1977.

2.1.5 Thus practically only the societies organized under Colony Cooperative Farming Scheme worked and achieved their objectives. Their success has been attributed to the following factors:

a. Regular managerial staff and availability of desired physical infrastructure facilitated the continuation of activities particularly the maintenance of account correctly and enabling the society to know its overall financial position in general and that of the specific activity in particular.

b. Assured income enabled the society's management to plan and execute various development activities in an effective manner.

c. Existence of well developed forward and backward linkages facilitated the development of agricultural land and other infrastructure.

d. Linking of the process of land development with input supply including additional irrigation water from tubewell, farm machinery on rent and desired credit on soft terms did help improve village agricultural economy.

2.2 Marketing Cooperatives

2.2.1 This type of societies were first organized in 1953 at market towns with membership to village level primary societies. The idea was to use the primary societies as collection and distribution units while the actual purchase and sale business was held by the town level marketing and supply societies. However, the village traders and commission agents managed to get the membership and control of management of town level societies. The interests of primary societies representing the producers were jeopardised and the effort failed. Likewise, the service societies at Union Council level and farm service centres in selected market towns also failed to safeguard the interest of members [1]. The key factors which contributed to the inability of the cooperative societies to achieve their main objectives were:

a) The non-existence of a well-knit organizational structure ensuring necessary linkage and institutional support.

b) Lack of physical infrastructure and qualified staff to maintain proper record and plan/implement viable development projects.

c) Dependence on loans instead of internally mobilized resources.

d) Availability of subsidized short-term credit in abundance from the government.

e) Excessive official control which proved detrimental to the efficient management and satisfactory participation level.

2.2.2 To overcome the specific problems of producers of agricultural perishables, organization of specialized cooperatives was encouraged by providing subsidy under the development schemes. However, on the expiry of such schemes, most of the societies became in-operative or preferred to continue their operations as credit organizations without taking care of the much desired services like: technical assistance, plant protection and marketing/processing facilities. A few of these did achieve success in the selected area of activities. Following were the main factors:

a. A genuine society organized on initiative of the like-mind persons doing almost the same business helping the development of strong will to contribute to self-help.

b. Collective decision making process creating better understanding paving the way to development projects.

c. Large membership providing opportunity to earn more due to large volume of business and economics of scale.

d. Sincerity and efficiency of leadership enabling the society to continue some of its activities which kept the members' interest alive.

2.3 Livestock and Dairy Cooperatives

2.3.1 A number of Livestock and Dairy Societies were organized in the districts of Sahiwal, Lahore, Sheikhupura and Rawalpindi. Besides technical assistance, credit facility was also made available on subsidized rates. Most of these societies, however, were organized by the big landlords to grab the

public money. Consequently these efforts remained generally limited to selected families. Barring a few exceptions, almost all these societies have become defunct. Their failure has been attributed to the following factors:-

a. These were organized not because of realization of need but on persuasion of the government officials to achieve targets. As such, instead of developing the organization, the managements' enthusiasm was centered on grabbing the facilities.

b. Lack of ability to plan and manage the development activities resulted in financial losses. The government's technical support also remained inadequate.

c. Instead of mobilization of resources internally, operations of these societies were made dependent on external sources. Non-availability of the needed funds hindered the development process.

d. Lack of adequate milk processing facilities in the area multiplied the marketing problems of these societies.

2.4 Cooperative Credit System

2.4.1 Prior to 1976, there was 3-tier cooperative credit system in the Provinces of Punjab, Sindh and Balochistan while in Khyber Pakhtunkhwa, it was 2-tier. Under 3-tier system, the primary societies formed the basis and were affiliated with the district level central cooperative bank. The credit cooperative had the following shortcomings:-

a. The central banks being small units could not afford to employ properly qualified staff and hence their banking status was not upto the mark.

b. Being controlled locally, the Managing Committees were in a strong position to exploit public resources for their own interest.

c. In the event of weak financial position of a central bank, the credit flow to all the societies of the area became blocked adversely affecting their activities.

2.4.2 To solve the above said problems, the Federal Government in consultation with the Provincial Governments established the Federal Bank for Cooperatives and restructured the cooperative banking system. The Federal Bank for cooperatives could not achieve the desired goals. It generally acted as an agent between the State Bank of Pakistan and the Provincial Cooperative Banks. The Provincial Banks operated as revenue offices of the Provincial Cooperative Departments. Local level primary societies remained at the mercy of the field functionaries of the cooperative department. As a result, the Federal Government liquidated the Federal Bank for Cooperatives on 31st October 2002 vide SRO(1)/2002. Currently the Cooperative Banks are reported to be functional only in the Punjab [1, 5, 6].

3. Suggestions for Improvement

3.1 The review of past efforts indicate that the performance of cooperative system in the country has been quite un-satisfactory. Despite various efforts, major components of the system remained underdeveloped because these efforts did not address to the basic issue of sustainability. In order to achieve meaningful cooperative development and to improvise viable organizations, there is a need to create climate conducive to their establishment and growth through policy framework and institutional infrastructure on the pattern of Japan/Egypt [3, 7]. For the purpose, following suggestions are made:-

3.1 Organization and Structure

a) To provide sufficient volume of business, the primary societies may be organized for multipurpose and the membership be given to households instead of individuals.

b) Effective linkage between credit and input supply including technical assistance with produce marketing and processing.

c) Ensure necessary infrastructure and strong organizational structure like office, equipment, storage, training facilities and regular qualified staff.

d) Official control over the management of cooperatives may be removed.

e) The cooperative societies may be free to distribute the dividends among members keeping in view their annual profits without any official intervention.

3.2 Cooperative Credit System

a) To improve capability and efficiency of the staff, a properly structured training programme be prepared and implemented.

b) Magnitude of financing to cooperatives including Provincial Cooperative Banks be made a function of their own funds.

c) To encourage the cooperatives to become business like enterprises, credit facility be extended on the condition that borrowing society will undertake all the major activities envisaged in their bye-laws.

d) The cooperative societies and commercial banks should be made independent for lending affairs without interference of any department.

e) An effective system of internal resource mobilization through deposit banking may be launched.

3.3 Institutional Support

3.3.1 Significant achievements of cooperatives in Egypt, Japan, Thailand, India and many other countries have been attributed to the Government support i.e., institutional backing through policy measures, particularly in the field of input supply, produce marketing, education and training to develop the managerial and financial capability of cooperative organizations.

a) The Provincial Cooperative Banks should help develop physical infrastructure and managerial services at grass roots level for the cooperative societies.

b) The training of the trainers for the training of members of the cooperative societies may be given top priority.

c) Public sector organizations dealing with supply of improved seed, fertilizers and pesticides should distribute the same through the cooperatives.

d) The public sector procurement agencies of foodgrains should do their operation through cooperatives to the possible extent.

e) To monitor smooth implementation of the decisions in this respect, a National Council for Cooperatives may be constituted.

3.4 Legal Framework

3.4.1 The rules and regulations governing the working of cooperative societies, the credit structure and for produce marketing and farm input supplies may be modified as under:

a) The cooperative system may be relieved of official control by restructuring the powers of the Registrar for cooperative societies.

b) The procedure for registration of a cooperative society may be simplified. The Registrar Office should be made time-bound for processing the case.

c) The cooperative societies should be set free to decide the terms and conditions of their business.

d) The cooperative societies should be made free to decide the avenues for the investment of their funds.

e) Necessary changes in the rules and regulations of produce marketing and farm inputs including machinery and supply systems may be made.

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THE FIRST YEAR OF WTO: IMPLICATIONS FOR PAKISTAN'S EXPORT PERFORMANCE

By

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Abstract

The analysis shows that terms of trade are mainly determined by trading partners instead of being settled by the overall demand-supply situation in the world trade. Data for the time frame from January to April, 2005 viz-a-viz the same for 2004 showed that the shocks from the post-quota WTO regime had severe repercussions, especially a more than 8 per cent decline in export prices and shortfall in targets for export values for 2004-05. This resulted in pushing excessive raw commodities at very low prices to meet envisaged targets for export revenue. The situation improved in remaining eight months of 2005, but still pricing shocks could not be adequately mitigated which, in turn, has implications for an overall production, income and employment in the country.

1. Introduction

1.1 The World Trade Organization (WTO) is the latest institutional set-up to regulate international trade. Its regulatory measures to ensure quality and price competitiveness were last introduced in January 1995 with quota provisions for the member countries to continue for ten years till the end of December 2004. Thus, quota provisions ended on 1st January, 2005 and the member countries are free to undertake import-export business as per quality and price standards established earlier.

1.2 The information presented in Economic Survey 2004-05 [Government of Pakistan (2005a)] showed decline in prices and demand for our export goods in the international market, especially after the elimination of quota provisions. It has been generally noted that due to shortfall in targets set for export earnings, there was increased export of raw commodities, i.e. prominently rice and cotton (lint) in 2004-05 to meet the targets. Increased export of cotton (lint) came partly due to bumper harvest for the said year and partly due to closure of high-cost value adding (VA) units [The World Trade Review (2006)]. At the same time, there has been

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substantial increase in prices of Imports and quantum imported in the post-quota regime of the WTO which led to a mounting trade deficit [State Bank of Pakistan (2005a), (2005b), (2006)].

1.3 From the point view of trade balance and other implications of the WTO, a simultaneous examination of both exports and imports is imperative. However, mainly due to the limitations of time and space, this study is confined to the exports only. The study considers data and analytical framework in Section 2, followed by empirical analysis in Section 3 and concluding remarks and policy recommendations are provided thereafter.

2. Data and Analytical Framework

2.1 Month-wise export data on quantity, price and value in US Dollars (US$) are available in the Monthly Bulletin of Statistics of the Federal Bureau of Statistics [Government of Pakistan (2005b)] for he salient commodities. A part of the data which are not yet published were obtained from web-site of the Federal Bureau of Statistics [Government of Pakistan (2005c)]. The export items considered for this study are rice, cotton (lint), fruits and vegetables, fish, tanned leather, yarn, cloth, knit-ware, bed-ware, towels, ready made garments (RMGs), tents and canvas, silk and synthetic textiles, carpets, petroleum goods and foot-ware. These commodities account for about 90 per cent of overall exports.

2.2 Policy decisions demand both detailed analysis involving individual export items and compact or aggregated analysis for the entire export basket taken together. The former analysis is quite straightforward, but the latter encounters a variety of complex issues. For instance, some commodities, such as rice, cotton (lint), etc. are raw, while others are value added (VA). Further, there are three units of measurement, viz. weight in metric tones (MT), square meters (Sq.M.) and dozens (Dz.). Thus, a compact analysis for all export commodities taken together can not be undertaken. In view of these limitations, said export items were apportioned among two weight-oriented groups of raw and value-added goods and another two VAs comprising Sq.M. and Dz. measures. Group 1 included rice, cotton (lint), fruits & vegetables and fish, Group 2 is comprised of yarn, bed-ware, towels, tents & canvas and petroleum goods, Group 3 consisted of cloth, silk & synthetic textiles & carpets and tanned leather. The knit-ware, RMGs and foot-ware were included in Group 4.

2.3 In addition to above, the elimination of export quotas effecting from the 1st January, 2005 as per WTO regime posed a major upheaval for export quantities, prices and values (earnings) of the goods traded in the international market. In case of Pakistan, substantive changes were, *inter alia*, noted in first four months (January to April) of 2005 in the export business. However, adjusting mechanism eased out the situation later, to some extent, in the remaining eight months of 2005. Thus, it is imperative to undertake separate analyses for first four months and then for the entire calendar year to pin-point the salient issues for future policy decisions.

2.4 Empirical analysis included examining month-wise change in the identified commodity groups with respect to selected criteria, such as export quantities, prices and values. The temporal changes were explained by developing the indices (considering January, 2004 = 100) of selected commodity groups, which were presented in graphic forms. Actual values and physical quantities of all commodities in terms of said criteria, for 2004 and 2005, also merit a comparison to assess the real impacts. Standardized values, i.e. achievement in 2005 as per unit (1) of the same in 2004 separately for the two time scenarios, of each variable with respect to the said criteria are also worked out to examine year-wise performance.

3. Empirical Analysis

3.1 Data on export quantities, prices and values, in US$, of 16 commodities are given in Annexes I to III, respectively. An overall analysis focused on a comparison of the first year (2005) of WTO with the preceding year (2004) for all commodities is presented in Section 3.1 followed by a detailed analysis for four commodity groups in Section 3.2.

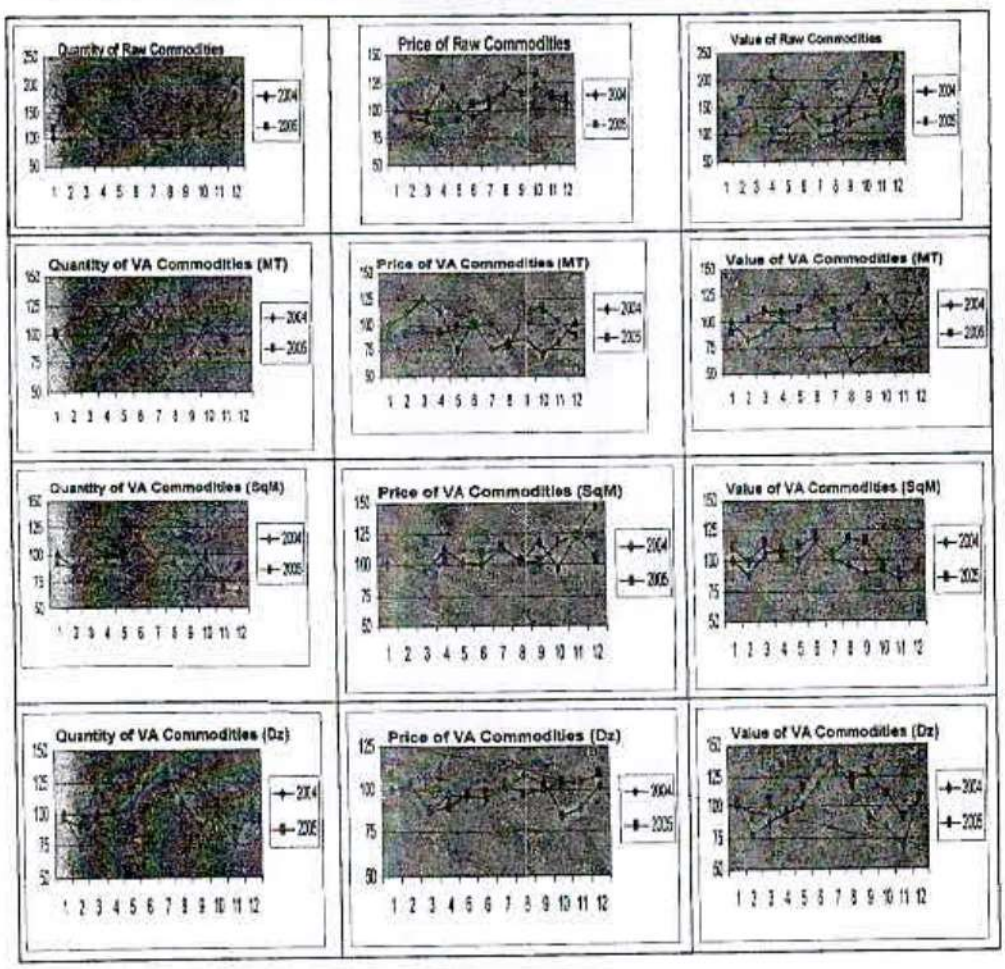
3.1 An Overview of Exports

3.1.1 An aggregated group-wise analysis helps to develop an understanding of quantity-price relationships for broad groups of commodities identified in Section 2. An insight into these relationships may be developed with reference to indices reflecting month-wise change in quantity, price and value of exports for twelve months of the calendar years 2004 and 2005 depicted in Figure 1. First four months of 2005 for all four groups of export commodities present an atypical picture with respect to the said indicators. Quantities of Groups 1&2 (raw and VA goods measured in MTs) for first four months of 2005 exceeded substantially than those in corresponding months of 2004, while their respective prices performed otherwise exhibiting an inverse quantum-price relationship which is

consistent with the economic logic. However, higher export values for 2005 as compared with 2004 indicate that quantum increase was proportionately more to mitigate the effect of drop in prices. On the contrary, VAs in Groups 3&4 appeared to be supply driven, fairly stable in terms of quantum-price relationship and somewhat better in export value as compared with Groups 1&2.

3.1.2 For the later eight months, quantum-price relationship and export value remained quite stable for Group 1. In the case of Group 2, drastic fluctuations, in terms of quantity and price, are noticeable but these are consistent with economic logic and export values kept on increasing in 2005 as compared with 2004. For Groups 3&4, a somewhat parallel movement in said indicators during 2004 and 2005 is an evidence of stable international market for VAs.

Figure 1 Quantity, Price and Value of Export Commodities in 2004 and 2005



3.1.3 As per economic theory, Pakistan, being a supplier of a very small fraction of total supplies in the international market, is not in a position to settle the export prices. However, it appears that the terms of trade are mainly determined by trading partners instead of being settled by demand-supply situation of the overall international market.

3.1.4 Another way to capture an overall view of export performance is to examine commodity shares in total export value, which are provided in Table-1. It appears that, in first four months of 2005 as compared with 2004, export shares of rice and cotton (lint) went up substantially due to meeting shortfall in export value target, while other contributories were towels and RMGs. Leather and tents exhibited stability, while the rest experienced varying degrees of decline in their export shares. However, cloth and towels turned out to show stability in export shares during the entire 2005 year as compared with 2004, while buoyancy was regained by the VA commodities, such as bed-ware, RMGs, petroleum goods and foot-ware. The post-quota shocks were not adequately absorbed by most of raw and some of the VAs prominently consisting of yarn, knit-ware and synthetic cloth.

Table-1: Commodity Shares in Export Values

Per cent

Commodity	January to April (4 months)		January to December (12 months)	
	2004	2005	2004	2005
i) Rice	6.17	**10.62**	7.06	**9.39**
ii) Cotton (Lint)	0.48	**1.09**	0.88	0.72
iii) Fruits and Vegetables	**1.48**	1.04	1.37	0.92
iv) Fish etc.	1.31	1.07	**1.47**	1.33
v) Leather	**2.64**	2.65	2.92	2.37
vi) Yarn	13.52	**10.21**	11.26	10.60
vii) Cloth	19.13	18.45	**18.32**	18.13
viii) Knit-ware	14.24	11.75	17.19	13.59
ix) Bed-ware	15.39	14.73	13.35	**15.96**
x) Towels	4.52	**4.98**	**4.86**	4.84
xi) RMGs	10.15	**11.40**	9.70	**11.23**
xii) Tents and Canvas	**0.89**	0.82	0.59	0.44
xiii)Silk and Synthetics	3.82	2.63	3.52	2.08
xiv) Carpets	**2.58**	2.53	2.61	2.24
xv) Petroleum Goods	2.68	**4.92**	3.82	**4.95**
xvi) Foot-ware	0.99	1.13	1.08	**1.21**
Total	100.00	100.00	100.00	100.00

3.2 Detailed Analysis

3.2.1 Data provided in Annexes I to III were used to estimate average annual values for export quantum, price and earnings in respect of all commodities which are provided in Tables 2&3 and depicted in Figures 2&3 for a comparative analysis. Standardized form (given in parentheses) of the same, in the years 2004 and 2005, are also shown in the said table and figure to examine year-wise performance of each commodity with respect to the said criteria. It may be noted that exports of rice and cotton (lint) in first four months of 2005 viz-a-viz. the same time period of 2004 were outliers, which over-shadowed export of other commodities (Figure 2). Within these two commodities, export of cotton (lint) was more prominent, which seems to be an outcome of a bumper harvest of cotton in the year 2004-05 Economic Survey 2004-05 [Government of Pakistan (2005)].

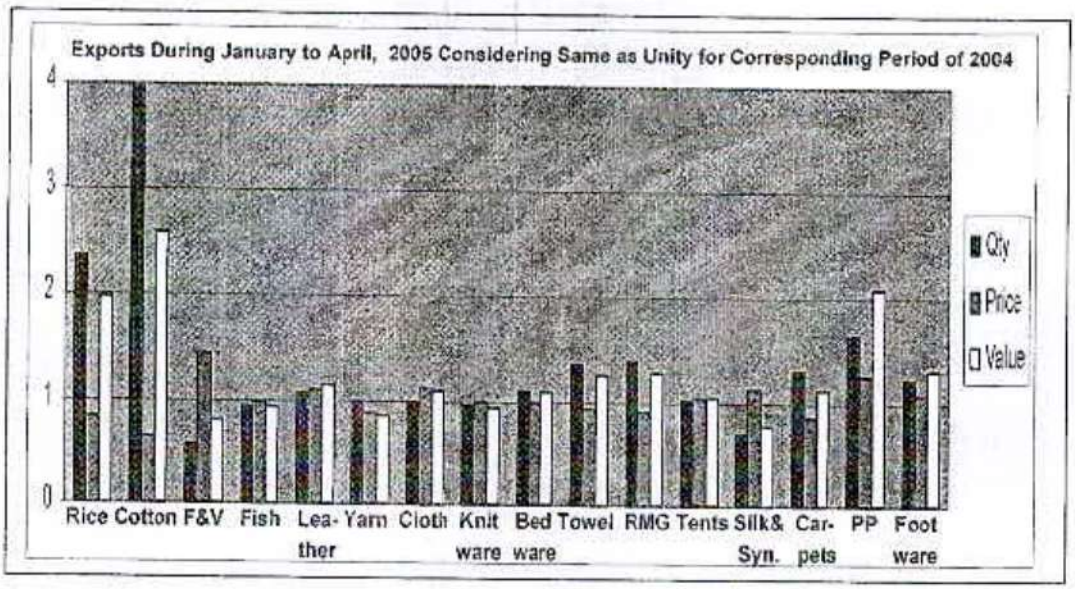
3.2.2 An observation relates to shortfall in export values from fruits & vegetables, fish, yarn, knit-ware and synthetic textiles in first four months of 2005 as compared with the same period in 2004. At the same time, declining prices with the on-set of post-quota regime of WTO, is noteworthy. An overall price decline of 8.63 per cent was observed, which is close to that noted from the tentative estimates provided in Economic Survey 2004-05 [Government of Pakistan (2005a)]. Thus, shortfalls in export values from several VA commodities instrumented exorbitant export of raw commodities, such as rice and cotton (lint), at substantially depressed prices (Table 2 and Figure 2). It is, however, satisfying to note that Pakistan has a comfortable foothold in the international market in respect of cloth, bed-ware, towels, RMGs, tents & canvas, foot-ware, petroleum products and tanned leather with fairly stable prices.

Table 2
Actual and Comparative Volumes of Exports in January to April, 2004 and 2005

Commodity/ Quantity *Unit*	Quantity		Price (US$ per MT/Sq.m./Dz.)		Value (US$ Million)	
	2004	2005	2004	2005	2004	2005
i) Rice *'000' MT*	541.7(1)	1274.2(2.35)	367(1)	306(0.83)	199(1)	390(1.96)
ii) Cotton (Lint) "	11.3(1)	44.7(3.97)	1377(1)	894(0.65)	15(1)	40(2.58)
iii) Fruits & Vegetables "	216.1(1)	120.4(0.56)	221(1)	316(1.43)	48(1)	38(0.80)
iv) Fish etc. "	34.2(1)	32.0(0.94)	1235(1)	1232(1.00)	42(1)	39(0.93)
v) Leather *Mill.Sqm.*	5.5(1)	5.9(1.06)	15.38(1)	16.62(1.08)	85(1)	97(1.14)
vi) Yarn *'000' MT*	178.8(1)	176.3(0.99)	2434(1)	2126(0.87)	435(1)	375(0.86)
vii) Cloth *Mill.Sqm.*	865.3(1)	856.0(0.99)	0.71(1)	0.79(1.11)	616(1)	678(1.10)
viii) Knit-ware *Mill. Dzs.*	21.5(1)	20.5(0.95)	21.36(1)	21.09(0.99)	458(1)	431(0.94)
ix) Bed-ware *'000' MT*	87.6(1)	96.9(1.11)	5659(1)	5584(0.99)	496(1)	541(1.09)
x) Towels "	36.4(1)	49.1(1.35)	3998(1)	3731(0.93)	146(1)	183(1.26)
xi) RMGs *Mill. Dzs.*	9.3(1)	12.9(1.39)	35.21(1)	32.38(0.92)	327(1)	419(1.28)
xii) Tents& canvas *'000' MT*	11.4(1)	11.5(1.01)	2517(1)	2636(1.05)	29(1)	30(1.05)
xiii)Silk&synthetics *Mill.Sqm.*	174.8(1)	123.3(0.71)	0.70(1)	0.78(1.11)	123(1)	96(0.78)
xiv) Carpets "	1.5(1)	1.9(1.30)	57(1)	49(0.86)	83(1)	93(1.12)
xv) Petrol. Goods *'000' MT*	261.0(1)	431.9(1.65)	331(1)	418(1.26)	86(1)	181(2.09)
xvi) Foot-ware	4.5(1)	5.5(1.21)	7.04(1)	7.55(1.07)	32(1)	42(1.30)
Total Value (US$ Million)	-	-	-	-	3220(1)	3673(1.14)

Note: a) Figures in parentheses are standardized to make intra-variable comparison of January to April, 2005 by considering respective value for the same time period of 2004 as unity.

Figure 2
Quantity, Price and Value of Exports in January to April, 2005
Considering 2004 as Unity



3.2.3 The commodity-wise numerical figures are presented in Table 3 and depicted in Figure 3 for the entire year 2005. The turbulent scenario noted in its first four months changed dimensions in remaining eight months of the year showing on-set of the adjustment process. The comparative export quantum in respect of rice, for the entire calendar year 2005 viz-a-viz 2004, adjusted downward with improved price regime and positive implications for export values. Similar improvements were also noted for fish as compared with the situation discussed above. The demand for and prices of cloth, bed-ware, towels, RMGs, petroleum products and foot-ware are stable in the international market. However, shock brought to yarn persisted for the entire 2005 as compared with 2004 and before [Ellahi (2004), (2005a), (2005b)]. The adjustment process is yet to cover the blinkered picture in respect of cotton (lint), fruits & vegetables, leather, knit-ware, tents, silk & synthetic fabric and carpets (Figure 3). Further, an overall price decline in 2005 viz-a-viz 2004 stood at 3.41 per cent, which is also a matter of serious concern.

Table 3

Actual and Comparative Volumes of Exports in Twelve Months of 2004 and 2005

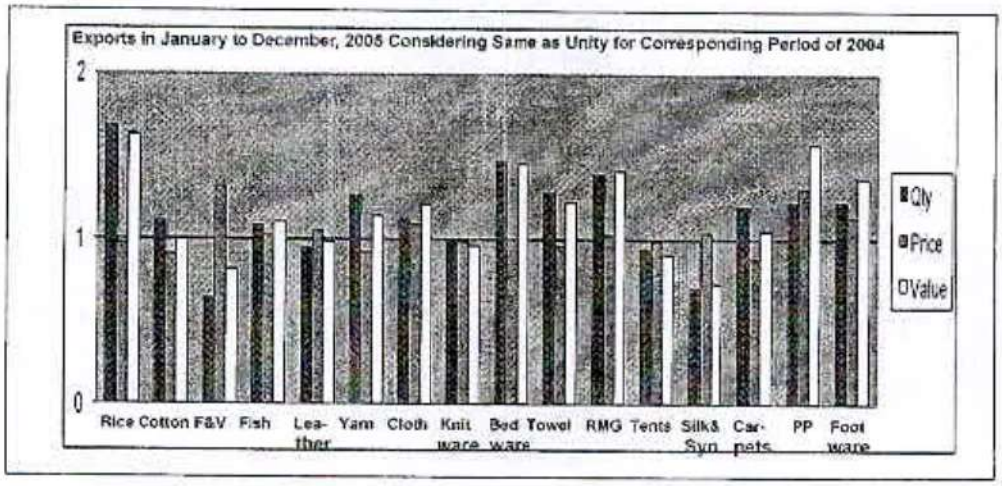
Commodity/ Quantity *Unit*	Quantity		Price (US$ per MT/Sq.m./Dz.)		Value (US$ Million)	
	2004	2005	2004	2005	2004	2005
i) Rice *'000' MT*	1957.9(1)	3263.6(1.67)	347(1)	336(0.97)	680(1)	1097(1.61)
ii) Cotton (Lint) "	81.4(1)	89.1(1.09)	1044(1)	944(0.91)	85(1)	84(0.99)
iii) Fruits & Vegetables "	509.3(1)	318.1(0.62)	258(1)	338(1.31)	132(1)	108(0.82)
iv) Fish etc. "	100.7(1)	107.9(1.07)	1403(1)	1440(1.03)	141(1)	155(1.10)
v) Leather *Mill.Sqm.*	17.6(1)	16.6(0.94)	15.97(1)	16.67(1.04)	281(1)	276(0.98)
vi) Yarn *'000' MT*	477.0(1)	597.8(1.25)	2271(1)	2071(1.08)	1083(1)	1238(1.20)
vii) Cloth *Mill.Sqm.*	2388.3(1)	2653.4(1.11)	0.74(1)	0.80(0.91)	1762(1)	2117(1.14)
viii) Knit-ware *Mill. Dzs.*	72.3(1)	71.0(0.98)	22.88(1)	22.35(0.98)	1654(1)	1587(0.96)
ix) Bed-ware *'000' MT*	231.1(1)	337.9(1.46)	5559(1)	5515(0.99)	1285(1)	1864(1.45)
x) Towels "	120.5(1)	152.3(1.26)	3879(1)	3713(0.96)	467(1)	565(1.21)
xi) RMGs *Mill. Dzs.*	28.0(1)	38.9(1.39)	33.27(1)	33.73(1.01)	933(1)	1312(1.41)
xii) Tents& canvas *'000' MT*	22.2(1)	20.6(0.93)	2550(1)	2497(0.98)	57(1)	51(0.91)
xiii)Silk&synthetics *Mill.Sqm.*	472.0(1)	327.3(0.69)	0.72(1)	0.74(1.04)	338(1)	243(0.72)
xiv) Carpets "	4.2(1)	5.0(1.19)	60.01(1)	52.61(0.88)	252(1)	262(1.04)
xv) Petrol. Goods *'000' MT*	1064.1(1)	1292.2(1.21)	345.78(1)	447.35(1.29)	368(1)	578(1.57)
xvi) Foot-ware *Mill. Dzs.*	15.0(1)	18.2(1.21)	6.93(1)	7.81(1.13)	104(1)	142(1.36)
Total Value (US$ Million)	-	-	-	-	9622(1)	11680(1.21)

Note: a) Figures in parentheses are standardized to make intra-variable comparison of January to April, 2005 by considering respective value for the same time period of 2004 as unity.

b) Data in respect of tents and canvas relate to January to October as export of tents were suspended due to catastrophic earthquake in the Northern Areas.

Figure 3

Quantity, Price and Value of Exports in 2005 Considering 2004 as Unity



4. To Sum up for Policy Recommendations

4.1 The analysis showed that contrary to the principles of economic theory, terms of trade are mainly determined by trading partners in stead of being settled by demand-supply situation of the overall international market. The analysis for first four months of 2005 viz-a-viz the same of 2004 showed that the shocks from the post-quota regime had severe repercussions, especially a more than 8 per cent decline in export prices and shortfall in targets for export values for 2004-05. This resulted in pushing excessive raw commodities at throw-away prices to meet the envisaged targets for export revenue. The situation improved in remaining eight months, but still pricing shocks could not be adequately mitigated and this, in turn, had definite implications for an overall production, income and employment in the country.

4.2 Despite the observations made above, value addition turned out to be an instrument to keep the WTO's post-quota implications from going far beyond shock absorption capacity of the economy. Therefore, the main recommendation is that value addition process needs continuation and expansion but not beyond the economic limits tailored out by pricing mechanism of the international market. The composition of the export basket and quantum of the goods need to be carefully scrutinized to meet with future challenges posed by changing scenario of the international trade.

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Annex-I

Commodity-Wise Quantities Exported: 2004 and 2005

Month	Rice	Cotton (Lint)	Fruits & Vegetables	Fish	Leather	Yarn	Cloth	Knit-ware
	000 MT	000 MT	000 MT	000 MT	M. Sqm.	000 MT	M. Sqm.	M. Doz.
				2004				
January	132.18	1.98	51.34	9.36	1.39	48.83	206.17	5.59
February	127.91	2.27	56.02	6.18	1.03	41.12	193.02	4.18
March	158.12	2.42	71.81	8.51	1.46	46.33	248.52	5.81
April	123.50	4.59	36.95	10.15	1.64	42.54	217.55	5.89
May	158.74	2.87	46.40	9.45	1.55	36.58	212.50	6.44
June	213.29	2.32	55.43	8.14	1.52	34.75	249.60	7.72
July	127.58	1.01	46.00	4.93	1.62	30.30	205.51	8.10
August	121.69	1.75	33.37	5.02	1.58	27.29	197.57	7.95
September	171.97	3.74	23.87	6.23	1.84	36.83	153.86	6.33
October	173.04	10.52	18.29	10.07	1.10	41.66	216.27	5.40
November	181.42	21.97	23.13	11.36	1.46	45.51	147.20	4.20
December	268.43	25.95	46.72	11.29	1.42	45.26	140.51	5.20
Total	1957.87	81.39	509.33	100.68	17.61	476.99	2388.27	72.31
				2005				
January	170.33	19.19	37.27	6.91	2.03	38.64	212.26	3.91
February	275.82	10.96	40.75	5.78	1.14	43.46	185.13	4.71
March	405.45	8.53	19.12	7.89	1.27	50.02	222.22	6.18
April	422.64	5.97	23.22	11.41	1.42	44.20	236.42	5.65
May	332.57	4.10	24.72	7.02	1.81	51.09	235.67	6.51
June	239.27	3.38	28.72	8.81	1.76	49.60	242.35	7.25
July	163.54	3.69	38.77	7.56	1.59	48.27	205.46	6.77
August	166.98	3.29	32.60	8.35	1.14	49.26	273.53	7.07
September	174.71	3.37	20.09	10.98	0.75	55.69	264.48	7.03
October	253.53	10.89	17.82	14.60	1.33	60.66	204.28	5.94
November	244.67	7.05	13.78	8.86	1.14	50.64	177.39	4.78
December	414.14	8.71	21.22	9.77	1.21	56.23	194.19	5.00
Total	3263.65	89.12	318.07	107.93	16.57	597.75	2653.38	71.00

Month	Bed-ware	Towels	RMGs	Tents& canvas	Silk& synthetics	Carpets	Petroleum Goods	Foot-ware
	000 MT	000 MT	M. Doz.	000 MT	M. Sqm.	M. Sqm.	000 MT	M. Doz.
				2004				
January	21.29	10.37	2.65	2.31	53.85	0.34	88.56	1.32
February	18.02	6.93	1.97	2.24	37.69	0.28	59.82	0.90
March	24.13	8.64	2.40	2.28	43.35	0.39	40.76	1.20
April	24.15	10.46	2.26	4.59	39.90	0.46	71.86	1.11
May	18.98	9.65	2.20	1.48	41.59	0.27	139.56	1.20
June	21.71	10.88	2.68	2.99	48.18	0.39	85.85	1.35
July	21.94	10.54	2.99	2.56	29.54	0.37	147.84	1.07
August	11.79	10.23	0.87	1.00	43.12	0.29	72.90	1.57
September	15.47	10.02	1.00	1.05	43.00	0.30	80.35	1.83
October	18.28	9.97	2.82	1.67	38.45	0.33	119.25	1.50
November	13.60	15.08	2.15	2.03	27.97	0.38	90.31	0.91
December	21.74	7.74	4.05	2.59	25.40	0.41	67.05	1.04
Total	231.09	120.52	28.05	22.16	472.03	4.19	1064.10	15.00
				2005				
January	20.78	11.85	4.04	3.17	27.18	0.50	97.30	1.46
February	23.54	11.35	2.62	3.32	42.10	0.33	110.46	1.23
March	24.89	13.74	3.67	3.37	28.88	0.52	106.96	1.67
April	27.65	12.13	2.61	1.61	25.10	0.56	117.14	1.15
May	28.59	13.10	3.13	2.07	22.75	0.45	106.05	1.64
June	35.68	13.25	4.19	2.00	44.91	0.56	119.53	3.63
July	31.09	10.18	3.61	1.68	33.25	0.27	94.48	1.94
August	25.52	13.10	3.43	1.10	25.23	0.42	158.89	1.60
September	35.45	17.16	3.49	1.70	34.40	0.39	86.50	1.04
October	31.14	13.74	2.88	0.57	10.69	0.26	71.27	0.85
November	22.19	9.22	2.31	-	13.91	0.31	78.48	0.78
December	31.42	13.48	2.91	-	18.89	0.43	145.18	1.16
Total	337.94	152.30	38.86	20.59	327.28	4.98	1292.23	18.16

Note: a) Data in respect of tents and canvas are not available for November and December as export of tents were suspended due to catastrophic earthquake in the Northern Areas.

Annex-II

Commodity-Wise Export Prices: 2004 and 2005

US$ per unit

Month	Rice	Cotton (Lint)	Fruits & Vegetables	Fish	Leather	Yarn	Cloth	Knit-ware
				2004				
January	359	1349	219	1070	15.81	2456	0.72	22.48
February	353	1384	222	1219	16.44	2509	0.72	22.47
March	364	1424	201	1281	14.07	2327	0.66	19.41
April	394	1360	257	1357	15.52	2452	0.75	21.44
May	357	1312	215	1267	16.21	2475	0.72	21.48
June	317	1321	247	1442	16.18	2430	0.70	21.20
July	379	1278	265	1166	16.35	2396	0.75	23.27
August	385	1231	357	2173	16.98	2150	0.70	28.23
September	347	1037	392	2222	16.25	2152	0.77	26.67
October	343	991	394	1762	16.42	1903	0.68	18.21
November	317	891	302	1171	15.03	1920	0.80	21.34
December	316	976	268	1225	16.45	2123	1.01	26.37
Average	347	1044	258	1403	15.97	2271	0.74	22.88
				2005				
January	348	910	294	1393	16.34	2098	0.80	27.20
February	318	833	287	1240	16.43	2269	0.86	20.27
March	299	881	358	1171	16.88	2104	0.83	19.10
April	288	974	366	1172	16.95	2035	0.70	19.74
May	312	965	205	1428	16.61	2047	0.76	22.16
June	343	1003	294	1597	16.93	2060	0.75	22.34
July	359	1056	320	1403	17.31	2034	0.81	23.65
August	388	942	297	1376	16.47	2031	0.75	21.79
September	439	1004	356	1439	16.71	2025	0.77	22.51
October	390	1022	572	1641	16.54	2047	0.86	23.79
November	352	968	486	1515	16.40	2102	0.87	23.51
December	327	1003	471	1705	16.39	2039	0.89	23.72
Average	336	946	338	1440	16.67	2071	0.80	22.35

Month	Bed-ware	Towels	RMGs	Tents& canvas	Silk& synthetics	Carpets	Petroleum Goods	Foot-ware
				2004				
January	5744	3923	35.14	2505	0.66	55.14	351	7.54
February	5869	3942	37.45	2415	0.69	54.25	320	8.64
March	5200	3994	32.18	2692	0.66	56.93	321	5.82
April	5885	4113	36.56	2486	0.82	59.08	321	6.46
May	5702	4059	36.35	2554	0.69	60.71	342	6.51
June	5782	4088	36.48	2665	0.71	62.41	347	6.27
July	5757	4019	36.63	2645	0.78	63.45	332	6.05
August	5441	3927	33.79	2505	0.72	55.86	363	6.97
September	5197	3766	31.86	2777	0.80	57.19	363	5.77
October	5371	3638	30.32	2307	0.66	56.49	277	7.94
November	5335	3578	27.52	2349	0.76	67.37	421	8.54
December	5228	3590	27.91	2400	0.68	67.07	421	7.87
Average	5559	3879	33.27	2550	0.72	60.01	346	6.93
				2005				
January	5410	3626	30.16	3036	0.76	54.85	384	7.61
February	5619	3776	39.25	2579	0.76	34.05	386	7.50
March	5648	3737	29.98	2432	0.85	50.32	441	7.42
April	5628	3783	32.27	2391	0.77	49.95	456	7.71
May	5423	3758	33.97	2213	0.76	52.38	453	7.62
June	5486	3729	31.71	2372	0.70	47.48	413	7.67
July	5411	3677	34.14	2430	0.71	66.36	450	7.34
August	5381	3706	33.74	2301	0.72	52.21	453	8.36
September	5489	3765	34.77	2326	0.72	53.15	508	8.40
October	5476	3802	35.29	2247	0.70	55.24	503	8.54
November	5722	3678	36.91	-	0.72	59.76	485	8.35
December	5551	3492	37.00	-	0.72	61.67	468	8.41
Average	5515	3713	33.76	2497	0.74	52.61	447	7.81

Note: a) Data in respect of tents and canvas are not available for November and December as export of tents were suspended due to catastrophic earthquake in the Northern Areas.

Annex-III

Commodity-Wise Export Values: 2004 and 2005

US$ million

Month	Rice	Cotton (Lint)	Fruits & Vegetables	Fish	Leather	Yarn	Cloth	Knit-ware
				2004				
January	47.41	2.67	11.27	10.01	21.99	119.93	148.29	125.65
February	45.18	3.14	12.44	7.54	16.98	103.14	139.82	93.82
March	57.49	3.45	14.46	10.90	20.50	107.81	164.67	112.70
April	48.63	6.24	9.50	13.78	25.45	104.29	163.07	126.27
May	56.73	3.76	9.97	11.97	25.16	90.53	153.86	138.33
June	67.71	3.06	13.68	11.74	24.55	84.43	173.84	163.69
July	48.40	1.29	12.21	5.75	26.46	72.59	154.98	188.49
August	46.86	2.16	11.92	10.91	26.87	58.66	138.93	224.49
September	59.61	3.88	9.36	13.85	29.83	79.24	118.30	168.77
October	59.40	10.43	7.20	17.75	18.07	79.29	147.06	98.25
November	57.58	19.57	7.00	13.29	21.93	87.40	117.86	89.68
December	84.71	25.34	12.51	13.83	23.41	96.07	172.09	124.02
Total	679.70	84.98	131.51	141.31	281.20	1083.39	2117.26	1654.16
				2005				
January	59.31	17.48	10.96	9.62	33.12	81.06	169.60	106.42
February	87.77	9.13	11.72	7.16	18.65	98.60	158.73	95.45
March	121.05	7.52	6.84	9.24	21.40	105.26	184.61	118.09
April	121.92	5.82	8.51	13.37	24.03	89.94	164.88	111.43
May	103.72	3.96	5.06	10.03	30.13	104.57	180.12	144.33
June	81.96	3.39	8.44	14.07	29.71	102.17	181.59	162.03
July	58.77	3.89	12.42	10.60	27.51	98.18	166.05	160.17
August	64.78	3.10	9.67	11.50	18.71	100.03	206.34	153.99
September	76.66	3.38	7.16	15.80	12.45	112.77	203.58	158.29
October	98.96	11.13	10.19	23.97	22.00	124.14	174.88	141.31
November	86.19	6.82	6.70	13.43	18.70	106.43	154.79	112.26
December	135.45	8.74	9.99	16.65	19.83	114.67	172.09	123.38
Total	1096.53	84.34	107.66	155.43	276.23	1237.81	2117.26	1587.16

Month	Bed-ware	Towels	RMGs	Tents& canvas	Silk& synthetics	Carpets	Petroleum Goods	Foot-ware
				2004				
January	122.30	40.67	93.20	5.77	35.56	18.47	31.11	9.97
February	105.75	27.30	73.78	5.41	26.10	14.97	19.13	7.78
March	125.45	34.51	77.33	6.13	28.78	22.43	13.08	6.99
April	142.11	43.02	82.56	11.40	32.63	27.06	23.06	7.20
May	108.21	39.18	80.04	3.78	28.58	16.09	47.80	7.83
June	125.51	44.49	97.74	7.98	34.19	24.03	29.79	8.47
July	126.30	42.37	109.67	6.77	23.12	23.48	49.11	6.45
August	64.14	40.17	29.33	2.52	30.94	16.03	26.44	10.95
September	80.40	37.72	31.73	2.90	34.34	17.33	29.18	10.57
October	98.18	36.28	85.54	3.85	25.43	18.53	32.98	11.89
November	72.57	53.97	59.19	4.78	21.25	25.87	38.00	7.75
December	113.65	27.79	113.07	6.22	17.37	27.23	28.25	8.18
Total	1284.56	467.48	933.17	56.51	338.29	251.51	367.94	104.02
				2005				
January	112.41	42.96	121.74	9.63	20.61	27.37	37.34	11.10
February	132.26	42.86	102.95	8.57	31.98	11.10	42.62	9.19
March	140.57	51.34	109.98	8.20	24.55	26.27	47.17	12.41
April	155.60	45.89	84.10	3.85	19.33	28.02	53.41	8.90
May	155.04	49.22	106.19	4.58	17.29	23.31	48.01	12.48
June	195.73	49.39	132.78	4.73	31.65	26.40	49.38	27.83
July	168.25	37.43	123.15	4.09	23.46	18.18	42.52	14.26
August	137.35	48.54	115.58	2.54	18.19	21.77	71.93	13.39
September	194.60	64.63	121.39	3.95	24.75	20.78	43.93	8.77
October	170.54	52.24	101.52	1.27	7.53	14.09	35.81	7.24
November	126.96	33.92	85.08	-	10.01	18.41	38.08	6.53
December	174.40	47.08	107.51	-	13.57	26.33	67.89	9.79
Total	1863.70	565.49	1311.96	51.40	242.92	262.03	578.08	141.89

Note: a) Data in respect of tents and canvas are not available for November and December as export of tents were suspended due to catastrophic earthquake in the Northern Areas.

AVERAGE FARM SIZE IS DECREASING

By

Masood Bakhtiar Siddiqui, Chief API

Abstract

The article analyses the average farm size over time. The history of agriculture census taking dates back to 1960. A total of six agriculture censuses have been conducted so far. Average farm size is decreasing in every census one after the other which is due to inheritance. Similar pattern has been observed on the Indian side due to very reason of inheritance. Average farm size in Pakistan is 2.59 hectares while that of India is 1.16 hectares. The article concludes that decrease in farm size has put pressure on the farming community. Avenues of employment have to be sorted in non-farm sectors including livestock, poultry, fish farming etc. besides raising crop yields is the need of the time.

1. Introduction

1.1 The Agricultural Census Act, 1958 (Act No.XLI of 1958) provides the legal cover for the census operations. The Act makes it binding on the Government for taking agricultural census and also on the respondents to cooperate with the census enumerators and to furnish information on or with respect to items specified in the said Act. At the same time it assures secrecy of the information supplied by the respondents (Census of Agriculture 1990).

1.2 History of Agriculture Census taking in Pakistan dates back to 1960 when first Census of Agriculture took place since then it has been conducted on decanal basis except the second census of agriculture which was held in 1972 due to War in December 1971 and urgent implementation of land reforms in April 1972. So far country has conducted four censuses, after 1972, namely, Third, Fourth, Fifth and Sixth. These censuses were conducted in 1980, 1990, 2000 and 2010, respectively. Census provides basic structure of agriculture in the country. Successive censuses enable us to measure changes in structure of agriculture over time. It also provides information about the agriculture resources, the state of their utilization and acceptability of modern farming practices.

1.3 Although it is known as census of agriculture but in fact it is conducted on sample basis with the help of suitable sample design unlike the population census in which complete enumeration of population is made. For the census of 2010 the UN generally proposed that complete

enumeration of both the population census and agriculture census be made simultaneously but for some political reasons population census could not be conducted and only agriculture census took place on sample basis. It is worth mentioning here that India is conducting Census of Agriculture on quinquinal basis since 1971. They also conduct the census on sample basis.

1.4 At the beginning of the first census of agriculture it was realized that the resources in terms of men and finances required for complete enumeration were beyond the capacity of the country. The same situation is prevailing now. However, if we start doing this right from now we may accomplish the ultimate goal of complete enumeration by the next census in 2020.

2. The 1960 Agriculture Census

2.1 The census was carried out on sample basis. A systematic sample of 20 percent villages in Pakistan was selected and all holdings with in the sample villages were listed and enumerated. It was one stage selection of villages with known chance of selection. The de-jure approach was adopted, asking sample households about their holdings wherever located.

2.2 In 1960 the agriculture census enumeration came up with 3.34 million farms at country level. Major chunk of farms were enumerated in 3 to 10 hectare category at 1.76 million or 53 percent of the total farms. Next important category was the 1.14 million farms having area less than 8 hectares comprising 34 percent of total farms. The rest of the 13 percent were having farm area 10 hectares and above.

2.3 The area under all farms was estimated at 20.80 million hectares. The category comprising 3 to 10 hectares had the most area of 9.34 million hectares or 45 percent of the area under all farms. Fallowed by 10 to 20 hectares category having 3.94 million farms. The 20 to 60 hectare and more than 60 hectare category had farms area of 3.33 and 2.40 million hectares. The less than 3 hectare group had the least farm area of 1.79 million hectares, comprising 9 percent total area under farms.

2.4 Average holding size for the 1960 census was estimated at 6.22 hectares. However, the size of holding increases with size of farm size category. For the less than 3 hectare category it is 1.57, for 3-10 hectares it is 5.34, for 10-20 hectare it is 12.64, for 20-60 hectares it is 29.2 and for 60 hectares and above it is 133.44 hectares (Annex-I to III).

2.5 This was the first census of agriculture conducted on sample basis.

3. Agriculture Census 1972

3.1 The sample design of second Census of Agriculture of Pakistan is a combination of various sampling techniques. It can be described as a stratified, systematic, multi frame and multi stage sample with first and second stage sampling units selected with probability proportional to size and third stage sampling units selected with equal probability. Patwar circles were first stage units. Second stage units were Mouzas and third stage units were households.Due to implementation of land reforms in April 1972 and war of 1971 December the second Census of Agriculture was conducted in 1972.

3.2 The number of farms in the second Census of Agriculture were estimated at 3.76 millions, an increase of 0.42 million farms or 12.6 percent over the number of 3.34 millions in 1960. Highest number of farms were enumerated at 1.72 million in the 3-10 hectare category. The trend was similar as was observed in the first census of agriculture, but both the proportion and absolute number decreased over time although the total number of farms in the second census increased. The numbers in all the categories 3 hectares and above decreased. The only increase was observed in the less than 3 hectare category where the number of farms increased both in absolute term and as proportion to total number of farms. All this happened due to inheritance.

3.3 The total area under the farms was estimated at 20.8 million hectares in the first census of agriculture. It however, decreased in the second census of agriculture to 19.9 million hectares, a decrease of 4.5 percent. The trend was similar as was observed in case of distribution of number of farms. The number of farms increased by 44 percent but the farm area decreased by 36 percent in small farm category.

3.4 The size of holding in the second census of agriculture was estimated at 5.28 hectares, a decrease of 15 percent or 0.94 hectares over the average farm size of 6.22 hectares estimated for first census of agriculture. The average size of farm in each category decreased except 10-20 hectare category which increased. The increase was possible through slower decrease in farm area as compared to decrease in number farms (Annex-I to III).

4. Agriculture Census 1980

4.1 The 1980 census of agriculture was third decenal census of the country. Its enumeration was made on sample basis as was done in the previous two censuses. The factors behind sample enumeration were financial and administrative. Due to limited financial resources and lack of sufficient competent enumerators the census operation was carried out on sample basis. A three stage sample design was used in general.

4.2 In the third census of agriculture the number of farms increased to 4.1 million, increasing from 3.8 million in 1972, an increase of 8 percent or 0.31 million farms during the intercensal period. The number of farms in all the categories having 3 hectares and above decreased. The only increase was observed in the less than three hectare category which increased from 2.1 to 3.2 millions, an increase of 26.4 percent or 0.43 million.

4.3 The total farm area was estimated at 19.1 million hectares, a decrease of 4.1 percent or 0.81 million hectares, cumulatively during the span of 20 years total farm area decreased by 1.7 million hectares. The decrease in farm area was observed in all the farm categories having area more than 3 hectares. However, farm area increased in the less than 3 hectare category where it increased from 2.42 to 2.91 million hectares, an increase of 22.5 percent or 0.5 million hectares.

4.4 The size of holding in the third census of agriculture was estimated at 4.68 hectares, a decrease of 11.4 percent or 0.6 hectares. A cumulative decrease of 1.54 hectare over the period of 20 years between 1960 and 1980 Censuses. The size of holding decreased in less than 3 hectare category from 1.48 to 1.43 hectares; in 3-10 hectare category from 5.18 to 5.09 hectares and in 10-20 hectare category from 12.99 to 12.86 category. The holding size, however, increased from 29.09 to 29.14 hectares in the 20-60 hectare category and 113.38 to 115.3 hectares in the 60 hectares and above category. Due to increase in number of farms and some how decrease in area under farms the average holding size decreased.

4.5 Overall during course of 20 years encompassing 1960 and 1980 censuses there was decrease of 1.744 million hectares in total farm area and increase of 0.728 million farms which resulted an average farm size of 4.68 hectares in 1980 census of agriculture (Annex-I to III).

5. Agriculture Census 1990

5.1 This was fourth decanal census of agriculture in the country. It was conducted through a three stage sample design. Major parts of the country

comprising rural settled areas of NWFP, Punjab and Sindh Provinces, a three stage weighted and stratified sample was used where as a single stage weighted sample was used in rural settled areas of Balochistan. In the rest of the country comprising entire urban areas and unsettled rural and tribal areas, a single stage systematic sample was used as used in 1972 and 1980 Agriculture Censuses. However, minor improvements in the design were made.

5.2 In the 1990 Census of Agriculture a total 5 million farms were estimated. Small farms having area of less than 3 hectares constituted 64 percent farms. This proportion increased from 34 percent farms enumerated in this category in 1960. The total farms in this category at 3.2 million were less only by 0.1 million total enumerated farms in 1960. The number of farms in 3-10, 10-20 and 20-60 hectare category decreased while 60 hectares and above category observed an excess, from 14 thousand to 15 thousand farms.

5.3 Total farm area in the fourth Census of Agriculture 1990 was assessed at 19.2 million hectares, a slight increase in total farm area of 19.1 million hectares in 1980. Farm area increased in the extreme categories i.e. less than 3 hectares category by 39 percent and 60 hectare and above category by 19 percent. In all other categories the farm area decreased by varying rates. Increase in farm area in extreme categories is based on the increase in number of farms in these categories.

5.4 The average size of holding as observed in 1990 census was 3.78 hectares. During the course of 30 years between 1960 and 1990 Censuses the farm size reduced by 61 percent or 2.44 hectares. The farm size in all the categories decreased except 60 hectares and above category which increased. This is also supported by increases in number of farms and farm area in this category. The less than 3 hectare category has highest number of farms and highest farm area and have least holding size of 1.27 hectares (Annex-I to III).

6. Agriculture Census 2000

6.1 The 2000 Census was the first in new millennium and fifth on decanal basis. The data on land and land utilization refers to agriculture year 1999-2000 i.e. kharif 1999 and Rabi 1999-2000. The data on number of farm size refers to year 2000 as enumerated in different parts of the country. The sample design as used in 1972, 1980, 1990 was used for 2000 censuses.

6.2 The Census of Agriculture 2000 estimated a total of 6.66 million farms in the country. The number of farms enumerated in 1960 were 3.3

million. During the course of 40 years almost 3.3 million farm were added. The number of farms having less than 3 hectares and 10 to 20 hectares increased but decreased in farms having area 3-10 hectares and 60 hectares and above. There was more than fourfold increase in the number of farms in the less than 3 hectare category since 1960. While the farms in all other categories decreased.

6.3 Total farm area as captured by the census is 20.4 million hectares. The 3-10 hectares category holds maximum proportion of 36 percent fallowed by less than 3 hectare category having proportion of 27 percent.

6.4 The average holding size of the census is 3.08 hectares which is less than half of the farm size observed in 1960 at 6.22 hectares. Farm size almost decreased in all farm size categories (Annex-I to III).

7. Agriculture Census 2010

7.1 Agriculture Census is a regular exercise conducted on decanal basis. Agriculture Census 2010 was the sixth census since its inception in 1960. It provides basic information on structure of agriculture. This year UN advised the national governments to carry out both population and agriculture censuses simultaneously to save on cost and time. But due to non availability of political clearance the population census could not be conducted and agriculture census 2010 was conducted as usual. It was based on three stage sample design. Its results are available on line for data users. The authorities concerned deserve appreciation.

7.2 According to the sixth census of agriculture the total number of farms are estimated at 8.26 million, registering an increase of 25 percent or 1.64 million farms over the fifth census conducted in 2000. The census composed of 78 percent farms having area less than 3 hectares and 22 percent farm having area more than three hectares. Over the previous census small farms surged by 36 percent or 1.7 million number .The farms in other categories generally decreased except farms having area between 3-10 hectares which marginally increased.

7.3 The total farm area as captured by the census is 21.4 million hectares. Incidentally this was highest farm area reported in any of the agricultural censuses conducted so far. The farm area was declining upto 1980 census. After 1980 census it went on increasing and ended up with 21.4 million hectares. The farmers having area 3-10 hectares have the highest farm area of 7.33 million hectares fallowed by less than 3 hectares farmers. Farm area increased in extreme farm size categories of 60 hectares

and above and less than 3 hectares and in the intervening categories it decreased.

7.4 The average size of holding estimated by census of 2010 is 2.59 hectares. Both the farm area and number farms showed increasing trend. But the increase in number of farms was phenomenal and total farm area was marginal that is why average holding size resulted in reduced farm size. It is interesting to that average farm size in 60 hectares and above category registered an increase of 50 percent or 62 hectares over the previous census (Annex-I to III).

8. Growth Rate of Farm Size in Pakistan and India

8.1 During the course of 50 years comprising 1960 to 2010 censuses total farm area has reached 21.41 million hectares and the number of farms reached 8.2 million as a result the average size of holding is estimated at 2.59 hectares (Table-1).

Table-1: Number Farms, Farm Area and Holding Size: 1960 to 2012

Year	Farm area (Million Hectares)	Number of Farms (Millions)	Size of Holding (Hectares)		Change in farm size
			Pak	India	(Percent)
1960	20.80	3.34	6.22	2.63	137
1972	19.86	3.76	5.28	2.28	132
1980	19.86	4.07	4.68	1.84	154
1990	19.15	5.07	3.78	1.55	144
2000	20.41	6.62	3.08	1.33	132
2010	21.41	8.26	2.59	1.16	123
Growth Rate	0.66	1.20	-16.23		

Source: Various Agriculture Census Reports.

8.2 The average decanal growth of total farm area is estimated at 0.66 percent. The growth rate of number of farms during this period is estimated at 1.2 percent. The average holding size grew at -16.23 percent.

8.3 Farm size in Pakistan is generally more than twice the farm size of India. Farm size of Pakistan has experienced faster decrease as compared to

Indian farm size. Pakistan registered a decrease of 58 percent and India registered decreased 56 percent in 50 years period Table-2.

Table-2: Number of Farms, Farm Area and Size of Holding in India: 1960-61 to 2010-11

	Number(million)	Area(million hectares)	Holding(hectares)
1960-61	51.0	134.0	2.63
1970-71	71.0	162.1	2.28
1976-77	81.8	163.3	2.00
1980-81	88.9	163.8	1.84
1985-86	99.2	164.6	1.69
1990-91	106.6	165.5	1.55
1995-96	115.6	163.4	1.41
2000-01	119.9	159.4	1.33
2005-06	129.2	158.3	1.23
2010-11	137.8	159.2	1.16
Growth	10.13	0.77	-20.99

8.4 India conducted first two censuses in 1950 and 1960 on decanal basis. Then after with the approval of FAO India conducted Agriculture Censuses on quinquinal basis. The Censuses were generally conducted as a combination of complete enumeration in some area and sample survey in other areas. India has 10 percent of global arable land and feeding 18 percent of worlds population.

8.5 The number of farms which were estimated at 51 million in 1960-61 increased to 137.8 million in 2010-11, an increase of 170 percent. The area under farms which was estimated at 134 million hectares rose to 165.5 million hectares in 1990-91 but afterwards it has been declining and ended up with 159.2 million hectares in 2010-11, an increase of 19 percent over the farm area of 1960-61 census.

8.6 According to the 1960-61 census the average size of holding in India was 2.63 hectares. The farm size was continuously on the decrease in every

census. In the census of 2010-11 the farm size is worked out 1.16 hectares, loosing almost 1.5 hectares in 50 years inter censual period, a decrease of 56 percent.

9. Conclusions

- Accelerated decline in the farm size has created livelihood problems for the farming community.
- Drop of average farm size has economic effects on land man ratio.
- The farming community should not only depend upon farm income but they have to involve themselves in non-farm activities
- Raising livestock, poultry and fish farming are other avenues of non farm employment.

10. References

1. Census of Agriculture, CSO, Pakistan 1960
2. Census of Agriculture, CSO, Pakistan 1972
3. Census of Agriculture, CSO, Pakistan 1980
4. Census of Agriculture, CSO, Pakistan 1990
5. Census of Agriculture, CSO, Pakistan 2000
6. Census of Agriculture, CSO, Pakistan 2010
7. Census of Agriculture, India various issues: 1950 to 2012

Annex-I

ANALYSIS OF NUMBER OF FARMS: 1960 TO 2010 (THOUSANDS)

	1960	1972	1980	1990	2000	2010
< 3	1140	1639	2071	3245	4781	6483
3 - 10	1758	1715	1625	1480	1471	1477
10 - 20	312	289	264	238	261	211
20 - 60	114	103	96	92	93	79
60 +	18	16	14	15	14	13
Total	**3342**	**3762**	**4070**	**5070**	**6620**	**8263**

Percentage

	1960	1972	1980	1990	2000	2010
< 3	34.11	43.57	50.88	64.00	72.22	78.46
3 - 10	52.60	45.59	39.93	29.19	22.22	17.87
10 - 20	9.34	7.68	6.49	4.69	3.94	2.55
20 - 60	3.41	2.74	2.36	1.81	1.40	0.96
60 +	0.54	0.43	0.34	0.30	0.21	0.16
Total	100.00	100.00	100.00	100.00	100.00	100.00

Change

	1972/1960	1980/1972	1990/1980	2000/1990	2010/2000
< 3	499	432	1174	1536	1702
3 - 10	-43	-90	-145	-9	6
10 - 20	-23	-25	-26	23	-50
20 - 60	-11	-7	-4	1	-14
60 +	-2	-2	1	-1	-1
Total	420	308	1000	1550	1643

Change(%)

	1972/1960	1980/1972	1990/1980	2000/1990	2010/2000
< 3	44	26	57	47	36
3 - 10	-2	-5	-9	-1	0
10 - 20	-7	-9	-10	-10	-19
20 - 60	-10	-7	-4	-1	-15
60 +	-11	-13	-7	-7	-7
Total	13	8	25	31	25

Source: Various Census of Agriculture

Annex-II

ANALYSIS OF AREA OF FARMS: 1960 TO 2010 (THOUSAND HECTARES)

	1960	1972	1980	1990	2000	2010
< 3	1786	2425	2970	4124	5422	6749
3 - 10	9343	8891	8277	7444	7334	7325
10 - 20	3943	3739	3394	3033	3324	2724
20 - 60	3329	2996	2798	2614	2644	2246
60 +	2402	1814	1620	1935	1682	2369
Total	**20803**	**19865**	**19059**	**19150**	**20406**	**21413**

Percentage

	1960	1972	1980	1990	2000	2010
< 3	8.59	12.21	15.58	21.54	26.57	31.52
3 - 10	44.91	44.76	43.43	38.87	35.94	34.21
10 - 20	18.95	18.82	17.81	15.84	16.29	12.72
20 - 60	16.00	15.08	14.68	13.65	12.96	10.49
60 +	11.55	9.13	8.50	10.10	8.24	11.06
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Change

	1972/1960	1980/1972	1990/1980	2000/1990	2010/2000
< 3	639.00	545.00	1154.00	1298.00	1327.00
3 - 10	-452.00	-614.00	-833.00	-110.00	-9.00
10 - 20	-204.00	-345.00	-361.00	291.00	-600.00
20 - 60	-333.00	-198.00	-184.00	30.00	-398.00
60 +	-588.00	-194.00	315.00	-253.00	687.00
Total	**-938.00**	**-806.00**	**91.00**	**1256.00**	**1007.00**

Change(%)

	1972/1960	1980/1972	1990/1980	2000/1990	2010/2000
< 3	36	2	4	3	2
3 - 10	-5	-1	-1	0	0
10 - 20	-1	-1	-1	1	-2
20 - 60	-1	-1	-1	0	-2
60 +	-2	0	2	-1	4
Total	**0**	**0**	**0**	**1**	**0**

Source: Various Census of Agriculture

Annex-III

ANALYSIS OF FARM HOLDING: 1960 TO 2010 (HECTARES)

	1960	1972	1980	1990	2000	2010
< 3	1.57	1.48	1.43	1.27	1.13	1.04
3 - 10	5.34	5.18	5.09	5.02	4.99	4.96
10 - 20	12.64	12.94	12.86	12.74	12.74	12.91
20 - 60	29.2	29.09	29.14	28.41	28.43	28.43
60 +	133.44	113.38	115.3	129	120.14	182.23
Total	**6.22**	**5.28**	**4.68**	**3.78**	**3.08**	**2.59**

Change

	1972/1960	1980/1972	1990/1980	2000/1990	2010/2000
< 3	-0.09	-0.05	-0.16	-0.14	-0.09
3 - 10	-0.16	-0.09	-0.07	-0.03	-0.03
10 - 20	0.30	-0.08	-0.12	0.00	0.17
20 - 60	-0.11	0.05	-0.73	0.02	0.00
60 +	-20.06	1.92	13.70	-8.86	62.09
Total	**-0.94**	**-0.6**	**-0.9**	**-0.7**	**-0.49**

Change(%)

	1972/1960	1980/1972	1990/1980	2000/1990	2010/2000
< 3	-6	-3	-11	-11	-8
3 - 10	-3	-2	-1	-1	-1
10 - 20	2	-1	-1	0	1
20 - 60	0	0	-3	0	0
60 +	-15	2	12	-7	52
Total	**-15**	**-11**	**-19**	**-19**	**-16**

Source: Varous Census of Agriculture