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The Infrastructure Assesment Process for Development Initiative: A Case of Agriculture Sector of Khyber Pukhtunkhwa, Pakistan

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ABSTRACT

Infrastructure has a vital role in economic development of a country. Agriculture being the vital sector for the economic development of a country requires its infrastructure development enabling it to contribute its role for the purpose. This initiative is particularly important in case of KP (Khyber Pakhtunkhwa), where rural areas constitute more than 70 percent of the total population and depend upon agriculture sector. The present study was therefore carried out to assess the infrastructure of agriculture sector in KP enabling the concerned development specialist to devise development initiative for strengthening the role of agriculture sector in the economy of the KP. The study was qualitative in nature and thirty farmers were interviewed using Merriam's (1998) procedure of general qualitative and characterization procedure wherein themes and categories were identified and recorded. Verbatim remarks of the farmers were indicated through quotations within each theme while pseudonyms were the indicators to denote the farmers. Results of the study revealed specific themes from the farmer's interviews depicting the impacts of infrastructure had on farmer's facilitation and services role. These themes include: (a) problems in farm to market roads, (b) issues in availability of water for irrigation, (c) seed, fertilizers and pesticides provision in villages, (d) availability of vegetables processing and packing facility and (e) government or private advisory service for farmers. Based on the results it is suggested that there are some common areas which require initiative to be taken by the development professionals for comprehensive assessment and development of infrastructure in respective areas of agriculture sector for subsequent enhancement of productivity in agriculture sector complementing its role in economic development.

Key words: *Infrasturture, Development, Agriculture, KPK*

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INTRODUCTION

Infrastructure is the basis of socio-economic development of a country. It comprised of physical form of structures and services form of facilities that helps to run the economy of the country at operational as well as policy level. All

the elements of structure, functions, procedures and systems are interconnected in a way that make a framework supporting developmental process (Fulmer 2009). It helps to determine the status of economy and development of a country within a region and provides bench mark for comparison with other countries in the region particularly and with the world generally. It includes all types of sectors that builds an essential components of an economy such as, transportation, telecommunication, energy, natural and physical resources etc. (AIC, 2009). Infrastructure facilitates production of goods and services, and subsequent distribution to markets. The availability of goods and services are based on its production, and subsequent distribution, which is subsequently, facilitated by the infrastructure hence a prerequisite for the development in a country. Infrastructure may either be hard form of physical networks or soft form of institutions that provides services to the country in the form of social, economic, culture and health etc. to the country as a benchmark of growth and development. Governance, policies, systems, procedures and rules and laws provide the supporting network for proper functioning of these institutions. (Niskanen, 1999). Hence role of both the types of infrastructure is, however, significant and undeniable in the development of a country.

Agriculture Infrastructure

Pakistan's economy is largely based on Agriculture sector. According to Govt. of Pakistan statistics (2014) contribution of Agriculture is 24% of Gross Domestic Products (GDP). It provides employment about 46.6% of the population and earns about 70% foreign exchange (Pakistan Agriculture Overview, 2014). The economic development is therefore entirely depends upon agriculture sector, since industrial sector is largely dependent on it (GOP, 2011). In agriculture; appropriate production, distribution, storage and utilization are the significant interconnected elements of infrastructure that contribute to the agriculture development. Therefore understanding elements of infrastructure related to agriculture is necessary to delineate its role in agriculture development.

Agriculture infrastructure is composed of two types' i.e. physical infrastructure (roads, communication services etc) and social (agriculture information, research, & extension services etc) (Nadeem et al., 2011). The physical or hard infrastructure which is the main source to access to the market for farmers' can be categorized into four broader types, which includes market access ways (roads, telecommunication, transportation & energy),irrigation (water management), whole sale markets & trading centers (sale, storage etc), physical inputs and agro-processing (pre and post harvest storage).

Statement of the Problem

Several studies have examined the effect of infrastructure on agricultural de-

velopment theoretically (Ruttan, 1984; Mellor 1976), while many studies have been done to empirically examine its impact (Barns and Binswanger, 1986; Binswanger et al., 1989; Fan et al., 1999; Narayanamoorthy and Hanjra, 2006). A study carried out by FAO (2008), examined significant value chain of agriculture sector that are based upon some of the component of competitiveness and identified access to physical infrastructure as a major source of competitiveness. One of them was on-farm production infrastructure such as water courses, provision of electricity, farm to market access, and storage facilities. This helps to take competitive advantage of trading and marketing which subsequently helps to establish agro processing infrastructure and provision of packaging facilities. This whole network of infrastructure facilities help farmers with more efficient logistics from farm to subsequent value addition units and finally to end-users. Any deficiency in Infrastructure will result in loss of agricultural production, productivity and depreciated supply chain.

The present study was therefore designed to assess impact on the sector's long-run viability i.e., agriculture infrastructure. A specific orientation was to understand as to what and how infrastructure plays its role in the growth of agriculture sector and to know the availability of present infrastructure to the farmers for the facilitation in their activities. Furthermore, identifying the deficiencies that constraint the development of the sector and to suggest the development practitioners for the development interventions required in the sector.

In Pakistan, scant studies have been found related to this particular issue. Also quantitative evidence in this specialized area of study is also missing specifically examining and assessing the agriculture infrastructure from development perspective. Therefore, it will adds a significant contribution into the understanding of the present agricultural infrastructure and subsequent development interventions for the policy makers to intervene in the development process accordingly.

Objectives of the study:

The specific purpose of this study was to examine the present infrastructure of agriculture in Pakistan specifically in Khyber Pakhtunkhwa. The specific objectives of the study were:

- Study the present status of agricultural infrastructure available in the KP.
- Assess the efficiency of existing agricultural infrastructure.
- Study the process of development planning providing such infrastructure by the government.
- Formulate practicable strategy to provide necessary infrastructure leading to the prosperity of rural population.
- Analyze the future challenges of the agricultural infrastructure to improve growth.

LITERATURE REVIEW

Shane et al. (1998) has identified that during the year 1949 and 1991 about 75 percent of the growth in agricultural productivity was due to the public investment in the field of agricultural research and infrastructure development. Fan et al. (2000) during their study find out that rural poverty can be reduced if additional investments are made in construction of rural roads and also in the field of agricultural research. As per their findings, such types of investment have greater impact on growth, productivity and reduction in poverty as compared to investment in any other field such as, investment in education, water management, conservation of soil and water resources, enhancement of health and rural & community development wherein less impact has been recorded on rural poverty.

In a subsequent study by Fan et al. in 2002, it was found that investment by the government in the areas of rural education, rural infrastructure, water management, and agriculture research, has significantly and positively enhanced agricultural productivity and crop growth, reduced the rural poverty and regional inequality in China. However, they found education as the main source of poverty reduction which has produced high returns in agriculture sector due to high growth and returns in the economy of rural areas.

Mamatzakis (2003) using the data on agriculture in the Greece of years 1960-1995, and developed a agriculture's technology and behavior model employing dual cost function approach. The model revealed that significant returns in agriculture and production growth have been obtained through investment in public infrastructure development. Fan et al. (2004) during his study on Thailand, determined that investments made by the government in the areas of rural infrastructure, irrigation, water management, rural education, health and agriculture research have significantly increased agriculture production, growth and reduced the poverty in rural areas of Thailand.

Total Factor Productivity was determined by Ashok and Balasubramanian (2006) by assessing the Infrastructure effect in India. Through this research the relationship between spending by the govt. in rural infrastructure was established wherein significant Total Factor Productivity was recorded in agriculture sector.

However, in Pakistan, very scant empirical studies were found in the area of spending on rural infrastructure and its subsequent effects on agricultural productivity and rural development. Rosegrant and Evenson (1993) has identified that agriculture development is associated with investment in research, production of high yielding varieties, improved literacy, and better irrigation systems. An evaluation study was conducted by Kiani et al. in 2008 using Almon distributed Lag model, to determine as to whether investments in rural infrastructures have any impact on total factor productivity in Punjab. The study found that spending on

construction of rural roads, provision of agriculture inputs, and establishment of tube wells, research and extension has positively enhanced agriculture production and growth.

Research Methodology

The goal of the study was to conduct in-depth review of existing agricultural infrastructure at Khyber Pakhtunkhwa, Pakistan. Farmer's views were recorded through questionnaires and interviews. For this, qualitative study were adopted from Merriam's (1998) followed by procedure of characterization. In this procedure, themes and categories were identified through repeated reading of records. This procedure enabled the researchers to reality has been unveiled.

Participants and context

To best align with our operationalization the data was collected during the 6th National Kissan's Convention at PARD during April 15-17, 2015. Only those farmers were selected who belongs to Khyber Pakhtunkhwa. This study implemented inclusion criteria for farmers to determine the purposeful sample (Miles & Huberman, 1994). The criteria as adopted were: a) Small Farmers having less than 100 kanals of land. b) Fully involve in cultivation. c) Literate. d) Were of both genders. A total 42 farmers and representatives from agriculture research institutes were participated from Khyber Pakhtunkhwa, of which 30were selected for interview, officers and officials form research institutes dropped from interview, interviewed farmers summarized in Table 1, while the graph 1 shows the interviewed farmers district wise strength.

Table 1. Number of farmers interviewed with their districts and major crops.

District	Number of Farmers	Major Crops
Mansehra	03	Wheat,Pea, Tomato, Potato
Peshawar	09	Wheat, Rice & Sugarcane
Abbottabad	03	Wheat, Maize, Pea &Potato
Shangla	02	Wheat, Maize & Vegetables
Kohat	01	Maize, Rice, Sugarcane & Wheat
Mardan	04	Wheat, Vegetables, Maize &Sugarcane.
Malakand	01	Wheat, Maize& Orange
Charsadda	02	Wheat, Sugarcane &Vegetables.
Chitral	03	Wheat &Barley
Swabi	01	Maize, Vegetables, Wheat &Tobacco.
Dir Lower	01	Wheat, corn & rice.

Graph 1 shows that almost the representation of all the districts is available. However representation from three southern districts Dera Ismael Khan, Bannu and Karak is missing.

The Graph 2 presents breakup of farmers on the basis of age. It depicts that majority of the farmers (67%) related to age group of 31-40 years, while 20% farmers having age between 21-30 years. Only 13% of farmers were above the age of forty years.

As per the data given in Graph-3, farmers were cultivating major crops in their area. Most cultivated crop was found to be Wheat which comprised 33% of cultivation by the farmers in almost all the districts having maximum proportion. It was followed by Maize (21%) and sugarcane (15%) respectively.

The type of land that is either Barani or Nehri cultivated land. The graph-4 shows that about 60% cultivation depends on rain. The canals water is available to only 40%. Most of the farmers also mentioned in the interview that water availability is the major cause of low agricultural product productivity in KP.

Data Collection Methods

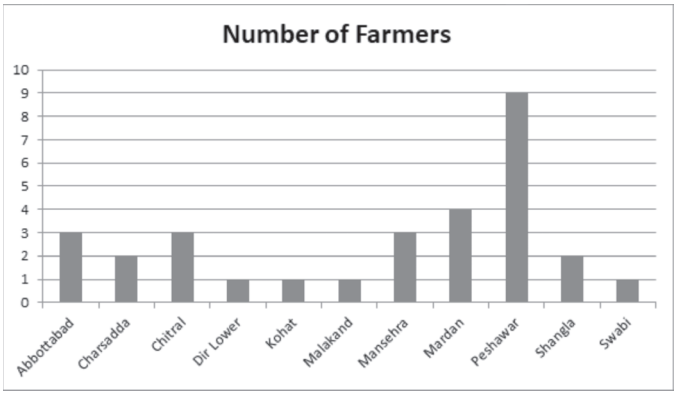
The primary method of data collection for the farmer's perspective was interviews. After the confirmation of each farmer selected for participation in the National Farmer's Convention, out of Sixty (60) confirmed farmer's forty two(42) from Khyber Pakhtunkhwa participated. Thirty (30) farmers were interviewed during the registration process. No group interviews were made, each farmer was interviewed separately for the provision of information about the questions formatted earlier. During interview each farmer was assisted by our staff member to translate questions to farmer and note their response.

Data Analysis

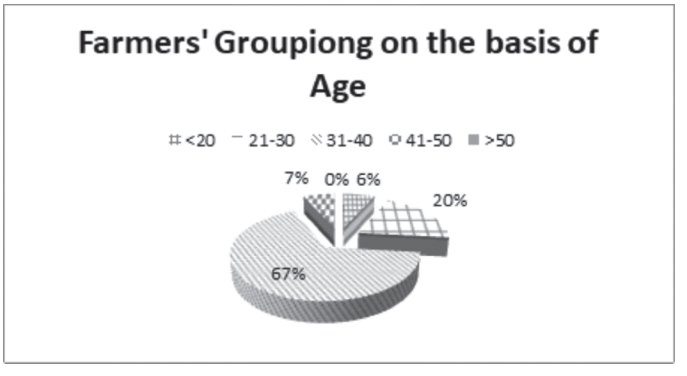
Data analysis was performed by adopting Cresswell (2007) Inductive analysis method to abstract the data. Iterative process of analysis was done using constant comparative method developed by Glaser and Strauss (1967). After revealing the connections, Patterns within the data were developed, and then collapsed into categories, and finally overarching themes evolved. This constant comparison of the data was conducted in three rounds of inductive analysis (Bogdan & Biklen, 2003).

RESULTS & DISCUSSION

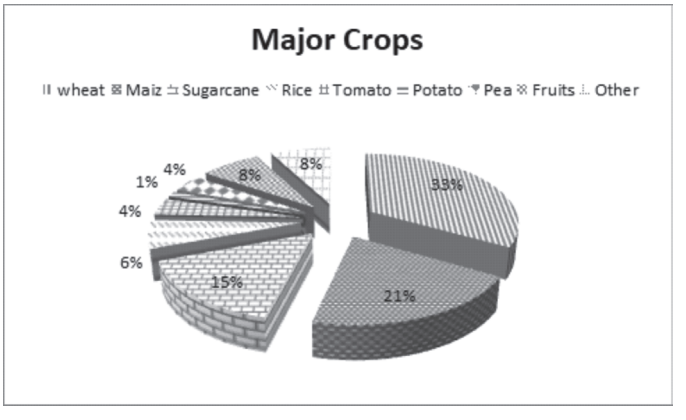
Five specific themes emerged from the farmer's interviews depicting the impacts of infrastructure had on farmer's facilitation and services role. These themes include: (a) problems in farm to market roads, (b) issues in availability of water for



Graph 1. Farmer's Demographics District Wise



Graph 2. Breakup of Farmers on Age basis.

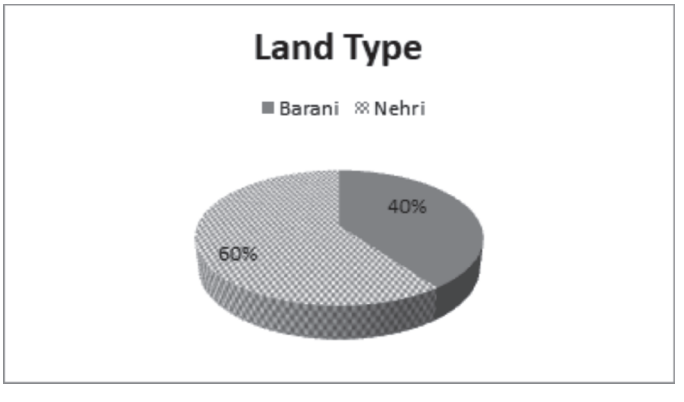


Graph 3. Major Crops sown

Table 2. Issues identified by Farmers

District	Problem Identified by Farmers
Abbottabad	Un-lined water courses Seeds and pesticides non-availability. Processing and packing facility non-availability. Advisory service non-availability
Charsadda	Kacha road from farm to village. Seeds and pesticides non-availability. Processing and packing facility non-availability. Un-lined water courses.
Chitral	Water non-availability Kachy roads from farm to village Un-lined water courses Seeds and pesticides non-availability. Processing and packing facility non-availability. Cool store and Warehouse non-availability. Advisory service non-availability
Dir Lower	Water non-availability Kachy roads from farm to village Un-lined water courses Seeds and pesticides non-availability. Processing and packing facility non-availability. Cool store and Warehouse non-availability. Advisory service non-availability
Kohat	Water non-availability Kachy roads from farm to village Un-lined water courses Seeds and pesticides non-availability. Processing and packing facility non-availability. Advisory service non-availability
Mardan	Seeds and pesticides non-availability. Processing and packing facility non-availability.

Malakand	Water non-availability Kachy roads from farm to village Un-lined water courses Seeds and pesticides non-availability. Processing and packing facility non-availability. Cool store and Warehouse non-availability. Advisory service non-availability
Mansehra	Un-lined water courses Seeds and pesticides non-availability. Processing and packing facility non-availability. Cool store and Warehouse non-availability. Advisory service non-availability
Peshawar	Un-lined water courses Seeds and pesticides non-availability.
Shangla	Un-lined water courses Seeds and pesticides non-availability. Processing and packing facility non-availability. Cool store and Warehouse non-availability. Advisory service non-availability
Swabi	Seeds and pesticides non-availability. Processing and packing facility non-availability. Cool store non-availability.



Graph 4. Type of Land

irrigation, (c) seed, fertilizers and pesticides provision in villages, (d) availability of vegetables processing and packing facility and (e) government or private advisory service for farmers. Quotations used within each theme indicate verbatim remarks by the farmers, and pseudonyms are used to denote the farmers.

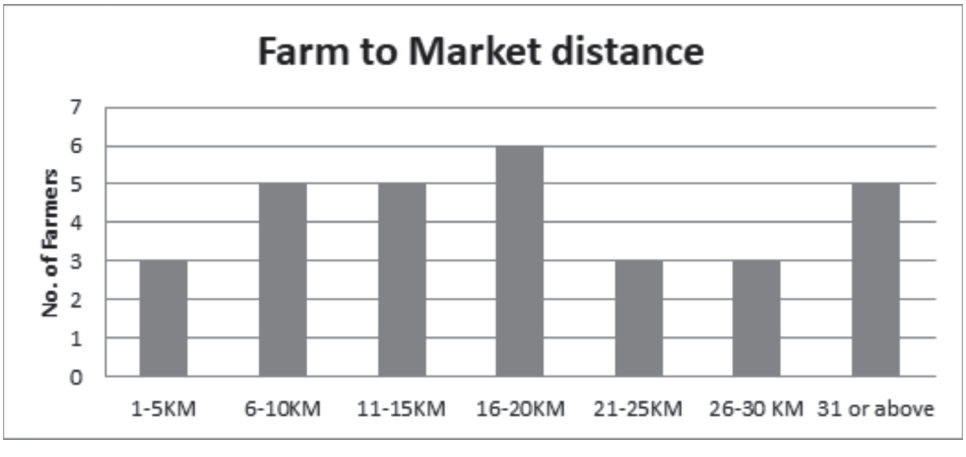
1. Problems in farm to market roads and transportation:

Farm to main grain market transportation is the key problem faced by many farmers. Below graph 5 shows the distance in kilometers from farm area to main grain market. It shows in most of the districts grain market distance from village is about 20km or more. Due to this distance and non-availability of transport, it is very difficult for small farmers to have access to grain markets especially of larger cities, where demand is high and he can earn more for their agricultural products.

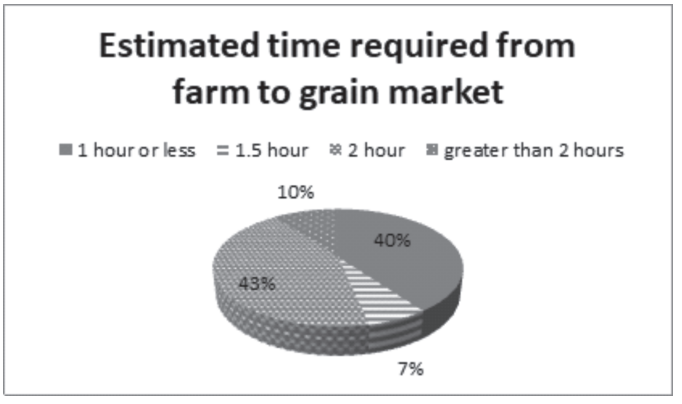
Graph 6 shows the estimated time required by farmer to deliver their agricultural products to grain market. The graph shows 53% mentioned 2 or more hours are required for grain market.

Road is the important component of agricultural infrastructure. Plain and wide roads may help farmers to access grain market in less time. Graph 7 shows that there are still 23% villages did not have proper roads from farm to village. There are 77% farms and villages which are connected with plain/pacca roads. Most of the farmers also mentioned that the existing roads are single and required repair. They further added at most of the places from farm to village roads, these are broken.

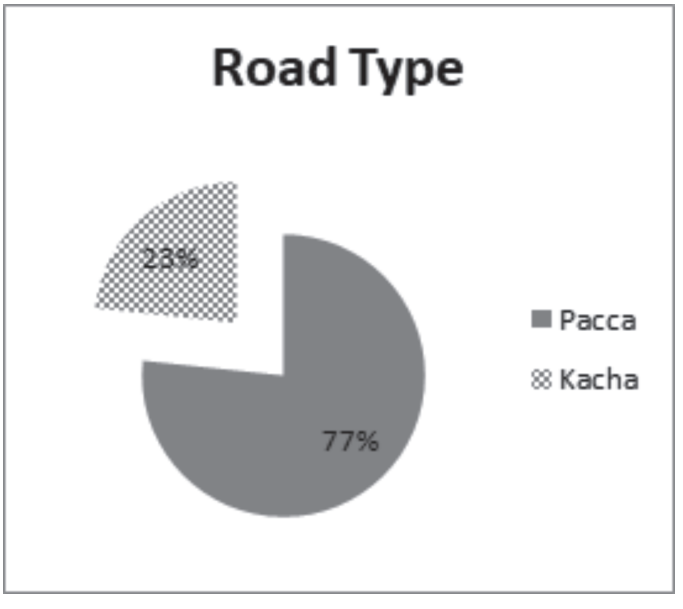
Out of 77% Pacca (cemented) roads as given in graph 7, these roads were divided into three categories i-e Single, Double and Double one way. In most of the areas which have cemented road from farm to village or from farm to main



Graph 5. Farm to market distance in Kilo Meters.



Graph 6. Estimated time required from farm to grain market



Graph 7. Road Type

road, there exist single 15 feet wide roads which connect villages or farms with grain markets. As graph 8 shows that out of 77% cemented roads there are 70% roads which are single and 30% are of double 22 feet wide. The graph also shows that there are no double 44 feet wide roads from village to market or from farm to market in all the twelve districts of KP, from which data has been collected. Single and kachy (non-cemented) roads also creates hurdle in the delivery of agricultural products.

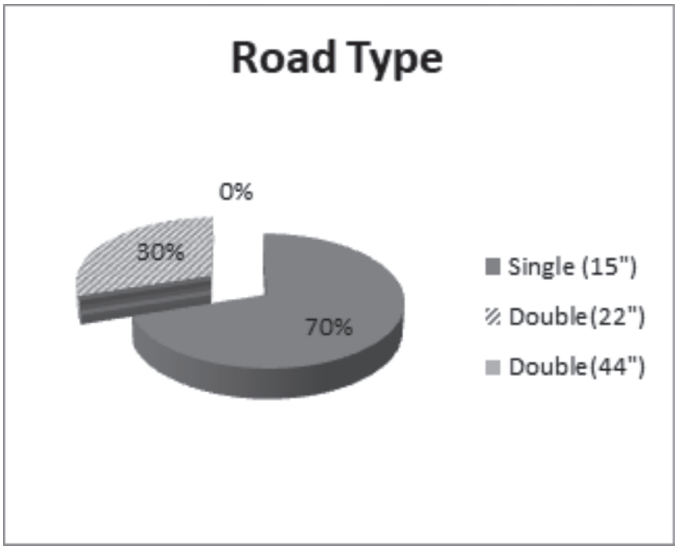
Every farmer was also asked to give opinion on existing road network infrastructure. There are 73% farmers who were not satisfied with existing road infrastructure and suggested improvement for better delivery of products to larger cities. Only 23% shown their satisfaction about the existing road infrastructure, most of them belongs to Peshawar district.

When farmers were asked for suggestions as to how road infrastructure may be improved in order to expedite the transportation of agricultural products. Most of the farmers are not satisfied with the existing road infrastructure. Over all 70% farmers suggested that there should be Pacca and double road from farm to village or from farm to grain market. Single Pacca road may be provided from Farm to village, as they mentioned that at most of the places there are no roads from farm to village or broken single roads. There are places where single or broken roads exist from village to grain market which is the main hurdle in transporting the agricultural products. Due to the transportation ways problem products not reach to the market well on time. Further this transportation delay is the main hurdle in agricultural product exports.

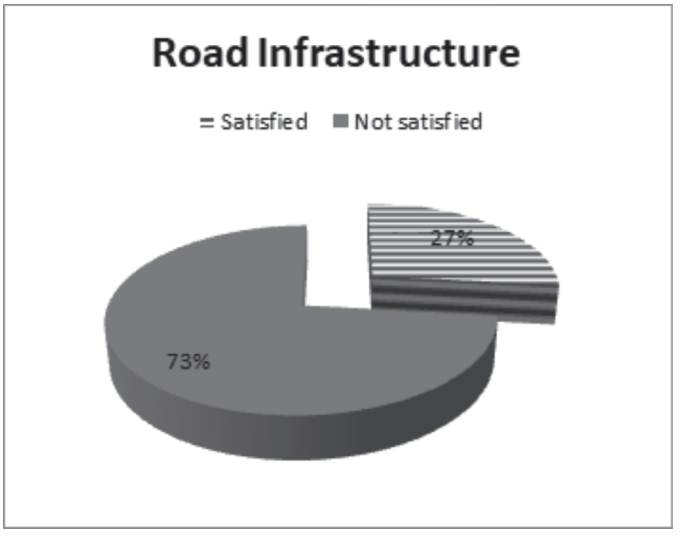
Some farmers are satisfied with existing road infrastructure especially belongs to areas of Peshawar and Mardan only. All other farmers complaints about the road infrastructure and suggest improvement.

2. Issues in availability of water for irrigation

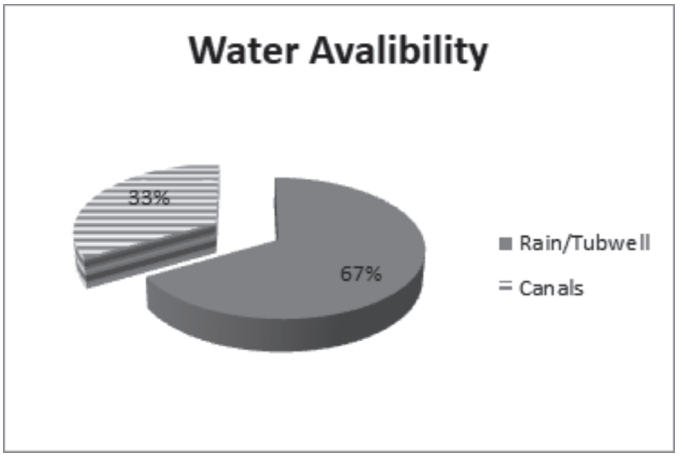
Water is the major component of irrigation and major input for cultivation of agricultural products. Irrigation system is also the component of agricultural infrastructure. Better irrigation system may leads towards the better development of agriculture sector. There are three major sources of water Rain, Tube wells and canals. The graph 10 shows, there are 67% farmers who use tube wells or rain water for irrigation purpose. Only canal water is available to 33% farmers in KP. Tube wells is costly way of taking underground water for irrigation, which not only increase the cultivation cost but also put extra burden on national economy with reference to fuel or electricity.



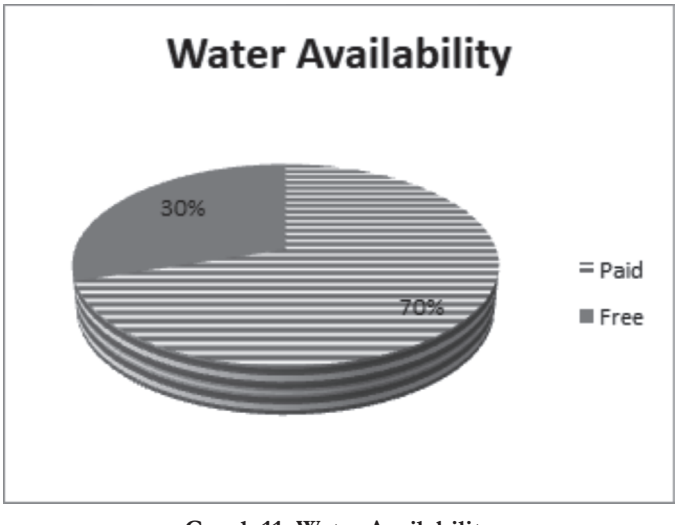
Graph 8. Road Type



Graph 9. Road Infrastructure



Graph 10. Water Availability



Graph 11. Water Availability

Creation of natural water reservoirs for the supply of water for irrigation can reduce the cost and saves foreign exchange reserves, spent on importing extra fuel for agriculture sector. The 33% farmers using canal water did not have proper canal system. Most of them, like in Abbottabad, Mansehra, Dir and Chitral districts make their own arrangement in taking water for irrigation from small rivers or wells. The improved and proper canal system is the need of the day and it improves agricultural sector productivity. Furthermore building new small dams in hilly areas not only resolve their water shortage problem for irrigation but it also reduces the drinking water issue also.

Graph 11 shows that there are 70% farmers who pay for irrigation water, while 30% farmers using free water. These 30% are those who mostly use rain water.

When farmers were asked either existing water courses are according to their irrigation requirements. The 100% farmers showed their concern on it and suggested improvement in existing water courses infrastructure. Graph 12 shows that none of the farmer showed his satisfaction on existing water courses structure.

Graph 13 shows the data about the water courses. It shows that 100% farmers mentioned that the water courses in their area are un-lined.

Every farmer was also asked about their satisfaction from existing irrigation system. There are 97% farmers who are not satisfied with existing irrigation system due to non-availability of canal water as shown in graph 14.

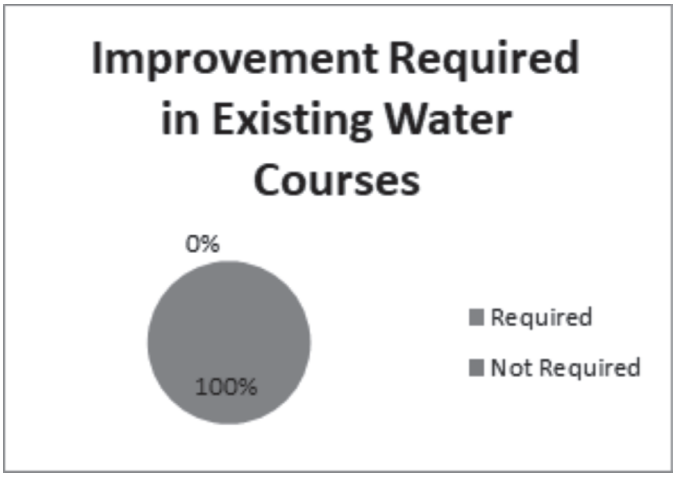
3. Seed, fertilizers and pesticides provision in villages.

Three major inputs of agriculture are Seeds, Pesticides and Fertilizers. Availability of these products in timely manner improves productivity of this sector.

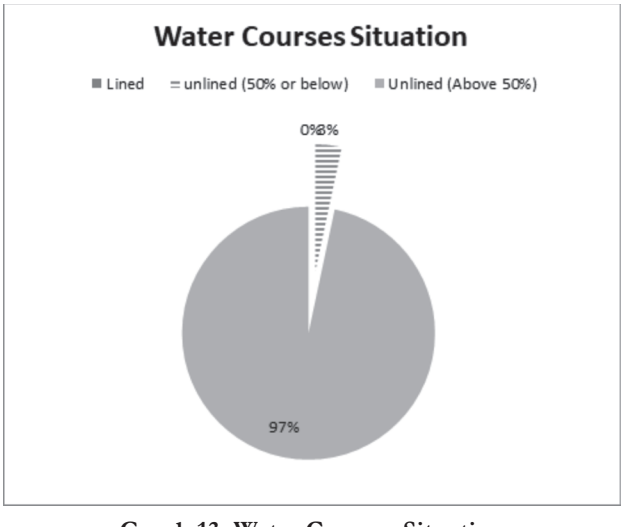
Graph 15 shows the data about the availability of these products in the village or in nearby area with in two kilo meter radius. The data shows that 83% farmers showed their concern about the non-availability of these products in their villages or nearby. There are only 17% farmers, to whom these products are available in village or near village.

The availability of quality seeds, pesticides and fertilizers is necessary. These products are major agriculture inputs and have direct impact on production. It is further added that all the farmers mentioned that there is no government organization or NGO or any institute in their area for the provision of quality inputs especially seeds. The government and NGO's may facilitate the farmers in provision of quality agriculture inputs which improves this sector productivity. The agriculture extension offices are not available in most of the rural areas, where available not so much active to facilitate farmers.

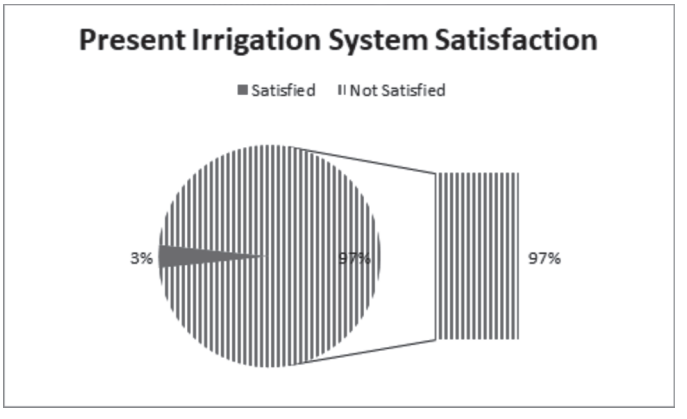
The graph 16 shows the equipment, 83% farmers did not have their tractor or allied equipment's. They take these items on rent. The results showed that



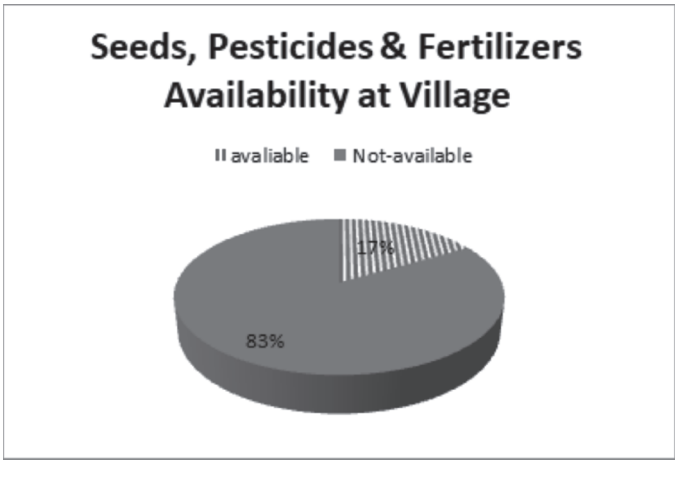
Graph 12. Improvement Required in Existing Water Courses



Graph 13. Water Courses Situation



Graph 14. Present Irrigation System Satisfaction



Graph 15. Seeds, Pesticides & Fertilizers Availability at Village

availability of tractor being the most primary equipment for the farmer cannot be purchased by the farmers. Therefore the farmers have to compel and rely on rent services.

4. Availability of vegetables processing and packing facility.

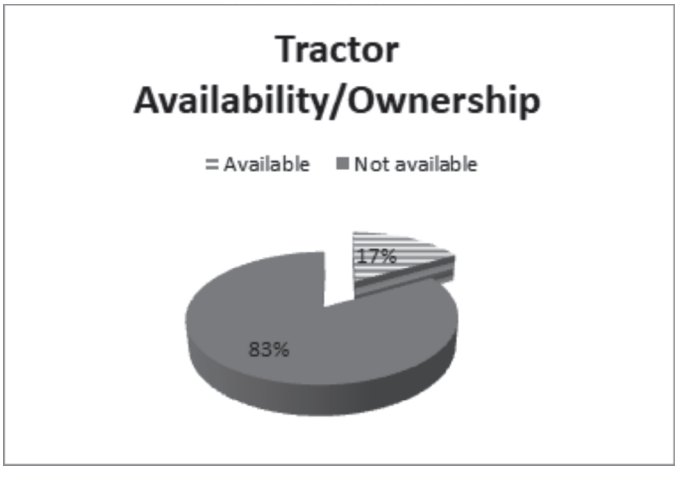
Agricultural products processing, polishing and packaging facility not only preserve the products but these things are necessary or perquisites for their exports.

The results show that all the farmers (100%) confirmed the non-availability of the packaging and polishing facilities at their villages. Thus it may be judged that these facilities are not available for the farmers.

Warehouse, storage and cool store are the facilities that help farmers to preserve their produce from decay before it is transported and marketed so that the farmers may not face the loss. However, the results of the questionnaire from the farmers showed that these facilities are not available at all (100%) in the villages. Thus the farmers are completely deprived of from these facilities and therefore they face the problem of loss of their produce.

5. Government or private advisory service for farmers

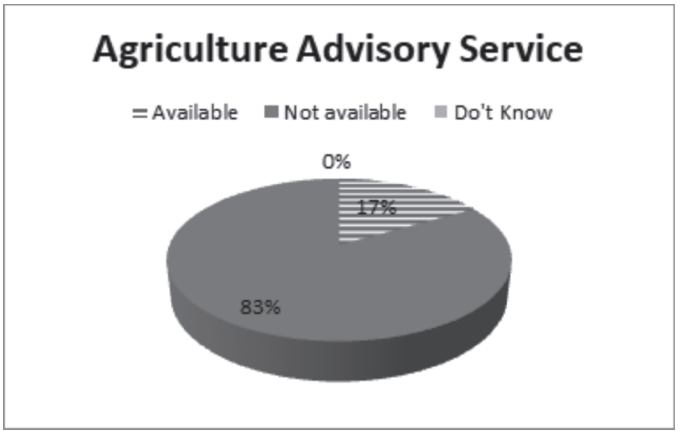
Most of the farmers (83%) mentioned that none of the staff members from agriculture extension department or from research institutes visits them for advisory purpose. However, 17% of farmers said that they get advisory service from these organizations. These farmers are from district Peshawar, Charsadda, Mardan and Swabi.



Graph 16. Tractor Availability/Ownership

Graph 17. Processing and packing Facility

Graph 18. Warehouse, Store & Cool Store Availability



Graph 19. Agriculture Advisory Services

CONCLUSION AND RECOMMENDATIONS

The results obtained above revealed that the rural areas particularly in Khyber Pakhtunkhwa and generally in Pakistan, lack basic and necessary Agriculture Infrastructure. The role of agriculture sector in the development of economy and in enhancing the income of the poor farmers is particularly significant. However, agriculture sector can only be developed if proper and appropriate infrastructure in all spheres of the agriculture sector is provided. Only this will help to achieve higher production of agriculture crops and enhance the incomes of the poor farmers in the country. There are some common areas which require improvement to improve the productivity of agriculture sector. Some major areas that need focus are construction and lining of water courses, small dams, farm to market roads warehouses, processing and packing facilities and provision of appropriate farm machinery. The development practitioners would need to integrate all the developmental initiatives in a way which ensures sustainable agriculture development of Pakistan.

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