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## **Agricultural Development: Meanings, Modes and Models**

### **(A Feasible Model for Sindh-Pakistan)**

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#### **Abstract:**

*The main objective of the study is to discuss various paths of agricultural development in details and also revisit Sindh agriculture sector to compare it in the light of empirical evidences of the field and also recommended Agricultural-Development Model for Sindh southern province of Pakistan.*

*The study finds that theoretical model of agricultural development is in sharp contrast with empirical situation of Sindh agricultural sector and requires immediate attention of policy makers for implementation of suggested remedies mostly provided in Sindh Agricultural-development Model by the authors.*

*This study recommended implementation of land reforms, water sector improvement, facilitating the forward and backward linkages between traditional agricultural sector and modern industrial sectors in the province with storage facilities; agro based industries at farm level and improved taxation system by computerized assessment and collection according to basic laws of taxation for the further development of Sindh's agriculture.*

**Keywords:** *Agricultural Development; Economy, Growth, Modes, Models*

## 1. Introduction

The Sindh province of Pakistan (lower Indus valley) has remained the epicenter of the sub-continent in producing agricultural commodities over the last six thousand years. "The people of Sindh have been among the sedimentary farmers of the world, and have also been outstanding in the field of agricultural and industry. The historical evidence lends credence to the very fact that textile and other agricultural commodities of Sindh were exported across the world in particular Middle East. ". Ghulam Rasool Chaudhry & Nazeer Hussain (1988, pp1.10). But now a day situation is in sharp contrast with the past glory of Sindh. The unequal land distribution, mismanaged water resources, poor infrastructure and marketing facilities, mismanagement in development schemes, low farmer literacy, poor healthcare facilities at villages hamper grower's performance, keeping them out of market and reducing the opportunities of capital accumulation, the time barred revenue collection system and incident of tax on small illiterate growers inflicts heavy losses on the growers/government affects reinvestment process which is complementary to accelerate development process , so that it is very necessary to revisits Sindh agriculture theoretically and empirically and to sort-out its major obstacles and provide policy guidelines for further development of the sector. The topic of agricultural development has been studied in Pakistan by various authors but the earlier studies mostly focused national level and also dealt with a specific issue and their work is said to be decades old. We come across in Sindh province some simple reports on agriculture of Sindh without proper recommendations for further development of the sector but this vast subject urgently needs feasible policy document for further development. This study underscores the importance for sustainable agricultural planning and development in Pakistan in view of rapid increase in population and food inflation. The earlier studies have mainly used similar type of variables with descriptive statistical analysis but there is an urgent need to determine the process of agricultural sector development by applying theoretical and empirical model to examine the development process on scientific methods to test performance of the proposed variables in its empirical review. The study discussed in detail on different meanings, modes of production and also different models of agricultural development to test the hypothesis in relation to earlier studies. Study explains that how we can increase in agricultural out put, role of investment including public and private investment and total agricultural export and to discover new facts to make the document a unique piece. The estimation and re-visit of agric-development process would be helpful to devise a most significant policy document for the

implementation to remove the current obstacles and also suggests new development model to face changing future economic trends in the sector i.e. Free trade / globalizations. The study of “Agricultural Development Meanings, Modes and Models” is of considerable importance for devising a suitable policy for the agricultural sector of Sindh-Pakistan where agriculture is a dominant sector of national economy with great potential of natural resources despite the fact the country of late is faced with ever rising food import bill to the tune of near 3 billion dollars recently. The food inflation at present stands at double digit (10-20) highest among all Asian countries and over 50 % poverty among agricultural and rural communities which mostly depend on agro- based economic activities.

## **2.Methodology And Data**

The descriptive analysis method has been used in the study including findings of specific group of the growers conducted in different cropping zones of the region. The insights from my Ph.D thesis “Major Obstacles in Agriculture Development of Sindh and their Remedies” are also widely included in the study. Authors are practically associated with cultivation in central and upper cropping zone of Sindh, so that their personal observations strengthen the hypothesis.

## **3.Agricultural Development**

The agricultural sector development is defined by eminent economists in books of development literature as; what happens over time change, evolution, growth it may be an improvement or not. The main emphasis will remain on what happens to the country’s economy and to the entire agricultural sector given to overall economic development, i.e. higher income, more production and increase in consumption with improved living conditions of the whole population and bring about a number of other positive changes in society and economy. The economic and agricultural development addresses the following important basic questions when will we usually be descriptive, asking; what happens over time? Is there accumulation of ‘capital’ like houses, roads, machines; human capital like education, health; institutional capital? Are people and countries getting richer? What differs across countries between rich & poor? And sometimes we will be prescriptive, asking what should be done for the material welfare of the people? What they want in their daily business? In answer, all of the above questions are based on accumulation of capital that makes it more abundant and cheaper. This is more

important that accumulation does not happen automatically and speedily; it requires, money saving, time and energy. To build up capital, people must save and invest from one year to the next and in this process. Development also involves innovation, which economists call “technical change” means new physical things as seeds, chemicals, etc, new ideas for crop rotations; new institutions or futures markets for output. Innovation makes it possible to produce more of what people want, from the resources they have. But innovation does not happen automatically. To innovate, people must be able to change what they do. The concept needs to be discussed in detail with reference to various concepts of agricultural development in historical and modern context for a thorough understanding. Eminent Agricultural Economist, [John W. Mellor’s, 1966, pp. 10-44] analysis provides a base for agriculture sector development during green revolution period. According to him, there are three phases of agriculture development. (1) Technologically stagnant because of the non-availability of modern inputs. (2) Technologically dynamic with low capital technology. (3) Technologically dynamic, dynamic high capital farming so the last approach is identified with an increase in the role of high capital farming in agriculture. His emphasis is on action rather than discussion on historical development process. His hypothesis mostly depends on green revolution. The role of state is important as distributors of new inputs, finance and marketing facilities with technology change. He ignores the fact that the mechanisms of institutional changes are different and subject to economic as well as political constraint. The process of modernization and increasing productivity through technological change including physical factors of production and institutional input provision through policy measures are important.

The Lenin V.I (1964) work, the development of Capitalism in Russia can be considered as historically specific and based on empirical grounds. The main feature of his approach is the format of capitalism in the economy. Agriculture itself becomes an industry and the same process of exchange through market modernization and commoditization takes place in agriculture but it spreads slowly. He also concludes three important aspects for the formation of home markets for capitalism without the help of other foreign markets for its production; disintegration of the peasantry; transformation of the agrarian economy to capitalist production; commercialization in agriculture. He argues in the capitalist system of production in agriculture peasantry was in the process of dissolution and in its place new type of inhabitants were emerging. This was accompanied by a

polarization of peasantry and the creation of rich farmers and independent, and also owners of industrial establishment.

The process of disintegration expands the home market and purchase and sales begin there, when this process begins the strong bourgeoisie the means of production and the weaker section i.e. proletarians purchase articles of subsistence living, there by stimulating the growth of industries. In this process, he observed some retarding factors such as migration of middle class peasantry to towns, the use of money lending and borrowing the payment to labour in kind. He explains in his second aspects that the previous system of land cultivation (Share Cropping) declines because of the polarization of peasantry on which the middle class of farmers having some tools and implements disappear and are replaced by rich peasants. The third aspect of development or change according to Lenin is the growing commercialization of agriculture. He argued that agriculture pattern is different from industry, farmers specialize in one major crop which spreads on the farmers around, thus commercial agriculture creates demands for the products of industry and also intensifies capitalist contradiction in agriculture and it accelerates the process of change.

Banaji (1976, pp.2-49) conclude that Karl Kautsky discovered the mechanism underlying agricultural transformation, based upon the experience of Western Europe. He provides a detailed analysis of process of agrarian change and concludes the laws of agricultural development under capitalism in agriculture. According to him, developed capitalism in industry affects agriculture and means of communication reduces the distance in rural areas to towns, rent farm changed into cash payments instead of barter. The increased role of money and dependence of peasant on markets increase and creates middleman then comes usurer and merchant capital and land becomes private commodity including change in mode of production. He further explains a long process of agriculture development when he says that the use of machinery, tools and equipment put agriculture on new basis in 19<sup>th</sup> century. New cropping patterns and individual ownership of land and commodity production introduce capitalism in agriculture and capital accumulation process begins. Introduction of capital creates two kinds of farmers, large scale farmers engaged in production for markets and small farmers are technologically backward and use family labour engaged in production for home consumption, he also pays attention to the co-existence and mutual relations between big and small farmers.

### *3.1.Agricultural Development Modern Views*

The agriculture economists of present era are agreed on three stages of agricultural development. (1)Traditional farming in backward regions, (2) Mixed farming in developing economies, and (3)Modern commercial farming of developed world that has now been recognized as ‘agriculture development’ on the basis of the past experiences in the sector and empirical analysis of the developed farming particularly a lesson learned from developed nations. A renowned Pakistani economist, Abdul Hamid Shahid [2003, pp.143-170] discusses the above three stages in detail in his famous book ‘Economic Development’.

#### 3.1.1. The subsistence / Traditional farming:

This is a most primitive type of farming which is characterized by low productivity and the produced output is just for the sake of subsistence. It is also called old and traditional type of agriculture in which most of the output is produced for family consumption and the agricultural production mostly consists of a few staple food crops like wheat, barely, sorghum, rice and corn etc. It entirely depends on traditional methods and tools in cultivation.

Land and labour are the only factors of production, the capital investment is minimal and organization depends on myth not actual reality. The law of diminishing return applies as more labour is employed. The farmers face inadequacy of credit for appropriation of their land and appearance of the money lenders to collect outstanding loans. The agriculture labour is employed during planting and harvesting seasons while they remain unemployed. The peasants cultivate only that much of land which they could manage without hired labor. The agriculture environment is mostly tough, harsh and static in nature. The technological limitations, rigid social institutions, fragmented markets and reduced communication net-work between rural areas and urban centers often inhibit the higher level of production. The cash income of peasants mostly comes from non-farm wage labour as the salaries and wages earned by the offspring of peasants working in urban centers or nearby industries. The farmers are haunted by uncertainties, thus because of rigid behavior, poverty and illiteracy. They also resist or avoid the use of new techniques, new seeds and new machinery on farms because of cultural forces. The farmers hardly aim at maximizing their profits; they are just desirous of saving their families from starvation. They are worried of rains, afraid of drought and famine and

other uncertainties. These uncertainties affect inventions and innovations; so they tend to be reluctant to surrender those techniques which they inherited from their forefathers.

### 3.1.2. Mixed or Diversified Farming

This second stage of farming is defined as a situation in agriculture sector where the farmers not only produce output just for the sake of their subsistence but some surplus for sale in the market to earn money for accumulation of capital or consumption expenditure. It is a transformation processes from traditional agriculture towards commercial farming. The system could assume the shape of commercial farming just in a shock. Thus the mixed farming is a first step to commercialized farming from subsistence farming. In such stage of agriculture development, the cash crops like vegetables, tea, coffee, cotton and fruits are produced rather than staple foods of traditional or substance farming. In addition to these, the dairy and livestock are also developed.

The labor that remains unemployed during the major part of the year ago on getting employed in this stage that situation creates the demand of farm labour particularly at the time of harvesting and sowing. This process leads to increase their wages in all respects. In this stage of farming, the tractors, threshers, chemical fertilizers and several other tools are needed as substitute. The basic aim is more production of foods but the stress is also laid on producing more of cash crops to earn 'Surplus'. With such kind of surplus, the farmer can uplift/improve the standard of living of his family members. When mixed or diversified farming starts, the farmers some how are prepared to take risks. But all this depends on the abilities and competence of the farmers as well as on the social, commercial and institutional set-up where the farmers reside. If the farmers are in a position to gather complementary inputs and they are convinced that the agriculture improvement will benefit them and their families will welcome the new changes.

The agriculture history lends credence to this very fact that if the farmers have surety of the their profits, they are well prepared to move from subsistence farming or stage one to mixed farming or stage two. After that better use of seeds, fertilizers, and simple irrigation devices enhanced the production of staple food crops and also lead to free the land which would now be available for cash crops due to positive changes. Now the farm surplus can also be used to make investment in the farm sector. In this stage, farming will also lead to minimize the impact of staple crop failure, and provide a security of income to poor farmers which were not available earlier in traditional farming. In



conclusion, the transition from subsistence / traditional farming to diversified farming depends upon access to credit, fertilizers, water, crop information, and marketing facilities and provision of extensive services by the state.

### 3.1.3. Agricultural Development / Modern Commercial Farming

The modern developed farming is the last stage in the process of agricultural sector development. "It is the most prevalent type of farming in advanced industrial nations and comes into being along with the development of other sectors of the economy like the biological and mechanical changes, improvement in living standard of the people and extension in domestic and foreign markets. The basic motive of growers is to earn more profit which plays an important role, rather than the personal needs of foods for their families. These specialized farms differ in their size and operation and highly aim at maximizing their outputs per acres with using the scientific inventions, harvesters, modern fertilizers, cropping techniques and others available modern inputs. The growers also keep in view the costs, fixed as well as variable, the revenues, the support prices and investment in lands while determining the prices of agriculture produce according the emerging marketing trends in the economy" [Abdul Hamid Shahid 2003,pp.152].

Further more in this third stage, production functions are prepared; the predictions regarding inputs and outputs markets are made with projections regarding outputs prices. The growers rely on economies of scale, and agricultural technology applied on such farms is of capital-intensive or labor-saving nature. The use of modern agricultural machinery, superior chemicals and hybrid seeds is increased so it expands industrial sector.

The modern farms are also organized as efficient industrial firm, so that the sophisticated labor saving techniques are followed and furnished with air spray, combine harvesters, bulldozers, huge tractors and tube wells and several other mechanical tools and implements where a single family becomes capable enough to cultivate large tracts of land. The case of America, Canada, Australia, Japan and several other developed countries is an example in this regard. Some of modern farms are also owned or controlled by large agriculture business multi-national corporate enterprises. When crop is produced and cultivated by big firms, the economies of scale will be accrued and the goods would become available to domestic and foreign consumers at lower prices and also helpful during world supply shocks, shortages, famines, natural disasters and war like situations. The employment opportunities will also increase and will boost the



national outputs. These firms mostly hire highly efficient and experienced farm managers; therefore, the 'developed agriculture' also creates human capital and widely impacts on human resources development.

#### **4. Agriculture Development And Modes Of Production**

The main object of the discussion on the issue of mode of production in agriculture sector is to identify the right mode of production for agricultural development in the historical context with its pivotal importance in the transformation process in the light of review literature on the topic captioned above within a political economy framework with specific reference to Sindh / Pakistan and other regions of the sub continent. It will also provide ample evidence of transition/ journey of agriculture from feudalism to capitalism. The concept of the mode of production is defined as "a complex structure which is organized by specific combinations of social relations and forces of production which are internally articulated, and this structure is reducible simply to the forms of direct exploitation. In the broadest sense, this concept refers to the totality of relations that include social relations of production, distribution and exchange."(J. Harris 1982b, pp, 259).

MS Kamdar (1996 pp, 30- 32) defines that in order to produce a commodity, certain elements have to combine without which production is not possible. The elements include the worker, his means of production such as land, tools, etc and the object in which the workers work. These elements are supposed to work in tandem if production is to take place. He said that the concept of the mode of production in its broadest form refers to the totality of the relations with social relation of production, distribution, and exchange. The concept of the mode of production is a concept of structure, which defines the structure of social relations of production.

Alvi Hamza (1981, pp475) G.McLennan, (1986 pp.89) used the concept mode of production and social formation quite interchangeably. According to Hindess and Hirst (1975, p.9), the mode of production is, "an articulated combination of relations and forces of production." Other scholars are critic of the concept and avoid to use the same and also put million dollar question about mode of production concept adequacy and acceptably.

Munshi S. (1991) Rudra A. (1975) and Cohen G.A. (1978) is its critic and suggests avoiding using the concept. They emphasize much on class relations and on economic structure rather than the mode of production but Byres T.J. (1985) is in favour of the

concepts. Marx argues about the mode of production and concludes that “In all forms of society there is one specific kind of production which predominates over the rest, whose relation thus assigns rank and influence to others.”(K.Marx, 1973, pp.106-107) The concept of the mode of production has been much debated in Marx literature on the economics of agriculture. This literature has identified two major kinds of mode of production, Pre-Capitalist mode of production and Capitalist mode of production. As we have discussed various definitions of mode of production, we emphasize on the details of two kinds of mode of production, pre-capitalist and capitalist mode of production and their categories in detail.

#### *4.1.Pre-Capitalist mode of Production*

Pre-Capitalist mode of production is generally considered here as a feudal mode of production which means traditional and old mode of production in agriculture sector. (M.S. Kamdar 1996) argues that this mode of production is generally categorized further as: (a) The feudal (b)The Semi feudal (c)The Asiatic.

##### 4.1.1.The Feudal Mode of Production

Dobb’s (1946, pp.35) defines the concept of feudal mode of production as “Virtually identical with what we usually mean by serfdom an obligation laid on the produce or by force and independently of his own volition to fulfill certain economic demands of an overlord, whether, their demands take the form of services to be performed or of dues to be paid money or kind”. The feudal mode of production is a dominant mode of production in less developed countries. Presently, it can be considered as an obstacle to agriculture and also economic development. According to M.S Kamdar, this mode of production began in Asia during 3<sup>rd</sup> century and in India or sub-continent in the 5<sup>th</sup> century. Some basic elements of feudal mode of production are as follows;

- Simple and low cost tools used in the cultivation of land.
- Production for self consumption
- Compulsory labor service with the cultivation of land.
- Political and decentralization of power.
- Availability of land for cultivation subject to some kind of service tenure.
- Lords enjoy some judicial powers.

Hamza Alivi (1981pp 475-486) also identifies the following structural properties of the feudal mode of production, extra economic measures in the extraction of the surplus, a

fusion of economic and political power at the point of production and a localized structure of power, self-sufficient nature of production, and simple reproduction of commodities.

#### 4.1.2. Semi Feudal mode of production

Bhaduri A. (1974 pp, 120-37) first developed this mode of production. He used a village data from the Indian state of Bengal for supporting his hypothesis. The key features of his model are as follows.

- Share cropping without any written agreement
- Perpetual indebtedness of small tenant cultivators.
- More than one role of landlord, such as a moneylender trader and also provider of rental land to the same cultivators, hence exploitation of the highest orders.
- Small and tenant farmers' lack of access to the market.

#### 4.1.3. The Asiatic mode of production

The concept of Asiatic mode of production was first discussed by Karl Marx; this concept of Marx is similar to his "Primitive Communism" approach this means early communism in old communities. The concept of Asiatic mode of production was debated much in development literature. Maurice G. (1978) has worked on Asiatic mode of production in detail and tries to find the answers to questions about existence of a class less society in this system. S. Munshi (1991, pp.175-196) had given critical appreciation and evolution of the work of G. Maurice in detail. The Asiatic mode of production was the prevalent in communities in which the ownership rights of the lands were vested with the community, and the cultivation was organized on kinship relations. The whole system was based on the absence of land as private property. Primitive tools and a low level of development was the feature of this mode of production, which demands that all members of the community participate in the production of material values. The production was organized by the family labour for self-consumption. Production relations were represented by people working together, and for each other. All member of the community produced material value and gave to society each according to ability. The society under the Asiatic mode of production was a classless society. The land and its riches were the basic means of production. State ownership was limited and combined

with common ownership. A surplus was appropriated by the king, farm produce rose by the communities. The king's share of surplus varied at different periods of time.

Bailey A.M. (1981), Tokei F. and Taylor J.G. (1979) argue that the unity of agriculture and manufacturing in the self-sufficient village economy is the main factor in the survival of communal property in the Asiatic mode of production. The common ownership of the means of production determines the absence of any social and property inequality or division of society into various social groups. In Sindh province, this production mode had dominated during the period of Rajas and Maharajas before the Arab rule.

#### *4.2. Capitalist Mode of Production and Agriculture Development*

Alvi Hamza (1981pp, 475-486) also adds a new colonial mode of production. The colonial mode of production in the sense of British India according to him the Indian social structure and formation during British times can be understood in terms of the colonial mode of production which is a structure within a structure. He argues further that colonial rule brought changes, dissolved feudal structure and introduced capitalist mode of production. M.S. Kamdar (1996 pp, 31) defines the concept of capitalist mode of production in an economic and social organization system of production and distribution in which mostly the means of production, such as land in the case of agriculture, are privately owned and operated for profit under a competitive system which operates through a market mechanism. Another more important element for capitalist mode of production is wage labour but free from feudal obligations (to work or serve extra for the land Lord) is the necessary condition for the capitalist mode of production. Accumulation and reinvestment are also the basic elements of the capitalist mode of production. The commercialization of agriculture and dependence on market than labour process is a very important condition in this mode. The capitalist mode of production can be now considered as an important element for the development of agriculture instead of feudal mode of production that has been considered as an obstacle to agricultural development process on the basis of past experiences. It is concluded that 'The capitalist mode of production' has dominated in developed countries and feudal mode of production is still in vogue in less developed countries.

Harris J. (1982b) professor of agricultural economics at London school of economics suggests three main paths for agricultural development where by feudal agrarian societies may be transformed into capitalist agrarian societies and their farming becomes

productive. There is also an appreciable agricultural output which increases incomes and hence an egalitarian income distribution. According to him, the first path of agricultural development is a large scale capitalist farming. This means a breakdown of feudal structure of landholding. Large-scale farming does not mean land concentration in a few hands, but inductions of capital mode in place of feudal / share cropping land tenure system or right arrangement. The second path of transition is that of collectivization or state farming, which is viewed by Marx as a socialist equivalent of capitalist agriculture. The above path is famous as Russian and Chinese models for agricultural development. In these systems, labour / salaried workers have been recommended in lieu of share croppers. The third path is famous as Japan, South Korea and Taiwan models. These are same as first two models capitalist farming but there is a little difference among these that the size of the landholding would be small and would make use of capital intensive techniques of production.

Byres T. J. (1991pp, 1-18) also identifies six important paths of agricultural development in the entire world and interestingly five paths are capitalist mode of production; only the Prussian path could not be successful as capitalist path. At present, the above five capitalist paths have been converted into theories of agricultural development. These are given below.

I- The English path

II-The Prussian path

III-The American path

IV-The French path

V-Japanese path

VI-The Taiwan path

There is some ample evidence that in capitalist mode of production rate of returns are high in agriculture sector; it leads to commercialization and competition in the sector instead of feudal mode. It has been considered as an important agent of change in agricultural transformation. It indicates great significance of capital mode of production to be implemented in agriculture sector of developing and less developed countries to achieve the goal of agriculture development for their future development including increase in GDP and overcoming the ever increasing food crisis.

### **5.Agricultural Development Models**

Agricultural development models offer various strategies for further development of this primary but key sector of the economy. Therefore, we analyze three important models here to understand the concept of agricultural development

- The Frontier Model

- The Conservation Agricultural Model
- A Science–Based Agricultural Model

The Frontier Model for Agricultural Development: The frontier model presents a main development strategy through historical experience. This a simple model that suggests that the increased agricultural production totally depends on opening up and use of new and fertile tracts of land with little change in the existing technologies of the day. It further suggests that the increasing population pressure on the present agricultural lands stresses the need for more land is brought into cultivation around the village or part of the population move to virgin lands. .

#### *5.1.Conservation Model for Agricultural Development*

The conservational model for agricultural development is an experience of European intensification of crop and livestock with land resources virtually fixed. Another important element of this model is that increasing soil fertility through the use of green manure, crops and animal manure increase the agricultural out put per unit of land. It also facilitated by better use of water resources and labour, the use of animal power and the use of equipment. Most of above inputs were produced within agricultural sector and individual farm by itself. The frontier and conservation models are the oldest models and both can be considered as classical and natural resources based on agricultural development models. And these could increase only one percent rate of growth; so minimal attention has been given to above two models in the development of the sector.

#### *5.2.A Science-Based Agricultural Development Model*

A Science based agricultural development model was followed by all developed countries and is now being followed by most developing countries. The concept of science based agricultural development models were drawn from various famous models of development like The Urban impact model; The Diffusion Model; The high pay off model; Induced innovation mode.

A science based agricultural development model can be considered here as a new, important and multi dimensional model for today's crisis in agriculture sector of developing world. Joseph. Gabriel Nagy [1984, pp.2.6] suggests this model for Pakistan in his PhD thesis submitted in the University of Minnesota. This model focuses on three main areas: First the uses of high pay off inputs; the development of efficient

technologies consistent with countries' resource endowment; and Institutional Development that facilitates the above two. The use of high-pay off inputs is classified further in three categories; this concept was drawn by Rutton from Model of Schultz (1964).

The capacity of public and private research institutions to produce new technical knowledge, the capacity of the industry sector to develop, produce and market new technical inputs, the capacity of farmers to acquire new knowledge and to use new inputs effectively. Second has been defined as the development of efficient technologies consistent with country's resource endowment. It means that technologies be developed with a country's particular resource price ratio in mind. Cheap labour of developing countries is relative to other inputs; the agricultural education, research and extension system must produce technologies to exploit the use of this relatively cheaper input. Attention resource price ratio will also ensure that an appropriate path to technological development is followed that will permit an optimum agricultural output response. Third Institutional development in the science based agricultural model suggested by (Nagy 1984) encompasses the development of those institutions that directly influence agricultural output and productivity. These are all input institutions along with agricultural education, research and extension component and product market institutions. Most of the inputs required by this model come from non agricultural model, land tenure system, irrigation, labour; high yielding varieties, fertilizer, pesticides, mechanical power and credit, all have to be purchased from the non-agricultural sector. Institutional developments also take place in the production market as the demand for marketing services increases with a rural to urban population shift and more product move through wholesale and retail channels. In the sense of social sciences, especially economics offers guidelines for the development of the structure of the input and product-marketing institutions that are consistent with increased agricultural out put and productivity growth. The basic units of the agricultural education, research and extension component are the universe system and agricultural technical schools, research stations and research institutions and the extension departments. Institutional development here refers also to the organization of each of the units along the lines dictated by the management sciences so that resources and manpower are used effectively and efficiently. This includes proper incentive mechanism for scientists, educators, extension, specialists and administrator and a system of financial support with the control timing and allocation of funds. The science based



agricultural model relies on the physical and biological sciences, management sciences and social sciences to produce and disseminate new technologies and guide institutional development that will provide the proper environment for optimum agricultural output and productivity growth. Evidence exists that productivity growth and rate of return from employing a science based agricultural model are high. Joseph Gabriel Nagy(1984) emphasis that the experience of United States and other developed nations and high rates of return to investment in science-based agriculture indicate that this model of agriculture development has the potential to attain agricultural output growth rates required by developing nations including Pakistan for their sustainable economic development and social prosperity.

### **6. Empirical Review Of Sindh Agriculture**

After the feasible discussion on the concept of agric sector development it is very necessary to make an overview of Sindh agriculture sector for further understanding and to find out gap in theoretical review and empirical situation of Sindh agricultures to suggest some key points for its sustainable planning and future development.

The empirical study safely draws a conclusion in view of three major events in historical context of agricultural development that “Kalhora period also called a ‘Golden Era’ (1700–1782) marked a new phase in agricultural development based on irrigational development in Sindh”. Ishrat Hussain Dr. (1981pp7). The British period (1843- 1947) earned its place in history in agricultural development mainly due to construction of Lloyd Barrage (1930) in Sukkur and a number of other infrastructural development schemes in the region. The green revolution period of 1960s on the one hand brought about significant changes through modern inputs and on the other led to a crisis in agricultural economy of the province. Despite crisis, the agriculture of Sindh still forms the backbone of the economy, contributing more than one fourth in GDP and engaging the majority of the rural population in the Province.

The study sums up that over a decade, the agriculture sector of Sindh is in the grip of serious crises such as; failure of land reforms, scourge of feudalism, speedy land degradation, declining water resources, inadequate supply of quality seed, fertilizers, pesticides, slow process of mechanization, constraints in credit, poor infrastructure, ill-conceived agriculture marketing, taxation policies, environmental and cultural obstacles that slowed down the development process in this sector. The scant research in this area

lies at the heart of obstacles to the development of the sector which is urgent need of a separate study on the process of agricultural development in the Province.

The study finds that land reforms fared poorly in the past. A few people owning greater land area strengthens feudalism and encourages share cropping, contributing to unskilled-bondage labour, poverty and inequality. The agricultural development requires implementation of last land reforms in letter and spirit and capital mode of production with a balanced use of modern inputs to create medium scale land holdings with progressive farmers, reduction in land less poverty and skilled agric-labour. Unbridled land degradation has dented agricultural production/growth in Sindh. Salinity and water logging, the main culprit, can be checked / reduced by lining of canals, efficient and sustainable drainage system. Land fragmentation constitutes an obstacle too; farms are fragmented from two to ten and reduce the opportunities of increasing return. The introduction of anti fragmentation laws with optimal farm size may be helpful in this regard.

The Forest and inland fisheries resources are fast depleting with livestock sector in an urgent need. Their potential should be enhanced/ realized and tapped to the maximum by sustainable development policies to meet increasing food and future environmental challenges.

As far water resources, a considerable amount of canal irrigation water goes down the drain. The ground table water has very little potential and it can not be utilized properly due to high cost and difficult process of electric connection for tube wells. The received rainfall in Sindh is in small quantity due to isolated geographical location. Whereas required rainfall particularly in arid zones can not be collected with modern methods and is wasted in drains. The study suggests immediate reforms in canal irrigation to reduce waste of available resources, subsidies on tube wells, and small dams for rain water in arid zones with introduction of drip irrigation system in the region to check water losses at field level.

A developed agriculture requires newly developed high yield varieties of quality seed, proper and timely use of chemical fertilizer & pesticide and mechanized farming which is said to be as low as 5 to 10 %, good quality seed, improperly low use of fake chemical fertilizer & pesticide (i.e. 6% and 35% respectively) with low level of modern means of cultivation. Such a poor access to these modern inputs is due to inefficiency of institutions like Sindh Seed Corporation, Pakistan Agriculture Supply Corporation,

institutional and non-institutional rural financial markets and agriculture extension services.

There is an urgent need for institutional reforms like flexible and easy mechanism of agricultural loans without any delay, an effective loan recovery procedure with affordable level of interest with flexible pay back period. The institutional capacity should be enhanced to produce required amount of quality seed with its timely availability on subsidized prices. There should be a controlled mechanism for fertilizer and pesticide prices and removal of fake suppliers from the market. There is an urgent need to adopt alternative pest management strategies as followed by developed nations to produce environmental safe production for their growing demand in the world. Education and vocational training of growers and cheap two-wheel Chinese's tractor and tube well technologies may deliver the mechanization goods.

A separate research is needed to investigate into new technological developments in farm machinery use and to suggest the proposed optimal level of mechanization on regular basis. The poor infrastructure and marketing facilities, mismanagement in development schemes, low farmer literacy, poor healthcare facilities at villages hamper grower's performance, keeping them out of market and reducing the opportunities of capital accumulation. The time barred collection system and incident of tax on small illiterate growers inflicts heavy losses on the government and affects reinvestment process for further development.

The study recommends facilitating the forward and backward linkages between traditional and modern sectors in the province with storage facilities; agro based industries at farm level and improved taxation system by computerized assessment and collection according to basic taxation cannon. The study discovers new important facts and figures and finds that theoretical model of agricultural development is in sharp contrast with empirical situation of Sindh agricultural sector and requires immediate attention of policy makers for implementation of suggested remedies.

## **7. Conclusion & Policy Recommendation**

### *7.1. Feasible Agricultural Development Model For Sindh/Pakistan:*

After the detailed study of the conceptual framework of agricultural development and empirical review of Sindh agriculture sector, the following key points can be considered for agricultural development on the basis of earlier studies and personal observations.

These fifteen points are considered as new agricultural development model for the region according to the need of the topic and need of the hour.

- Introduction to small and medium size landholdings through land reform implementation with full backing of the state. This will create new land tenure system and will abolish time barred traditional land tenure system of absentee's feudals lords. This exercise will change the whole system of political economy of the rural areas, create new bulk of middle class and their representation at all forums, alleviate rural poverty, problem of bondage labour but only needs political will with true sprit and cooperation's of all state organs.
- Corporate farming in the condition of low fertile tracts or frontier lands where small-scale farming is impossible especially in the arid zone area of Sindh Thar desert and hilly Kohistan area is most suitable for the said purpose.
- Adoption of capitalist mode of production in place of feudal mode of production or share cropping system .It will lead to create progressive class of farmers in the future and also to introduce new socio-economic and political trends in rural masses.
- Modernization in agriculture sector specially introduction of two wheel Chinese tractor and small plastic oriented tube well which is cheaper and sufficient for 12 to 20 acres cultivation. These mechanical tools should be exempted from all taxes and duties to create mechanized farming instead of old cultural and also for optimum level return.
- Effective role of the state for the institutional change by making and implementing grower-friendly policies in agricultural and other concerned sectors of the economy with zero implantation gap for the long term growth of the sector.
- Better organized irrigation system by investment in new irrigational development schemes and proper maintenance of old irrigation system of the British era are very essential for land expansion and yield increase. The public sector policies should be made in accordance with the modern methods of irrigations i.e. construction of small rainy dams, drip irrigation, sprinkle irrigation and several other methods currently in vogue in developed countries /world.
- Provision of agricultural extension / research services reorganizations of agriculture department at provincial and federal level with strong monitoring and

investment in socio-economic infrastructure of rural areas for cultural change and rural development.

- Better marketing facilities for crop, livestock and fisheries production by high intensive prices and adoption and introduction of insurance schemes.
- Easy availability of institutional credit on cheap rates with increasing network of micro credit banks on the pattern of Grameen bank of Bangladesh.
- Establishment of agro based / cottage industries at farm level on the one village one product basis that can reduce poverty level in rural communities.
- The establishment of new public sector organization for the supply of seed, pesticides and fertilizer, timely availability of other purchase inputs to increase per acre yield according to the world standard at town / Taulka level.
- Better use of available natural resources for better environment, conservation and use of alternative pest management strategies for sustainable agricultural development by promoting local herbicides.
- Development of allied sectors, livestock, fisheries and forest sector by zone wise policy making according to absolute advantages and potentials of the area as central cropping zone for increase in per acre yield, Thar and Kohistan desert areas in the case of live stock sector development / diary production, delta area for increase forest and inland fisheries production. In the wake of Sindh Arid Zone Development Authority closure, establishments of separate autonomous institution for the development of arid zone in Sindh.
- The establishment of new corporation for rapid increase in agricultural commodities exports growth through international standard of produce and grading to meet upcoming challenges of globalization / WTO.
- The human resources development of farming communities by hiring professionals of developed world to field training as Australians & Indians experts for agri-business and dairy farming, Canadian for alternative pest management strategies, Americans and several others for increase in per acre yield particularly for wheat and cotton Chinese and Japanese for rice cultivation, Malaysian for oil seed production to overcome current food crisis in the country.

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