

DEVELOPMENT OF AGRICULTURAL ENGINEERING INDUSTRY IN PAKISTAN: A STUDY OF LYALLPUR DISTRICT IN HISTORICAL CONTEXT

Hamid Iqbal (CA)
Visiting Lecturer
Department of History
GC University Faisalabad
historianhami@gmail.com
Muhammad Umair Irshad
M.Phil Scholar
Department of Pakistan Studies
GC University Faisalabad
Warda Kousar
M.Phil Scholar
Department of Pakistan Studies
GC University Faisalabad

Abstract

The rise of agriculture and associated engineering industries in the Pakistan and particularly in Lyallpur district from 1947 to 1977 is investigated in this study. Agricultural engineering industries were implanted both privately and publicly, particularly in Lyallpur, which became Pakistan's largest industry area. The agricultural engineering sector has improved the agriculture standard. These industries played a vital role in the economy of Pakistan, particularly in Lyallpur. To analyze the growth of Agricultural engineering industry in Lyallpur used library research. To get a rational conclusion, primary and secondary data was used. The agricultural engineering industry has faced issues in rapid growth due to ambiguous strategies of different governments as heavy taxes were imposed on production and on imports of industrial machinery. This research suggests approval of separate industrial budget; rebate must be set forth on import of machinery and exclusion in taxable income.

Key Words: Lyallpur, Agriculture, Engineering, Industry, Economy

Introduction

Agriculture is considered the backbone of Pakistan's economy, as the country majorly reliant on crops. However, lack of suitable equipments, inappropriate input timing, shortage of water and land and inefficient pest control education are the issues to acquire actual output. Synthetic chemicals are commonly employed by farmers to manage insect pests, although they are often applied inappropriately. However, history reveals the facts that Pakistan was not able to produce as much crops as producing these days. Was the country able to fulfill its food requirements without the improving Agriculture and Agricultural Engineering at the time of independence? The gradual change in agro based industry clarified that there is need

to expand agriculture not for only domestic purposes but for the improvement in economy by exporting the fruits, grains, oil, and items of agricultural engineering. The study focused the historical aspect of agriculture as well as agricultural engineering from 1947 to 1977.

Agriculture is a late Middle English version of Latin *Agricultra* came from the words *ager* having meaning as "field," and *cultra*, which means "cultivation" or "growth" (Glynnis, 2002). Agronomy, horticulture, plant cultivation, animal husbandry, and forestry are also included in the term. Agriculture is a science, an art, and a business all rolled into one. The reason it is called as science is that it produces new crop strains and animal breeds on a regular basis, art is the due to crop and animal husbandry while it is commerce due to the interconnectedness of all agro-products, linked to the market.

The wild grains which are the oldest grains discovered around 105,000 years ago while plantation of rice in China was discovered between eleven to six thousands BC. Sheep were first domesticated in Mesopotamia between eleven to eight thousands BC, and Levanteinkorn wheat, barley, peas, lentils, bitter vetch, chick peas, and flax were cultivated in the around 11,500 years ago (Ensminger, & Parker, 1986). Cattle were bred in some eight thousands BC in Turkey and Pakistan (McTavish, Decker, Schnabel, Taylor, & Hillis, 2013). Potato, beans, coca, llamas, and alpacas were cultivated between eight to five thousands BC in South America, and cotton was first grown in Peru 2600BC.

The agricultural machinery sector began in the nineteenth century in Britain and the United States. To begin with, the plough and sickle were converted to iron farming instruments (Gifford, 1992). These were standard farming equipment forged by blacksmiths in the village. In the 1830s, the agricultural business introduced integrated harvesting, threshing, and cleaning, and in the 1840s, blacksmith workshops began producing a variety of ploughs, just as Case Corporation began manufacturing the Racine Threshing Machine in 1842. Following that, portable steam-powered ploughing engines were invented, which were also used to power threshing machines, mills, and pumps as well as direct ploughing steam tractors were also introduced.

In the twentieth century, England firstly converted machines to a petrol engine, then to a diesel engine and their overall agricultural engineering output was valued 6.5 million pounds. Hydrologic was first used in 1930s and in 1960s UK started to export machinery to Western

Europe, Australia, the United States, Canada, and South Africa, accounting for more than 60% of total output, and in the 1970s, it transferred 75% of total output. Agricultural engineers formed a Britain based associations all over the world named as the Agricultural Engineers Association and the Americans framed Association of Equipment Manufacturers while Germany associated the VDMA Agricultural Machinery Association.

Expansion of Agriculture in Pakistan:

Pakistan is fortunate as it possesses many natural resources, as well as arable land and water. Barley and wheat were more ancient Pakistani crops, grown in Mehrgarh between 8000 to 6000 BCE. In 4500 BCE, the Indus Valley Civilization created a comprehensive irrigation system (Possehl, 1996). Ploughs were also used in the Indus Valley Civilization circa 2500 BC, according to archaeological data (Lal, 2001). Presently agrarian land of Pakistan makes up roughly 43% of the country's total land area, while agriculture employs about 43% of the workforce. It accounts for roughly 21% of GDP.

Punjab is a Pakistani province that contributes significantly to agriculture, with wheat and cotton being the most common crops. Mango of Sindh and Punjab are another important crop, making Pakistan the world's fourth largest mango grower (TDAP, 2017). Pakistan is a major producer and exporter of food and crops in the world. The most important goods of Pakistan are listed here, along with their rankings in the world.



Ayub Agricultural Research Institute

Wheat, sugarcane, cotton, and rice are the cash crops of Pakistan, accounting for around 75% of total output. Rice, cotton, fish, fruits (particularly oranges and mangoes), and vegetables are the main exports, while vegetable oil, pulses, and consumer items are the main imports. Pakistan has the world's largest camel market, the second-largest apricot and ghee market, and the third-largest cotton, onion, and milk market in Asia. “The livestock sector produces over half of the value added in the agriculture sector, accounting to nearly 11% of Pakistan's GDP, which is larger than the crop sector” Economic Survey of Pakistan revealed the fact in 2017 (Ministry of Finance, 2017).

Agricultural Engineering Industry in Pakistan:

Since 1947, Pakistan began improving its irrigation system, constructing water-related structures such as the Mangla, Tarbela, and connecting canals. The Mangla and Tarbela reservoirs watered over 12 million acres each, with the remaining 8.5 million acres irrigated by tube wells and other sources. However, there is still a lot of uncultivated land in Pakistan that might benefit from technological advancements. Agricultural Engineering contributed significantly to the growth of agriculture in Pakistan and boosted cultivating efficiency. It increased the tractor business and sales increased by 100% from 2004 to 2010.

In Rahim Yar Khan, the first agricultural implements and machinery manufacturing business began in the 1950s, ushered in a new era of farm mechanisation. In 1954, the first tractor was imported, and a manufacturing facility was quickly formed with the help of John Deere from the United States. The first importer was the Esakhel Estate Farm, which was a John Deere associate. In 1959, the country had 15 agro engineering industries, with locations in Lahore, Karachi, Rahim Yar Khan, EsaKhail, and Lyallpur. To improve things, the government waved of tax on machinery imports, and the agro engineering industry rose to 514 in 1984.

The food and agricultural department devised a new approach to enhance invest in agricultural engineering therefore agricultural loans were made available on a big scale during the end of the 1950s and the beginning of the 1960s. These loans were provided by the ADBP, CCS, and Tacavi loans. They have issued loan in the amount of 600 million rupees. The following are the loan information for these three years:

Loan provided 1959-62 (in million rupees)				
Year	Taccavi loans by revenue department	Loan by Agricultural development Bank	Loan by cooperative credit societies	Total
1959-60	34	55	100	189
1960-61	35	77	117	229
1961-62	35	95	104	234

Agricultural Development Bank of Pakistan.

The table showed the interest of Ayub government in enhancement of agriculture as the improvement was brought in Cotton, Rice and Wheat throughout the country during his administration. According to ADBP provided loan was Rs 95 million in 1961-62 while only Rs 2.6m used for fertilizers while residual amount was invested in agricultural machinery (ADB, 2017). On the other hand, 84.4% of amount of loans was used to purchase machinery provided by Taccavi and cooperative societies.

Agricultural Engineering of Pakistan witnessed improvement with tractor manufacturing industry. In 1964, Rana Tractors was first ever established industry then converted to Millat Tractors Limited in next year. Assembling plants were set up in after two years in 1967. Government launched tax free program so in 1981, five more companies were accredited for mechanization. These companies left Pakistan but Millat Tractors Ltd and Al-Ghazi Tractors Ltd. are still working in the country, producing 45 thousands and 30 thousands units' vice-versa. Other small scale industries are also working in the country. Initially the industries were implanted for tractors manufacturing but now other instruments are being manufactured by them as well. Currently Pakistan is exporting Agricultural machinery and tractors to Afghanistan and African countries.

Development of Agricultural Engineering Industry in Lyallpur:

Lyallpur made a significant contribution to improve agriculture by nomenclature of seeds as well as Agricultural Engineering. Before partition, British established University of Agriculture in 1906 in Lyallpur to enrich and improve agriculture's educational infrastructure, as well as to assist the agricultural engineering sector. Pakistan pursued industrialisation and development after independence, although agriculture remained the economy's backbone.

Pakistan's government established an agrarian reform commission. In 1961, a research centre was built by commission in Lyallpur, which included the Agriculture University, AMRI Multan, the Directorate of Agriculture Extension, and the Directorate of Water Management. These institutions were created to identify farm mechanization difficulties as well as to research and improve agricultural engineering. Several meetings were held under the direction of Lyallpur Research Centre to develop new tactics for Agricultural Engineering sector. They projected an automation plan, ranch empower tactics, farmer programs for their acknowledgement, trainings, and the creation of an institution to track farm mechanisation status. They also proposed lowering the price of equipments by providing subsidy, tax exclusion, exploration of linkages, encouraging manufacturing of equipments, and promoting health and safety.

Another important institute was established at Lyallpur during Ayub era having the name as Ayub Agricultural Research Institute. It remained the key driver of significant agricultural development over the years. After the split of research and education working under the old Punjab Agricultural College and Research Institute Lyallpur the institute was founded in 1962 (AARI 2021). The goals were set for the improve crops genetically for economic purposes, improvement in technology, protection from insects, pests, deceases, and weeds can all be controlled in an environmentally responsible manner. Similarly, the purpose was to bring improvement in fruit and vegetable processing, its preservation, and postharvest technology.

After two years the Agricultural Engineering Research Division was founded in 1964 at Lyallpur. It was upgraded in 1976 and renamed Agricultural Mechanization Research Institute (AMRI) after observing the advances and best work of the research centre. The Agricultural Machinery Division (AMD) was founded two years later, in 1978. It was renamed Farm Machinery Institute (FMI) after it was upgraded. The Agricultural and Biological Engineering Institute (ABEI) was also renamed by the Pakistan Agriculture Research Council (PARC, 2017). In Lyallpur, research and development grew by the day. With the help of Pakistan Standard and Quality Control Authority, AMRI and ABEI certified agricultural engineering and mechanical standards (PSQCA, 2017).

As per each Decennial Agricultural Machinery Census (In Thousand)				
Machinery	1975	1984	1994	2004
Tractors	35.7	157.3	252.9	401.7
Implements				
Cultivator	31.6	146.8	236.3	369.9
Mould Board Plough	2.7	7.3	28.4	40.1
Bar/Disk Harrows	2.4	8.1	13.2	23.8
Disk Plough	2.9	6.4	20.4	29.2
Ridger	Less than 0.01	4.7	11.0	71.3
Trolly/Trailer	18.0	98.7	176.4	242.7
Tube wells & Lift Pump	155.8	237.9	454.2	931.0

Pakistan bureau of statistics

The sector began to expand in 1959-60 as a result of government policies and incentives, such as agricultural loans, which increased farmers' purchasing power. The demand for machines and tube wells both increased at the same time. By the end of 1965, Pakistan had around 35 thousands tube wells, including 25 thousands in Punjab and five thousands in Lyallpur only. Further tools were also procured by farmers to aid in improvement of Punjabi agriculture.

The following major crops of Pakistan were enhanced in cultivation (PBS, 1978):

Production of crops (000) Bales/MT.					
Year	Cotton	Wheat	Rice	Sugarcane	Maize
1947-48	1156.2	3354.0	692.9	5529.3	358.7
1948-49	1007.8	4037.8	747.8	6946.7	379.0
1949-50	1295.2	3924.0	804.7	7849.0	407.4
1950-51	1469.8	3993.1	864.7	5506.0	387.1
1951-52	1460.4	3009.5	730.5	5399.3	383.1
1952-53	1865.0	2405.0	832.1	7265.8	351.6
1953-54	1489.7	3644.6	920.5	8956.5	408.5
1954-55	1654.8	3186.3	838.2	8835.6	432.8
1955-56	1754.2	3370.2	841.3	8199.5	457.2
1956-57	1788.7	3638.5	844.3	8947.3	469.4
1957-58	1785.5	3564.3	875.8	11294.4	447.1
1958-59	1659.0	3906.7	991.7	12489.3	488.7
1959-60	1713.4	3908.7	994.7	10662.4	495.0
1960-61	1767.8	3814.3	1030.3	11640.9	438.9
1961-62	1905.7	4026.6	1126.8	14356.8	487.7
1962-63	2153.5	4169.9	1095.3	18439.3	488.7
1963-64	2460.8	4161.7	1191.8	16139.0	526.3
1964-65	2220.4	4590.6	1350.3	18666.9	528.3
1965-66	2436.8	3915.9	1316.8	22306.6	539.5
1966-67	2723.2	4334.5	1364.6	21982.2	587.3
1967-68	3043.1	6418.4	1498.7	18659.8	791.5
1968-69	3101.7	6617.5	2032.1	21971.1	625.9
1969-70	3148.7	7294.2	2400.9	26367.7	667.5
1970-71	3189.1	6476.3	2199.7	23167.0	717.7
1971-72	4159.4	6890.4	2261.9	19963.1	705.1
1972-73	4125.6	7442.3	2329.7	19947.5	705.9
1973-74	3871.7	7628.9	2455.1	23910.5	767.1
1974-75	3728.6	7673.5	2313.8	21241.9	746.9
1975-76	3020.5	8690.7	2617.5	25545.7	802.5
1976-77	2557.3	9143.9	2737.4	29523.0	763.8
1977-78	3380.0	8367.2	2949.6	30076.6	820.9

PBS

The introduction of new varieties of these five crops and fertilizers ushered in a new era in Pakistan's agricultural history in the 1960s. In the late 1960s, the sector, which had been increasing at a rate of three to six percent per year, soared to fifteen percent. Farmers who had not previously been affected by modern machinery began to employ it. Following that, Punjab saw a tremendous increase in machinery such as tractors, tube wells, and farm implements.

The green revolution arrived in Punjab in the early 1970s when agriculture was at its pinnacle at the time. Farmers have also expressed their dissatisfaction with the lack of labour available for agricultural purposes. During that decade, tractor and other machinery sales increased by ten to fifty percent. Punjabi farmers began to employ tractors extensively, and in 1984, Punjab had the highest number of tractors in Pakistan, accounting for 81 percent of all tractors (Girvan, 1990).

Five key kinds of agricultural machines that are given below were started to assemble in agricultural engineering at larger scale. Lyallpur, Daska, Sialkot, Gujranwala, Multan, Lahore, and Miyyan Channun were among the first cities to establish the industry. The number of industries that produced these instruments is listed in the table below.

Number of machinery producing industries						
City	Tube wells	Threshers	Trolleys	Tractors attachments	Sugarcane and chaff cutters	Total
Lyallpur	7	2	-	3	18	29
Daska	16	2	-	3	-	21
Sialkot	-	12	4	4	-	20
Multan	1	12	5	2	-	20
Lahore	8	5	-	5	-	18
Miyanchannun	-	18	-	2	-	20

Census of Agricultural Machinery(PBS)

It demonstrated Lyallpur's significant impact on the agricultural engineering business at a period when agricultural machinery was in high demand. Lyallpur made a bigger contribution than the other cities which were producing these equipments. The increased usage of equipments and machines raised demand for machinery, resulting in a considerable amount of machinery being imported and made in the country. In those decades, the new industry grew rapidly, and Lyallpur grew significantly as a result of the research centre. Investors, who had previously invested in other industries, as well as cotton mill owners, expressed an interest in starting a new business in the agricultural engineering industry. Lyallpur research centers' increased awareness and education led to a rise in the number of people using agricultural machinery.

The following are some examples of implements: (PBS, 1984)

Use of agricultural equipment items in Punjab(1968-84)			
Equipment	1968	1975	1984
Tractors	13764	28747	127589
Tube wells	69030	139224	214106
Cultivators	12369	26685	123755
Moldboard ploughs	1169	1215	2780
Bar and disc harrows	1089	854	2734
Grain drills	N/A	1057	10669
Ridgers	N/A	101	4030
Trailers	5501	14741	81668
Threshers	N/A	4776	71195
Disc ploughs	1342	1193	1134

Census of Agriculture Machinery(PBS)

The table depicted the amount of machinery used in Punjab, particularly in Lyallpur. With the support of Lyallpur, the tractor industry grew in Lyallpur and beyond. With the growth in horse power of machinery, the research centre developed a new tractor manufacturing strategy. Many new industries have sprouted up in Lyallpur, including:

- Zephyr Engineers
- Zeeshan Engineering
- Noorani Industries (Pvt) Ltd
- Amjad Brothers zarai industry
- Batala industries
- Supreme agricultural industry
- Ikram engineering company
- Ittefaq industries
- New batala zariati foundry
- Punjab engineering company
- Seth Fazulur Rehman and brothers co
- Seth Muhammad Tufail and sons industry
- Swat foundry
- The national zarai industry
- Waheed engineering industry

Despite this, the tube well infrastructure in Lyallpur was also enhanced by agricultural engineering. With the help of Lyallpur agro engineers, almost 5000 new tube wells were erected throughout the city (Ministry of Planning, 1965). As a result of the high volume of new tube well installations, the agriculture department expanded the number of drilling rigs in the city. There were 150 rigs, and they had ordered 169 more rigs to boost tube well installation capacity. Formers were given threshers with the support of the government as well as privately. Those machines were mostly in the hands of major cultivators, although distribution was also done on merit at a lesser level. Small farmers receive tractors in proportion to their acreage, with no requirement for a tube well if the cultivated area was less than one acre. Tube wells were never built on land that was irrigated with sea water. The distribution of farm machinery was done using the size of farms as a guide. The following table shows the percentage distribution of machinery:

Distribution of farm machinery by farm size 1972 (percent)			
Farm size	Tube wells	Tractors	Threshers
Total private forms	100.00	100.00	100.00
< 1.0 acre	0.34	0.12	0.11
Small farms			
1-2.5 acre	1.39	0.81	0.69
2.5-5 acre	4.16	0.99	1.84
5-7.5 acre	6.85	1.52	3.13
7.5-12.5 acre	14.34	5.78	8.34
Medium farms			
12.5-25 acre	26.45	14.00	20.49
25-50 acre	22.46	23.54	25.86
Large farms			
50-150 acre	17.93	37.50	28.50
150- Above	6.08	15.74	11.01

Census of agriculture 1972

As a result, the city of Lyallpur enhanced its agricultural yields of cotton, wheat, rice, and other crops and the formers of Lyallpur earned 56 percent more than they would have without these improvements. This resulted in a rise in agricultural engineering investment from Rs 1218M in 1965 to Rs 3418M in 1975. It was risen to Rs 6441 million in 1978, which was nearly doubled in three years. Many new businesses were established in Pakistan with the

assistance of the ADBP, and local production increased to Rs 234M in 1978 from Rs 38M in 1965. The country saw a large-scale sale of both domestic and imported machinery.

The following are the quantities of some of the sold items:

Origin of Agricultural equipment sold in 1977			
Type of Equipment	Numbers sold		Percentage of local origin
	Local origin	Imported	
Rear blade	5400	—	100
Wheat thresher	12300	—	100
Cotton seeder	618	—	100
Reaper winnower	461	—	100
Tiller	23000	60	99.7
Grain drill	1250	22	98.3
Tractor mounted sprayer	177	3	98.3
Chisel plough	520	25	95.4
Moldboard plough	270	43	85.3
Trailed combines	—	33	0
Rotary cultivator	—	515	0
Disc harrow	—	240	0

Agricultural development Bank of Pakistan

Following that situation, people began to invest in this sector on a greater scale, and wholesale markets in Lyallpur and Lahore were established. Firms produced tractor attachments, trolleys and other items and started imports and exports. After a few years, Lyallpur began to produce raw materials as well, and they were now involved in both raw materials and machinery. Agricultural industry and farm tool production were concentrated in a few major towns like as Lahore, Daska, Multan, Sahiwal, Gujranwala, Gujrat, and Lyallpur until 1978, with only a few industries operating outside of these locations. The following is a list of farm machinery industries in Punjab:

Number of agro machinery manufacturers in Punjab			
District	No. of industries	District	No. of industries
Bahawalnagar	15	Okara	23
Bahawalpur	9	Muzaffargarh	1
Chakwal	1	Multan	12
Dera Ghazi Khan	8	Rahim Yar Khan	26
Faisalabad	48	Rawalpindi	1
Gujranwala	27	Sahiwal	16
Gujrat	14	Sargodha	13
Jhang	4	Sheikhupura	3
Jhelum	1	Sialkot	28
Kasur	13	Toba Tek Singh	12
Khanewal	24	Vehari	21
Lahore	22		
Total no. of units =342			

Pakistan Agriculture Research Council

The fast-growing agricultural industry in Pakistan's Punjab region had a significant impact on agriculture, and Lyallpur's contribution in that field was noteworthy. Lyallpur functioned in accordance with public demand and improved technology, such as the demand for diesel pumps, which has increased since the early 1970s as a result of increased competition from electric motors. In the mid-1970s, demand for tube wells was similarly high, but Lyallpur worked more effectively and varied their progress according to customer preferences.

Conclusion

The food is a basic necessity for human beings and without knowing the rules of agriculture, food cannot be attained. Pakistan is semi-industrialized country and its major part of economy is based on agriculture. The era of Ayub Khan remained the glorious era for industrialization and for the improvements in agriculture. Governments have subsidised agricultural commodities in varying degrees since then, but the rate of subsidies has remained so varied, so that projected benefit has been lost. Tax rebate on industry and agricultural farming left its positive impacts but with the change in policies these impacts got vanished.

In spite of boom in agricultural engineering, use of agricultural equipments and fertilizers are at primary stage. To guarantee extensive division, it is preferable that the financial support be maintained and it stays constant throughout time, so that farmers are not left in the dark about

the investment they must make. The government should implement new policies that include an effective finance mechanism and interest-free loans for purchasing machinery, according to this study.

References

- AARI. (2021). Objectives. https://aari.punjab.gov.pk/aari_objectives
- ADBP. (March 2017). Agricultural development bank of Pakistan, Annual report and statement of accounts for the year ending June 1962. <https://www.ztbl.com.pk/1962-report%adbpc.aspx>.
- Ensminger, M.E & Parker, R.O. (1986). *Sheep and Goat Science (Fifth Ed.)*. Interstate Printers and Publishers.
- Gifford, R.C. (1992). *Agricultural Engineering in Development: Concepts and principles*. US: UN printing press.
- Girvan, N.P. (1990), overcoming technology dependency, *World Development*, Vol. 18(1).
- Glynnis, C. (2002). *The Oxford Dictionary of Word Histories*. UK: Oxford University Press.
- Lal, R. (August 2001). *Thematic evolution of ISTRO: transition in scientific issues and research focus from 1955 to 2000*. Soil and Tillage Research printing press.
- McTavish, E.J.; Decker, J.E.; Schnabel, R.D.; Taylor, J.F. & Hillis, D.M. (2013). *New World cattle show ancestry from multiple independent domestication events*. U.S.A: Proc. Natl.science Academy.
- Ministry of Finance, Government of Pakistan. (February 2017). Economic Survey of Pakistan, at the Wayback Machine. <http://www.finance.gov.pk/machi-wayback223>.
- Ministry of Planning, Government of Pakistan. (2017) Planning Commission, memorandum for the Pakistan consortium, 1964-65.
- PARC. (2021)<http://www.parc.gov.pk/index.php/en/abei>
- PBS, Government of Pakistan. (1984) Pakistan census of agricultural machinery, Vol II, part 2, province report Punjab, agriculture census organization, statistics division, Islamabad.
- PBS, Government of Pakistan. (2021). Agricultural machinery. <http://www.pbs.gov.pk/content/agricultural-machinery>
- Possehl, G. L. (1996). Mehrgarh, Oxford Companion to Archaeology. Oxford: Oxford University Press.
- PSQCA. (2021). Introduction. <http://www.psqca.com.pk/>

TDAP (February 2017). Report on mangoes.
http://www.tdap.gov.pk/doc_reports/tdap_report_on_mangoes.pdf.