

Managing Crop Residual Burning Using Advanced Harvest Machinery - *Evidence from a Cluster Randomized Control Trial in Punjab, Pakistan*

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Babur Wasim Arif

Natural Resources and Agriculture Economist
Asian Development Bank/Pakistan

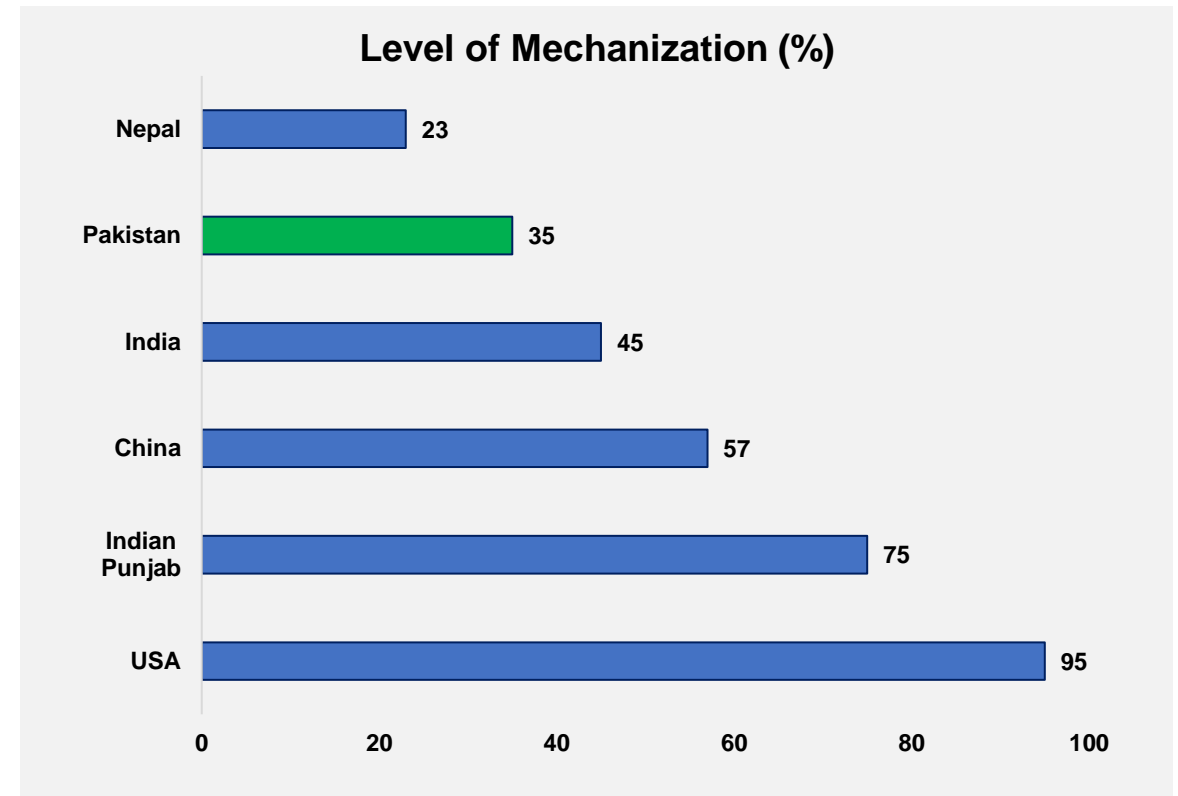


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Agriculture Sector's Contribution in Pakistan Economy

- Agriculture sector share in GDP in about 23%
- It provides employment to around 37% of the employed labor force
- Wheat-rice is the dominant cropping system in the country
- The agriculture in Pakistan suffers from low productivity and low level of mechanization

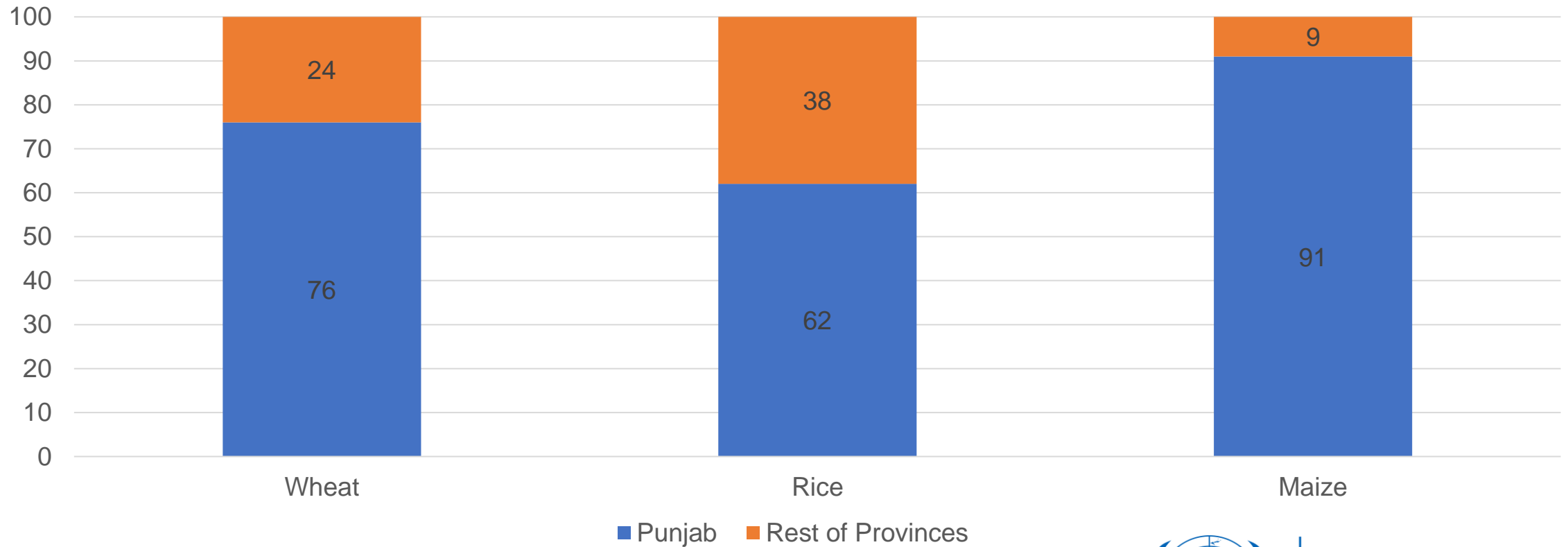


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Punjab Province is the Largest Contributor in Country's Cereals Production



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ADB KSTA 9838 PAK

Enhancing Technology Based Agriculture and Marketing in Rural Punjab

Aimed at improving farmers profitability through reduced harvest losses and improved quality of produce

60 technology demonstrations in 32 villages in 4 districts in Punjab

2 wheat, 3 rice and 5 maize seasons (During 2020-2023)

Around 16000 farmers participated

Technologies Introduced for Paddy Harvesting



New Holland (8070) Full Feed
(Conventionally used for Wheat/Rice Crop)



Kubota (ER-112) Half Feed
(For Standing Rice Crop)



Thinker (XG750S) Full Feed
(For Lodged and Semi-Lodged Rice Crop)



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Machine Performance, Grain Losses and Impurities

Parameter	New Holland (8070) Full Feed	Kubota (ER-112) Half Feed	Thinker (XG750S) Full Feed
Field Losses (%)	3.61	1.94	1.79
Impurities (%)	3.99	0.77	1.95
Broken Grain (%)	1.70	0.49	0.75
Stubble Height (inches)	13-15	5.65	5-10



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Findings of FAO Report (2019) - Punjab, Pakistan



In the past farmers used to harvest and thresh rice crop manually and use residues as fodder for their animals.



In past two decade or so there has been an increase in the use of **wheat combined harvesters** for paddy harvesting. Since then, rice crop residue burning is a common practice in the month of November.



The main reasons are to get rid of trash/residue, desire to save labor cost, to eradicate weeds and pests and to facilitate cultivation and timely sowing of the next crop.



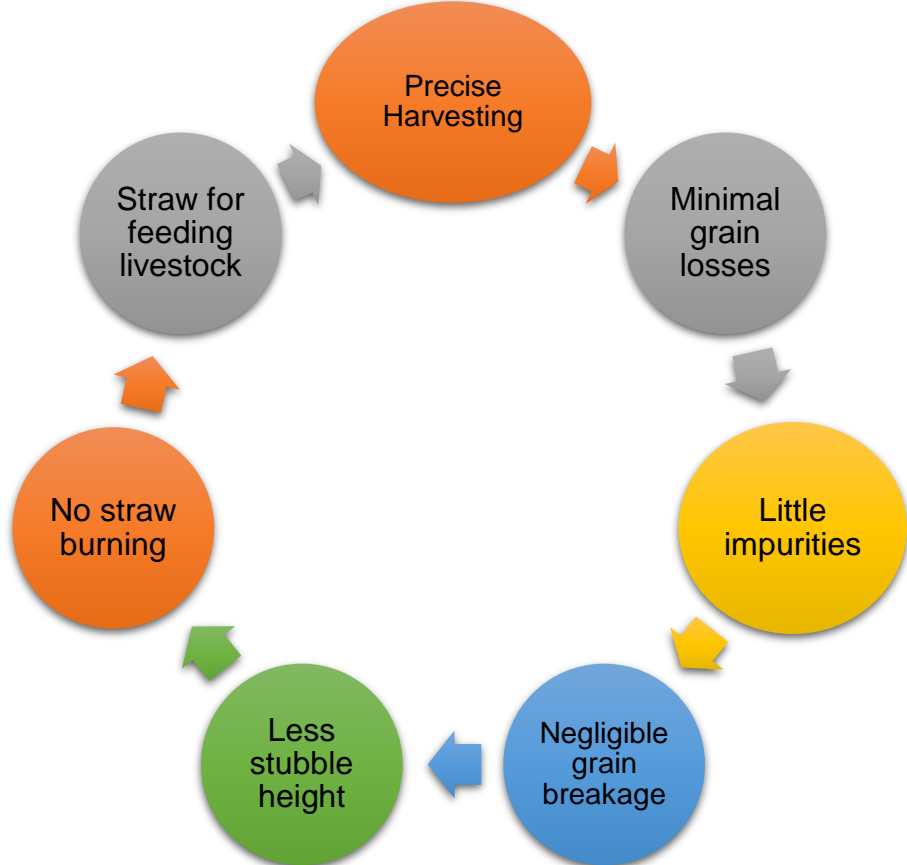
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Impact Evaluation of ADB KSTA 9838 PAK



Benefits of Rice Harvester (Half Feeder)



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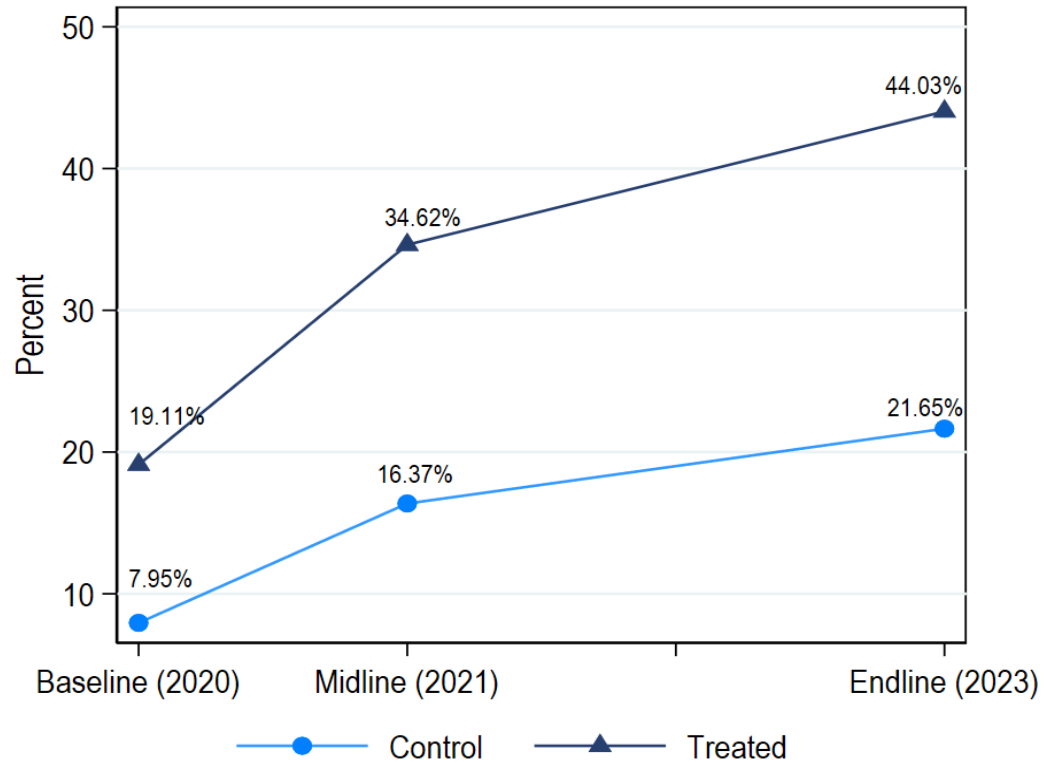
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Economic Benefits of Rice Harvester (Half Feeder)

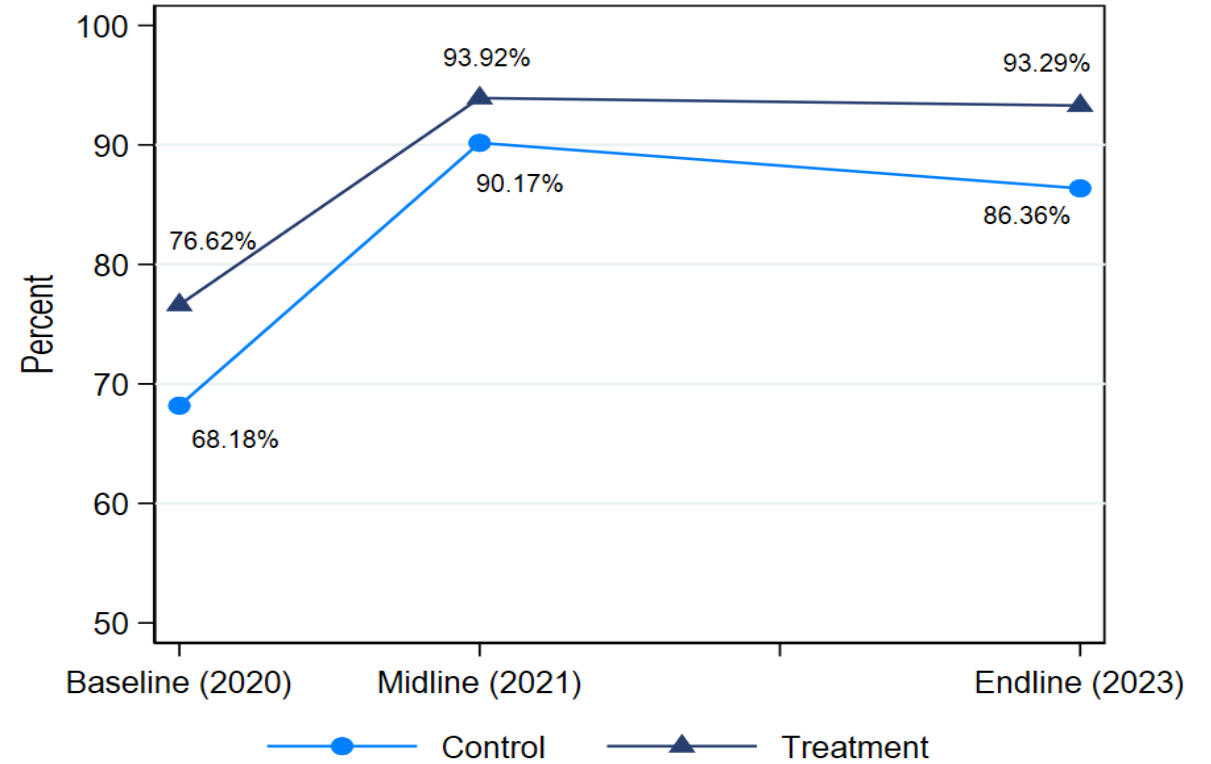
	Baseline – 2020	Midline – 2021	Endline – 2023
Cost of wheat combine harvester (USD/acre)	16.31	20.29	27.61
Cost of paddy harvester (USD/acre)	35.97	39.36	49.33
Reduction in harvest losses (Kg/Acre)	0.86	0.90	0.86
Additional price of paddy harvested by rice harvester (USD/40 Kg)	0.46	0.59	0.48
Price of straw saved by rice harvester (USD/Acre)	32.37	38.66	39.76
Cost saving in land preparation for next sowing (USD/Acre)	13.48	14.91	19.77
Net Benefit/Acre (USD/Acre)	81.00	96.00	104.00

Technology Adoption and Intent for Adoption

Adoption Rate



Intent for Adoption



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Major Barriers in Adoption of Technology

Supply Side Barriers

- High initial investments
- Longer recovery period

Demand Side Barriers

- Lack of awareness
- High rental charges
- Non-availability of machines at the time of harvest



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Conclusion



Considering the high investment costs involved, any model for delivering mechanization should be considered based on its feasibility and scalability (e.g. subsidy or subsidized loans for service providers, crowd funding, aggregate demand etc.)



Along with identification of right machinery to curb residual burning, supplementary initiatives such as targeted awareness programs and financial incentives for farmers are needed to promote the use of such machinery.



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