**Farmers’ Constraints in Adoption of Custom Hiring Centres Services in Buxar District of Bihar**

**Abstract**

The study was administered to assess the level of constraints of farmers in adoption of farm machinery in custom hiring centres in Buxar district of Bihar. The well-structured schedule was prepared and data concerning status of custom hiring centres were solicited from 180 farmers during field and farm visit through personal interview. **The major constraints faced by the farmers in custom hiring of machines were - “Less number of government custom hiring centres compared to private custom hiring centres” having highest weighted mean score (WMS) of 2.36, followed by “Less extension link of rural farmers with KVKs” (2.34), “**Lack of straw management machineries in custom hiring centres” (2.34) and constraint “Small and fragmented land holdings of farmers**” (2.23). The findings prioritized the need of** expanding government CHCs, awareness programmes for the small and marginal farmers for promoting CHCs and integrating CHCs with Krishi Vigyan Kendra for enhancing sustainable agricultural mechanization and farm productivity.

**Keywords:** Custom hiring centres (CHCs) services. farm machinery, mechanization, constraints, weighted mean score (WMS).

1. **Introduction**

The agricultural sector in India has experienced slower economic progress compared to the industrial and service sectors, leading to a widening income disparity between rural and urban areas. Mechanization in agriculture is a crucial factor in enhancing both productivity and output, especially in developing nations **(N.S.L. Srivastava, 2014).** In India, farms are generally small in size, averaging around 1.16 hectares, with about 85% of land holdings categorized as small or marginal (less than 2 hectares) **(Mehta C. R. et al., 2014).** As cropping intensity increases, the interval between harvest and the next planting season has significantly reduced, making it difficult to manage harvesting and land preparation efficiently within a limited timeframe—unless sufficient farm power is available.

Over the past five decades, India has seen a substantial increase in farm power availability, rising from approximately 0.25 kW/ha in 1951 to around 1.35 kW/ha by 2001. There has also been a significant transition from traditional power sources to mechanical and electrical alternatives. While animate sources (like human and animal labor) contributed about 97.4% of farm power in 1951, their share dropped to 18% by 2001. Meanwhile, the role of mechanical and electrical power rose from 2.6% to about 82% during the same period. In Punjab, for example, farm power availability reached over 3.5 kW/ha in 2001, in contrast to states such as Odisha, Rajasthan, Himachal Pradesh, Jammu & Kashmir, Chhattisgarh, Jharkhand, Gujarat, Assam, Madhya Pradesh, and Maharashtra, where it remained below 0.90 kW/ha **(Mehta C. R. et al., 2014).** There is a clear correlation between farm power availability and agricultural productivity, as observed in mechanized states like Punjab, where approximately 30% of the power is sourced from electricity and about 48% from diesel engines.

Despite being home to some of the most fertile lands in the country and having nearly 75% of its population reliant on agriculture, Bihar continues to record productivity levels lower than the national average and significantly behind states like Punjab and Haryana that benefitted from the Green Revolution. As Bihar’s population continues to grow, the pressure to increase food and fiber production also rises. Mechanization can significantly impact all stages of production—from land preparation and planting to harvesting and post-harvest processing. To make expensive machinery like combine harvesters, paddy transplanters, potato harvesters, and laser land levelers accessible, there is a need to develop a rental or custom hiring service model, either through private initiatives or government-backed institutions. Establishing farm machinery banks that provide equipment on a rental basis in less mechanized areas can help bridge this gap. Providing subsidies or financial aid for machinery procurement, either for individual ownership or custom hiring, would further encourage adoption.

Numerous studies have been conducted to evaluate the status of Custom Hiring Centres (CHCs), their acceptance among farmers, and the challenges faced. States such as Punjab and Uttar Pradesh have already seen the implementation of such models with varying degrees of success **(Agarwal et al., 2020)**, Tamil Nadu **(Murugesan, 2019)**,Karnataka **(Kadaraiah et al., 2022)**, Madhya Pradesh **(Kisku U. 2022), Uttarakhand (Awasthi V. 2024)** etc. However, it was deduced that maximum work pertaining to farm mechanization was carried out in various states of India. However, very inadequate work has been conducted in Bihar state of India relating to scenario of custom hiring services centres as the state constitutes about 89.5% of total rural population **(DOS, Government. of Bihar).**

Therefore, an attempt was made to analyze farmers’ constraints towards adoption of agricultural machines through CHCs and assess its services to the native farmers of Buxar district of Bihar.

1. **Material and methods**

The study was governed to assess the level of mechanization and constraints of farmers in adoption of farm machinery in custom hiring centres in Buxar district of Bihar. The well-structured schedule was prepared and data concerning status of custom hiring centres were solicited from 180 farmers during field and farm visit through personal interview. All respondents were recruited randomly. The socio-economic profile was also determined which considers age, education, land holding, income and extension contact of farmers in the selected district. Majority of interviewed farmers belongs to villages adjoining tehsils viz. Baruna, Brahmapur, Raghunathpur and Dumraon (Table 1).

**Table 1** Blocks of Buxar district of Bihar

|  |  |  |  |
| --- | --- | --- | --- |
| S. No. | **Blocks**  | **Villages/towns of the native farmers** | **Frequency** |
| 1. | Baruna | Basauli ,Panditpur, Lachmanpur  | 45 |
| 2. | Brahmapur | Dharauli’ Maharajganj , Raghunathpur | 45 |
| 3. | Simri | Puraini, Naya Bhojpur, Chilahri | 45 |
| 4. | Dumraon | Pratap Sagar, Mustafapur, Twining Ganj | 45 |

**2.2 Constraints and perception of farmers regarding CHCs services**

 The farmers’ reaction for assessing constraints, were recorded on a three-point continuum *viz.,* strongly serious, serious and not so serious and the corresponding scores were given as 3, 2, 1, respectively. Subsequently, the frequency of farmers falling in the domain was multiplied with the score (3, 2 or 1) and total weighted score was ascertained. Afterwards, the weighted mean score (WMS) was obtained by dividing total weighted score by total respondents (n=180). Accordingly, weighted mean score rank order was allotted.

 Weighted mean score = $\frac{w1. x1+w2. x2+w3x3}{n}$ **=** $\frac{total weighted score }{n}$

where

w = number of respondents

x = value of seriousness i.e. Very Serious (x1)-3, Serious (x2)-2 and Not so serious (x3)-1 and

n = total number of respondents

**3. Results and discussions**

**3.1 Socio economic profile of the farmers in Buxar district**

The socio-economic profile of farmers in the Buxar district of Bihar, detailing various categories such as age, education, landholding size, annual income, and extension contacts is enlisted in table 2. The results indicated that the majority of selected farmers were in the middle age group (41-55 years), constituting 48.33% of the sample. The young age group (21-40 years) makes up 17.78%, while the old age group (55-75 years) accounts for 33.89%. The educational background of farmers was also taken into consideration which indicates that the level of education of farmers is directly proportional to the sagacious methods followed in utilization of farm machinery. It was ascertained that the largest group of farmers have matriculation education (31.67%). A notable number were illiterate (20.00%), and another 15.00% have primary education. Middle-level education is reported by 10.56% of farmers, while 13.33% have completed higher secondary education. A small proportion (8.33%) were graduates, and only 2 farmers (1.11%) have attained postgraduate education (Table 1).

 From land holding point of view, the majority of farmers in the district have small landholdings: 42.78% possess between 1 to 2 hectares of land. Marginal farmers (those with less than 1 hectare) make up 23.33% of the sample. Semi-medium farmers (owning 2 to 4 hectares) account for 24.44%, while medium farmers (4 to 10 hectares) and large farmers (owning more than 10 hectares) represent only 7.22% and 2.22%, respectively as illustrated in table 1.

As far as annual income is concerned, majority of farmers have low income (<3.6 lakh), representing 53.89% of the sample (Table 2). It was assessed that 34.44% of farmers fall in the medium-income range (3.6 to 7.78 lakh), and only 11.67% have a high income (greater than 7.78 lakh). The extension contact of the district farmers was also ascertained for evaluating the need of expert advice (for enhancing the efficiency of operations and increasing productivity of output) from the extension personnels, researchers and scientists to the district farmers. It was deduced that a significant portion of farmers report low extension contact, making up 76.67%. It was assessed that 17.22% have medium extension contact, and only 6.11% have high extension contact, indicating a limited reach of agricultural advisory services.

**Table 2:** Socio-economic profile of the farmers of Buxar district

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Category**  | **Frequency** | **Percentage** |
| **Age** | Young (21-40 Years)  | 32 | 17.78 |
| Middle (41-55 Years)  | 87 | 48.33 |
| Old (55-75 Years)  | 61 | 33.89 |
| **Education** | Illiterate  | 36 | 20.00 |
| Primary  | 27 | 15.00 |
| Middle  | 19 | 10.56 |
| Metric  | 57 | 31.67 |
| Higher secondary  | 24 | 13.33 |
| Graduate  | 15 | 8.33 |
| Postgraduate  | 2 | 1.11 |
| **Land holding** | Marginal (<1ha) | 42 | 23.33 |
| Small (1 to 2 ha)  | 77 | 42.78 |
| Semi medium (2 to 4 ha) | 44 | 24.44 |
| Medium (4 to 10 ha)  | 13 | 7.22 |
| Large (>10 ha) | 4 | 2.22 |
| **Annual income** | Low (<3.6 lakh) | 97 | 53.89 |
| Medium (3.6-7.78 lakh) | 62 | 34.44 |
| High (>7.78 lakh) | 21 | 11.67 |
| **Extension contacts** | Low | 138 | 76.67 |
| Medium  | 31 | 17.22 |
| High  | 11 | 6.11 |

This profile provides valuable insights into the socio-economic characteristics of farmers in Buxar, revealing a predominantly middle-aged, low-income group with limited access to educational opportunities and agricultural extension services.

**3.2 Perceived constraints of farmers in the adoption of farm machines through custom hiring basis**

The perceived constraints of farmers in the adoption of farm machines through custom hiring basis are enlisted in table 3. The following results were obtained and are discussed below:

1. Top Constraints (Ranks I to III): Majority of farmers opined that the “Less number of government custom hiring centres compared to private custom hiring centres (C12)” was the major constraint with weighted mean score of 2.36 followed by “Less extension link of rural farmers with KVKs” (C7) with WMS of 2.34 (Table 3). It was revealed that the less linkage of rural farmers with KVKs reflect systemic and structural issues, such as insufficient government-backed CHCs, lack of straw management machines, and poor connectivity with Krishi Vigyan Kendras (KVKs). These issues indicate the need for policy intervention, equipment supply, and extension system strengthening.
2. Middle Constraints (Ranks IV to VII): Maximum farmers were in favour of constraint “Small and fragmented land holdings of farmers” (C3) having weighted mean score of 2.23 followed by “Lack of extension facility in guiding farmers” (C6) (WMS of 2.28) and “Lack of proper knowledge about custom hiring centres (C1)” with WMS of 2.22 (Table 4.6). These constraints were moderate and less significant compared to major constraints. Although, these constraints affects the farmers for conducting farm operations effectively and deals with accessibility and affordability, such as fragmented landholdings, weak extension support, and high rental costs. These are operational challenges that could be improved through training programs, cooperative farming, or targeted subsidies.
3. Lower Constraints (Ranks VIII to XII): Though still significant, these issues are more logistical and managerial, including peak season demand, technical expertise, and outdated machinery. Solutions could involve operator training, predictive booking systems, and machine replacement programs.

**Table 3:** Illustration of perceived constraints of farmers in the adoption of straw management machineries through custom hiring basis

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| S. No. | Constraints of farmers related to CHCs | Strongly serious (%) | Serious (%) | Not so serious(%) | Total Weighted Score | Weighted Mean Score | Rank Order |
| 1. | Lack of proper knowledge about custom hiring centres (C1) | 78(43.33) | 65(36.11) | 37(20.56) | 401 | 2.22 | VI |
| 2. | Lack of straw management machineries in custom hiring centres (C2) | **85****(47.22)** | **72****(40.00)** | **23****(12.78)** | **422** | **2.34** | **II** |
| 3.  | Small and fragmented land holdings of farmers (C3) | 79(45.56) | 65(35.00) | 35(6.11) | 402 | 2.23 | IV |
| 4. | High and exorbitant custom hiring costs (C4) | 65(36.11) | 81(45.00) | 34(18.89) | 391 | 2.17 | VII |
| 5. | Obsolescence and old condition of existing machineries (C5) | 38(21.11) | 41(22.78) | 101(56.11) | 297 | 1.65 | XI |
| 6. | Lack of extension facility in guiding farmers (C6) | 89(49.44) | 52(28.89) | 39(21.67) | 410 | 2.28 | V |
| 7. | Less extension link of rural farmers with KVKs (C7) | **92****(51.11)** | **47****(26.11)** | **51****(28.33)** | **421** | **2.34** | **II** |
| 8. | High advance reservation of available farm machines during peak season (C8) | 56(31.11) | 77(42.78) | 47(26.11) | 369 | 2.05 | IX |
| 9. | Less weightage to advance paddy residue management machineries (C9) | 33(18.33) | 49(27.22) | 98(54.44) | 295 | 1.64 | XII |
| 10. | Lack of technical expertise among operators (C10) | 56(31.11) | 73(40.56) | 51(28.33) | 365 | 2.02 | X |
| 11. | During peak seasons, there are not enough CHCs to meet the huge demand (C11) | 67(37.22) | 59(32.78) | 54(30.00) | 373 | 2.07 | VIII |
| 12. | Less number of government custom hiring centres compared to private custom hiring centres (C12) | **91****(50.56)** | **63****(35.00)** | **26****(14.44)** | **425** | **2.36** | **I** |

**3.3 Assessment of services rendered by custom hiring centres to the farmers**

The table 4 presents an assessment of various services provided by Custom Hiring Centres (CHCs) based on farmers' perceptions of their importance. Among the services evaluated, the provision of repairs and maintenance of farm machinery emerged as the most crucial, receiving the highest weighted mean score and ranking first. This indicates that farmers place significant value on the availability of maintenance support to ensure the continuous and effective operation of hired equipment. The availability of an advance booking facility was also highly appreciated, ranking second, suggesting that farmers prefer planning and timely access to machinery. On the other hand, services such as visiting farmers' fields after work completion and the availability of straw management machinery were considered less critical, as reflected by their lower rankings and higher percentages of farmers deeming them "not so serious." Overall, the findings highlighted that while modern equipment and skilled operators are beneficial, farmers prioritize timely maintenance, booking convenience, and service quality when using CHCs services.

The analysis of services delivered by Custom Hiring Centres (CHCs) revealed that farmers prioritize practical and efficiency-oriented features over supplementary services. The highest importance is placed on the **provision of repairs and maintenance,** followed by **advance booking facilities, quality of service,** and **reasonable hiring costs.** These services directly impact operational reliability and ease of access, which are critical during peak agricultural seasons. Conversely, services like **field visits post-operation** and **straw management machinery availability** are seen as less essential, indicating that farmers may not view them as immediate necessities. Therefore, for CHCs to enhance their effectiveness and farmer satisfaction, they should focus on strengthening maintenance support, streamlining booking processes, and ensuring service affordability and quality.

**Table 4: Enumeration of questionnaire process associated with farmers indicating the services rendered by CHCS**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| S. No. | Services delivered by farmers through CHCs | Strongly serious | Serious | Not so serious | Total weighted Score | Weighted mean score | Rank order |
| 1. | Modern and advance machinery/equipment is available in custom hiring services centres (S1) | 13(7.22) | 31(17.22) | 136(75.56) | 237 | 1.32 | VIII |
| 2. | Availability of straw management machineries in custom hiring services centres (S2) | 21(11.67) | 18(10.00) | 141(78.33) | 240 | 1.33 | VI |
| 3. | The advance booking service facility is available in custom hiring services centres (S3) | 47(26.11) | 59(32.78) | 74(41.11) | 333 | 1.85 | II |
| 4. | Proficient drivers and skilled operators are available in custom hiring services centres (S4) | 31(17.22) | 46(25.56) | 103(57.22) | 288 | 1.60 | V |
| 5. | Quality and excellent service is available (S5) | 39(21.67) | 43(23.89) | 98(54.44) | 301 | 1.67 | III |
| 6. | Visiting farmers field after completion of the work (S6) | 16(8.89) | 27(15.00) | 137(76.11) | 239 | 1.33 | VI |
| 7. | Provision of repairs and maintenance of farm machines in custom hiring services centres (S7) | 55(30.56) | 74(41.11) | 51(28.33) | 364 | 2.02 | I |
| 8. | Reasonable and economical cost for hiring machineries in custom hiring services centres (S8) | 27(15.00) | 59(32.78) | 94(52.22) | 293 | 1.63 | IV |

1. **Conclusion**

**The study demonstrates** a strong correlation between farm size and the adoption of mechanized practices. **Small and marginal farmers remain at a disadvantage,** highlighting the need for targeted interventions such as **subsidized machinery, better access to custom hiring centers, and tailored extension services.** Enhancing mechanization for these groups can lead to more efficient farming operations, reduced labor burdens, and improved agricultural productivity across the board.

The reformation in the current scenario can enhance the mechanization level in Bihar

* Expanding government CHCs: Particularly in underserved areas, to balance the dominance of private canters.
* Integrating CHCs with Krishi Vigyan Kendra (KVKs): To improve farmer education, advisory services, and awareness.
* Subsidizing straw and residue management tools: This would help boost adoption and sustainability.
* Promoting CHCs awareness campaigns: To bridge knowledge gaps (Constraint C1).
* Investing in machinery upgrades: Address obsolete equipment (C5) for improved efficiency.

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