

Empowering Marginal And Small Farmers Through Mobile-Based Custom Hiring Services: An Adoption Study

Authors: T. Ramesh^{1*}, Dr. Sharmishtha Deshmukh²

^{1*}Ph.D. Scholar, Global Business School & Research Centre, Dr.D.Y. Patil Vidyapeeth, Pune

²Associate Professor and Research Guide, Global Business School and Research Center, Pune

Abstract:

Empowering marginal and small farmers through mobile-based custom hiring services is crucial for enhancing agricultural productivity and sustainability, particularly in regions with limited access to modern farming equipment and technology. These services, accessible via smartphones, enable farmers to rent farm machinery and equipment on a need basis, thereby reducing the capital investment required to purchase expensive machinery. This model not only improves the affordability and accessibility of advanced agricultural tools for smallholder farmers but also promotes efficient resource use and can lead to increased crop yields and income. Furthermore, by facilitating the sharing of resources among farming communities, mobile-based custom hiring services encourage collaboration and knowledge exchange, contributing to the overall resilience and advancement of the agricultural sector. Adopting such services can significantly impact rural economies, driving growth and reducing poverty among the farming communities that form the backbone of many developing countries. For the present study, data is collected from 140 farmers of the Jalgaon district.

Keywords: Marginal Farmers, Small Farmers, Mobile Services, Custom Hiring Centres.

Introduction:

Marginal and small farms play a crucial role in the agricultural sector, particularly in developing countries where they contribute significantly to food security and rural livelihoods. Understanding these farms' definitions and characteristics helps address their needs and challenges. Marginal farms are defined based on the size of the land under cultivation. While the specific threshold can vary by country, marginal farms typically involve landholdings of less than 1 hectare (about 2.47 acres). The owner and their family usually run these farms with little reliance on hired labor.

Marginal farms often rely on traditional farming methods and are characterized by low productivity and limited access to markets, technology, and credit. The small size of these farms makes it difficult to achieve economies of scale or invest in improvements, leading to a cycle of low income and limited resources for development.

Small farms are generally defined as those with a slightly larger landholding than marginal farms, typically between 1 and 2 hectares (about 2.47 and 4.94 acres), though this can vary by country. These farms are also primarily family-owned and operated. Small farms often face productivity, market access, and investment challenges like marginal farms. However, their slightly larger size may offer better opportunities for diversification and intensification of agricultural activities. Small farmers might be more likely than marginal farmers to adopt improved farming practices and technologies, provided they have access to the necessary resources and support. Both marginal and small farms are critical for the sustainability of rural economies, as they support the livelihoods of a significant portion of the world's population. Efforts to support these farmers, such as through mobile-based custom hiring services, can improve agricultural productivity, income levels, and food security. Despite their challenges, marginal and small farms have the potential for resilience and innovation, especially when given access to appropriate resources, knowledge, and technology.

A Custom Hiring Centre (CHC) is a community-based or entrepreneurial initiative designed to improve access to agricultural machinery and equipment for small and marginal farmers who cannot afford to own such assets. CHCs offer rental services for various farm tools and machinery, including tractors, harvesters, plowing equipment, and irrigation systems. This model enables farmers to utilize advanced farming technologies and practices without the hefty investment in purchasing and maintaining the equipment, thereby reducing operational costs and enhancing productivity. Custom Hiring Centers support agricultural efficiency and productivity and foster community cooperation and resource sharing, contributing to rural farming communities overall sustainability and resilience. By bridging the gap between the availability of modern agricultural technologies and their accessibility for small-scale farmers, CHCs play a crucial role in the modernization of agriculture and the improvement of rural livelihoods.

Mobile Services of CHC: Mobile services of Custom Hiring Centers (CHCs) refer to mobile technology platforms that facilitate the renting and sharing of agricultural machinery and equipment among farmers. These services are typically provided through mobile applications or SMS-based platforms, allowing farmers to access, book, and pay for agricultural

machinery as needed without needing physical travel to the CHC. The mobile platform is an intermediary between equipment owners, CHCs, and farmers, offering a convenient, efficient, and scalable method of accessing farming tools. The providers of these mobile services can vary but often include:

Governmental Agencies: Many governments, recognizing the importance of agricultural modernization for food security and rural development, have launched mobile-based CHC services to support small and marginal farmers.

Private Companies: Agri-tech startups and companies specializing in agricultural services offer mobile platforms for equipment sharing as part of their business models, aiming to connect equipment owners with farmers.

NGOs and Cooperatives: Non-governmental organizations (NGOs) and farmer cooperatives sometimes develop or sponsor mobile services to support their members or target communities, focusing on improving agricultural productivity and sustainability.

These mobile services enable real-time availability checks, offer a wide range of machinery, include transparent pricing, and sometimes provide user reviews to help farmers make informed decisions. Additionally, they can offer educational content on best practices for machinery use and crop management techniques. By leveraging mobile technology, CHCs can significantly enhance the reach and impact of their services, contributing to increased efficiency, cost-effectiveness, and inclusivity in agricultural practices.

Literature Review

1. **Patel, A. (2016)** In the research titled "Digital India Reaching Small, Marginal, and Women Farmers," A digital agriculture ecosystem allows farmers from remote and underdeveloped areas to engage in the global economy, sharing information and fostering local agricultural and economic prosperity in India and around the world. Digital content development and administration would provide timely, relevant information, promoting inclusive growth and competitive agriculture. It would enable two-way exchanges between farmers, agricultural scientists, input dealers, marketing agencies, food processors, credit and insurance agencies, and other stakeholders to advance agriculture technology.
1. **Mapiye, O. et al. (2023)**, In the research titled "Information and communication technologies (ICTs): The potential for enhancing the dissemination of agricultural information and services to smallholder farmers in sub-Saharan Africa," smallholder farmers are crucial to SSA food security and poverty alleviation. They face several ecological, economic, and institutional obstacles, but their most significant issue is inadequate access to relevant and timely agricultural information and services. Lack of knowledge and services hinders their ability to handle daily barriers and seize opportunities. However, the spread of mobile phones, the internet, and mobile network coverage across the region has increased mobile services for rural smallholder farming systems.
2. **Kumar, S. et al. (2020), Extension** In the research titled "Small and marginal farmers of Indian agriculture: Prospects and extension Strategies," Millions of smallholder farmers want to boost agricultural production and market performance. Modernizing extension services can speed up these operations. Extension cannot solve many smallholders' micro- and macro-economic problems. Local governance structures, antiquated land tenure systems, high internal transit costs, low input access, inefficient local administration, and uncoordinated domestic and global trade policies necessitate other supportive solutions.
3. **Inge, K. J., et al. (2023)**, In the research titled "The Essential Elements of Customized Employment: Results from a National Survey of Employment Providers," rehabilitation practitioners' views on CE service delivery are revealed. The results indicate that service providers understand essential CE features like Discovery and job growth but don't consistently implement them properly. Therefore, more study is needed on CE adoption nationally and service recipients' outcomes.
4. **Butterworth, J. et al. (2007)** In the research titled "Community Rehabilitation Programs and Organizational Change: A Mentor Guide to Increase Customized Employment Outcomes," The establishment of a core framework for the development of an effective job support program for those who have severe mental illness is based on these seven founding principles. Many are drawn to the Individualized Placement and Support (IPS) approach when offering job services to these individuals. The principles have immediate repercussions for those who supply employment services, for organizations that purchase employment services, and for individuals who use employment services.
5. **Hasan, M. K. et al. (2020)**, In the research titled "Custom hiring service of reapers for harvesting paddy," Economically, reaper custom hire entrepreneurship depends on operating costs. Payback period (PBP), benefit-cost ratio (BCR), net present value (NPV), and internal rate of return (IRR) showed that reaper investment is profitable and ideal for custom-hire entrepreneur development. The reaper outperforms traditional paddy harvesting financially, and reaper custom hire service (CHS) entrepreneurship is advocated to avoid machine user investment. Reaper paddy harvesting could solve the peak harvesting labor dilemma and reduce harvesting costs, human struggle, and labor engagement. Data analysis suggests inventive farmers, entrepreneurs, and well-organized farmers' organizations can spend their joint capital on services for group members and nearby farms.

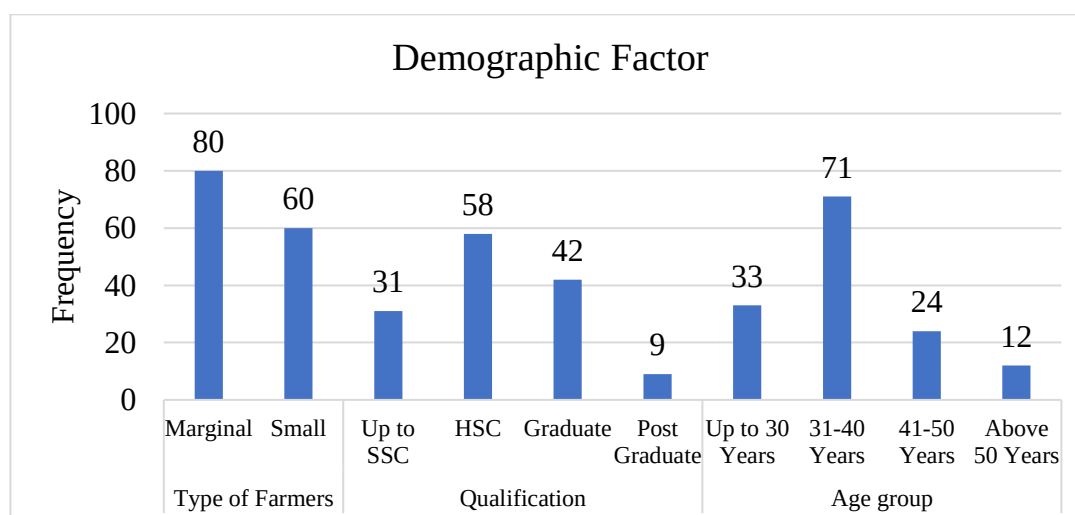
6. **Srinivasarao, C. et al. (2013)** In the research titled "Operationalization of custom hiring centers on farm implements in hundred villages in India," it was shown that farmers' adoption of modern technologies like CHCs was influenced by their owner's education, land ownership, experience, and availability of equipment and machinery. According to farmers' responses, CHCs are 100% beneficial to farmers; 90% are satisfied with their services, 75% say they are nearby, 70% are happy with their machinery, and 64% agree with government pricing. The study also found that CHCs help marginal and small farmers obtain agricultural machinery and benefit most farmers.
7. **Research Methodology:** The study is based on primary and secondary data. Secondary data is used to understand the reviews of the earlier researchers. Research papers from repeated journals related to the present topic are selected for literature review. The convenience sampling method is used for the collection of primary data. Having land under cultivation up to five acres is considered as respondent. The study aims to explore the adoption of mobile-based custom hiring services among the marginal and small farmers in the Jalgaon district. SPSS version 23 is used for the analysis of data. Descriptive statistics such as frequency, percentage, and arithmetic mean standard deviations are calculated to study objectives and test hypotheses. Inferential statistics such as Friedman's Chi-square and independent sample t-test are used.

Data Analysis:

The demographic factor of the study is as follows: The information of 140 farmers is classified according to Type of farmer, qualification, and age, which is classified and presented in the following table.

Sr.no	Demographic Factor	Category	Frequency	Percent
1	Type of Farmers	Marginal	80	57.1
		Small	60	42.9
2	Qualification	Up to SSC	31	22.1
		HSC	58	41.4
		Graduate	42	30.0
		Post Graduate	9	6.4
3	Age group	Up to 30 Years	33	23.6
		31-40 Years	71	50.7
		41-50 Years	24	17.1
		Above 50 Years	12	8.6

The data presents a demographic breakdown of farmers according to their landholding size, educational qualifications, and age groups. Marginal farmers, those with the smallest landholdings, constitute the largest group with 80 farmers, followed by small farmers with 60 farmers, highlighting the prevalence of small-scale farming. In terms of education, a significant number have completed high school (HSC), with 58 farmers, indicating a moderate level of educational attainment among the farmers. Graduates and postgraduates are fewer, with 42 and 9 farmers respectively, suggesting limited higher education. The age distribution shows a concentration in the 31-40 years category with 71 farmers, suggesting that the majority of farmers are in their early to mid-adulthood. The groups of up to 30 years and 41-50 years contain 33 and 24 farmers, respectively, while those above 50 years are the least, with 12 farmers, indicating that older age groups are less represented in this farming community. This information is shown below in the bar diagram.



The following table indicates the Adoption of Mobile Services factor:

Sr.no	Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5.1	It is easy to download app	19	28	44	24	25
5.2	Registration process is simple	38	43	31	13	15
5.3	Navigation is simple	56	30	29	21	4
5.4	Selection of regional language	28	25	28	24	35
5.5	Implement and hiring processes convenient	20	32	18	30	40

Above question are rated as follows:

Strongly Disagree =1

Disagree = 2

Neutral = 3

Agree = 4

Strongly Agree = 5

Using above responses, mean score of Adoption of Mobile Services is obtained using formula given below.

Mean score of Adoption of Mobile Services

$$= \frac{\text{Totalscore of rating of respondent (for 5 statements)} \times 100}{\text{Maximum rating (25)}}$$

Using the above formula mean scores are obtained for each respondent and also for all 140 respondents. Descriptive statistics is as follows:

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Adoption of Mobile Services	140	20	76	56.29	11.611
Valid N (listwise)	140				

The above table indicates that the mean score of Adoption of Mobile Services is 56.29 per cent with standard deviation 11.61, suggesting high variation in the responses.

The following table indicates the Challenges in Adoption factor:

Sr.no	Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
6.1	Connectivity problems	5	12	41	43	39
6.2	Lack of technological knowledge	23	22	11	61	23
6.3	Difficult to remember the process	19	33	31	18	39
6.4	Require help from family members or friends	8	11	12	54	55
6.5	Does not have the required document to process	7	20	26	53	34

The above questions are rated as follows:

Strongly Disagree = 1

Disagree = 2

Neutral = 3

Agree = 4

Strongly Agree = 5

Using the above responses, the mean score of Challenges in Adoption is obtained using the formula below.

Mean Score of Challenges in Adoption

$$= \frac{\text{Totalscore of rating of respondent (for 5 statements)} \times 100}{\text{Maximum rating (25)}}$$

Using the above formula, mean scores are obtained for each respondent and all 140 respondents. Descriptive statistics are as follows:

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Challenges in Adoption	140	20	100	71.06	12.248
Valid N (listwise)	140				

The above table indicates that the mean score of Challenges in Adoption is 71.06 percent with a standard deviation of 12.24, suggesting high variation in the responses.

Objective-1: To study the adoption of mobile services towards custom hiring centers for farmers in the Jalgaon district.

Null Hypothesis H_{01A}: There is no significant difference in the adoption of mobile services towards custom hiring centers according to the qualifications of farmers.

Alternate Hypothesis H_{11A}: There is a significant difference in the adoption of mobile services toward custom hiring centers according to the qualification of farmers.

To Study the above null hypothesis, ANOVA and F-test are applied, and the results are as follows:

ANOVA					
Adoption of Mobile Services					
	Sum of Squares	df	Mean Square	F	P-value
Between Groups	1753.877	3	584.626	4.681	.004
Within Groups	16986.694	136	124.902		
Total	18740.571	139			

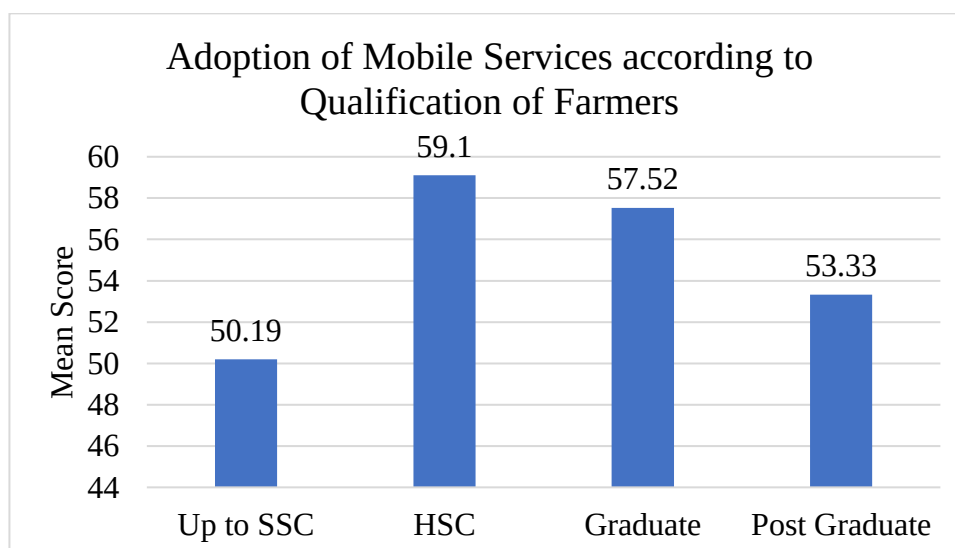
Interpretation: The above results indicate that the calculated p-value is 0.004. It is less than 0.05. Therefore, the F-test is rejected. Hence, the null hypothesis is rejected, and the alternate hypothesis is accepted.

Conclusion: There is a significant difference in the adoption of mobile services towards custom hiring centers according to qualification of farmers.

Finding: The finding of the mean score for qualification of farmers is obtained and presented in the following table:

Report	
Mean	
Qualifications	Adoption of Mobile Services
Up to SSC	50.19
HSC	59.10
Graduate	57.52
Post Graduate	53.33
Total	56.29

The data reflects the relationship between educational qualifications and the adoption of mobile services, showing varying rates across different levels of education. Individuals with education up to the Secondary School Certificate (SSC) level have an adoption rate of 50.19%, while those with a Higher Secondary Certificate (HSC) show a higher rate of 59.10%. Interestingly, the adoption rate slightly decreases for graduates (57.52%) and further for postgraduates (53.33%), suggesting that higher education does not necessarily correlate with higher adoption rates of mobile services. This information is shown below in the bar diagram.



Null Hypothesis H_{01B} : There is no significant difference in adopting mobile services toward custom hiring centers according to the Type of farmers.

Alternate Hypothesis H_{11B} : There is a significant difference in adopting mobile services towards custom hiring centers according to the Type of farmers.

To Study the above null hypothesis, ANOVA and F-test are applied, and the results are as follows:

ANOVA					
Adoption of Mobile Services					
	Sum of Squares	df	Mean Square	F	P-value
Between Groups	1501.038	1	1501.038	12.016	.001
Within Groups	17239.533	138	124.924		
Total	18740.571	139			

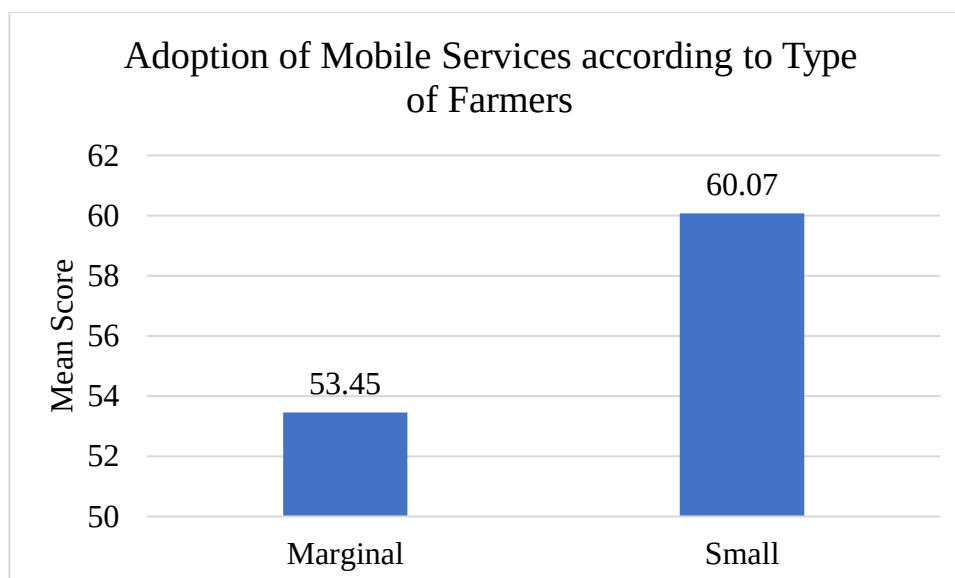
Interpretation: The above results indicate that the calculated p-value is 0.001. It is less than 0.05. Therefore, the F-test is rejected. Hence, the null hypothesis is rejected, and the alternate hypothesis is accepted.

Conclusion: There is a significant difference in the adoption of mobile services towards custom hiring centers according to the Type of farmers.

Finding: The finding of the mean score for the Type of farmers is obtained and presented in the following table:

Report	
Mean	
Type of Farmers	Adoption of Mobile Services
Marginal	53.45
Small	60.07
Total	56.29

The data indicates the adoption rates of mobile services among different types of farmers, with marginal farmers having a 53.45% adoption rate and small farmers at a higher rate of 60.07%. This suggests that small farmers, possibly due to having slightly more resources or access, are more inclined or able to utilize mobile services than marginal farmers, who may face more significant constraints. This information is shown below in the bar diagram.



Objective-2: To study challenges in adopting mobile services toward custom hiring centers for farmers in the Jalgaon district.

Null Hypothesis H_{02A} : There is no significant difference in challenges in the adoption of mobile services toward custom hiring centers according to the qualifications of farmers.

Alternate Hypothesis H_{12A} : There is a significant difference in challenges in the adoption of mobile services towards custom hiring centers according to the qualifications of farmers.

To Study the above null hypothesis, ANOVA and F-test are applied, and the results are as follows:

ANOVA					
Challenges in Adoption					
	Sum of Squares	df	Mean Square	F	P-value
Between Groups	2588.937	3	862.979	6.427	.000
Within Groups	18262.606	136	134.284		
Total	20851.543	139			

Interpretation: The above results indicate that the calculated p-value is 0.000. It is less than 0.05. Therefore, the F-test is rejected. Hence, the null hypothesis is rejected, and the alternate hypothesis is accepted.

Conclusion: There is a significant difference in challenges in the adoption of mobile services towards custom hiring centers according to the qualifications of farmers.

Finding: The finding of the mean score for the qualification of farmers is obtained and presented in the following table:

Report	
Mean	
Qualifications	Challenges in Adoption
Up to SSC	78.45
HSC	67.86
Graduate	69.14
Post Graduate	75.11
Total	71.06

The data illustrates the challenges individuals with different educational qualifications face in adopting new practices or technologies. Individuals with education up to the Secondary School Certificate (SSC) face the highest challenges at 78.45%. The challenges decrease for those with a Higher Secondary Certificate (HSC) at 67.86%, slightly increase for graduates at 69.14%, and then rise significantly for postgraduates to 75.11%. This pattern suggests that the level of education influences the adoption challenges, with the lowest and highest educated groups facing more significant barriers. This information is shown below in the bar diagram.

Null Hypothesis H_{02B} : There is no significant difference in challenges in the adoption of mobile services towards custom hiring centers according to the Type of farmers.

Alternate Hypothesis H_{12B} : There is a significant difference in challenges in the adoption of mobile services towards custom hiring centers according to the Type of farmers.

To Study the above null hypothesis, ANOVA and F-test are applied, and the results are as follows:

ANOVA					
Challenges in Adoption					
	Sum of Squares	df	Mean Square	F	P-value
Between Groups	7869.343	1	7869.343	83.651	.000
Within Groups	12982.200	138	94.074		
Total	20851.543	139			

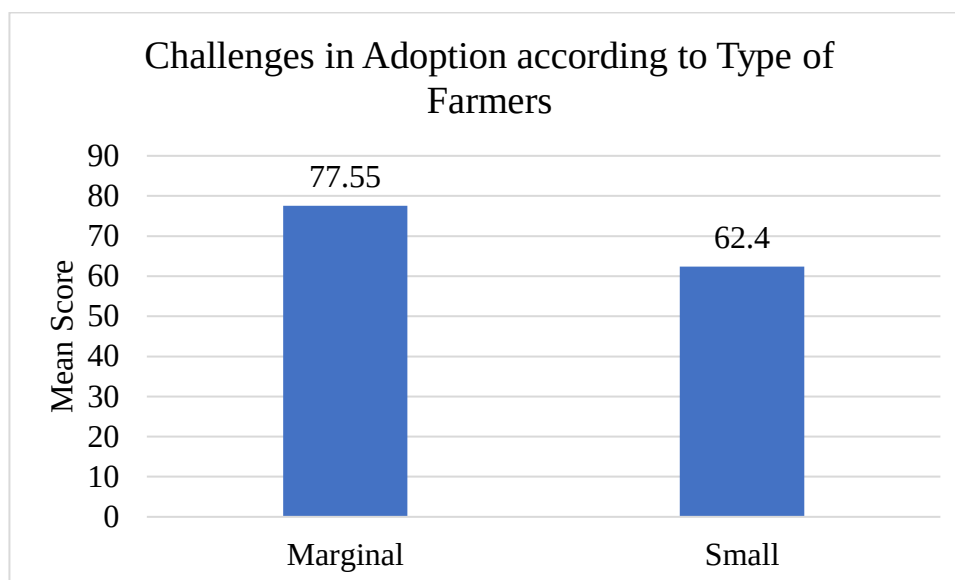
Interpretation: The above results indicate that the calculated p-value is 0.000. It is less than 0.05. Therefore, the F-test is rejected. Hence, the null hypothesis is rejected, and the alternate hypothesis is accepted.

Conclusion: There is a significant difference in challenges in the adoption of mobile services towards custom hiring centers according to the Type of farmers.

Finding: The finding of the mean score for Type of farmers is obtained and presented in the following table:

Report	
Mean	
Type of Farmers	Challenges in Adoption
Marginal	77.55
Small	62.40
Total	71.06

The data shows the challenges marginal and small farmers face in adopting new practices or technologies, quantified as 77.55% and 62.40% respectively. Marginal farmers, with less land and resources, face greater difficulties at 77.55%, indicating significant barriers to improvement. While slightly better off, small farmers still encounter substantial challenges at 62.40%, reflecting the systemic issues in agriculture that impede progress for those with limited landholdings. This information is shown below in the bar diagram.



Findings and Suggestions:

The study examined the demographics and mobile service use habits of 140 marginal and small farmers in Jalgaon, including their educational credentials and age. Marginal farmers made up 57.1% and small farmers 42.9%. Farmers had average education, with many graduating from high school. According to the age distribution, farmers are mostly 31-40 years old. The mean score for mobile service uptake was 56.29%, with the standard deviation reflecting variation. According to the survey, small and highly educated farmers adopted mobile services at higher rates. Connectivity, technology understanding, and process complexity were also considered as mobile service adoption challenges. The average adoption challenge score was 71.06%. However, answers varied. ANOVA showed significant differences in problems based on farmers' education and kind. Marginal farmers and those with lower or higher education experienced more challenges to mobile service adoption, requiring targeted support and interventions. These findings imply that while mobile services may improve agricultural efficiency and output, specialized measures are needed to overcome the challenges different farmer groups face, particularly marginalized or educated ones.

A multifaceted approach is essential to enhance the adoption and effectiveness of mobile-based services. Improvements should bolster internet connectivity and provide robust technical support to mitigate connectivity and technological challenges. Simplifying the user interface and ensuring the availability of services in regional languages will cater to a broader demographic, particularly benefiting those with lower educational qualifications. Educational workshops and hands-on training sessions can bridge the digital literacy gap, empowering farmers to navigate and utilize these platforms confidently. Incorporating feedback from the farming community into service design and development will ensure that mobile services are user-centric and directly address the farmers' needs. Additionally, policy interventions and financial incentives could further encourage the uptake of these technologies, making them more accessible and attractive to marginal and small farmers.

Bibliography

1. Patel, A. (2016). Digital India is reaching small, marginal, and female farmers. *Int. J. Res. Granthaalayah*, 4, 109–121.
2. Mapiye, O., Makombe, G., Molotsi, A., Dzama, K., & Mapiye, C. (2023). Information and communication technologies (ICTs): The potential for enhancing the dissemination of agricultural information and services to smallholder farmers in sub-Saharan Africa. *Information Development*, 39(3), 638–658.
3. Kumar, S., Rao, D. U. M., Thombare, P., & Kale, P. (2020). Small and marginal farmers in Indian agriculture: prospects and extension strategies. *Indian Research Journal of Extension Education*, 20(1), 35–41.

4. Inge, K. J., Sima, A. P., Riesen, T., Wehman, P., & Brooks-Lane, N. (2023). The essential elements of customized employment: results from a national survey of employment providers. *Rehabilitation Counseling Bulletin*, 66(3), 170-185.
5. Butterworth, J., Gandolfo, C., Revell, W. G., & Inge, K. J. (2007). Community rehabilitation programs and organizational change: A mentor guide to increasing customized employment outcomes.
6. Hasan, M. K., Ali, M. R., Saha, C. K., Rahman, M. S., & Alam, M. M. (2020). Custom hiring service for reapers for harvesting paddy. *Journal of the Bangladesh Agricultural University*, 18 (Suppl. 1), 872–879.
7. Srinivasarao, C., Srinivas, S. D. I., Reddy, B. S., Adake, R. V., & Borkar, S. (2013). Operationalization of customs hiring centers on farm implements in 100 villages in India.
8. Rawat, S., Jaiswal, M., Bhalave, K., Vani, D. K., & Rahangdale, C. P. (2020). Assessment Study on Custom Hiring Centers (CHCs) and Their Services for Farmers in Khandwa District of Madhya Pradesh. *Asian Journal of Agricultural Extension, Economics & Sociology*, 38(12), 178–184.
9. Smith, P. (2023). The Evolution of Customized Employment and the Influence of the NDIS on Customised Employment Practice in Australia. *Journal of Health and Rehabilitation Sciences*, 2(2), 1–10.
10. Kalagi, S., Dhananjaya, B., & Kumar, N. (2023). Knowledge of the farmers about mechanized paddy cultivation through Custom Hiring Service Centers (CHSC).
11. Ranjna, N., & Mala, M. (2021). Digital Empowerment of Indian Agriculture. In *Citizen Empowerment through Digital Transformation in Government* (pp. 23–44), Chapman and Hall/CRC.
12. Keil, A., Mitra, A., Srivastava, A., & McDonald, A. (2018). Dynamics of zero-tillage wheat adoption in the Eastern Indo-Gangetic Plains: socially inclusive use through custom-hiring services?
13. Blankertz, L., Magura, S., Madison, E., & Spinelli, M. Customized Employment Supports (CES) Training Manual (V. 4.2).
14. Hemant, D., Poudel, K. R., & Tikaram, B. (2009). Economics of customary hiring of tractor- and tractor-driven farm implements in the Sunsari District of Nepal. In *Proceedings of the 10th International Agricultural Engineering Conference, Bangkok, Thailand, December 7–10, 2009. Role of agricultural engineering in the advent of a changing global landscape. Asian Association for Agricultural Engineering.*
15. Adams, M. D. (2015). Perceptions of Customized Employment Among Employers: A Survey and Focus Group. Utah State University.
16. Mills, L. A. TASH Connections: Volume 38, Issue 2, New Options: Microenterprises and Customized Employment Letters from Our President.