A Smart Rental Model for Affordable Access to Agricultural Equipment: A Sustainable Solution for Small Farmers

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Abstract

The Indian economy mostly depends on agriculture, as it gives a livelihood to the majority of the rural population and is important in the development of the country. Although this is important, smallholder farmers are still experiencing a serious problem of accessing modern agricultural technology and machinery because of the lack of sufficient financial resources. Consequently, they are mostly using traditional methods of farming. Which might not be efficient and long-term sustainable. This gap must be closed by introducing an innovation, affordable and handy. The study aims to assess the ability of a technology-tailored solution to bridge the gap between smallholder farmers and modern farming equipment. The primary goal of the study is to create a mobile-based renting platform upon which farmers will easily locate, book and rent farming equipment at an way that of affordable rate in accordance with their requirements. The study in question is of a mixed-methods nature and incorporates field survey, interviews with farmers and stakeholders, as well as Agri-tech model analysis. The solution is proposed to be worked out in the form of a conceptual framework and tested in terms of its viability, availability, and effect on productivity. Practical value through providing a cheaper alternative to enable farmers, ensure higher crop production, and sustainable activities. With its implementation, the model has the potential to promote the Indian rural economy to a significant level and favorable agricultural development that is inclusive.

Keywords *:* Agriculture, smallholder farmers, smart rental model, sustainable, Rural innovation

1. Introduction

India depends on agriculture as the main sector of the economy, with smallholder farmers taking a big share of the rural population, and in some areas in India, such as in Rayagada, Odisha, where agriculture is the main activity, agriculture is the major occupation. Nonetheless, the small and marginal farmers are experiencing extreme difficulties in accessing modern agricultural machinery because of financial constraints, ignorance, and poor rental infrastructure, and are left with no option but to stick to the traditional methods of farming. This usually leads to poor productivity and reduced sustainability, repeating the cycle of poverty in tribes and rural areas. The solution to these dilemmas is to come up with cheap, accessible, and technology-oriented solutions that will fill the balance between the smallholder farmers and the modern farming gadgets to help them improve productivity in a sustainable manner.

2. Literature Review

Available literature indicates how mechanization plays a very crucial role in enhancing farm productivity, minimizing the amount of labour and enhancing sustainability (Pingali, 2007). Nonetheless, a study by Singh et al. (2019) and NSSO (2018) indicates that high prices and inaccessibility inhibit the use of machinery among small farmers in India. According to Roy and Saha (2021), potential solutions to these barriers include emerging smart rental models, which offer an opportunity to share equipment by using technology platforms, which is not require to be owned but are delivered in a timely and optimized manner.

Digital literacy, inadequate connectivity, and lack of cooperative organization, are further problematic in tribal-dominated districts such as Rayagada, Odisha (Nanda and Sahu, 2022). However, the pilot studies on mobile-based rent-out systems in agricultural activities in states such as Andhra Pradesh and Maharashtra have demonstrated the potential of enhancing the productivity of smallholder farmers and lowering the cost of operations (Kumar & Sharma, 2020). The aim of this research is to put such findings into perspective of Rayagada by developing and pilot testing of smart rental model to suit local requirements.

3. Objectives

To analyze the difficulties that farmers have in obtaining farm machinery in the Rayagada district, Odisha.

To determine the extent of technological preparedness of the smallholder farmers in. Rayagada district, Odisha

To examine the farm choice of farmers in terms of agricultural equipment.

To measure the readiness of the farmers to become customers of the mobile-based rental model.

4. Research Methodology

The current research was based on Rayagada, Odisha, where tribal and smallholder farmers were sampled in different blocks to learn about the accessibility to equipment, their issues, and preferences regarding smart models of rental. The main survey methodology was selected to have all-inclusive data. The study population used was 100 smallholder farmers in Rayagada and the study instrument was a structured questionnaire which included items on demographics and farming details, equipment current use, awareness and access to rental services, challenges and need related to mechanization, preference of smart model of equipment rental in the area, technology awareness and availability of technology, and the feedback on the proposed model of smart equipment rental in the area. The data collection was made through field survey and interviews, and discussions with farmers in order to get more insight into their perception, barriers and expectations in relation to equipment rental systems. Also, the current rental practices adopted in the area were observed, and the researchers could contextualize the quantitative data with the realities on the ground to determine the viability and development of smart models of renting based on tribal and smallholder farmers in Rayagada.

5. Data Analysis and Results

Demographics: 68% were marginal/small farmers. 73% practiced conventional farming because equipment was not available or was too expensive. 82% showed interest in renting equipment in case affordable ones were available.

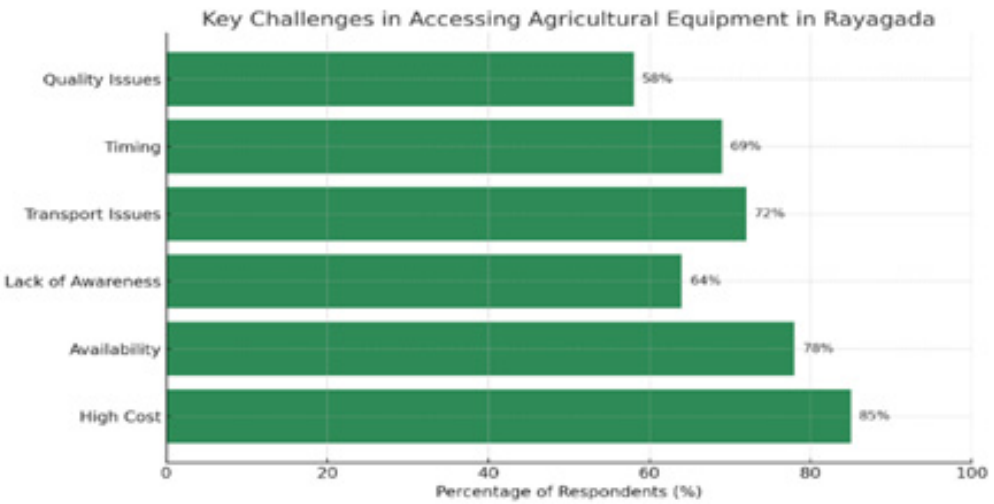
Equipment Usage and Awareness & Access: 21% owned the light equipment (sprayers, ploughs), and more sophisticated equipment, such as tractors and harvesters, were hired infrequently. The sources of rental were not very formal (neighbors or local traders). Awareness of government schemes on renting was limited to 27% and obstacles comprised bureaucracy, time wastage, and transport problems.

Challenges Identified: The major challenges identified during the access to agricultural equipment in Rayagada is quality, high rental prices, lack of awareness, non-availability during high seasons, and not having quality services when required. On top are availability during peak season, rent cost and transport. Besides, digital readiness was average; 58% of the respondents had smartphones, and 44% accessed

apps that provided weather and mandi prices. In addition, 67% of the farmers like verbal instructions. (Figure 1and 2)

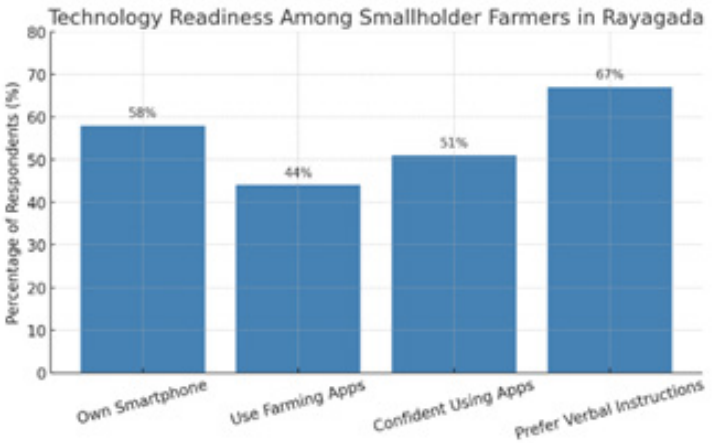
Smart Rental Model Preferences: 76% said they would be willing to use a mobile-based booking program provided there was its availability in local languages with cost-effective transaction fees. There was a strong demand for group-based rentals in order to lower costs (66%). Some of the key features sought were availability in real time, transparent pricing and transport reliability. (Figures 3 and 4)

Figure 1- Key challenges in accessing agricultural equipment in Rayagada



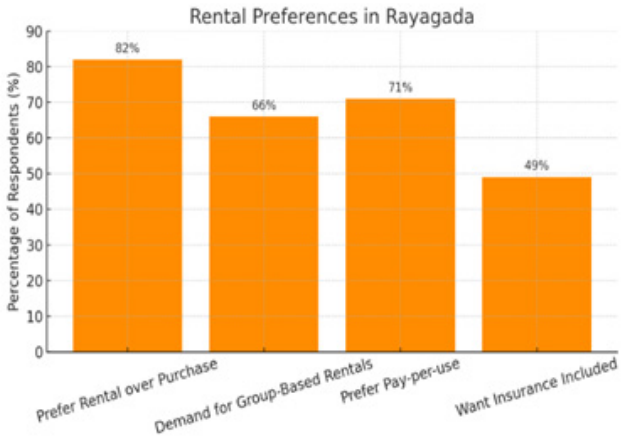
Source: compiled by the authors

Figure 2- Technological Readiness among small farmers in Rayagada.



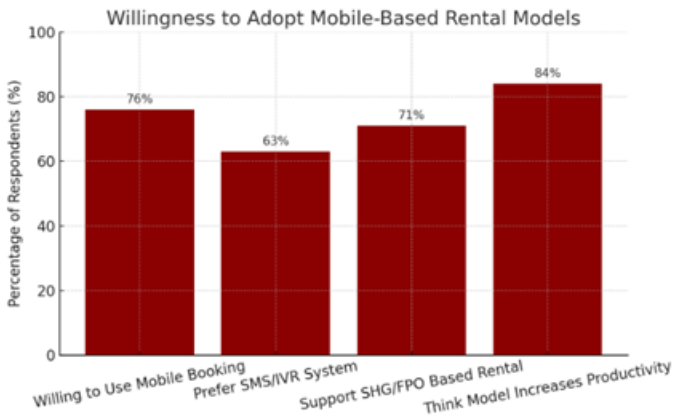
Source: compiled by the authors

Figure 3- Rental Preferences in Rayagada



Source: compiled by the authors

Figure 4- Willingness to adopt mobile-based rental models



Source: compiled by the authors

6. Recommendations

A localized smart rental platform integrated with mobile booking and SMS/IVR systems in Odia and other tribal languages should be created to enhance access of farm mechanization among the tribal and smallholder farmers in Rayagada to match the digital literacy level of the farmers in the region. The encouragement of SHG or FPO-based rental cooperatives will assist in collective bargaining and effective management of equipment that will guarantee community ownership and responsibility. Clear pricing and availability in real time, especially when it is the peak season, is necessary to create trust between the farmers and make them maintain their use of the rental system. The incorporation of transportation

solutions into the rental system shall overcome the logistical obstacles, in that the farmers will find it simpler to get equipment at the farm gate. Cooperation with the government programs and CSR activities may be crucial in subsidizing the initial rental rates and training of the farmers to be able to move to mechanization without financial fears. Also, carrying out digital literacy sessions will also serve to enhance the confidence and ability of the farmers to utilize the mobile applications for equipment rentals and will also see a successful implementation of the smart rental platform in improving agricultural productivity and sustainability in the area.

7. Conclusion

The proposed use of a smart rental model can contribute greatly to the affordable accessibility of modern farming equipment by smallholder farmers in Rayagada, Odisha, where issues of affordability, availability, and accessibility remain significant. When applied to mobile-based applications and community-based cooperatives, this model could lead to greater productivity, less drudgery, and more sustainable agriculture practices in tribal areas, which can help empower rural economies and meet Sustainable Development Goals (SDGs).

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