JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

AN ANALYSIS OF SOCIOECONOMIC DYNAMICS CONTRIBUTING TO RURAL DEVELOPMENT IN MAHARASHTRA WITH REFERENCE TO PUNE, SATARA, NASHIK, AND PALGAR DISTRICTS

This research article is a part of New Research Centre for Agricultural and Rural Studies, (RUSA Sponsored), St. Xavier's College (Autonomous), Mumbai

Dr. Aditi Sawant
Associate Professor & Head, Department of Economics,
Coordinator, New Research Centre for Agricultural and Rural Studies,(RUSA Sponsored)
St. Xavier's College (Autonomous), Mumbai

Ritam Dutta Chowdhury
Research Fellow, Department of Economics
St. Xavier's College (Autonomous), Mumbai

Abstract
The aim of the research paper is to analyze the socioeconomic dynamics viz. gender diversity, financial inclusion, the impact of technology, and access to finance on the production of crops in Maharashtra, with reference to Pune, Satara, Nasik, and Palgar. The research is conducted with primary data, via the survey method of data collection. For analysis of productivity that is crop yielding (Kg/ annum) two regression models and tables are used. The results give a clear indication that technology plays a pivotal role in increasing crop yielding. For, analyzing gender inclusivity in agriculture and allied services stacked graphs and tables are used, generated from Microsoft Excel. It is observed that though women's participation is increasing in allied services there is no presence of women in ownership of fertilizer stores in the districts. Additionally, there is an urgent need for promoting financial literacy and banking schemes for hassle-free financial inclusion in the region.

Keywords: rural development, socioeconomic factors, gender inclusivity, agricultural growth

Introduction

In recent years, rural development in Maharashtra has seen progress on several socioeconomic dynamics such as gender diversity, financial inclusion, and the adoption of technology in agriculture. Financial inclusion remains a critical challenge, particularly in remote and rural areas, where access to formal financial services is limited. The government has launched several schemes such as the Pradhan Mantri Jan Dhan Yojana (PMJDY) to promote financial inclusion and enable access to credit, insurance, and other financial services. The adoption of technology in agriculture, such as precision farming and the use of drones, has led to significant improvements in crop yields in some areas, particularly in commercial agriculture. However, smallholder farmers in remote areas often lack access to these technologies, which can limit their productivity and profitability. Overall, sustained efforts are needed to address these challenges and promote rural development in Maharashtra. (MHDR, 2012).

For the empirical analysis, we considered 4 important districts of Maharashtra viz. Pune, Nashik, Satara and Palghar. Pune, with a population of 9,429,408, has a relatively high literacy rate of 86.15%. However, there are significant gender disparities in literacy rates, with a male literacy rate of 91.35% and a female literacy rate of 80.96%. The main crops in Pune include sugarcane, wheat, grapes, pomegranates, and vegetables. (Census Report 2011)

Nashik, with a population of 6,107,187, has a lower total literacy rate of 82.67%. The gender disparities in literacy rates are more significant in Nashik, with a male literacy rate of 89.54% and a female literacy rate of 75.73%. The main crops in Nashik include grapes, onions, tomatoes, wheat, and soybean. (Census Report 2011)

Satara, with a population of 3,003,741, has a similar total literacy rate of 82.85% as Nashik. However, the gender disparities in literacy rates are not as significant as in Nashik, with a male literacy rate of 89.28% and a female literacy rate of 75.60%. The main crops in Satara include sugarcane, grapes, turmeric, onions, and groundnuts. (Census Report 2011)

Palghar, with a population of 2,990,116, has a total literacy rate of 83.10%. The gender disparities in literacy rates are similar to Satara, with a male literacy rate of 90.13% and a female literacy rate of 75.48%. The main crops in Palghar include rice, wheat, vegetables, and fruits. (Census Report 2011)

Objectives

- To analyze the impact of gender inclusivity on farming and allied businesses
- To analyze the impact of financial inclusion on farming
- To understand the level of technological application in farming

Review of Literature

Dushing, et al. (2022) examined the causal relationship between agricultural productivity and food availability in the Junnar Tehsil region of Pune, Maharashtra. The study found a positive and significant relationship between agricultural productivity and food availability. The authors attribute this relationship to factors such as irrigation facilities, availability of credit, and access to markets. Swami and Parthasarathy (2021) presented that the farmers in Maharashtra perceived climate change as a significant challenge that affects their livelihoods. The farmers reported changes in temperature, rainfall patterns, and the occurrence of extreme weather events such as droughts and floods. The study highlights the need for policymakers to recognize the challenges faced by farmers and to provide support for climate change adaptation. Ramotra & Divate (2018) highlight that while Satara District has made significant progress in agricultural development, similarly there has been non-agricultural development in the Satara tahsil due to the establishment of educational institutes and industries. Improved agricultural practices, high-yielding crop varieties, and modern technologies have been adopted in the district. Ujawane (2017) finds that though there are various government initiatives for rural development, the standard of living of rural people in Maharashtra still remains low due to factors such as poverty, lack of education and healthcare facilities, and inadequate infrastructure. The paper argues that there is a need for a comprehensive approach to rural development that addresses these challenges holistically. Promoting micro-enterprises and agriculture, and empowering rural women and youth through skill development programs are an aid to the development issues. The paper emphasizes the need for effective implementation and monitoring of these strategies to ensure their success. Jayade and Khot (2014) found that farmers are having growth after implementing Information & Communication Technology (ICT) in their farming, even greater than their expectations. The author suggests that the government should intervene and spread more awareness on ICT for farmers. Bachhav (2012) analyzes the importance of access to agricultural information as essential for rural farmers to adopt new farming practices and mitigate crop losses. Newspapers are considered the most easily accessible source due to their availability in local languages, and they publish weekly supplements on various agricultural topics. However, television remains the preferred source of information, highlighting the need to deliver information to farmers at their convenience for productivity gains. Dr. Jadhav (1997) identifies various socioeconomic and cultural factors that have contributed to the alarming rise in farmer suicides in Maharashtra, India. These factors include debt burden, crop failure, and lack of government support, social stigma, and psychological distress. The paper identifies that the Neo-liberal policies of the government and structural inequalities in the agricultural system have created a situation of extreme vulnerability for small and marginal farmers, leading to their distress and eventual suicide.

Methodology

Primary surveys were conducted in 43[1] households across four districts viz. Narayangaon, and Sawargaon villages in Pune, Umbari village in Satara, Wai village in Nashik, and Wada village in Palghar. The parameters considered are Crop Yield (in kgs), level of technology use (application of drone, agro-tech products viz sensors, soil testing and other machinery, mobile app), financial inclusion (mode of transaction cash, cheque, credit, digital payment), Gender Insensitivity (women participation in business participation, financial autonomy, allied business).

Empirical Analysis

1.1 Use of Technology and Crop Yield (in Kg/year)

The new technology in agriculture helps farmers to increase productivity, optimize resource use, mitigate risks, and make data-driven decisions. Hence, we considered parameters such as drones, agro-tech products via sensors, soil testing, and other machinery, and mobile app to assess the impact of technology on crop yield.

Table: 1: Use of Technology and Crop Yield (in Kg / year)

Crop Yield and Technology	Do they use technology? (use of mobile app)		
Crop Yield (in Kg/ year)	**Yes**	**No**	**Grand Total**
50	2	0	2
100	5	1	6
150	2	2	4
200	2	0	2
225	2	0	2
300	4	1	5
500	4	0	4
2722	6	2	8
3629	4	0	4
13607	0	1	1
Grand Total	**31**	**7**	**38**

Source: Primary Data

It is clearly evident from Table 1 that there is a positive relationship between technology use and crop yield. To prove this observation we run a regression equation as follows:

$Y = \alpha + \beta (X)$ ……. **Equation 1.1**

Y= Crop Yield (in Kg/ year)

X= Use of Technology

Crop Yield (in Kg/ year) is the dependent variable, α is the intercept, β is the slope coefficient of the independent use of technology. In absence of use of technology, crop yield (in Kg/ annum) would be α.

After running the regression equation in MS Excel, we get the following results: -

Table 2: Regression Result of Technology use and Crop Yield

	Coefficients	Standard Error	t Stat	P-value
Intercept	1154.774194	425.2577451	2.715469	0.010101
Technology	1666.797235	990.8205612	1.682239	0.101178

Source: Primary Data. Regression Microsoft Excel

The result of regression analysis is substituted in equation 1.1 as follows:

Crop Yield (in Kg) = 1666.79 (Use of Technology) + 1154.77

[1] The total number of respondents are 43, however 5 respondent data were not up to the mark. Hence not included in the analysis and the paper.

From Table 2 and regression equation 2, it is evident that if the farmer decides to do manual work, then the crop yield will be 1154.77kg and if the farmer makes use of technology (use of mobile primarily for weather and crop updates) then the crop yield will be 2821.56 kg. (1154.77 + 1666.79).

Hence it is evident from the results that the use of technology aids in greater crop yield and is profitable for the farmers. Modern farming techniques like the use of drones, sensors, soil-testing kits, and other agro-tech products are of immense help to the farmers. However, the p-value of Technology (mobile app use) is 0.101178 which is greater than 0.05 (statistically insignificant). Hence, it indicates that the level of technological advancement (use of the mobile app) does not suffice enough to upgrade the standard of crop production or productivity.

1.2 Relationship between Crop Yield and Financial inclusion

Financial inclusion of farmers includes access to bank credit, and insurance products, enabling them to invest in their farms, manage their finances more effectively and mitigate the risks associated with farming. Additionally, financial inclusion can help farmers connect with markets and buyers, ultimately leading to improved crop yields.

Table: 3: Financial Inclusion (different mode of transaction) and Crop Yield (in Kg / year)

Respondents	Yield In Kg	D2	Respondents	Yield In Kg	D2	Respondents	Yield In Kg	D2
1	100	1	14	300	0	27	225	1
2	300	1	15	2722	0	28	100	1
3	3629	1	16	500	0	29	200	0
4	2722	1	17	2722	0	30	150	0
5	100	0	18	300	0	31	2722	0
6	50	1	19	13607	0	32	150	0
7	3629	0	20	100	1	33	2722	1
8	225	1	21	300	0	34	500	0
9	100	0	22	3629	0	35	300	0
10	200	0	23	2722	1	36	2722	0
11	150	1	24	100	0	37	500	0
12	2722	0	25	50	1	38	150	0
13	500	0	26	3629	1			

Source: Primary Data

D2: Dummy variable for Financial Inclusivity (0 for only cash, and 1 for more than cash or other modes)

$Y = \alpha + \beta (X)$ ……. **Equation 1.2**

Y = Crop Yield (in Kg/ year)

X = Financial Inclusivity

Crop Yield (in Kg/ year) is the dependent variable, α is the intercept, β is the slope coefficient of the independent financial inclusivity. In absence of financial inclusivity, crop yield (in Kg/ annum) would be α.

After running the regression equation in MS Excel, we get the following results: -

Table 4: Relationship between Crop Yield and Financial Inclusion

	Coefficients	Standard Error	t Stat	P-value
Intercept	1617.708333	500.1203517	3.234638	0.002611
Financial Inclusion	-423.136905	823.9527516	-0.51355	0.610708

Source: Primary Data. Regression Microsoft Excel

The result of regression analysis is substituted in equation 1.2 as follows:

Crop yield (in Kg) = 1617.708333-423.136905 (Financial Inclusion)

From Table 4, farmers use cash as the mode of the transaction then the crop yield is 1617.70 kg. And if multiple modes of transactions are used then the crop yield is 1194.56kg (1617.70 – 423.136). Due to the lack of financial literacy among villagers and fraudulent activities by the non-regulated local financial institutions, using multiple modes of payment decreases their crop yield. The values in Table 3 clearly evident that the majority of the farmers with relatively high yields prefer cash transactions to digital payment. It was also observed that there is a huge

reluctance to use online or digital modes of payment due to a lack of security owing to fraudulent transfers. Hence there is an urgent need for financial literacy in the villages of Maharashtra.

1.3 Financial Interpretation and Source of Capital

Financial Interpretation includes multiple modes of transactions in form of cash, barter system, cheque, digital payments, and a combination of them. The financial interpretation is a representation of the financial literacy in the villages. Further, there are multiple modes for capital sourcing like bank loans, credit, farming, and own business. The survey highlights in Table 5 the source of capital and financial interpretation in the villages as follows:-

Table 5: Financial Transaction/ Interpretation

Table For Financial Interpretation	***Source of capital***					
Mode of financial transaction	**By selling Agri and Dairy products**	**Bank loan**	**Credit**	**Farming**	**Savings/ reserves**	**Grand Total**
Barter	0	0	2	0	0	2
Cash	4	2	7	2	0	15
Cheque	0	0	0	0	1	1
Digital Payments	0	0	0	0	1	1
Cash & Cheque	3	0	0	0	0	3
Cash & Digital Payments	2	0	0	2	0	4
Cash, Digital Payment & Cheque	4	3	0	5	0	12
Grand Total	**13**	**5**	**9**	**9**	**2**	**38**

Source: Primary Data

1.4. Gender Inclusion & Diversity

The economic well-being of people, families, and communities is significantly impacted by gender inclusion, making it a socio-economic element. Men and women can increase their income for themselves and their families by participating in both the formal and informal sectors. Here, we checked the degree of gender inclusivity in agriculture and allied services like animal husbandry, dairy, a combination of both, and fertilizer shops (refer to fig.1). These indicators are selected as allied services of agriculture due to their high demand in the selected areas of the study.

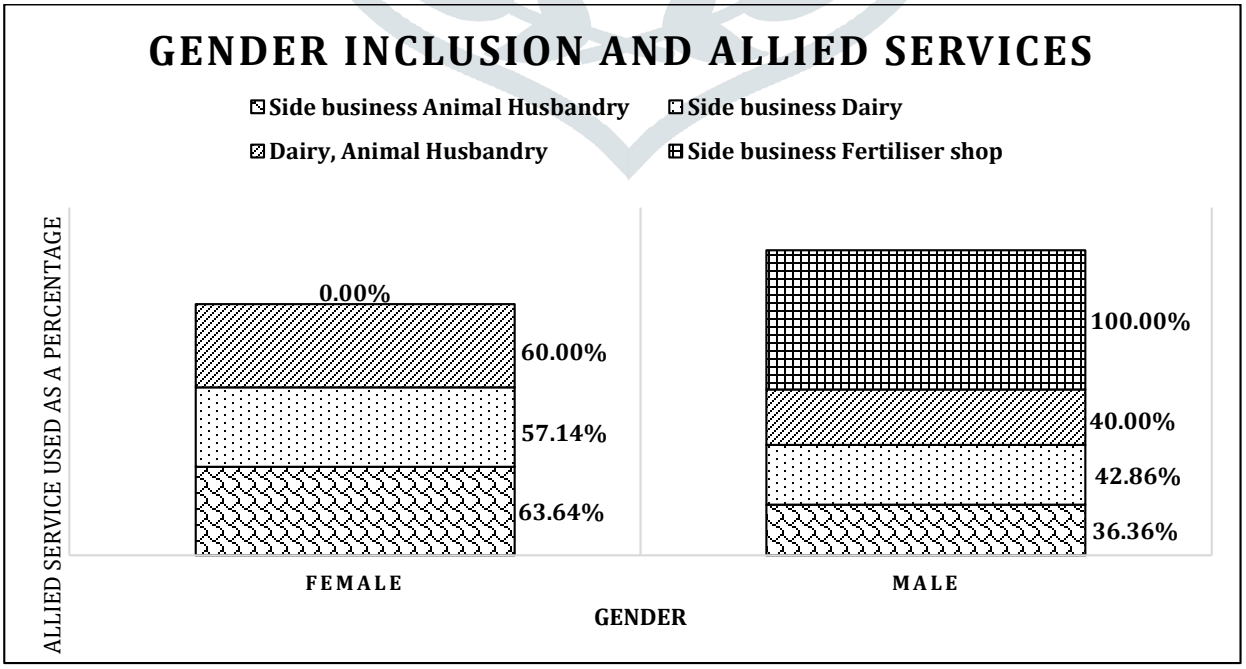

Figure 1: Gender Inclusion & Diversity[1]

Source: Primary Data

Table 6: Gender Inclusion & Diversity[2]

Gender Participation rate	Irrigated Land Ownership
Gender	
Female	42%
Male	57%

Source: Primary Data

In Figure 1, the second source of income (as a percentage) is higher for females. Females engage in animal husbandry and dairy (uniquely and together), as a second source of income, more than males do. 63.64% of females engage in Animal husbandry as a second source of income compared to 36.36%; 57.14% in dairy compared to 42.86%; and, 60% in both compared to 40% in both in case of males. Thus, the promotion of multiple sources of income helped address gender-based income disparities. However, ownership of shops like fertilizers shop is a male-dominated business in the villages. The most important resource that families and communities hold, the land is essential for the growth of agriculture, housing, and businesses. Women's socioeconomic standing can be greatly improved when they have access to land and property rights. The opportunity to earn income and make decisions about their lives, as well as a sense of security and stability, can all be benefits for women who own land. Despite the gender gap in irrigated land ownership (42% women and 58% men), progress toward gender equality is evident.

Conclusion

To sum up, our primary research in 4 districts of Maharashtra throws light on important aspects of farming and socioeconomic dynamics contributing to rural development in the region.

1. The level and extent of technology use are extremely poor and confined to only mobile app use. Mobile apps are used for weather and crop updates.
2. Financial inclusion needs urgent attention as the majority of the farmers to believe in cash transactions and refrain from online and digital payment due to insecurity and fraudulent practices.
3. It is found that women's participation and engagement in allied businesses viz animal husbandry and dairy is remarkably high compared to males. This shows that women are actively engaged in income-generating sources of livelihood.
4. However, it is observed that 100 percent of land ownership is in the name of male family member/s.
5. Women although actively engaged in farming and allied activities are denied the right of equal land ownership.

Policy Suggestions & Recommendations

The government should prioritize **promoting the use of technology and storage facilities for the villages**. There is an urgent need for the inclusion of technology in the agro sector for the rapid growth and development of the villages. As all five villages reported that due to lack of storage, hence, they have to sell all the production at cheap throwaway rates to the middleman, who in return controls the market and sells at a high price to the consumers.

Banking representatives to be present in the villages to create **financial awareness** on Jan Dhan accounts, Insurance schemes, investment/savings options, and account opening. Further, monitoring that easy loans are available is important. The paper has analyzed that none of the farmers use bank loans as their source of credit, and hence face fraudulent activities like high-interest rates and unfair barter systems carried by the creditors.

Government should introduce **policies w.r.t crop insurance**. As private crop insurance companies often cheat the farmers with complicated legal regulations and loopholes in the contract. In spite of paying high insurance, the farmers get no proper crop protection and returns in case of damage. In case of losses due to monsoon/ any disaster, farmers should get at least 25% more than the invested amount (accumulation of labor cost, farming cost, and other expenditures) as an insurance cover.

Promotion of **agro-tourism** in the villages for the additional flow of revenue. The villages of Maharashtra consist of rich biodiversity and authentic cultural experiences. If a tourism model is being built that will help the local artisan and craftsman alongside local tour operators.

There should be a presence of at least one **NGO and self-help group** in the villages to ensure adequate women representation, children & women's safety, and in ensuring basic education, healthcare facilities, and other minimum requirements of the villagers. These NGOs can work as PMUs (project monitoring units); for all the government schemes and evaluations in the village.

Reference

Amrutrao, S. A. (2019, November). *Association of Financial aspects in agricultural industry related to farmers: In connection to farmer suicide in Maharashtra*. INTERNATIONAL JOURNAL OF RESEARCH CULTURE SOCIETY. Retrieved March 17, 2023, from https://www.researchgate.net/profile/Suyog-Amrutrao/publication/340335151_Association_of_Financial_aspects_in_agricultural_industry_related_to_farmers_In_connection_to_farmer_suicide_in_Maharashtra

Dushing, A. J. (2020, October). *A Geographical Study of Crop Combination in Junnar Tahsil*. International Journal of Advanced Research in Science, Communication and Technology (IJARSCT). Retrieved March 17, 2023, from https://ijarsct.co.in/Paper516.pdf

Home | Government of India. (n.d.). https://censusindia.gov.in/census.website/

Jadhav, N. (2008, July). *FARMERS' SUICIDE and DEBT WAIVER an ACTION PLAN for AGRICULTURAL DEVELOPMENT OF MAHARASHTRA*. Retrieved March 7, 2023, from http://www.drnarendrajadhav.info/new_version/drnjadhav_web_images/Farmers'SuicideReport(English).pdf

Jayade, K. G., & Khot, P. G. (2014). *IMPACT OF ICT AND MOBILE TECHNOLOGY IN AGRICULTURE IN MAHARASHTRA*. International Journal of Emerging Technologies in Computational and Applied Sciences (IJETCAS). Retrieved March 17, 2023, from https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=7690ec7eed7cb348a5f03c6c77a2ad5e467e56c8

Planning Department, Government of Maharashtra & Center for Human Development, YASHADA. (2012). *Maharashtra Human Development Report 2012*. Retrieved March 2, 2023, from https://mahasdb.maharashtra.gov.in/docs/pdf/mhdr_2012.pdf

Swami, D., & Parthasarathy, D. (2021). Dynamics of exposure, sensitivity, adaptive capacity and agricultural vulnerability at district scale for Maharashtra, India. *Ecological Indicators*, *121*, 107206. https://doi.org/10.1016/j.ecolind.2020.107206