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# Perceived Constraints of Organic Turmeric Farmers in Kandhamal District of Odisha

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**ABSTRACT**

The study was conducted in 2019 to know the constraints perceived by the organic turmeric farmers in the Kandhamal District of Odisha. The study considered 7 major dimensions under which 30 constraints were considered; data was suitably analyzed with the help of principal component analysis. The result of these 7 dimensions of constraints is further divided into several components based on Eigenvalue. Under general constraints, 4 components identified with Eigen Value 3.055, 1.871, 1.278, 1.058 sequentially leveled as scarce organic manure, inaccessible microbiological tools, poor resource quality, and water scarcity. In technological constraints, two components with Eigenvalue 2.498 and 1.518 leveled as costly input with poor knowledge support and biotic stress, respectively. In Extension activity constraints, two components were identified: inadequate Training and improper Training, with Eigenvalues 1.115 & 1.032, respectively. In the case of the remaining 4 main areas, organic market constraints, economic constraints, social constraints, and other constraints, only one component was identified with Eigenvalue 4.623, 1.780, 1.506, 1.318, respectively.

## INTRODUCTION

Turmeric is an important cash crop for thousands of tribal farmers in the Kandhamal district of Odisha. The southern district is generally clogged with hills and forests and is blessed with appropriate agro-climatic conditions for turmeric cultivation. People familiar with the crop and its economic importance report that around 50,000 farmers were growing turmeric without applying chemical fertilizers or pesticides on approximately 25,000 hectares, and give a yield of more than 26,000 metric tonnes of dry turmeric per year (Mohanty, 2021). Turmeric of Kandhamal contains 2-3 per cent curcumin, 12.15 per cent oleoresin, and 5.3 per cent volatile oil (Project report KASAM), the highest among other varieties. It has a powerful aroma and higher medicinal value, making it popular in domestic and international markets. As per the report of the Trade Promotion Council of India (TPCI) 2019, India is the largest producer and exporter of turmeric (Pushp, 2019). Odisha accounts for about 21 per cent of India's turmeric area, and more than half of this is in Kandhamal. In 2019 during my research study, the 'Kandhamal Haldi'a variety of turmeric grown in the Kandhamal district got Geographical Indication (GI) tag (Behera, 2019).

The primary source of income for tribal farmers in Kandhamal is the turmeric crop. Tribal farmers are socio-economically and educationally backward compared to non-tribal farmers (Chetri et al., 2020). Turmeric is typically grown in uplands, hill slopes, and even hilltops where shifting cultivation (PODU) is practiced; however, some farmers continue to rely on traditional methods (Sharma, 2013). But farmers need to test and improve their

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indigenous technical knowledge with modern technologies (Babu et al., 2013) to increase the yield. Farmers have always been forced to sell the harvest at a minimum price. As a result, most district farmers sell turmeric at Rs. 30-35 per kg. This price is half of the market rate. The state government-run cooperative agency, Kandhamal Apex Spices Association for Marketing (KASAM), promotes turmeric cultivation in the district, which offers Rs. 60 per kg. This price is the least assured price fixed by the district administration. However, KASAM is buying little, so all the farmers are not benefited. There are also numerous age-old challenges associated with turmeric cultivation. So to identify the several constraints faced by the tribal farmers of the Kandhamal district of Odisha, this study was undertaken to explore the constraints of the turmeric growers for sustainability in organic turmeric cultivation.

## METHODOLOGY

This study was conducted in the Kandhamal district of Odisha. The methodology suggested by Kerlinger (1966); Ray & Mondal (2011) was followed with modifications. Kandhamal district was purposively selected. Two blocks, i.e., Phiringia and Tikabali, were selected, and two villages from each block and 25 farmers from each village were selected through a random sampling method. Thus a total of 100 farmers were selected for this study as respondents. Data were collected from the primary sources (respondents) with the aid of a structured interview schedule, and data analysis was done with the help of ranking and PCA. A similar method of analysis is also used by Gupta et al., (2021); Paine et al., (2021) & Gupta et al., (2020). To measure the significant constraints, a suitable schedule consists of constraints under 7 major dimensions of constraints, such as general constraints, technological constraints, extension activity constraints, social constraints, organic market constraints, economic constraints, and other constraints. Each main constraint was further divided into sub-areas, and the respondents were asked to indicate whether they were facing those constraints or not. Score 2 and 1 was given for positive and negative response, respectively.

## RESULTS AND DISCUSSION

Table 1 indicates that BTS test values of general constraints (BTS 437.825 and the significance point in P=0.00), technological constraints (BTS 297.999 and the significance point in P=0.00), extension activity constraints (BTS 1.799 and the significance point in P=0.00), social constraints (BTS 28.826 and the significance point in P=0.00), organic Market constraints (BTS 575.921 and the significance point in P=0.00), economic constraints (BTS 91.555 and the significance point in P=0.00) and other constraints (BTS 10.400 and the significance point in P=0.00) showed that all the constraints of the turmeric farmers were suitable for analysis of principal component. Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) gave the values of general constraints (0.521), technological constraints (0.455), extension activity constraints (0.476), social constraints (0.500), organic market constraints (0.899), economic constraints (0.500), and other constraints (0.500) which showed that the constraints of the turmeric growers had adequate items. Both tests favored the adequacy of principal component analysis.

From Table 2, it is revealed that general constraints were categorized into four components based on Eigen values. In general constraints component 1 (levelled as scarce organic manure) had higher Eigenvalue of 3.055, a variance percentage of 30.553, and a cumulative percentage of 30.553 and under this component unavailability of green manuring material (0.915) was the major problem followed by unavailability of adequate amount of compost of 0.826. The second component, leveled as an inaccessible microbiological tool, has Eigenvalue of 1.871, a variance percentage of 18.706, and a cumulative percentage of 49.259 and under this unavailability of different type of bio fertilizers (0.851) was major problem followed by, unavailability of biocontrol agents (0.830) and low percentage germination of the crop seeds (0.639). A similar result was also found by Jayanthi and Vaideke (2015). The third component (leveled as poor resource quality) had an Eigenvalue of 1.278, a variance percentage of 12.779, and a cumulative percentage of 62.038, the next major general constraint. The component consists of 3 items such as poor water retention capacity of the soil (runoff losses) of 0.815 major problems followed by non-availability of labour in time (0.784) and unavailability of quality seed in proper time (0.622). The fourth component (leveled as water scarcity) has an Eigenvalue of 1.058, a variance percentage of 10.585, and a cumulative percentage of 72.623, and under this, unavailability of water at the proper time (0.934) was the major problem.

Technological constraints categorized into two components based on Eigenvalues, more than one shown in Table 2. The first component (leveled as costly inputs with poor knowledge support) was major technical constraint as it has a higher Eigenvalue of 2.498, a variance percentage of 49.970, and a cumulative percentage of 49.970 than the second component. The component consists of three statements: the high cost of organic inputs (0.908) was a major problem, followed by the Lack of support from the extension agents of 0.855 and the Lack of knowledge about the proper organic method of cultivation of turmeric of 0.759. The second component (leveled as biotic stress) has an Eigenvalue of 1.518, a variance percentage of 30.363, and a cumulative percentage

**Table 1.** KMO and Bartlett's test for constraints perceived by the turmeric growers

| Constraints | General | Technological | Extension activity | Social | Organic market | Economic | Other |
|---|---|---|---|---|---|---|---|
| Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) | 0.521 | 0.455 | 0.476 | 0.500 | 0.899 | 0.500 | 0.500 |
| Bartlett's Test Approx. $\chi^2$ of Sphericity | 437.825 | 297.999 | 1.799 | 28.826 | 575.921 | 91.555 | 10.400 |
| d.f. | 45 | 10 | 3 | 1 | 15 | 1 | 1 |
| Sig. | 0.000 | 0.000 | 0.615 | 0.000 | 0.000 | 0.000 | 0.001 |

**Table 2.** Principal component factor analysis (varimax rotation), factor loading, and commonalities of different constraints perceived by the organic turmeric growers

| S.No. | General constraints | Rotated component matrix [a] | | | | |
|---|---|---|---|---|---|---|
| | | Component | | | | Communalities |
| | | 1 | 2 | 3 | 4 | |
| 1 | Unavailability of green manuring material | 0.915 | | | | 0.860 |
| 2 | Unavailability of adequate amount of compost and FYM | 0.826 | | | | 0.821 |
| 3 | Un availability of different type of bio fertilizers. | | 0.851 | | | 0.770 |
| 4 | Unavailability of biocontrol agents. | | 0.830 | | | 0.827 |
| 5 | Low percentage germination of the crop seeds | | 0.639 | | | 0.481 |
| 6 | Poor water retention capacity of the soils. (Runoff losses) | | | 0.815 | | 0.854 |
| 7 | Non-availability of labour in time | | | 0.784 | | 0.740 |
| 8 | Unavailability of quality seed in proper time | | | 0.622 | | 0.654 |
| 9 | Unavailability of water at proper time | | | | 0.934 | 0.894 |
| | Eigenvalues | 3.055 | 1.871 | 1.278 | 1.058 | |
| | Percentage of variance | 30.553 | 18.706 | 12.779 | 10.585 | |
| | Percentage Cumulative | 30.553 | 49.259 | 62.038 | 72.623 | |
| | Technological constraints | Component | | | | Communalities |
| | | 1 | 2 | | | |
| 1 | High cost of organic inputs | 0.908 | | | | 0.737 |
| 2 | Lack of support from the extension agents | 0.855 | | | | 0.680 |
| 3 | Lack of knowledge about proper organic method of cultivation of turmeric | 0.759 | | | | 0.825 |
| 4 | Incidence of more disease and pest | | -0.898 | | | 0.836 |
| 5 | Weed problem | | 0.886 | | | 0.938 |
| | Eigenvalues | 2.498 | 1.518 | | | |
| | Percentage of variance | 49.970 | 30.363 | | | |
| | Percentage cumulative | 49.970 | 80.333 | | | |
| | Extension activity constraints | Component | | | | Communalities |
| | | 1 | 2 | | | |
| 1 | poor contact of extension workers with farmers | 0.760 | | | | 0.662 |
| 2 | Lack of proper training facility | -0.733 | | | | 0.639 |
| 3 | Lack of timely and appropriate transfer of technology for organic farming. | | 0.919 | | | 0.845 |
| | Eigenvalues | 1.115 | 1.032 | | | |
| | Percentage of variance | 37.163 | 34.384 | | | |
| | Percentage Cumulative | 37.163 | 71.547 | | | |
| | Organic market constraints | Component 1 | | | | Communalities |
| 1 | Get less price for the produce | 0.959 | | | | 0.787 |
| 2 | Distance between producer and market or delivery point | 0.939 | | | | 0.883 |
| 3 | Lack of organic marketing network | 0.887 | | | | 0.921 |
| 4 | Presence of middle man | 0.873 | | | | 0.762 |
| 5 | Lack of processing facility | 0.799 | | | | 0.639 |
| 6 | Lack of proper storage facility | 0.795 | | | | 0.632 |
| | Eigenvalues | 4.623 | | | | |
| | Percentage of variance | 77.049 | | | | |
| | Percentage Cumulative | 77.049 | | | | |
| | Economic constraints | Component 1 | | | | Communalities |
| 1 | Unavailability of loan during Proper time | 0.943 | | | | 0.890 |
| 2 | Getting less Benefit | 0.943 | | | | 0.890 |
| | Eigenvalues | 1.780 | | | | |
| | Percentage of variance | 89.019 | | | | |
| | Percentage Cumulative | 89.019 | | | | |

*Table 2 contd...*

| | Social constraints | Component 1 | Communalities |
|---|---|---|---|
| 1 | Poor condition of the farmer | 0.868 | 0.753 |
| 2 | Lack of Education | 0.868 | 0.753 |
| | Eigenvalues | 1.506 | |
| | Percentage of variance | 75.296 | |
| | Percentage Cumulative | 75.296 | |
| | Other constraints | Component 1 | Communalities |
| 1 | Natural hazards | 0.812 | 0.659 |
| 2 | Poor return as compare to organic method of cultivation | 0.812 | 0.659 |
| | Eigenvalues | 1.318 | |
| | Percentage of variance | 65.904 | |
| | Percentage Cumulative | 65.904 | |

of 80.333. The component consists of two statements, and between these two incidences of more disease and pest, 0.898 was a major problem, followed by a weed problem of 0.886. Similar constraints were also identified by Karthik and Amaranth (2014).

In the case of extension activity constraints, two components were identified as per Eigenvalues higher than one. The first component leveled as inadequate Training was major extension activity constraint and had an Eigenvalue of 1.115, a variance percentage of 37.163, and a cumulative percentage of 37.163. The component is constructed from two constraints, the major problem under this was poor contact of extension workers with farmers (0.760), which has the highest factor loading, and the other one was the Lack of proper training facility (7.33). The second component (leveled as improper Training) has eigenvalues of 1.032, a percentage of the variance of 34.384, and a cumulative percentage of 71.547. It consists of only one constraint factor i.e., Lack of timely and appropriate transfer of technology for organic farming (0.919).

It is evident from Table 2 that organic market constraints had only one component with Eigenvalue more than one. The component has an eigenvalue of 4.623, a percentage of the variance of 77.049, and a percentage cumulative of 77.049. The component comprises of several constraints factors such as get less price for the produce (0.959) was the major problem followed by distance between producer and market or delivery point (0.939), Lack of organic marketing network (0.887), presence of middle man (0.873), Lack of processing facility (0.799) and Lack of proper storage facility (0.795). Sahoo & Sarangi (2018); Shasani et al., (2020) also reported similar constraints.

Economic constraints had only a single component and eigenvalues greater than one. Here the component has Eigenvalues of 1.780, a percentage of the variance of 89.019, and a percentage cumulative of 89.019. The principal component consists of two constraint statements, such as the unavailability of a loan during the proper time and getting less benefit with the same factor loading value (0.943). These two problems were equally important in economic constraints.

Social constraints had only one component that has Eigenvalues greater than one. Here the component has Eigenvalues of 1.506, a percentage of the variance of 75.296, and a percentage cumulative 75.296. The principal component consists of two constraint statements, such as the poor condition of the farmer and Lack of education with equal loading (0.868), so both the problem play equal importance in social constraints.

It is clear from Table 2 that other constraints had only one component, which had an eigenvalue of more than one. Here the component has Eigenvalues of 1.318, a percentage of the variance of 65.904, and a percentage cumulative of 65.904. The principal component comprises two constraint statements, such as natural hazards and poor return compared to the organic cultivation method (0.812).

## CONCLUSION

In the study through PCA of the seven major constraints, it was concluded that the unavailability of green manuring material, unavailability of different types of biofertilizer, runoff loss, and unavailability of water at the proper time was major general constraints under 4 components. The high cost of organic inputs and the incidence of more diseases and pests were major technological constraints under two components. While in the case of extension activity constraints, inadequate Training was the major constraint. Getting less price for the produce was a major organic market-related constraint, unavailability of loans during the proper time was major economic constraint, poor condition of the farmers was major social constraints and natural hazard was major constrains among other constraints faced by the farmers. To address these issues, government and the other institutions should focus on these tribal hotspots to give them support so that they do not divert to other means of income and thus preserve the age-old traditions.

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