

## Original Research Article

# Computational analysis of socioeconomic status of women vermicompost-producing farmers of Raipur district of Chhattisgarh

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**Abstract:** Vermicompost is a great choice for organic manures as a soil amendment input. Female entrepreneurship is one of the most significant contributors to the growth of any economy. New businesses contribute to the construction of a successful business environment through economic growth, the creation of novel employment possibilities, and innovations in methods of production and products. Even though the share of women-owned and operated businesses in India has been growing gradually over the years, their overall representation continues to be very low. In this research, a computational analysis of the socioeconomic status of 134 women vermicompost producers was evaluated by using a pre-tested questionnaire to interview these women about various key independent and dependent characteristics. The findings were separated, correlated, and evaluated with averages and percentages as needed. The study concluded that vermicomposting improved rural women's societal power, as demonstrated by their ability to pay for their families' educational requirements and their economic contribution.

**Keywords:** vermicompost; entrepreneurship; variables; socioeconomic

## 1. Introduction

With the aid of earthworms, a straightforward technique known as vermicomposting, worm composting, or worm manure turns partially degraded organic wastes into organic compost. Organic farming is growing more and more popular, but managing organic waste is also becoming a major concern. Worm manure is the most effective way to combine these. One of the finest substitutes for using organic manures as a soil amendment is worm composting. Though producing worm manure is a practical way to boost farm income, not enough problem analysis and research have been done on the manufacturing, processing, and marketing of worm composting.

A biotechnological method for composting a variety of organic waste materials is vermicomposting<sup>[1]</sup>. It contains specific kinds of earthworms that improve the conversion of trash into vermicompost, an extremely valuable final product of excellent quality<sup>[2]</sup>. Identical to composting, it involves bio-oxidative processes and the stabilization of organic waste; interactions between earthworms and microbes are also a part of this process, though not as much as in worm composting. While earthworms shred and consume fresh organic material, worms also contribute to a larger microbial population through the synthesis of enzymes that promote the biochemical degradation of organic materials. Further to the aforementioned, earthworms influence different microflora and microfauna individuals through their interactions with other soil organisms<sup>[3]</sup>.

Vermimanure and composting share a lot in common, but they also differ greatly, as various assessments have pointed out<sup>[4]</sup>. These distinctions include worm manure's lack of the thermophilic phase, which reduces pathogens<sup>[5]</sup>, vermicompost's higher water content requirements, and worm compost's superior end-product

quality, which manifests in its increased positive effects on the soil's physical characteristics and plant growth<sup>[6]</sup>. Since worm compost can be used to reduce waste and has the potential for use in remediation, turning industrial waste into worm compost is crucial for pollution monitoring and management<sup>[7]</sup>.

Worm compost, also known as vermicompost, also increases plant yield and growth, among its many other positive impacts on plants. Because it is utilized as manure and for sustainable growth, it is crucial for horticulture and agriculture as well<sup>[8]</sup>. One of the most essential elements of any economy's growth is female entrepreneurship. By stimulating economic growth, creating new job possibilities, and innovating in product and process production, new businesses help to create a dynamic business environment<sup>[9]</sup>.

According to estimates, women who are entrepreneurs in the vermicomposting industry now make up around 10% of all Indian entrepreneurs, a ratio that is anticipated to be rising annually. Women will probably make up 20% of the entrepreneurial workforce in five more years if current patterns continue. The current climate presents a great chance for driven and innovative women to launch their businesses, as corporations are willing to work together to promote women-owned enterprises, and a variety of banks and non-governmental groups are willing to assist them in their endeavors. Though their share of economic activities in India has grown over time, the overall number of businesses owned and operated by women is still very small. Experts expounded on the idea that, in addition to economists, high-level labor force expansion—that is, the emergence of entrepreneurs—has replaced the pace of capital creation as the primary driver of economic growth.

Aside from men, women's strong traits—such as their capacity to oversee corporate operations, their dedication to excellence, their tolerance, and their kindness toward others—contribute greatly to the progress of entrepreneurship. It is untrue to express that women are incapable of being successful managers<sup>[10]</sup>. Since mothers create the budget, carry it out, and achieve outcomes in their daily activities, they are genuinely the most powerful administrators in our society. This makes it possible for women to run their enterprises with the same level of competence as men.

Indian women entrepreneurs, whether they are aspiring or established, have enormous potential and may make significant contributions to the country's economic growth. Although there are still some limitations, women entrepreneurs are no longer limited to traditional industries like knitting, sewing, and tailoring. Instead, they must pursue entrepreneurship and obtain financial support. They choose careers in electronics, engineering, and computing. They have persevered in their entrepreneurial endeavors with bravery, resolve, vision, and perseverance. The choices and preferences of family members have a significant impact on the businesses founded by women. The overall expansion of female entrepreneurs and their businesses depends on the participation of women in business management. Therefore, to plan for appropriate interventions, it is imperative to investigate the extent to which women entrepreneurs were active in the management of the companies they owned. To better understand the socioeconomic background of self-help group women in Raipur District and the several aspects of micro-enterprises that these women have started, current investigations have been undertaken.

The farmers who received this training and are implementing this technology were the main focus of the current study. Keeping all of this in mind, the current investigation was conducted with the help of the following particular objectives:

- To investigate the trainees' profile.
- For assessing the trainees' understanding of vermicomposting technology.

## 2. Materials and methods

The study took place in Chhattisgarh's Raipur district. At 298.15 m above sea level, it is located between latitudes 21°25' and 81°62' longitude. The four blocks that together make up the Raipur district—Arang, Tilda, Dharsiwa, and Abhanpur—were chosen for the present study since Krishi Vigyan Kendra Raipur provided further programming instruction as well as presenting vermicompost technology demonstrations relative to alternative productions<sup>[11]</sup>. Greater than 200 vermicomposts are generated by women in this neighborhood who are part of self-help groups and can earn their existence. The current study focused on 12 FIG's self-help groups, totaling 134 members. A pre-tested questionnaire was employed for the interviews, and data on the women's literacy level, land holding status, livelihood status, type, size, and composition, and livestock inventory were gathered. The information was calculated, sorted, and investigated, using percentages and averages as needed. When necessary, arcsine or square root conversions were applied to the percentage data, putting it through a significance test. Karl Pearson's formula was used in determining and testing this survey.

## 3. Results and discussion

According to the data displayed in **Table 1**, of the total number of vermicompost respondents, 26.12% belonged to the young age group, 38.06% to the middle age group, and 35.82% to the senior age group. As a result, a greater number of respondents (38.06%) were middle-aged.

**Table 1.** Socio economic attributes of respondents.

| Sr. No | Age group               | No. of respondents | Percentage % |
|--------|-------------------------|--------------------|--------------|
| 1      | Young (up to 25 years)  | 35                 | 26.12        |
| 2.     | Middle (26 to 35 years) | 51                 | 38.06        |
| 3.     | Old (above 35 years)    | 48                 | 35.82        |
| Total  |                         | 134                | 100          |

**Table 2** shows that of the total respondents, 20.14% were uneducated, while 32.08% possessed higher education and could read and write. On the other hand, 17.91% had just finished primary school, 21.64% had finished middle school, and 8.20% had completed high school or above. Therefore, it can be said that those who responded with vermicompost had a greater percentage (32.08%) of the ability to read and write.

**Table 2.** Distribution of vermicompost respondents according to their education level.

| Sr. No. | Education level                                  | No. of respondents | Percentage % |
|---------|--|--------------------|--------------|
| 1.      | Illiterate                                       | 27                 | 20.14        |
| 2.      | Can read and write                               | 43                 | 32.08        |
| 3.      | Primary  | 24                 | 17.91        |
| 4.      | Middle   | 29                 | 21.64        |
| 5.      | High School, intermediate and graduate and above | 11                 | 8.20         |
| Total   |  | 134                | 100          |

**Table 3** revealed the distribution of vermicompost respondents according to their source of income which indicated a steady growing market in agriculture.

**Table 3.** Distribution of vermicompost respondents according to their source of income.

| Sr. No. | Activities/occupation | No. of respondents | Percentage % |
|---------|-----------------------|--------------------|--------------|
| 1.      | Agriculture           | 6                  | 4.47         |
| 2.      | Animal husbandry      | 20                 | 14.92        |
| 3.      | Labor                 | 31                 | 23.13        |
| 4.      | Horticulture          | 26                 | 19.4         |
| 5.      | Business              | 26                 | 19.4         |
| 6.      | Others                | 25                 | 18.65        |
| Total   |                       | 134                | 100          |

**Table 4** shows the respondents’ economic motivation which indicated orientation towards a better lifestyle by earning through warm compost.

The correlation matrix for all four blocks in the Raipur district is presented in **Table 5**. It is clear from all the values that correspond to 1 that the variables are dependent on each other. The regression analysis was performed, and it showed a positive relationship between dependent and independent variables in all four blocks of Raipur District.

**Table 4.** Distribution of vermicompost respondents according to their economic motivation.

| Sr. No | Statement   | Strongly agree 5 | Agree 4 | Undecided 3 | Disagree 2 | Strongly disagree 1 | Total | Mean score | Rank  |           |       |    |
|--------|---|------------------|---------|-------------|------------|---------------------|-------|------------|-------|-----------|-------|----|
|        |   | Frequency        | % age   | Frequency   | % age      | Frequency           | % age | Frequency  | % age | Frequency | % age |    |
| 1.     | Someone should aim for greater returns and monetary benefits.                           | 12               | 41.37   | 08          | 27.58      | 05                  | 17.24 | 04         | 13.79 | 0         | 0     | 29 |
| 2.     | The most fortunate individual who is most successful                                    | 10               | 38.46   | 08          | 30.76      | 04                  | 15.38 | 04         | 15.38 | 0         | 0     | 26 |
| 3.     | One ought to experiment with any new farming techniques that might boost his income.    | 12               | 40.00   | 09          | 30.00      | 04                  | 13.33 | 05         | 16.66 | 0         | 0     | 30 |
| 4.     | To increase financial gain, a person should use ATMA services rather than alternatives. | 12               | 44.44   | 09          | 33.33      | 03                  | 11.11 | 03         | 11.11 | 0         | 0     | 27 |
| 5.     | Lacking financial assistance, the farmer's children strive to get off to a good start.  | 06               | 27.27   | 07          | 31.81      | 03                  | 13.63 | 06         | 27.27 | 0         | 0     | 22 |

**Table 5.** Correlation matrix of vermicompost of all four blocks of Raipur district.

|          | A     | B    | C    | D    | E    | F    | G    | H    | I    | J    | K    | L    | M    | N    | O    | P    | Q    | R    | S    | T    | U    | V   |  |
|----------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|--|
| <b>A</b> | 1.0   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |  |
| <b>B</b> | 0.2   | 1.00 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |  |
| <b>C</b> | 0.4   | -0.4 | 1.0  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |  |
| <b>D</b> | 0.5   | 0.6  | 0.0  | 1.0  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |  |
| <b>E</b> | 0.4   | 0.2  | 0.1  | 0.2  | 1.0  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |  |
| <b>F</b> | -0.4  | 0.0  | -0.0 | -0.1 | -0.3 | 1.0  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |  |
| <b>G</b> | -0.3  | -0.3 | 0.2  | -0.0 | -0.3 | 0.6  | 1.0  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |  |
| <b>H</b> | 0.0   | 0.3  | 0.2  | 0.0  | 0.3  | 0.1  | -0.0 | 1.0  |      |      |      |      |      |      |      |      |      |      |      |      |      |     |  |
| <b>I</b> | 0.4   | -0.0 | 0.2  | 0.1  | 0.3  | -0.7 | -0.5 | -0.1 | 1.0  |      |      |      |      |      |      |      |      |      |      |      |      |     |  |
| <b>J</b> | 0.0   | 0.5  | -0.3 | 0.0  | 0.2  | -0.1 | -0.3 | 0.6  | -0.1 | 1.0  |      |      |      |      |      |      |      |      |      |      |      |     |  |
| <b>K</b> | 0.7   | 0.0  | 0.4  | 0.6  | 0.1  | -0.2 | -0.0 | -0.3 | 0.3  | -0.5 | 1.0  |      |      |      |      |      |      |      |      |      |      |     |  |
| <b>L</b> | 0.4   | 0.2  | 0.3  | 0.6  | -0.2 | 0.1  | 0.1  | -0.2 | 0.0  | -0.4 | 0.7  | 1.0  |      |      |      |      |      |      |      |      |      |     |  |
| <b>M</b> | 0.7   | 0.0  | 0.3  | 0.6  | 0.3  | -0.2 | 0.2  | -0.1 | 0.1  | -0.0 | 0.6  | 0.4  | 1.0  |      |      |      |      |      |      |      |      |     |  |
| <b>N</b> | 0.3   | 0.2  | -0.2 | 0.3  | 0.3  | -0.0 | -0.3 | -0.2 | -0.0 | 0.0  | 0.3  | 0.1  | 0.2  | 1.0  |      |      |      |      |      |      |      |     |  |
| <b>O</b> | -0.2  | -0.0 | -0.4 | -0.5 | 0.0  | -0.4 | -0.5 | -0.2 | 0.1  | 0.3  | -0.4 | -0.5 | -0.4 | 0.2  | 1.0  |      |      |      |      |      |      |     |  |
| <b>P</b> | 0.8   | -0.0 | 0.4  | 0.4  | 0.6  | -0.2 | -0.1 | 0.0  | 0.4  | -0.0 | 0.6  | 0.2  | 0.6  | 0.3  | -0.3 | 1.0  |      |      |      |      |      |     |  |
| <b>Q</b> | -0.6  | -0.0 | -0.0 | -0.4 | -0.2 | 0.6  | 0.3  | 0.5  | -0.5 | 0.1  | -0.7 | -0.2 | -0.6 | -0.4 | -0.1 | -0.5 | 1.0  |      |      |      |      |     |  |
| <b>R</b> | -0.2  | 0.2  | -0.3 | -0.2 | 0.0  | 0.4  | -0.3 | 0.3  | -0.2 | 0.3  | -0.4 | -0.1 | -0.6 | 0.2  | 0.3  | -0.1 | 0.5  | 1.0  |      |      |      |     |  |
| <b>S</b> | -0.27 | -0.0 | -0.1 | -0.0 | -0.0 | 0.2  | 0.5  | 0.0  | -0.1 | 0.0  | -0.3 | -0.2 | 0.1  | -0.4 | -0.2 | -0.1 | 0.3  | -0.3 | 1.0  |      |      |     |  |
| <b>T</b> | 0.00  | 0.3  | 0.1  | 0.0  | 0.0  | 0.3  | -0.2 | 0.3  | -0.1 | -0.0 | -0.0 | 0.4  | -0.4 | 0.1  | -0.1 | -0.0 | 0.4  | 0.7  | -0.4 | 1.0  |      |     |  |
| <b>U</b> | -0.5  | -0.5 | -0.2 | -0.3 | -0.4 | 0.2  | 0.2  | -0.6 | 0.0  | -0.5 | -0.0 | -0.0 | -0.3 | 0.0  | 0.1  | -0.3 | 0.0  | 0.0  | 0.1  | -0.1 | 1.0  |     |  |
| <b>V</b> | 0.5   | 0.1  | 0.1  | 0.2  | 0.1  | 0.1  | 0.0  | 0.0  | -0.4 | 0.2  | 0.3  | 0.2  | 0.5  | 0.4  | -0.1 | 0.5  | -0.2 | -0.0 | -0.2 | -0.0 | -0.4 | 1.0 |  |

Note: A = Age, B = Education, C = Marital status, D = Family size, E = Caste, F = Source of income, G = Social participation, H = Economic motivation, I = Material possession, J = Extension participation, K = Cosmopliteness, L = Fatalism/scientism, M = Information seeking behaviour, N = Management orientation, O = Decision making, P = Leadership ability, Q = Risk taking ability, R = Knowledge of enterprise, S = Achievement motivation, T = Innovativeness, U = Self-confidence, V = Problems in adoption.

## 4. Conclusions

The ability of rural women to send their young ones to school and their contribution to the household's income were two signs of the socioeconomic empowerment that came from producing vermicompost, according to the study. When applied to soil or plant growing media, vermicompost—a complex mixture of humified organic waste, earthworm feces, and microorganisms—increases germination, growth, flowering, and fruit production, as well as speeds up the development of a variety of plant species. The process of vermiculture and vermicomposting is simple, environmentally safe, profitable, and can improve the standard of living for those living in rural areas by increasing employment opportunities.

Vermiculture technology is currently poised to become a significant industry in the upcoming century. This customizable method of obtaining organic manure from different kinds of waste would help reduce environmental issues to a higher degree. India, a nation that relies heavily on agriculture, could easily create millions of tons of vermicompost and substantially decrease its usage of artificial fertilizers.

According to the research study, the majority of respondents (71.67%) had a moderate level of expertise, with low and high knowledge levels (15.83%) and 12.50%, respectively, coming in second and third. The independent variables that correlated positively and highly significantly with the management efficiency of the vermicompost producer were education, social involvement, land holding, annual income, supply of water, and knowledge of extension contacts. Age, family size, and type all had non-significant relationships with the vermicompost producers' success in managing. Farmers need to use vermicompost more frequently in the future. Vermicomposting is also helpful for reducing soil erosion and deterioration.

## Data availability

The data used to support the study's findings are readily available upon request from the corresponding author.

## Author contributions

Conceptualization, DS and HKA; methodology, DS; software, DS; validation, DS, HKA and NVRS; formal analysis, DS; investigation, DS; resources, DS and NVRS; data curation, DS; writing—original draft preparation, DS; writing—review and editing, DS and NVRS; visualization, DS; supervision, HKA. All authors have read and agreed to the published version of the manuscript.

## Conflict of interest

The authors declare that they have no conflicts of interest.

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