Received : 14.12.2022 | Accepted : 31.12.2022 | Online published : 01.01.2023
https://doi.org/10.54986/irjee/2023/jan_mar/46-50
IRJEE SOCIETY OF EXTENSION EDUCATION

RESEARCH ARTICLE

Construction of Scale to Measure Impact of Covid-19 Pandemic on Farm Operations of Tapioca Growers in Kerala & Andhra Pradesh

Kotha Rajesh[1] and Smitha K.P.[2]

1.PG. Scholar,
2. Assistant Professor,
Dept. of Agricultural Extension,
College of Agriculture,
Vellayani,
Kerala Agricultural University,
Thrissur, India
Corresponding author e-mail
kotharajesh963@gmail.com

ABSTRACT

The impact of COVID-19 and resultant lockdown were quite harsh on agriculture sector of India. Tapioca and plantain farmers suffered the most in Kerala and Andhra Pradesh during COVID-19 pandemic. In this context the present study was conducted to develop a scale to measure impact of COVID-19 pandemic on pre farmgate-post farmgate operations of tapioca growers in Kerala and Andhra Pradesh. Four dimensions were identified based on literature review & expert opinion for easy classification and measuring the impact of COVID-19 pandemic. A total 200 statements under four dimensions of impact of COVID-19 pandemic was collected, out of these 80 consistent statements were selected through relevancy test. Out of 80 statements, these 43 statements were retained on the final scale through t-test item analysis. Reliability and validity of the scale indicates its consistency and precision of the results. This scale was found to be reliable and valid.

***Key words**: Farmer; Likert scale; COVID-19 pandemic; Tapioca.*

The initial outbreak of COVID-19 occurred in Wuhan, Hubei Province in early Dec 2019. In March 2020, the WHO declared the novel coronavirus outbreak a global pandemic, and India reported its first infection on 30th January 2020, and was later spread to other parts of the country (*Saravanan, 2022*). The impact of COVID-19 and the resultant lockdown were quite harsh on the agriculture sector in almost all states of India. Tapioca farmers are one among the major categories of farmers who have suffered at various levels of the pre-farm gate and post-farm gate operations due to the COVID-19 pandemic. Tapioca and plantain farmers suffered the most in Kerala as many of them couldn't even get half the base price (*Jafri et al., 2021*). They sold tapioca at a very low price that could not even meet the production expenses (*Kumari et al., 2022*). In Andhra Pradesh, restrictions imposed on the movement of men/material, disruption of the supply chain and value chain due to closure of shops and markets have led to a decline in the marketing of tapioca which resulted in a price drop for farmers and unavailability of raw material and labour to agro-based industries (*Raghavendra et al., 2021*).

To measure the Impact of COVID-19 pandemic on tapioca growers of Kerala and Andhra Pradesh, a scale is necessary. The present study was undertaken with the following objectives :

i. To develop a scale to measure the impact of COVID-19 pandemic on pre farmgate-post farmgate operations on tapioca growers.
ii. To standardize the scale construction to measure the impact of COVID-19 pandemic concerns of stakeholders viz. tapioca growers, labourers, extension experts and CTCRI scientists in tapioca research aspects.

METHODOLOGY

On the basis of the review of relevant literature and discussion with the experts in the field, the following four dimensions were identified for easy classification and measuring the impact of COVID-19 pandemic on pre farmgate-post farmgate operations namely : pre-farmgate operations, post-farmgate operations, socio-psychological factors and economic & institutional factors. The primary purpose of this section is to discuss the construction of a scale that measures the perceived impact of COVID-19

pandemic on pre farmgate – post farmgate operations on tapioca growers in the selected locations and indicate the application of the resulting a scale that gives the total scores of individual farmers to quantify their perception. A suitable well-structured pre-tested interview schedule was prepared and administered to the respondent groups. Two important stages were followed in the scale development process i.e., items or statements generation and item analysis.

Collection and editing of items : A total 200 statements under above four dimensions of pre farmgate –post farmgate operations were collected covering the almost entire universe of content. The researchers, Kerala Agricultural University, professors, Acharya N.G. Ranga Agricultural University professors, Central Tuber Crop Research Institute scientist's, Krishi Vigyan Kendras scientist's and extension experts were also consulted for selection of the statements under ten sub components belonging to four dimensions.

Preliminary screening of the items by relevancy rating : The proforma containing 200 statements under 10 sub-components belonging to the four selected dimensions rated on a five-point continuum i.e., highly relevant, relevant, undecided, less relevant and not relevant with scores 5,4,3,2 and 1 respectively was sent through email and handed over personally to 50 judges with specific instructions. These judges were experts in the field of extension education and social science. The judges were requested to indicate their response by putting tick mark in suitable continuum for each item. The judges were also requested to make necessary modifications and additions or deletions, if they desired so. Out of 50 judges, 35 responded within a period of one month. The scores for each of the items were summated over all the judges and a relevancy test was worked out using the formula (*Kumar and Ratnakar, 2016*) :

$$\text{Relevancy test} = \frac{\text{Total scores obtained on each item}}{\text{Maximum possible score}} \times 100$$

Those items, which secured a relevancy test of 80 and above, were selected. From the 200 statements, final 80 were selected, there by relevant items were retained based on judges rating under the four dimensions. The 80 statements selected after the relevancy test were then administrated to 40 non-sample respondents and the responses were collected in a span of one month.

Calculation of 't' Value (Item analysis) : Responses were indicated on a five-point continuum, Strongly Agree (SA), Agree (A), Un Decided (UD), Disagree (DA) and Strongly Disagree (SDA) with 5, 4, 3, 2 and 1. On receiving the responses, the respondents were arranged in descending order & ascending order based on the sum of the scores obtained for all the statements by each individual. The top 25 per cent of the respondents with the highest scores and the bottom 25 per cent of the respondents with the lowest scores were considered as criterion groups to evaluate individual statements. The middle 50 per cent of the respondents were deleted for further analysis. The top 25 per cent were considered as high group and bottom 25 per cent were considered as low group to calculate the critical ratio i.e., 't' value for each statement (*Semie et al., 2009*)

The calculated 't' value for each statement was measured for the extent to which the statement differentiates between the respondents of high group and low group. The 't' values were calculated by using the formula suggested by *Edwards (1969).*

$$t = \frac{(X_H - X_L)}{\sqrt{\frac{(X_H - \bar{X}_H)^2 + (X_L - \bar{X}_L)^2}{n(n-1)}}}$$

Where :

$$\Sigma(X_H - \bar{X}_H)^2 = \Sigma X_H^2 - (\Sigma \bar{X}_H)^2$$

$$\Sigma(X_L - \bar{X}_L)^2 = \Sigma X_L^2 - (\Sigma \bar{X}_L)^2$$

$\bar{X}_H$= The mean score on a given statement for the high group

$\bar{X}_L$ = The mean score on a given statement for the low group

ΣX_H^2 = Sum of squares of the individual score on a given statement for high group

ΣX_L^2 = Sum of squares of the individual score on a given statement for low group

ΣX_H = Summation of scores on a given statement for high group

ΣX_L = Summation of scores on a given statement for low group

n = Number of respondents for in each group

Σ = Summation

The scale developed was standardized by testing its reliability and validity. A scale is reliable when it will consistently produce the same results by the same individuals on different occasions or with different sets of equivalents, for testing the reliability, Split half method was employed. After getting back the responses, the Scale was divided into two halves, all odd statements into one half and all even statements

into another. One half (one set) contains the odd-numbered items (1, 3, 5, 7 etc.) and the other half (other set) the even-numbered items (2, 4, 6, 8 etc.). Reliability coefficient (R.C) by Spearman-Brown formula (*Srinivas, et al., 2018*)

$$\text{RC of test} = \frac{2^* \text{ R.C of the half test, found experimentally}}{1+ \text{ R.C of the half test, found experimentally}}$$

RESULTS AND DISCUSSION

The results of the study have been presented in this section under subheads viz. relevancy test, t value and r value of the statements, standardization of the scale and administration of the scale. From the 200 statements, total of 80 statements were selected through relevancy test, there by relevant items were retained based on judges rating under the four dimensions. After computing 't' values for all the 80 statements, the statements with 't' values more than 1.75 were selected for the final scale. Thus, out of 80 statements, 43 statements with 't' value more than 1.75 were selected in the scale. The correlation of reliability coefficient (r = 0.702) was significant at 0.05 level of probability.

Standardization of the scale : A scale should measure what it seeks to accomplish to measure and it should be consistent in its measurement. A scale thus has to be standardized before it administered. The present scale developed was also standardized by verifying its reliability and validity.

Testing the Reliability of the Scale : A scale is reliable when it will consistently produce the same results when applied on the same sample. The Co-efficient of reliability was calculated between the two halves. The correlation of reliability coefficient for both the sets was worked out. The correlation of reliability coefficient (r = 0.702) was significant at 0.05 level of probability indicating the scale was highly suitable for administration to tapioca farmers as the scale was stable and dependable in its measurement. A positive and significant correlation between the two sets of scores indicated that the test is highly reliable.

Testing the validity of the scale : The content validity is the representative or sampling adequacy of the content, the substance, the matter and the topics of a measuring instrument. This method was used in the present scale to determine the content validity of the scale. The validity of the scale on pre farmgate –post farmgate operations was obtained through content validity by taking the judge's opinion. The statements selected for the scale were evaluated individually and as a whole by the judges. As the content of the scale was borne out by the method of collecting statements within the universe of pre farmgate–post farmgate operations, socio-psychological factors, economic and institutional factors influencing tapioca farmers, it may reasonably be assumed that the scale of impact of COVID-19 pandemic on pre farmgate – post farmgate operations has content validity.

Administration of the scale : The final scale of each respondent can be calculated by summating the scores obtained by him on all the items. Obtained score on this scale ranges from 43 to 215. The higher score indicates that respondent had more level of COVID-19 impact and vice-versa. The final scale to measure impact of COVID-19 pandemic comprised of 43 statements under four dimensions viz. pre-farmgate operations, post-farmgate operations, socio-psychological factors and economic & institutional factors of which 15 positive statements and 28 negative statements measured on a five-point continuum viz., Strongly Agree (SA), Agree (A), Un decided (UD), Disagree (DA) and Strongly Disagree (SDA) with 5, 4, 3, 2 and 1 for positive statements and vice-versa for negative statements.

CONCLUSION

The final scale was developed and standardized here to measure impact of COVID-19 pandemic, again checked by experts in extension division of KAU and ANGRAU, and CTCRI for their relevance and coverage. consist of 43 statements under four dimensions to measure impact of COVID-19 pandemic to respondent group had to be recorded on a five-point continuum representing for positive statements and vice-versa for negative statements. The reliability and validity measurements of the scale indicated highly administrated to measure level of impact of COVID-19 pandemic on tapioca growers in Kerala and Andhra Pradesh. The scale is not location specific and can be used in any geographical area with slight modification. Other parallel scales also be derived and standardized from the results of the study. The scale developed to measure the impact of COVID-19 pandemic on pre farmgate-post farmgate operations of tapioca and the data so obtained could be replicated elsewhere to understand the concern level of impact on tapioca growers, which in turn will help formulating policy prescriptions for alleviating adverse impacts of COVID-19 pandemic.

Table 1. r value of statements measuring 43 statements measuring impact of COVID-19 pandemic on tapioca growers

Statements	r value	t value
Pre-farmgate operations – impacts		
Planting operations		
Difficulty in procuring planting material from authorized agencies	0.906	2.16
Fear of disease transmissibility of COVID-19 virus restricted collection of planting materials	0.862	1.82
Lack of sufficient planting material led to delay in the next cropping season	0.789	1.86
Fertilizers /manure application		
Unavailability of adequate quantity of farm yard manure due to travel restrictions	0.845	1.97
Unavailability of adequate quantities of fertilizers due to covid 19 pandemic	0.769	2.15
Plant protection operations		
Plant protection chemicals were not available in adequate quantities due to lack of transportation and travel restrictions	0.984	2.78
Due to unavailability of stock in the market and closure of markets plant protection chemicals were not available to the farmers	0.845	2.16
Labour availability during pre-farmgate operations		
Insufficient availability of seasonal labour	0.985	2.64
Labourers were hired from other places due to labour shortage that led to increased cost of cultivation	0.786	1.93
Delayed harvest resulting in crop loss due to labour shortage	0.846	2.16
Involvement of family labour increased during COVID-19 pandemic	0.736	2.14
Reduced cost of cultivation due to higher involvement of family members in farming	0.912	2.89
Irrigation requirements		
Optimum availability of irrigation facilities during the pandemic period	0.814	2.17
Due to COVID-19 infection timely irrigation could not be undertaken	0.965	2.63
Post farmgate operations- impacts		
Marketing		
Produce was sold directly to consumers during pandemic	0.763	2.16
Due to lack of market facilities tapioca was not harvested in the field produced was not taken to the market due to fear of contagion	0.860	1.82
Produce was sold to retailers at low price due to closure of markets	0.943	2.79
As middlemen did not come to field to buy produce due to lockdown restrictions and fear of contagion, farmers had to find the markets.	0.945	2.16
Farmers faced difficulty for selling the produce due to sudden changes in markets	0.762	2.18
harvesting delayed due to low demand in the market	0.849	2.45
As there was low demand for produce in local market, tender tops and stems were used for feeding cattle and firewood respectively	0.760	2.19
Warehousing and storage		
As planting material was stored for longer duration due to lesser demand in the market, quality of planting material declined which has affected next season planting	0.878	2.18
Due to lack of warehouse facilities during COVID-19 pandemic there was a heavy post-harvest loss.	0.916	1.98
Grading and processing		
Grading of the tapioca produce could not be undertaken due to lack of grading facilitate available due to lock down	0.845	2.16
Due to lack of grading, processing and packaging facilities industries could not realize higher price for their produce	0.746	2.32
Labour in post-farmgate operations		
Delayed harvest due to shortage of labour and lesser demand in the market during pandemic situation	0.756	2.18
Due to lack of wage labours availability during pandemic difficulty was faced in loading harvested produce	0.817	2.64
Due to labour unavailability processing and grading of produce was affected	0.915	2.54
Transport		
Difficulty was faced to carry produce to markets due to unavailability of transport services because of travel restrictions and lockdowns imposed during pandemic period	0.756	2.21
Due to reduced transportation services during pandemic, there was rise in transportation charges which increased transportation cost	0.841	2.17
Due to restrictions on transportation market and market channels were closed	0.732	2.61
Impact on social-psychological factors		
Lack of physical interactions with fellow farmers	0.814	1.98
Poor contact with extension personnel/agriculture officials due to fear of high transmissibility of COVID-19	0.936	1.84
Family farming improved relationships within the family during the pandemic	0.725	1.79
Felt nervous and anxious about getting infected with the virus	0.896	2.18
I was tensed about the crop loss associated with COVID-19 pandemic	0.741	2.16
Impact on economic and institutional factors		
Adopted intercropping/mixed cropping to reduce risk associated with monocropping of tapioca	0.756	2.41
Expenditure on food & medicine increased due to COVID-19 pandemic	0.845	2.39
Farmers got less institutional support due to COVID-19 pandemic-imposed restrictions	0.798	1.95
Expenditure on children's education increased due to purchase of online gadgets for online classes	0.787	1.86
Increased borrowing from the private Money lenders due to non-accessibility to public sector banking institutes	0.858	2.19

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

REFERENCES

Edwards, A.L. (1969). Techniques of attitude scale construction. Vakils, Feffer and Simons Private Ltd. 9 Sport Road, Ballard Estate, Bombay (Mumbai) 1p.

Jafri, A.; Mathe, N.; Aglago, E. K.; Konyole, S.O.; Ouedraogo, M.; Audain, K.; Zongo, U.; Laar, A.K.; Johnson, J., and Sanou, D. (2021). Food availability, accessibility and dietary practices during the COVID-19 pandemic: a multi-country survey. *Public Health Nutri.*. **24** (7) :1798-1805.

Kumar, P.G. and Ratnakar, R. (2016). A scale to measure farmers' attitude towards ICT-based extension services. *Indian Res. J. Ext. Educ.*, **11**(21) : 109-112.

Kumari, A. and Babe, R. (2022). Effect of COVID-19 on socioeconomic status of entrepreneurs engaged in Mithila painting. *Indian Res. J. Ext. Edu.,* **22** (1): 128-130.

Raghavendra, K. C.; Vemaraju, A.; and Kumar, M.R. (2021). Impact of COVID-19 on farming activities in chittoor district of Andhra Pradesh. *The Pharma Inno. J*. **10**(5): 269-271.

Saravanan, K. P. (2022). Impact of COVID-19 lockdown on livestock and poultry sectors : Veterinary students' perception and suggestions. *Indian Res. J. Ext. Edu.,* **22** (5):8-12.

Semie, N.; Belay, K.; Karippai, R.S., and Bogale, A. (2009). Measurement of farmers' attitude towards complete ownership of farm land in Eastern Ethiopia. *J. Rural Devel./Nongchon-Gyeongje,* **32** : 111-131.

Srinivas, A.; Rani, V.S. and Rao, I.S. (2018. Construction and standardization of attitude scale to measure the attitude of tribal farmers towards seed banking. *J. Experi. Biology and Agril. Sci.,* **6**(3): 633-638.

• • • • •