RESEARCH NOTE

Measuring The Pollution Stress Coping Behaviour (PSCB) of Farmers Against Dyeing Industrial Pollution Using Newly Developed Index

Anitha Pauline. A[1] and C. Karthikeyan[2]

1. Ph.D.Scholar 2. Professor. Department of Agricultural Extension & Rural Sociology
Tamil Nadu Agricultural University, Coimbatore-641003
Corresponding author e-mail : anithapauline.agri@gmail.com

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ABSTRACT

The Pollution Stress Coping Behavioural Index (PSCBI) was developed to measure the behavioural pattern of farmers in a stressful polluted environment. The PSCBI has been operationalised as the degree to which farmers had taken steps to overcome the dyeing industrial effluents effects to achieve profitable income. Six components were identified to measure the coping strategy behaviour of farmers such as, diversification, adjustment, withdrawal, acceptance, participation and seeking support. This would reflect the total or wholesome coping behaviour of farmers against polluted agricultural environment. The developed index would be helpful to measure the behaviour of farmers in a polluted agricultural environment.

Key words: *Pollution Stress Coping Behavioural Index (PSCBI); Coping strategy behaviour;*

Coping is a highly researched area in contemporary Psychology, but very few researchers have applied coping theory to farmers. *Devereux (2001)* defines coping strategies as a response to adverse events or shocks. *Ellis (2000)* defines coping strategies as the methods used by households to survive when confronted with unanticipated livelihood failure. The strategies pursued by households differ in several aspects, that is, within the household and between households. Above all, the general tendency is that the lower the household asset status, the more likely the household would engage in erosive responses such as selling off productive assets such as farm implements (*Hoddinott, 2004*). Seasonal migration is a regular feature observed among the poor farmers during distress situations (*Shah and Shah, 2005; Reddy, 2009a*). Seasonal migration as defined by *Reddy (2009b)* is the movement for employment for a short duration. The basic reason for this type of migration is non-availability of adequate work in one's own place of residence. Occupational diversification is another measure to adjust in the risk environment. The farmers generally try to engage themselves in multiple activities that can provide them flexibility and strength to face risks. When the farmers have a secondary occupation they can easily face the risk situations. The farmers also engage themselves in wage labour and non-farm activities (*Subbaiah, 2004*). *Dabbadi and Sing (2012)* reported that mixed farming, crop insurance and soil reclamations are the best methods of mitigation strategies to cope up with livelihood failure situation. *Singh et.al (2013)* studied the application of soil amendments like farm yard manure and gypsum improve the fertility status of soil in the pollution affected areas. There are no previous studies available to measure the coping behaviour of farmers against polluted agricultural environment. Hence, there is a need to develop index to measure coping behaviour of farmers against polluted agricultural environment.

METHODOLOGY

An index may be defined as a technique of totalling or reducing a single composite series data on a number of distinct, but related variables expressed in different units of measurement (*Hooda, 2001*). It is a device

which facilitates comparison of the level of magnitude of a group of related variables under two or more situations. Situations requiring comparison may refer to

i) Changes occurring over a time
ii) The difference(s) between two or more places, and
iii) The variations between similar categories of objects or subjects such as persons, groups of persons, organization etc.

P*rocedure for Construction of Pollution Stress Coping Behavioural Index (PSCB):* The process involved in developing pollution stress coping behavioural index includes the following steps.

- Identification and selection of major components and sub components for measurement of pollution stress coping behavioural pattern
- Construction of an index to measure coping behavioural pattern and standardization**.**
- Development of Pollution Stress Coping Behavioural Index (PSCBI)

Identification and selection of major components and subcomponents for measurement of Pollution Stress Coping Behaviour: For measurement of pollution stress coping behavioural pattern, six major components were indentified based on the review of relevant literature, online sources, discussion with experts in the selected fields of study and thereby interaction with highly knowledgeable farmers with researcher's insights. The major components thus identified for the pollution stress coping behaviour were as follows Diversification, Adjustment, Withdrawal, Acceptance, Participation and Seeking support.

The study aimed at assessing the coping behaviour of farmers against polluted agricultural environment. For this purpose, it was necessary to include the above identified major components to reflect the wholesome coping strategy behaviour so as to construct an index. After the finalization of major components, sub component for each major component were identified based on the review of literature, online sources, systematic discussion with the members of advisory committee, faculty members and brainstorming sessions held with the other research scholars. Thus, the six major components and its subcomponents to measure the coping behaviour of farmers against polluted agricultural environment were identified.

Selection of sub components under each major component : The selection of sub components was done based on the (i) consensus approach and (ii) item analysis approach.

Consensus approach : Consensus approach means a panel of judges evaluate the items chosen for inclusion in the instrument in order to find out whether they are relevant to the specified domain and possess adequate clarity and representation. Accordingly, a list of identified major components and its sub components were distributed to 50 scientists identified from various institutions namely Tamil Nadu Agricultural University, Coimbatore, Kerala Agricultural University, Thrissur, Annamalai University, Gandhigram Rural University, Dindugul, Sugarcane Breeding Institute, Coimbatore and Central Institute of Cotton Research, Coimbatore. Responses were obtained from 35 judges. The judges were earlier asked to judge the components on a three-point continuum as relevant, somewhat relevant and not relevant. The weightages assigned were 3, 2, 1 for relevant, somewhat relevant and not relevant respectively.

Item analysis approach: The judges' scores arrived were subjected to item analysis approach for the selection of sub-components.

The Relevancy Co-efficient Index (RCI) for each major components and subcomponents were worked out by using the following formula devised by *Ramanna (1999).* Total score of all the judges on the i^{th} item

$$RCI = \frac{TSJ \text{ on the } i^{th} \text{ item}}{MSC} \times TNJ$$

TSJ= Total score of all the judges

TNJ= Total number of judges

MSC= Maximum score in the continuum

Considering relevancy weightage, the components were screened for their relevancy. Accordingly, components having relevancy weightage of more than 0.75 were considered. Using this process, final set of components was selected for final administration.

Procedure followed for index development: The index was constructed by quantifying the six major components with the inclusion of subcomponents. The major components included were such as Diversification Behaviour index (DBi), Adjustment Behaviour index (AdBi), Withdrawal Behaviour index (WBi), Acceptance Behaviour index (AcBi), Participation Behaviour index (PBi) and Seeking Support Behaviour index (SSBi).

The index for each major component was worked out as follows.

Diversification Behaviour index (DBi): Diversification behaviour is the one of the coping strategy management technique that mixes a wide variety of practices within a portfolio. Diversification refers to a situation in which decrease in the dominance of an activity, alternatively increase the share of many activities in a system is depicted. The DBi was worked out by using the formula as given below.

$$DBi = \frac{DBi\ (A)}{DBi\ (T)} \times 100$$

Where,

DBi = Diversification Behaviour index

DBi (A) = Actual score obtained by an individual on diversification behaviour

DBi (T) = Total maximum score for an individual on diversification behaviour

Adjustment Behaviour index (AdBi) : Adjustment behaviour index can be referred to the ways and means by which farmers reduced the pollution effects through small changes incorporated in their farming activities such as adjusting the cultivation practices, application of soil amendments and so on. The AdBi was calculated based on the score obtained by using the formula as follows.

$$AdBi = \frac{AdBi\ (A)}{AdBi\ (T)} \times 100$$

Where,

AdBi = Adjustment Behaviour Index

AdBi (A) = Actual score obtained by an individual on adjustment behaviour

AdBi (T) = Total maximum score for an individual on adjustment behaviour

Withdrawal Behaviour index (WBi) : It indicates that farmers had taken attempts to avoid or discontinue the existing farm practices and follow the new practices such as leaving the affected lands as fallow temporarily, leaving affected lands as fallow permanently, and temporary migration for employment and so on. The WBi was calibrated by using the formula,

$$WBi = \frac{WBi\ (A)}{WBi\ (T)} \times 100$$

Where,

WBi = Withdrawal Behaviour Index

WBi (A) = Actual score obtained by an individual on withdrawal behaviour

WBi (T) = Total maximum score for an individual on withdrawal behaviour

Acceptance Behaviour index (AcBi) : Acceptance behaviour is referred as a person's assent to the reality of a situation, recognizing a process or condition (often a negative or uncomfortable situation) without attempting to change it, protest. The AcBi was calculated based on the score obtained by using the formula as follows.

$$AcBi = \frac{AcBi\ (A)}{AcBi\ (T)} \times 100$$

Where,

AcBi = Acceptance index

AcBi (A) = Actual score obtained by an individual on acceptance behaviour

AcBi (T) = Total maximum score for an individual on acceptance behaviour.

Participation Behaviour index (PBi) : Participation behaviour index can be described as the process by which individuals, families, or communities assume responsibility for their own welfare and develop a capacity to contribute to their own and the community's development. The PBi was arrived by using the formula.

$$PBi = \frac{PBi\ (A)}{PBi\ (T)} \times 100$$

Where,

PBi = Participation Behaviour index

PBi (A) = Actual score obtained by an individual on participation behaviour

PBi (T) = Total maximum score for an individual on participation behaviour.

Seeking Support Behaviour index (SSBi) : Seeking Support index is defined as "behaviour of actively seeking help from other people". This component includes dimensions involving seeking support from government or public and private organisation to surpass the pollution effects. The SSBi was worked out by using the formula.

$$SSBi = \frac{SSBi\ (A)}{SSBi\ (T)} \times 100$$

Where,

SSBi = Seeking Support Behaviour index

SSBi (A) = Actual score obtained by an individual on seeking support behaviour

SSBi (T) = Total maximum score for an individual on seeking support behaviour.

Finally, the PSCB composite Index had been

calculated by adopting the following mathematical formulae devised by *Davis (2003)* and *Masure (2003)* with suitable modification to the content.

$$PSCBI = \frac{DBi + AdBi + WBi + AcBi + PBi + SSBi}{6}$$

Mean scores were worked out for each subcomponents. Thus PSCBI was arrived as the average value of composite five major components.

Table 1. Relevancy coefficient obtained for pollution stress coping strategy behavioural components

Components	Relevancy scores
Diversification	
Changing cropping pattern	0.99
Diversifying income sources	0.90
Cultivation of commercial crops by reducing the food crops	0.87
Cultivating tree crops by reducing the risk	0.64
Concentrating more on livestock rearing than agriculture	0.96
Concentrating more on business	0.90
Diversifying the activities towards non-farm resources	0.89
Becoming agricultural/ dyeing industry labour in addition to doing agriculture	0.88
Adjustment	
Adjust the cultivation practices	0.90
Using more family labour	0.84
Satisfying with possible income from agri.	0.77
Reducing the use of polluted water for irrigation	0.65
Reducing the family expenditures	0.82
Temporarily taking up cultivation in small fragmented land area to escape from huge loss	0.83
Application of soil amendments	0.84
Selling the farm implements, machineries and jewelleries	0.77
Withdrawal	
Leaving the affected land as fallow temporarily	0.83
Leaving the affected lands as fallow permanently	0.83
Leaving agriculture itself	0.64
Leasing out the affected agricultural lands	0.86
Selling the affected agricultural lands	0.62
Temporary migration for employment	0.84
Permanent migration for employment	0.60
Acceptance	
Accepting the fact that the stressful event has occurred and is real	0.88
Accept that this has happened and that it can't be changed	0.83
Learn to live with this situation	0.92
Participation	
Participation of government related schemes	0.88
Participation in farmers organization	0.87
Participation in agitation movements against dyeing industrial pollution	0.98
Seeking support	
Seeking support from agriculture department, KVKs, pollution control board	0.92
Seeking support from research organizations	0.86
Seeking support from NGOs and Private org.	0.86
Seeking compensation	0.83
Seeking financial assistance from bank	0.84
Seeking help from community	0.88

Reliability of the measure : According to *Anastasi (1968)*, reliability refers to the consistency of scores obtained by the individuals when re-examined with test on different occasions, or with different sets of equivalent items or under other variable examining conditions. Thus reliability is the accuracy, or precision of a measuring instrument. In order to determine the reliability of this scale, split-half method was carried out. The scale was administered to 30 farmers in a non-sample area and the reliability score obtained was 0.78. Since the reliability coefficient was more than 0.50 the constructed scale is reliable.

Validity of the measure : Lindquist (1955) has defined "as the accuracy with which it measures or intended to measure or as the degree to which it appropriate infallibility in measuring what it purports to measure". Thus, validity refers to degree to which a scale measures what it claims to measure. The scale was sent to 50 judges for judging the content of the scale. Based on the judgement regarding content validity, the constructed scale is said to be valid.

CONCLUSION

The index developed was standardized which is found to be valid and reliable. Hence the index would be highly useful for farmers, researchers, policy makers, planners and development department's functionaries to become more responsible and responsive towards such concerns. This study results will be helpful to carry out the reclamation process and also to formulate the appropriate policy options to improve the standard of living of affected farmers in the study regions.

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