

## A SCALE TO QUANTIFY THE CRISIS MANAGEMENT BEHAVIOUR OF SUGARCANE GROWERS

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### ABSTRACT

*During 2021–2022, an effort was made to produce a standardised scale to evaluate how sugarcane growers handle crisis circumstances while keeping in mind the current situations. Decision-making abilities, adaptability, and economic performance were recognised as the three main facets of sugarcane grower’s CMB. These dimensions were chosen to represent all behavioural, crisis, and its management components at all levels as well as the effectiveness of crisis management is evaluated using economic performance. The scale items were shaped with the best efforts to accurately reflect the behavioural traits of knowledge, attitude, skills, and confidence as well as the various crisis management activities viz., preparations, mitigations, interventions, and rehabilitation and reconstruction undertaken by sugarcane farmers to deal with crises. The summated rating method with necessary modifications recommended by Likert and Edward has been employed to construct the scale. The ultimate sugarcane grower’s CMB scale was composed of 82 statements, which were divided into three categories according to decision-making ability (11 statements), adaptability (71 statements distributed across 8 subdimensions), and economic performance (measured using standard formulas). The scale’s reliability and validity are ascertained by administering to 32 farmers in the Mandya district who cultivate sugarcane in 2020–21. Using the split half technique of reliability, it was discovered that the generated CMB scale was extremely dependable, with a reliability score of 0.9195. With a statistical validity coefficient of 0.9589, both the content and statistical validities were extremely valid.*

**Keywords:** sugarcane growers, crisis management behaviour, decision-making ability, adaptability, economic performances.

### INTRODUCTION

With the changing climate, crisis and catastrophes are projected to worsen and are already on the rise. This has hurt the livelihoods of smallholder and subsistence farmers, pastoralists, and landless labourers the most. The definition of a crisis is an unanticipated event that may be beyond an individual’s capability to cope and has a substantial detrimental effect on the economic viability and livelihood security of entire communities (Anonymous, 2005). The farmers adaptations directly contributed to their socioeconomic conditions (Tavethiya et al. 2021) and climate change directly affects agriculture production and farmers income (Khunt and Jadhav, 2022; Vinaya et al., 2022). Farmers that cultivate sugarcane have recently been routinely falling victim to crises. Production, marketing, and other systems related to sugarcane are under risk due to the crises’ increasing frequency and intensity. Therefore, in order to improve crisis planning, mitigation, response, and recovery through creation of location-specific relevant strategies by the respective agencies and the stakeholders

involved, it’s crucial to understand the CMB of sugarcane producers (Anonymous, 2021). These problems don’t just affect sugarcane producers; they also have an impact on every other element of the ecosystem. However, the impoverished farming communities, who are more at risk, are substantially impacted negatively. The integration of agricultural, livelihoods, and environmental concerns into crisis management initiatives and risk reduction techniques is made possible by sugarcane growers’ CMB.

A growing body of research has focused on quantifying the management behaviour of farmers. The formulation of more accurate and truthful criterion to anticipate the management behaviour of farmers, or more explicitly the difficulty of determining valid and credible criterion is a serious issue in behavioural management studies. Constructing scale, primarily to quantify crises management behaviour, is substantially more challenging and requires serious and innovative analysis to decipher the right dimensions that reliably reflect farmers’ managerial skills also while considering crisis management strategies in

to the account. But in the past, several scientists conducted management measurement in a variety of methods. Three levels of evaluation are used to evaluate management: input, process, and output. The ability of farmers to make decisions is a key factor in measuring managerial input in agriculture, however, a farmer finds it challenging to put all his judgments into practice. The management process measured using farmers' adaptive behaviour. However, relying solely on behavioural adaptations raises concerns because even when two people act similarly, the outcomes can vary due to timing, methodology, and intangible environmental / soil elements. Economic indicators like productivity, the benefit-cost ratio, and income inequalities are used to measure management output. However, these are post-hoc, reflecting measurement's reflection of profits and losses rather than management-related. Additionally, proponents such thought believed that the main goal of farming was to maximize profits. Farmers' factors and resource endowments should also be considered. In this case, it would be incorrect to attribute management input or process, or output solely.

It is acceptable to say that each component, rather than measuring management behaviour as a whole, measures a particular aspect of it. An endeavour to construct composite scale should be based on the fundamental premise that using numerous dimensions will allow for a more accurate assessment of the CMB phenomenon than using just one dimension. In light of these, current study makes an immediate effort to take note of these shortcomings and to develop a composite scale, involving appropriate components, by evaluating it from various perspectives and in various crisis situations in sugarcane farming, which best represents the CMB of sugarcane farmers. Therefore, the most practical method for more accurately and scientifically assessing the CMB of sugarcane growers is to use broader dimensions namely Decision-Making Ability, Adaptation techniques, and Economic Performance.

## **OBJECTIVE**

To construct and standardise a scale to measure sugarcane growers' Crisis Management Behaviour (CMB)

## **METHODOLOGY**

### **Operationalization and construction of scale to quantify the sugarcane growers' CMB**

In the present investigation, operationally a crisis is described as a scenario with a concentrated time of disturbance in sugarcane farming triggered by the change in various factors (production. Soil, Water, floods, drought, financial, price arrears, labour, livestock, thrash issues, and institutional crises) affecting sugarcane yields and thus, the

sugarcane growers' income.

### **Crisis management behaviour (CMB)**

Operationally, CMB is described as sugarcane growers' capacity to withstand, manage, and recover from crises in sugarcane farming related production, soil and water conservation, drought, flood, financial, price, labour, livestock, thrash, and concerned institutions. This capacity is assessed by sugarcane growers' ability to decision-making, adaptability, and economic performance.

### **Decision-making ability**

Decision-making ability is operationally described as the capability of sugarcane farmers to choose acceptable production alternatives and plan of action using a systematic way to be able to achieve maximum returns in identified crisis circumstances in sugarcane farming.

### **Adaptability**

Operationally, adaptability is described as the behavioural activities (survival strategies) performed by sugarcane farmers to deal with the current crisis and any predicted future crises. According to the sugarcane growers, these behavioural activities are limited to sugarcane productivity, soil and water conservation, drought and flood, financial and price, labour, livestock, and thrash management, as well as institutional modifications that are required.

### **Economic performance**

Operationally, economic performance refers to how well sugarcane farmers manage their farms through times of adversity by making quick decisions and adjusting their plans in order to generate the highest possible returns through their primary and subsidiary productions. Intensity of Crop (CI), Crop Yield Index, B: C ratio, Gross Income, and Net Income will all be used in the analysis.

The construction of the scale to assess sugarcane growers' CMB, six stages of the technique proposed by Likert (1932) and Edwards (1969) was followed. These six stages were identification of dimensions, collecting of items/statements, relevancy test, item analysis, reliability, and validity. Following are specifics of the procedures used to construct the scale to quantify CMB.

### **Identification of dimensions**

Based on an analysis of the literature and discussions with experts in the fields of extension education, economics, agronomy, entomology, Karnataka State Natural Disaster Management Centre, Contingency planning committees for district, and other concerned departments. The three main

dimensions that more precisely measures the sugarcane grower's CMB were identified viz., (1) Decision-making ability; (2) Adaptability (sugarcane production; soil and water conservation; drought and flood; financial and price; labour; livestock; thrash management; and institutional adaptations needed by sugarcane growers); and (3) Economic Performance.

### Collection of items/ statements

Based on reviews of numerous literatures, discussions with specialists in the field, consultations with scientists, the researcher's own experience, and input from advisory committee members, numerous statements on each recognised dimensions of sugarcane grower's CMB were prepared. Considering the 14 criteria outlined by Edwards (1969), Thurstone and Chave (1929), these 168 collected statements about the crisis management practises of sugarcane growers were carefully edited, rewritten, and restructured to prevent ambiguity and duplication (1929). Hence, 47 statements were dropped. For additional analysis,

the remaining 121 CMB statements were taken into account.

### Relevancy test

The remaining 121 statements were sent to 160 social science experts working in State Agricultural Universities, Indian Council of Agricultural Research Institutes, and Development departments as well as other concerned departments, for critical evaluation of each statement's relevance on a five-point continuum from "strongly agree" to "strongly disagree", with score of 5 to 1 respectively for positive statements and the scoring was reversed for negative statements. To make statements more appropriate, the juries were also asked to do any necessary changes, additions, or deletions of statements. In overall, 83 judges submitted the forms with all required information, and these were taken into consideration for further review. The following formulae were used to compute the "relevancy percentage," "relevancy weight," and "mean relevancy score" for each of the 121 statements using the data collected:

**I. Relevancy percentage (RP):** It was synthesized using the common formula shown below.

$$R.P. = \frac{(MR \times 5) + (R \times 4) + (SWR \times 3) + (LR \times 2) + (NR \times 1)}{\text{Maximum score attainable (i.e., } 121 \times 5 = 605)} \times 100$$

**II. Relevancy Weightage (RW):** Using the formula shown below, the relevance weighting was determined.

$$R.W. = \frac{(MR \times 5) + (R \times 4) + (SWR \times 3) + (LR \times 2) + (NR \times 1)}{\text{Maximum score attainable (i.e., } 121 \times 5 = 605)}$$

**III. Mean Relevancy Score (MRS):** The standard formula shown below was used to calculate the average relevance score.

$$M.R.S. = \frac{(MR \times 5) + (R \times 4) + (SWR \times 3) + (LR \times 2) + (NR \times 1)}{\text{Number of judges responded (83)}}$$

In order to include statements in the item analysis, those with a "relevancy percentage" equivalent to or more than 80.00 percent, a "relevancy weightage" equivalent to or greater than 0.80, and a "mean relevancy score" comparable to or greater than 4.00 were taken into consideration. After the relevancy test, 103 CMB statements remained. These statements were taken into consideration for further processing, and where necessary, they were amended and rewritten in accordance with the judges' and experts' suggestions and opinions.

### Item analysis

The statements were divided based on how well they could distinguish the assertions regarding the CMB scale through item analysis. 103 statements that were kept following the relevancy analysis underwent item analysis. For the pre-testing, a sample of 32 sugarcane farmers from

the Mandya taluk of the Mandya district, which is not a sample region, were taken into consideration. On a five-point scale ranging from "strongly agree" to "strongly disagree" the people who responded were asked to specify how much they agreed or disagreed with each statement.

The farmers who responded were arranged from lowest to highest based on their overall scores. According to their overall scores, the top 25% of responding growers were classified as the top group and bottom 25% as the low group. According to Edwards' (1969) recommendation, these two groupings serve as criteria groups for assessing the individual assertions. Eight sugarcane growers with the top scores and eight sugarcane growers with least scores were chosen as standard groups to analyse individual items out of the 32 sugarcane growers to whom the statements were offered for item analysis. The subsequent formula was used to determine

the crucial ratio, often known as the “t” value, which analyses the degree to which a particular statement distinguishes between the higher and lower groups of respondents for each statement:

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

Where,

$\bar{X}_H$  = Average score on given statement of the high group

$\bar{X}_L$  = Average score on given statement of the low group

$\sum X_H^2$  = sum of squares for a high group’s individual scores on a particular statement

$\sum X_L^2$  = sum of squares for a low group’s individual scores on a particular statement

n = Total responders in each category, in numbers

$\sum$  = Summation

t = The degree to which a statement makes a distinction between top and low groups.

The 82 statements with ‘t’ values equal to or superior to 1.75 were ultimately chosen and contained within in the final CMB scale after calculating the ‘t’ values for all 103 items. where each assertion carried a 5% significance level.

**Standardization of scale**

The scale’s validity and reliability were confirmed in order to standardise it.

**RESULTS AND DISCUSSION**

**Reliability of the CMB scale developed**

The sugarcane growers from the Mandya district, a non-sample area were personally interviewed using a scale consists of 82 statements to judge their CMB on a five-point spectrum. To examine the reliability of CMB scale, the split-half approach was used. The reliability coefficient (rII) of the CMB scale calculated was 0.8509 and the Spearman Brown prophecy formula proposed by Henrica et al. (2017) was further used for rectification. The scale’s reliability value was 0.9195, above the benchmark of 0.70 with a substantial 1 percent significance level. The developed CMB scale was extremely trustworthy and reliable in its measurement, according to the reliability value that was obtained.

**Validity of the CMB scale**

Both the statistical validity and the content rationality of the data were evaluated. Scale validity value for the CMB scale was 0.9589, and it was discovered to be statistically significant at the one percent significance level. When judging the statements, the validity of the content was considered. The contents and statistical validity were therefore judged to be quite valid. The scale that was devised to measure sugarcane growers’ CMB was so practical and sufficiently valid.

The results from Table 1 revealed that out of 168 items collected initially were reduced to 82 statements after following the technique proposed by Likert (1932) and Edwards (1969) in developing a scale to quantify the CMB of Sugarcane growers. Further, it also indicates the finally retained at the end of each stage.

**Table 1: The stage wise statements considered and retained in the construction of sugarcane growers’ crisis management behaviour scale**

Sr. No.	Steps	Crisis management behaviour	
		Statements considered	Statements retained
1	Collection of items	168	168
2	Editing of items	168	121
3	Relevancy analysis	121	103
4	Item analysis	103	82
5	Reliability and validity	82	82
6	Administering the scale	82	82

Finally, the sugarcane growers’ Crisis Management Behavior scale consists of 82 statements of Decision-Making Ability (11) and Adaptability (71) components along with five formulae of economic performance indicators.

**Administration of the scale and scoring criteria**

**Quantification of components of Sugarcane Growers CMB Scale**

**Decision making ability**

Previously, questionnaire responses based on a suggested set of practises were used to measure the decision-



making capacity of farmers (Singh and Sinha, 1968). However, they do not assess a farmer’s capacity for selecting choices when there are other options. Additionally, they neglected to consider the decision-making processes that

must be followed while planning and carrying out an action. A new dimension with 11 statements was constructed after taking into account the shortcomings of earlier attempts (Table 2).

**Table 2: Statement wise decision-making ability sugarcane growers**

Sr. No.	Statements
1	Prior to the onset of a crisis, a decision was made on the preparation of contingency crops plans.
2	Depending on the available water source, the decision on which irrigation techniques to use is decided
3	Decision to obtain financing from formal or informal sources to address the crises
4	Analysis of costs and returns is used to decide whether to sell sugarcane to factories or jaggery producers in order to deal with payment delays
5	Using an inspection of costs, benefits, and returns, the intercrops are choosen.
6	Depending on the situation, choose either labour or mechanisation.
7	Choosing adhoc advisors from the scientific community and peer groups during crises
8	Using weather forecasts to guide agricultural activity can help to reduce uncertainty.
9	Choosing of specific new varieties of sugarcane like drought tolerant varieties / submergence / flood tolerant varieties/ healthy setts
9	To combat price crises, producers of jaggery and ethanol decided to prepare value-added products based on market demand.
10	Choosing to employ institutional sources of information like price forecasting, input supply and advisory services

Strongly agree, agree, undecided, disagree, and strongly disagree are the five response options for the statements of decision-making ability dimension. For each response option, a score will be assigned, with positive statements receiving a score of 5, 4, 3, 2 and 1 respectively while negative statements receive a score in the opposite direction.

**Adaptability of sugarcane growers**

is used to describe the survival tactics and measures done by the sugarcane growers to deal with the current crisis conditions and predicted future catastrophe (Chamala and Crouch, 1977). These changes are limited to production management adaptations (Table 3), conservation of soil and water adaptations (Table 4), management of

floods and droughts adaptations (Table 5), price and financial management adaptations (Table 6), labour management adaptations (Table 7), management of livestock and waste management adaptations (Table 8), and institutional/organizational adaptations (Table 9) (Table 10). Although they have researched farmer adaptation patterns, there have never been attempts to quantify how farmers in sugarcane regions have adapted to sugarcane crisis. Therefore, it was determined to develop a scoring criterion based on psychological adjustment theories. The five-point continuum for adaptability that includes very larger extent, higher extent, moderate extent, least extent, and very least extent. Positive statements are given a weight of 5, 4, 3, 2, and 1, whereas negative statements receive a reversed score.

**Table 3: Adaptation patterns of sugarcane growers related to production crisis**

Sr. No.	Statements
1	Carrying out proper ratoon management practices like stubble shaving and gap filling
2	To control white grub- stagnation of water for 48 hrs. /drenching imidacloprid / chlorpyrifos @ 1 liter per acre
3	To control wooly aphid- Spray 2ml chlorpyrifos 20 E.C. or dimethoate @ 1.7ml per liter of water (requires 300-liter solution per acre)
4	Reduced the tillers/ plant population of sugarcane during stress season
5	Wrapping and propping of canes to prevent crop lodging
6	Grown fodder species as wind breakers on bunds to prevent crop lodging
7	Alteration in sowing dates to reduce the vulnerability of crisis on sugarcane
8	To control top and early shoot borer-trichogramma chilonis eggs @ 60000 / 5 times at 10 days interval after 4 weeks of planting / use of chlorpyrifos @ 1.2 liter per acre

**Table 4: Adaptation patterns of soil and water conservation in crisis management among sugarcane farmers**

Sr. No.	Statements
1	Followed green / dry mulching by rising green manure crops and thrash residues.
2	Application of tank silt and farmyard manure to increase soil fertility and water-holding capacity
3	Followed water saving irrigation methods like alternate furrow wetting and drip irrigation methods
4	Followed crop rotation to retain soil fertility after three harvests
5	Constructed bunds and stabilized with grasses to conserve soil and moisture
7	Levelled the land to promote uniform infiltration
8	Constructed farm pond and percolation pits for rain water harvesting and ground water recharge
9	Constructed water ways along the slope for safe disposal of rain water to avoid soil loss

**Table 5: Adaptation pattern of sugarcane growers to flood and drought crisis management**

Sr. No.	Statements
<b>A</b>	<b>Flood</b>
1	Draining out the flooded water in field as soon as possible
2	Early sowing of sugarcane to reach that growth stage which has minimum damage and effects on cane yield due to flooding
3	Field is cleared immediately and grown short duration crops like maize/wheat after flood occurrence
4	Slashing of severely damaged cane to promote ratooning
5	Construction of stone or sandbag structures to avoid water and silt load into field
6	Cultivating varieties tolerant/resistant to waterlogging and salinity
7	Restoration of normal soil characteristics by wetland restoration practices
8	Use of hazard insurance for crops
9	Use of desalination systems in the sugarcane field (nanofiltration, microfiltration and solar energy)
<b>B</b>	<b>Drought</b>
10	The stripped lower leaves and thrash residue of sugarcane is useful as mulching to conserve soil moisture
11	The temporary farm pond/bore well in river or deepened the existing bore wells to provide critical irrigations using improved irrigation methods
12	Increased usage of organic-manure with gradual reduction of chemical fertilizers
13	Earthing-up in main sugarcane and ratoon crop helps in soil and moisture preservation and to eliminates excess water
14	When crops are under water stress, foliar spraying with 2.5% urea and 2.5% KNO <sub>3</sub> as well as anti-transpirants improves crop growth and raises yield.
15	Reducing the area under sugarcane in forthcoming years
16	Cultivating short-lived and drought-resistant cultivars

**Table 6: Adaptation pattern of sugarcane growers to price and financial crisis management**

Sr. No.	Statements
<b>A</b>	<b>Price crisis management</b>
1	Wholesale based selling of sugarcane to the jaggery makers
2	Jaggery production to overcome delayed payment
3	Sold sugarcane for setts/seed purpose
4	Sold sugarcane to locals for juice/aesthetics purpose
5	Demand based value addition of sugarcane into powdered jaggery, liquid jaggery and flavored jaggery to get higher and immediate returns
6	Contract farming with jaggery makers and sugarcane factories

<b>B</b>	<b>Financial crisis management</b>
1	Wholesale based selling of sugarcane to the jaggery makers
2.	Saved money during normal year to utilize the same during crisis period
3	Mortgaged valuable assets like gold/home to meet capital needs
4	Borrowed loan from non-institutional sources like money lenders
5	Cultivated maize/sweet corn as intercrops over recommended intercrops in sugarcane to get additional income
6	Borrowed loan from institutional credit sources like commercial bank/ Primary land development bank (PLDB) for land development / Borrowed crop loan from PACS/SHGs/Banks
7	Rearing and selling of small livestock like sheep/goat to meet emergency financial needs

**Table 7: Adaptation pattern of sugarcane growers to overcome labour crisis**

<b>Sr. No.</b>	<b>Statements</b>
1	Lending loan to labours in advance
2	Hiring labours from nearby villages by providing transportation facilities to them
3	Involvement of family members in farm activities during peak work by suspending their regular work
4	Use of herbicides and weedicides for weed management
5	Mutual understanding with friends and relatives in peak work seasons to help each other
6	Use of implements/ equipments to carryout farm operations

**Table 8: Adaptation pattern of sugarcane growers to livestock management during crisis**

<b>Sr. No.</b>	<b>Statements</b>
1	Growing fodder in a piece of irrigated land with forage trees
2	Increased small animals like sheep/ goat and decreased the voracious feeding animals during crisis time
3	Increased the supplementary feeding to livestock
4	Purchased the fodder from fodder bank / other farmers on debt during crisis
5	Fodder preserved in the form of silage and hay for future
6	Shifting animals to safe places before occurrence of flood and sent to goshalas during drought

**Table 9: Adaptation patterns of sugarcane growers to thrash management**

<b>Sr. No.</b>	<b>Statements</b>
1	Mulching of sugarcane thrash residue in alternate rows
2	Thrash is used as firing material / biofuel in jaggery production
3	Thrash is baled and raked to sell it to biorefineries and jaggery units
4	Collected thrash is used as bedding material for livestock
5	Enriched thrash can be used as feed and fodder
6	Thrash is burnt in the field
7	Collected thrash is used as raw material for compost preparation

**Table 10: Adaptations needed from institutions/government for comprehensive crisis management according to sugarcane growers**

Sr. No.	Statements
1	Government should frame rigid laws and take actions against the factory owners for delayed payment
2	Uniform price for sugarcane across country
3	Government should replace fair and remunerative price with MSP
4	Immediate and adequate responses from line departments to help farmers at all stages of sugarcane crisis management
5	Cumbersome procedures should be made easy and immediate sanctioning of loans during crisis period
6	Government should adopt single sugarcane pricing mechanism instead of double sugarcane pricing mechanism
7	Separate development programmes for sugarcane by-products promotion

**Economic performance of sugarcane growers**

Several metrics have been employed by previous researchers to gauge economic performance. Indicators of financial performance include gross income, net farm income, and a few more metrics. Benefit-cost ratio was the most often used metric to gauge financial effectiveness across the research we analysed. However, these acts have some inherent flaws, such as misreading farmers' economic performance when resource underutilization and price variations are seen. In the context of Indian agriculture, these are very typical. As a result, this study makes an effort to pinpoint key metrics that effectively gauge economic performance. A list of factors compiled from the literature study and expert consultation was carefully cross-examined in light of the position of the farmers, the time they had available, as well as the researcher's and the farmers' capacity to submit the data. The best three metrics to gauge farmers' economic performance during the climate crisis (Vinaya et al., 2016). Five indicators were ultimately determined to be the most appropriate for measuring the economic performance of sugarcane farmers impacted by the crises following a thorough screening process. The five elements were as follows:

**(I) Crop Yield Index (CYI)**

**CYI** is a percentage comparison between the total crop production on a certain farm and the typical crop yield in the area. It is a percentage comparison of the yield of all crops on given farm with the average yields of these crops in the locality. The calculation method employed was:  $CYI = (\text{Acreage needed with mean produce of crops of locality}) / (\text{Acreage used by a sugarcane farmer to produce those crops})$ .

**(II) Intensity of Cropping (CI)**

CI is the proportion of net to gross cropped area.

$$CI = (\text{Net area cropped} / \text{Gross area cropped}) * 100$$

**(III) Net income (NI)**

NI is the difference between total gross income to total expenses in the farm.  $\text{Net Income} = \text{Total gross income} - \text{Total expenditure}$ .

**(IV) Gross Income (GI)**

GI is a farmer's total income from all sources, including agricultural income, wages, and other sources. Gross income (GI) is annual income before expenses and includes cash receipts, farm-related income, and government farm program payments (Anonymous, 2022).

**(V) Benefit-Cost ratio (BCR)**

The benefit-cost ratio is an indicator used for analysis of costs and benefits that attempts to recapitulate the overall value for money. A BCR is the ratio of the benefits from sugarcane farming expressed in monetary terms in relation to the costs involved in its production. The higher BCR indicates the better returns to the investment. Keeping this in mind the BCR is used as an indicator to measure the economic performance of sugarcane growers.

Under each economic performance indicating parameters, the sugarcane grower's performance was calculated using the formulae. After obtaining the performance values of all the farmers they were further into different categories under each heading i.e., low, medium and high using the mean and standard deviations. The farmers belonging to poor, medium and high-performance categories were assigned with scores of 1, 2, & 3 respectively for making the measurement convenient under CMB scale.

The final scale for assessing how sugarcane growers respond to crises is made up of 82 statements: decision-making ability (11 items), adaptability (71 items), production (8 items), soil and water conservation (8 items), flood (9 items),



drought (8 items), price (6 items), financial (6 items), labour (6 items), livestock (6 items), thrash (7 items), institutional adaptations (7 items), and economic performance (using standard formulae) (5 formula).

**Table 11: Distribution of sugarcane growers based on their crisis management behaviour level**

(n=32)

Sr. No.	Category	Criteria	Respondents
1	<b>Poor</b>	< (Mean- ½ SD)	11 (34.38 %)
2	<b>Moderate</b>	Between (Mean ± ½ SD)	14 (43.75 %)
3	<b>Better</b>	> (Mean + ½ SD)	07 (21.87%)

A respondent’s score on their CMB scale was determined by summing their scores across all items/statements across all dimensions. By employing mean and standard deviation as measures of check, sugarcane growers’ CMB was categorized into poor, moderate, and better categories based on the total cumulative score acquired. The results from Table 11 revealed that in study (pilot testing) area, more than two fifth (43.75 %) Mandya district sugarcane growers of belongs to the moderate CMB category followed by poor and better crisis management category with 34.38 per cent and 21.87 per cent respectively. In accordance with the severity of the crises, they made adjustments like made jaggery out of rejected cane to combat the price crisis, cleared fields, dug drainage ditches around them, applied cattle dung and urine slurry, and mulched their fields with greenery manure crops to restore fertility that had been lost to flooding & heavy fertilizer application. Since irrigation water is a crucial necessity, they follow and put into practise drought-relieving techniques in the summer to prevent river dry-off and post-flood effects like damage to electric channels. When filters and drip pipe holes were clogged, several farmers gave drip irrigation a try but abandoned it in this area. Since sugarcane is their main crop and the source of a sizable portion of their income, their spending was a little higher.

**CONCLUSION**

The CMB scale developed was found to be highly reliable and valid. Hence, it can be used to quantify the sugarcane growers’ CMB. It can be concluded that the scale developed is useful in measuring crisis management of behaviour of sugarcane cultivators. This also can be replicated to measure crisis management in other similar areas with suitable modification. But this evolved scale to measure the CMB of sugarcane growers has to be tested in diverse locations for its reliability (consistency) and also,

applicability under different sugarcane growing areas/regions as this scale was restricted to the sugarcane growing areas of Karnataka region only.

**IMPLICATION**

The developed scale to measure the CMB of sugarcane growers can be recommended to address the sugarcane growers’ crises across the nation after suitable modifications and testing at multiple locations.

**CONFLICT OF INTEREST**

No conflict of interest among researchers.

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