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# Determinants of Micro-Level Decisions of Sugarcane Farmers

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# DETERMINANTS OF MICRO-LEVEL DECISIONS OF SUGARCANE FARMERS

**Lavanya B T[1] and A V Manjunatha[2]**

## Abstract

*This is an attempt to understand the decision-making process and determinants of micro-level decisions of sugarcane farmers. Descriptive statistics have been used to identify the determinants and heuristics decision theory to understand the decision-making process of sugarcane farmers. The major determinants were identified as interest rate on credit, amount of land available for cultivation with the farmers, accessibility to formal credit sources and market, water availability with the farmer for crop cultivation, sugarcane price, expected yield from different varieties and expected profit from sugarcane. Based on the choice of determinants for each decision by farmers, choice of crop, choice of variety, frequency of irrigation, choice of market and choice of credit source were categorised under representative heuristics. While choice of planting season, methods of irrigation and fertilizer application were under available heuristics. Allocation of area and harvesting pattern of sugarcane farmers will follow anchoring heuristics method of decision-making process.*

## Introduction

Every day, people are inundated with decisions, big or small. Understanding how people arrive at their choices is an area of cognitive psychology that has received attention. Understanding the behaviour of individual agricultural decision makers is perhaps the most basic endeavour of the agricultural economics profession (Just, 1992). In recent years, agriculture is very dynamic in nature facing changes in almost every component like technology, prices, climate and institutional framework. The increased intervention from the state in agriculture through policies like Minimum Price Support (MSP), regulated markets, soil test program, fertilizer and micro irrigation policies and, not to forget, subsidies in different forms is contributing to the increased institutional risk in agriculture. Even small changes in policies impact realisation of agricultural production to considerable extent because of farmer's responsiveness towards it. Farmers usually act in response to changes to any policies by altering their decisions at micro-level or farm-level.

On the other hand, farm households form a significant base for any rural policy framework. The decision to participate in government policies or to adopt any new technologies is taken at farm household-level and the true micro-level impacts of such decisions are accurately seen at intra-household level. (Mc Gregor, Rubzen and Prior, 2001). Farmer's decision-making process is directed towards the objective they set at household-level which can range from maximizing their productivity and profitability to stabilising their income and food security or sustainability. Each decision throughout their farming process will be determined by their objective or goal to a larger extent. Existing socio-economic conditions, bio-physical conditions and institutional framework also play very important role in it. Realisation of output in agriculture is highly-dependent on these micro-level decisions and careful planning and executing the decisions is very important for the better realisations of their goal.

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Sugar sector is one of the most discussed agro-based industry in India. The sector has grown at slower pace and horizontally as compared to its global competitors. This is one such industry that impacts different segments of the economy as in: agriculture, industry, trade and most importantly politics in India. Sugarcane is an important commercial crop covering almost five percent of the total cultivated area in the country involving around 50 million farmers. The approximate value of the cane grown in the country in 2018-19 sugar year is around Rs. 70,000 Cr. There are 510 sugar mills operating in the country where around 0.5 million workers get their livelihood from. Sugar sector can be considered as one of the key sectors in rural India to target impact of rural developmental policies as it involves 7.5 percent of its population (ISMA, 2015).

Sugar sector is known as one of the highly-regulated sector in India. Government intervention is present throughout the value chain and almost all the stakeholders are subjected to it. Every stakeholder responds to these government interventions differently through their decisions at micro-level. The impact of the policies in sugar sector can be easily understood by understanding the micro-level decisions of each stakeholder of those policies. For example, there is continuous increase in the area under sugarcane cultivation in the country which could be understood by understanding the reason behind the change in cropping pattern at farm household-level. Likewise, the impact of the remedy by State to cut down the mounting cane arrears by providing soft loans to mills, can actually be evaluated by understanding the decisions taken by sugar mills to use that loan for various purposes at their unit-level. Sometimes, the policies framed by the State will not have the balanced impact on its stakeholders. It's during then that micro-level responses from each stakeholder will help the policy makers to understand flaws in policy frame. In case of farmers in sugar sector, micro-level decisions like choice of crop, allocation of area under sugarcane, choice of planting season, choice of variety, decisions regarding frequency and method of irrigation, fertilizer application, harvesting, choice of market and choice of credit source are considered as some important decisions at farm-level. The decisions are usually understood through their determinants and type of decision-making process.

Determinants are those factors which influence the decision-making process. These factors can be past experiences, cognitive skills of decision maker, personal and socio-economic characteristics of the decision maker, decision environment or external factors which are not in the control of decision maker. Understanding the decision-making process by identifying the determinants of it and by examining the reason behind those determinants will give a clear picture of decision-making process and out come from it. Determinants can be categorised using various criteria. Similarly, for our study, the determinants are categorised into socio-economic, bio-physical, institutional or external and individual categories. After identification of major determinants of a decision, identifying its category is also very important to know the most-influencing category among them and to understand the type of decision-making process adopted by the decision maker. The major possible determinants of the decisions chosen for farmers are listed according to their categories in Table 1. These determinants were identified both from review of literature and pilot survey conducted in the study area before the main survey.

**Table 1: Classification of Determinants Into Different Categories**

| Socio-economic factors | Bio-physical factors | Institutional / external factors | Individual Characteristics |
|---|---|---|---|
| Amount of land available for cultivation with farmers (Land availability) | Rainfall | Profitability | Risk involved |
| Risk involved | Water requirement of the crop | Risk involved | Market chosen |
| Peer group influence | Labour requirement of the crop | Credit availability for the crop | Trust worthiness of the buyers |
| Availability of water in tube well | Risk involved | Market availability | Purpose of obtaining loan |
| Labour availability | Method of cultivation | Availability of water in canal | |
| Method of irrigation | High-yielding variety | Availability of seed set | |
| Distance between the plot and canal | Availability of water in canal | Cost of irrigation | |
| Irrigation in the neighbouring field | Availability of water in tube well | Instalment cost | |
| Purpose of obtaining loan | Yield | Maintenance cost | |
| Capital available with the farmers | Duration of the variety | Fertilizer availability | |
| Credit required by farmers | Resistance to pest and diseases | Cost of fertilizer | |
| | Recovery content | Permit from sugar mill | |
| | Type of soil | Accessibility of market | |
| | G $ D of the crop | Time of payment to farmers from buyers | |
| | Stage of crop growth | Ease of interaction with buyers | |
| | Soil test result | Provision of transport | |
| | Crop maturity | Incentives from buyers | |
| | | Price of sugarcane | |
| | | Accessibility to credit sources | |
| | | Interest rate on credit from formal sources | |
| | | Procedures to obtain loan | |

Along with determinants, understanding the type of decision-making process gives better understanding of the drivers and outcome of those decisions. A heuristic is a simplified method by which people make judgments or decisions. Satisficing decision theory follows heuristics and is found to be simpler compared to optimising decision models. Heuristics are efficient cognitive processes, conscious or unconscious, that use only part of information available and ignore the rest. This heuristics method involves errors compared to optimising models but can approximate the results of optimising models in a simpler way. Heuristics is preferred because of its simple nature and easy of understanding the decision-making process.

Satisficing decision theory falls under heuristics. As with Simon's satisficing model, these heuristics are far simpler than analogous optimising methods. According to Gigerenzer and Gaissmaier 2011, heuristics are efficient cognitive processes, conscious or unconscious, that ignore part of the information. Because using heuristics saves effort, the classical view has been that heuristic decisions imply greater errors than do "rational" decisions as defined by logic or statistical models. But, these

methods can approximate the results of complex optimising models, yet simpler to be used by common decision maker.

There are three types of heuristics that decision makers usually use while making decisions: representative, available and anchoring heuristics. (Tversky and Kahneman, 1973).

**Representative heuristics:** The decision-making process, which falls under this category, uses comparison as the main tool to decide on things. In this type of decision-making process, the decision maker will consider only a part of the information available and ignore the rest. A given present problem is compared to similar problems in the past and their outcomes. Additional information specific to this problem are generally ignored in the process of decision making.

**Availability heuristics:** In this type of decision-making process, the decision maker relies on mental shortcuts like immediate things those come to his mind while trying to solve a given problem. This is purely based on what is vivid information to the decision maker and what he can recall from all the information he has at that point of time.

**Anchoring heuristics:** This is the third type of decision-making process where continuous adjustments are made to decision value to reach close to optimum decision. Based on the additional information available, the decision maker adjusts his initial value, which is known as anchoring value, to move close to optimum value.

## Research Gap

The available studies on understanding the decision-making process, especially in agriculture or agro-based sector, are very few in existing literature. It's important to understand the decision-making process of different stakeholders in a sector to understand the problems and prospects of that sector. Understanding the decision-making process using heuristics as a framework has not been much researched till now. This study tries to fill the above-mentioned gaps in addition to understand the problems and prospects of the sugarcane farmers. The results from the study can actually help policy makers to target particular determinants or factors through their policies and understand the decision-making process of sugarcane farmers. This will be helpful in designing the extension services for farmers.

## Data and Sampling

Maddur taluk in Mandya district was chosen as study area as it has the highest production of sugarcane in Mandya district with two sugar mills operating in the taluk. Three villages were selected based on their distance from sugar mills as below.

| Sl. No. | Villages | Distance from sugar mill (KM) |
|---|---|---|
| 1 | Chikkonahalli | 4 |
| 2 | Nallahalli | 12 |
| 3 | Kilaara | 18 |

Random sample of 33 each from Chikkonahalli and Nallahalli and 34 from Kilaara were selected for the study.

## Methodology

Micro-level decisions considered to understand the decision-making process of sugarcane farmers are: choice of crop, allocation of area under sugarcane, choice of planting season, choice of variety, decisions regarding frequency and method of irrigation, fertilizer application, harvesting, choice of market and choice of credit source. Various determinants listed in Table.1 were used specifically subjected to different decisions and farmers were asked to rank them in order of five according to their extent of influence on that particular decision. (1: highly influential, ....., 5: not influential). By using the below-mentioned methodology, major determinants for each decision were identified. Ranking details of determinants are presented on appendices.

### Average Mean Score

$$\text{Percentage} = \frac{\text{Frequency}}{\text{Number of sample}} \times 100$$

### Influential Level

$$\text{Descriptive Percentage} = \frac{S_r - S_{min}}{R} \times 100$$

$S_r$: Respondent score

$S_{min}$: Minimal score

R: Difference between maximal and minimal score

### Determinants influential categories

81-100%: Highly-influential

60-80%: Moderately highly-influential

41-60%: Relatively low-influential

21-40%: Very little influential

0-20%: Not influential

At second stage, in order to identify major determinants of micro-level decisions for sugarcane farm as a whole, farmers were also asked to rank the micro-level decisions according to their importance in sugarcane cultivation. The categorisation of decisions according to their importance is done using similar methodology as determinants. At the third stage, each decision is given weightage according to its importance category (Highly-important: 5, Moderately highly-important:4, Relatively low-important:3, less important: 2 and not important:2). Each determinant under particular decision is multiplied with its respective decision weight and its descriptive percentage to obtain a total score of the

determinant. Based on the total score, major determinants of micro-level decisions of sugarcane farms are identified.

**Total Score of Determinant = Determinant descriptive percentage × Specific decision weight**

## Understanding the Decision at Micro-Level

Various micro-level decisions, which are part and parcel of sugarcane cultivation, are identified and farmers perceptions towards them are analysed and accordingly major determinants for each decisions are identified.

### Decision: Choice of crop

In the present competitive environment, most of the farmers are interested in increasing their net return from their farming activity. This is driving the farmers to turn towards commercial crops. But it is not true that by doing so farmers are making their best decision. They need better information on crop characteristics, it's feasibility in that particular area, availability of resources and market structure, etc. to do so. Farmers usually select crop for cultivation according to their traditional knowledge and past experience in farming but a farmer's predictions may go wrong due to natural disaster (Deepa and Kaliyaperumal, 2017).

In the sample area, sugarcane has been the major crop for a very long period and when farmers were asked to name the top five determinants that influenced them for choosing sugarcane, they stated that water requirement (98%), land availability (97%), method of cultivation (83%), market availability (70%), risk involved (51%) and profitability (50%) were some of the major determinants.

In total, according to descriptive percentage, land availability fall under highly-influential category with 92.75 percent, followed by water requirement and profitability falling under moderately highly-influential category with 67.75 and 61 percent. Factors like risk involved (30.50%), method of cultivation (27.25) and market availability (20.50%) is known to have very little influence on the choice of sugarcane crop by the sample farmers. (Table 2)

Land is the prime factor for agriculture and extent of its availability influences the agricultural activities significantly. Availability of land has played as a major determinant in choosing the sugarcane crop by the sample farmers. Sugarcane is a water-intensive crop but when compared to paddy it requires lesser water. Paddy being the only competitive crop in the study area, many farmers have chosen sugarcane over paddy for its comparatively less water requirement. Sugarcane is a commercial crop and is believed to earn 50% profit above $A_2$ cost and when compared to paddy it earns almost twice as much as paddy's net return. Consequently, farmers have chosen sugarcane for its profitability. Sugarcane being an annual crop, is much easier to cultivate and less risky compared to paddy. The market for sugarcane is also well-established in the study area in the form of sugar mills and jaggery processing units (though numbers are dwindling, they are still present) thus, justifying the determinants like method of cultivation, risk involved and market availability as the determinants influencing choice of sugarcane by farmers.

**Table 2: Decision: Influential Categories of Different Determinants of Choice of Crop**

| Sl. No. | Determinants | Average Mean Score | Average respondent score | Descriptive percentage | Influential category |
|---|---|---|---|---|---|
| 1 | Land availability | 97 | 1.29 | 92.75 | Highly-Influential |
| 2 | Rainfall | 5 | 5 | 0.00 | Not influential |
| 3 | Water requirement | 98 | 2.30 | 67.75 | Moderately highly-influential |
| 4 | Labour requirement | 11 | 3.36 | 41.00 | Relatively low influential |
| 5 | Profitability | 50 | 2.56 | 61.00 | Moderately highly-influential |
| 6 | Risk involved | 51 | 3.78 | 30.5 | Very little influential |
| 7 | Credit available | 2 | 1 | 100 | Highly-influential |
| 8 | Method of cultivation | 83 | 3.91 | 27.25 | Very little influential |
| 9 | Market availability | 70 | 4.21 | 20.50 | Very little influential |
| 10 | Peer group influence | 7 | 4.57 | 10.75 | Not influential |
| 11 | High-yielding variety | 26 | 3.88 | 28.00 | Very little influential |

## Decision: Allocation of area

Farmers usually grow more than one crop in their field and the cases of specialisation is common mostly among large farms. Most of the small and marginal farmers tend to diversify their cropping pattern due to reasons like: risk aversion, subsistence farming and to spread their source of income throughout the year. Specialisation is advantageous because of higher rates due to economies of scale leading to higher profit levels. Subsistence farms are comparatively more diverse compared to profit-oriented farms. When the farm is diversified, cropping pattern is reflected in terms of area under each crop in it. It is common that the crop with utmost importance to farmer will have a larger share in the available land followed by other crops.

Crop choice and allocation of area to each crop chosen to be grown on farmer's field are connected significantly. Factors like land availability (100%), water requirement (97%), method of cultivation (79%), profitability (71%) and market availability (61%) were most cited by farmers as determinants of decision regarding allocation of area under sugarcane by farmers.

According to descriptive percentage, land availability (90.25%) plays an important role determining the area allocation under sugarcane crop. Subsequently water availability (71.25%) falls under moderately highly-influential category and determinants such as profitability (54%) and method of cultivation (42.75%) fall under relatively low-influential categories. While rainfall (40%), Risk involved (31.25%), Credit available for sugarcane crop from formal sources (31.25%) and high-yielding variety (28%) found to be having very little influence on the decision-making process of allocation of area under sugarcane. (Table 3)

As stated above in diversified farm, the allocation of area is mainly influenced by the extent of land holding with the farmers for cultivation. Therefore, amount of land that is available with the farmers influence the area allotted to sugarcane crop for that particular cropping season. Cropping pattern of the sample farmers shows that around 50 percent of the cultivable land was allotted for sugarcane crop followed by paddy which is the competing crop in the area. This shows that for most of the farmers sugarcane has been the most-important crop, thus, driving them to allot major portion of

their area under this crop. Sugarcane is a water-intensive crop and mostly grown under irrigation (87.9% of the area under sugarcane is irrigated in India (Das)) in India. Minimum of 3-4 irrigations per month are must for the crop in early stages. However, it can be brought down to 1-2 irrigations at later stages. Consequently, availability of water for irrigation is an important determinant for allocation of area under sugarcane. Farmers decide the sugarcane acreage usually based on that year's rainfall prediction, availability of water in major sources of irrigation like dams, tanks and tube wells.

Sugarcane is an annual crop, and when compared to its competing crop, paddy, it requires less intensive cultural practices. Cultural practices in sugarcane cropping is intense only during initial stages of the crop growth, while for the rest of the season only weed management and irrigation are the major practices on the field. As a result sugarcane crop is much easier to cultivate compared to paddy, making it comparatively more preferred crop in the study area. Sugarcane has one of the highly-regulated pricing system in the country and its prices are on continuous hike and its growth rate higher compared to even food crops like paddy and wheat (Lavanya and Manjunatha, 2018). Consequently, the calculated net return from sugarcane is much higher compared to paddy in the region. Another interesting fact is that availability of credit services from formal credit sources especially for sugarcane crop in the region. Farmer can obtain credit up to Rs. 50,000 per acre of sugarcane he is growing at minimal interest rate. This also acts as an incentive to farmers to grow sugarcane in their field.

**Table 3: Influential Categories of Different Determinants of Allocation of Area**

| Sl. No | Determinants | Average Mean Score | Average respondent score | Descriptive percentage | Influential category |
|---|---|---|---|---|---|
| 1 | Land availability | 100 | 1.39 | 90.25 | Highly-influential |
| 2 | Rainfall | 5 | 3.40 | 40.00 | Very little influential |
| 3 | Water Availability | 97 | 2.15 | 71.25 | Moderately highly-influential |
| 4 | Labour requirement | 9 | 3.44 | 39.00 | Very little influential |
| 5 | Profitability | 71 | 2.84 | 54.00 | Relatively low influential |
| 6 | Risk involved | 42 | 3.75 | 31.25 | Very little influential |
| 7 | Credit available | 4 | 3.75 | 31.25 | Very little influential |
| 8 | Method of cultivation | 79 | 3.29 | 42.75 | Relatively low influential |
| 9 | Market availability | 61 | 4.47 | 13.00 | Not influential |
| 10 | Peer group influence | 17 | 4.94 | 1.50 | Not influential |
| 11 | High-yielding variety | 10 | 4.6 | 10.00 | Not influential |
| 12 | Any other | 5 | 3.4 | 40.00 | Very little influential |

## Decision: Choice of planting season

Every crop that is being cultivated as part of agriculture has a set of cultural practices that should follow specific time frame during the entire cropping period. The most usual objective of a farmer will be to obtain maximum possible yield from a particular crop in that particular cropping period. Cultural practices and their time frames are very important in promoting crop yield. Since plants are sessile organisms, they automatically adjust their life cycles to the annual changes in the environment. The timing of such events as seed germination, flowering, the onset of dormancy, and the breaking of dormancy has to be coordinated with the seasons of the year. Plants achieve this coordination by

measuring the duration of day and night length and the time over which they are exposed to low temperatures. (NRC, 1989)

The optimal yield of particular strains of plants is usually higher when grown under non-limiting condition. The potential yield is much higher compared to average yield on farmer's field because of stressful conditions. In order to minimise the stressful conditions on plant's growth and development it is advisable to choose a right planting season as such that its critical stages of growth do not coincide with stressful conditions from the environment.

Since sugarcane is an annual crop planting it in right season is very important as it will have impact on its whole cropping period. It was noted that June and January were known to be major planting seasons for sugarcane in the study area. When farmers opinion was asked about the determinants that influence the choice of planting season for sugarcane, most of the farmers opined that time of rainfall (100%), availability of water in canal (100%), yield (96%), availability of water in tube well (92%) and availability of labours (75%) were most important factors.

Descriptive percentage analysis reveals that yield is the highly-influential factor with 80.75 percentage followed by availability of water in canal (62.25%) and time of rainfall (61.75) falling under moderately highly-influential. (Table 4)

Yield has been chosen as the most important factor that influences the decision-making process of choosing planting season. Most of the farmers opined that they prefer to plant sugarcane in June. Many studies have revealed that sugarcane planted in June yields more compared to January-planted sugarcane. It was also noted that the juice quality was higher if cane was harvested in dry months compared to wet months. Planting the sugarcane in June allows the cane to be ready for harvest during the dry months of next year. So June-planted cane's yield and quality of juice was higher compared to the cane planted in other seasons. Sugarcane is a water-intensive crop and irrigation at critical stages of growth is necessary to achieve higher yields. So determinants like rainfall, water availability in canal and tube well plays an important role to plant the crop.

**Table 4: Influential Categories of Different Determinants of Choice of Planting Season**

| Sl. No. | Determinants | Average Mean Score | Average respondent score | Descriptive percentage | Influential category |
|---|---|---|---|---|---|
| 1 | Time of rainfall | 100 | 2.56 | 61.75 | Moderately highly-influential |
| 2 | Availability of water in canal | 100 | 2.51 | 62.25 | Moderately highly-influential |
| 3 | Availability of water in tube well | 92 | 3.34 | 41.50 | Relatively low influential |
| 4 | Availability of seed set from sugar mill | 37 | 3.89 | 27.75 | Very little influential |
| 5 | Labour availability | 75 | 4.50 | 12.25 | Not influential |
| 6 | Yield | 96 | 1.77 | 80.75 | Highly-influential |

## Decision: Choice of variety

Variety which is chosen for the cultivation is a pivot point around which the entire production process revolves. Therefore, many studies suggest that scientific sugarcane cultivation must start with choosing an appropriate variety for the agro-climatic zone, soil type and season concerned. Due to advanced

research and breeding, improved varieties are now available for almost all the growing conditions. New varieties are continuously evolved by the Sugarcane Breeding Institutes, Agricultural Universities and Sugarcane Research & Development Centres world over. It would be therefore worthwhile for the growers to choose a variety which is most suitable for them.

Karnataka stands third in production of sugarcane in India and its productivity is higher than the national average. This is because of varieties that are grown in the state like: Co 86032 (Nayana), Co 8371, Co 62175 and recently introduced VCF 0517 (Bahubali) etc. Co 86032 and Co 62175 were the widely spread varieties in the study area until recently. However when VCF 0517 was released in 2017 by Zonal Agricultural Research Station, University of Bangalore, it replaced the other varieties quickly. Within two years, VCF 0517 had almost 100 percent spread in the study area. This variety is found be higher yielding (20-30 t/acre compared to Co 86032 and Co62175), better tillering, higher quality and has good ratooning ability convincing farmers to adopt in their field.

Among many other factors which influences the decision to adopt a new variety, yield of that particular variety (100%), availability of seed sets of that variety (98%), peer group influence (92%), recovery content (92%) and drought tolerant (72%) were the most-mentioned determinants by farmers.

According to descriptive percentage yield of that particular variety (90.50) was highly-influential in choosing the variety followed by availability of seed sets (68.25%) of that variety being moderately highly-influential. While peer group influence (54.25%) and water requirement of that particular variety (46.75) were found to be relatively low-influential on choosing the variety, recovery content had very little influence. (Table 5)

**Table 5: Influential Categories of Different Determinants of Choice of Variety**

| Sl. No | Determinants | Average Mean Score | Average respondent score | Descriptive percentage | Influential category |
|---|---|---|---|---|---|
| 1 | Yield of particular variety | 100 | 1.38 | 90.50 | Highly-influential |
| 2 | Availability of seed sets of that variety | 98 | 2.27 | 68.25 | Moderately highly-influential |
| 3 | Peer group influence | 92 | 2.83 | 54.25 | Relatively low-influential |
| 4 | Water requirement | 22 | 3.13 | 46.75 | Relatively low-influential |
| 5 | Duration of that variety | 22 | 4.45 | 13.25 | Not influential |
| 6 | Resistance to pest and diseases | 74 | 4.64 | 9.00 | Not influential |
| 7 | Recovery content | 92 | 3.94 | 26.50 | Very little influential |

## Decision: Irrigation

More than 80 percent of the sugarcane area falls under irrigated belts in India. Total water requirement of sugarcane varies from 120 to 350 cm depending on different cultivars, crop duration and climatic conditions. Water requirement varies from 1200 – 1800 mm in the subtropical zone while it is 1600 – 2700 mm in tropical belts. There are four stages in sugarcane growth: germination stage (1-35 Days After Planting (DAP)), tillering stage (36-100 DAP), grand growth stage (101-270 DAP) and maturity stage (271- till harvest). The water requirements vary between these four stages and accordingly,

frequency of irrigation can also vary. In germination stage, shallow wetting of 2-3 cm is required every alternative day to enhance germination especially in sandy soils. Whereas, in tillering stage and grand growth stage irrigation can be given in 8-10 days of interval to increase the number of tillers and for proper growth and development of the crop. In maturity stage, the irrigation interval can be widened to 10-15 days as little water stress in this stage will enhance the sucrose content and quality of juice in the cane.

Every farmer may not be able to follow the above-mentioned ideal irrigation schedule on their farm as many factors influence each farmer differently. Most of the sample farmers reported that water availability in canal (100%), water availability in tube well (95%), distance between plot and canal (77%), method of irrigation (71%) and cost of irrigation (60) are some of the important determinants which influences the frequency of irrigation in their field. Method of irrigation was ranked first by most of the farmers, who chose it as one of the important determinant, canal was mostly ranked second by farmers while water availability in canal was ranked second. Most of the time, water availability in tube well, cost of irrigation and distance between plot and canal got third, fourth and fifth rank by farmers.

Descriptive analysis of the farmers' chosen ranks reveal that determinants such as: water availability in canal, water availability in tube well, type of soil and method of irrigation fall under moderately influential category with 69.50%, 63.25%, 60.75% and 67% respectively. Availability of labour (32.25) and cost of irrigation (34.50) were found to be having very little influential. (Table 6)

The study area chosen is part of Cauvery River belt and is irrigated majorly by canal. But many of the farmers resort to tube well to irrigate their field to meet the additional water demand of the crop. Therefore, water availability from both canal and tube well play an important role in the frequency of irrigation. Type of soil has a major influence on frequency of irrigation as sandy soils need two irrigation more compared to clay soils in a month. Method of irrigation also determines the frequency of irrigation to larger extent as quantity of water applied to crop differs between different methods of irrigation. Almost all the farmers have adopted flood method of irrigation and involves some physical labour. The cost of flood irrigation is almost equal to cost of labour employed to irrigate the crop. Consequently, both availability of labour and cost of irrigation, were found to be little influential in determining the frequency of irrigation on farmers field.

**Table 6: Influential Categories of Different Determinants of Frequency of Irrigation**

| Sl. No. | Determinants | Average Mean Score | Average respondent score | Descriptive percentage | Influential category |
|---|---|---|---|---|---|
| 1 | Water availability in canal | 100 | 2.22 | 69.5 | Moderately highly-influential |
| 2 | Water availability in tube well | 95 | 2.46 | 63.25 | Moderately highly-influential |
| 3 | Availability of labour | 24 | 3.75 | 32.25 | Very little influential |
| 4 | Type of soil | 46 | 2.58 | 60.75 | Moderately highly-influential |
| 5 | Method of irrigation | 71 | 2.32 | 67.00 | Moderately highly-influential |
| 6 | Cost of irrigation | 60 | 3.63 | 34.50 | Very little influential |
| 7 | Distance between the plot and canal | 77 | 4.32 | 17.00 | Not influential |
| 8 | Irrigation in the neighbouring fields | 27 | 4.48 | 13.00 | Not influential |

## Decision: Method of irrigation

Different irrigation methods are gaining importance especially in water-intensive crops like sugarcane in the wake of depleting water resources in the country. There are different methods of irrigation practiced in sugarcane cultivation such as: flood, furrow, alternate skip furrow and sprinkler and drip irrigation methods. Among all the above-mentioned methods flood irrigation and furrow irrigation methods are widely followed by farmers. Though government is encouraging farmers to adopt micro irrigation methods by incentivizing them through subsidies, the adoption rate is not as much as it was expected. Farmers often complain about maintenance issues with these micro irrigation methods. Therefore, micro irrigation, which was believed to be solution to grow water-intensive crops like sugarcane, is not picking up momentum.

The common irrigation method that was practiced in study area was furrow irrigation method. Almost all the farmers stated water availability in canal was one of the determinant behind choosing the method of irrigation. Water availability in tube well was chosen by 96 percent, cost of irrigation by 93 percent, maintenance cost by 85 percent and instalment cost by 75 percent of the sample farmers. Among the farmers who chose above determinants as influential to choose method of irrigation on their fields, most of them ranked water availability in canal second, water availability in tube well third, instalment cost first, cost of irrigation equally first and second and maintenance cost first.

According to descriptive percentage analysis, instalment cost and cost of irrigation fall under moderately highly-influential category with 64.50 and 61.00 percent respectively. Maintenance cost and water availability in canal were found to be relatively low influential and water availability in tube well was very little influential. (Table 7)

Because of high instalment and maintenance cost on drip and sprinkler methods, which is finally resulting in higher cost of irrigation, farmers have resorted to mostly flood and furrow method of irrigation in the study area. Many farmers who had earlier installed drip irrigation method on their field have discontinued because of maintenance issues. As most of the study area is irrigated through canal even while choosing method of irrigation farmers opine that water availability in canal is significantly influential.

**Table 7: Influential categories of different determinants of Method of irrigation**

| Sl. No. | Determinants | Average Mean Score | Average respondent score | Descriptive percentage | Influential category |
|---|---|---|---|---|---|
| 1 | Water availability in canal | 100 | 2.62 | 59.50 | Relatively low influential |
| 2 | Water availability in tube well | 96 | 3.46 | 38.50 | Very little influential |
| 3 | Availability of labour | 51 | 4.45 | 13.75 | Not influential |
| 4 | Instalment cost | 75 | 2.42 | 64.50 | Moderately highly-influential |
| 5 | Cost of irrigation | 93 | 2.56 | 61.00 | Moderately highly-influential |
| 6 | Maintenance cost | 85 | 3.03 | 49.25 | Relatively low influential |

## Decision: Fertilizer application

Nutrient management is one of the important factor that influences the sugarcane yield significantly. Fertilizer cost constitutes around 30-50 percent of the total cost in sugarcane cultivation. Sugarcane requires many nutrients for its proper growth and development. However, the nutrient uptake is very active in vegetative phase of growth. Most of the farmers are aware about the importance of nutrient management in sugarcane but they also believe that more fertilizer application will help them realize more output, which is not true according to scientific studies. Consequently, most of the farmers apply more fertilizer than the recommended dosage for their sugarcane farms. Farmers reported that fertilizers will be applied in five doses and they do not follow recommended dosage of fertilizer. Though all the farmers are aware of soil test technology, they have not adopted it.

The three most-important factors that influence fertilizer application as per farmers opinion are fertilizer availability (100%), growth and development of crop (100%) and cost of fertilizer (100%). Nearly 60 percent of the farmers ranked cost of fertilizer above all other determinants followed by fertilizer availability as second rank and growth and development of the crop as third rank in that order.

Descriptive percentage analysis of the data reveals that cost of fertilizer falls under highly-influential category with 83 percent, followed by fertilizer availability (72%) and growth and development of the crop (66.75%) under moderately highly-influential category. (Table 8)

**Table 8: Influential categories of different determinants of Fertilizer application**

| Sl. No. | Determinants | Average Mean Score | Average respondent score | Descriptive percentage | Influential category |
|---|---|---|---|---|---|
| 1 | Fertilizer availability | 100 | 2.12 | 72.00 | Moderately highly-influential |
| 2 | G $ D of crop | 100 | 2.33 | 66.75 | Moderately highly-influential |
| 3 | Cost of fertilizer | 100 | 1.68 | 83.00 | Highly-influential |
| 4 | Stage of crop growth | 66 | 4.60 | 10.00 | Not influential |
| 5 | Water availability | 70 | 4.35 | 16.25 | Not influential |
| 6 | Soil test result | 64 | 4.34 | 16.50 | Not influential |

## Decision: Harvesting

In India, harvesting of sugarcane is carried out at 10 to 18 months stage depending upon the planting time and crop maturity. Early varieties are harvested at 10-months stage, mid-late 10-12 months and late after 12-month stage. Harvesting of cane should happen at its peak maturity by cutting cane at ground level so that bottom sugar-rich internodes are harvested properly to add to its yield and quality. De-topping at appropriate height and cleaning of cane by removing leaves and trash is very important to increase the quality of cane supplied to sugar mills. Harvesting process in sugarcane is very tedious and involves lot of manual labour. Mechanisation of harvesting process was a failure as the sugarcane harvester had many drawbacks such as: the machine being heavy, when operated on farmers field it would press the soil and compact it, the harvester cuts the cane at above internode level which is not desirable, as well as makes it difficult for the farmers to grow ratoon crop and sugarcane harvester's price being high makes it unaffordable for farmers to own one.

Some of the factors that influence the harvesting decision, according to farmer's opinion, are crop maturity (100%), Market chosen (100%), Permit from sugar mill (100%), pest and disease infestation (100%) and water availability (90%). Among all the determinants chosen, most of the farmers ranked permit from sugar mill above all other factors, flowed by crop maturity as second, market chosen as third, water availability as fourth and pest and disease infestation as fifth. According to descriptive percentage analysis, permit from sugar mill is the determinant that influences the harvesting decision the most with 92.25 percent. Crop maturity was found to be moderately highly-influential with 66.25 percent, followed by market chosen under relatively low-influential category with 50 percent. Other determinants like water availability and pest and disease infestation to the crop were found to be falling under very little influence category with 22.25 and 21.75 percentages respectively. (Table 9)

Most of the farmers expressed difficulties in obtaining the permit to harvest the cane at the right time. Therefore, farmers stated that time of permit decides the time of harvest. Crop maturity is one more factor that influences the time of decision, as farmers apply for permit when the crop is about to reach maturity. Most of the farmers stated that they apply for permit before the cane has matured enough because obtaining permit takes some time. Market chosen by farmers also influences the harvesting decision as in the case of sugar mill permit decides the harvesting time while in case of jaggery units farmers can choose their harvesting time. Other factors, like water availability and pest and disease infestation also influences the harvesting time to some extent like in case of water shortage, farmers harvest their cane if it has just reached maturity stage and do not wait till peak maturity period as crop may dry up.

**Table 9: Influential categories of different determinants of harvesting**

| Sl. No. | Determinants | Average Mean Score | Average respondent score | Descriptive percentage | Influential category |
|---|---|---|---|---|---|
| 1 | Crop Maturity | 100 | 2.35 | 66.25 | Moderately highly-influential |
| 2 | Market chosen | 100 | 3.00 | 50.00 | Relatively low influential |
| 3 | Water availability | 90 | 4.11 | 22.25 | Very little influential |
| 4 | Pest and disease infestation | 100 | 4.13 | 21.75 | Very little influential |
| 5 | Permit from sugar mill | 100 | 1.31 | 92.25 | Highly-influential |
| 6 | Yield | 10 | 4.9 | 2.50 | Not influential |

## Decision: Choice of market

Sugarcane is one among the most important cash crop grown in India for which the market is well-established and highly-regulated. Sugar and jaggery are two important products produced from sugarcane, thus, providing farmers to choose their market between sugar mills and jaggery processing units. Major share of the sugarcane produced is consumed by sugar mills, while only around 15 percent of the total sugarcane produced is diverted to jaggery and khandsari production.

According to primary survey, major factors that influenced the choice of market are accessibility (94%), labour availability (91%), provision of transportation for the harvested cane by mills (89%), price paid to sugarcane (85%) and ease of interaction (61%). Among the farmers who chose

the above factors, accessibility and price were ranked first by 61 and 33 percent of them. Labour was ranked second by most of the farmers while ease of interaction and provision of transportation were ranked fifth. (Table 10)

According to descriptive percentage analysis, accessibility was found to be under highly-influential category, labour availability and price paid to sugarcane were under moderately highly-influential category. Factors like availability of inputs and trust worthiness were found to be little influential in choosing the market between sugar mills and jiggery processing units.

The status of sugarcane diversion to different markets in study area was a true replica of national trend with major share being diverted to sugar mills. Most of the farmers stated that they preferred sugar mills over jaggery processing units as their market for various reasons. Establishment of market in the form of sugar mills, which is highly-regulated, has helped farmers to market their produce better. The accessibility of sugar mills to farmers is one important factor that has influenced the farmers the most to choose their market. Delicensing of sugar mills in 1998 was a major driver behind flow of private investment into the sector. This actually resulted in establishment of many private sugar mills in India. As a result, sugar mills as a market became well-established and accessible to farmers. Labour scarcity in agriculture is another crisis that is much talked about recently. Some of the cultural operations in sugarcane cultivation like irrigation, weeding and harvesting are labour-intensive and given limited opportunity for mechanisation for above-mentioned operations and a major constraint in growing this crop. Consequently, sugar mills providing labour for harvesting has influenced farmers positively towards them in choosing their market. Sugarcane pricing policy is one of the most-debated sugar policy in India and there are narratives for it on both the sides. State regulates the whole sugar sector majorly by fixing the cane price impacting both farmers and millers. Millers are obliged to pay the amount fixed by the state for the cane they purchase, which is not in the case of jaggery processing units. Therefore, the price farmers get for their cane is mostly higher from sugar mills compared to jaggery processing units. Farmers in the study area were of the opinion that management of sugar mills were more trust worthy compared to owners of jaggery processing units, as there will be formal procedures and records on agreement and transactions between the farmer and the sugar mills. The interaction between farmers and sugar mills is facilitated through field men, who act as bridge between them, thus, making it easy for both of them.

**Table 10: Influential Categories of Different Determinants of Choice of Market**

| Sl. No. | Determinants | Average Mean Score | Average respondent score | Descriptive percentage | Influential category |
|---|---|---|---|---|---|
| 1 | Accessibility | 94 | 1.51 | 87.25 | Highly-influential |
| 2 | Labour availability | 91 | 2.53 | 61.75 | Moderately highly-influential |
| 3 | Ease of interaction | 61 | 4.14 | 21.5 | Very little influential |
| 4 | Availability of inputs | 20 | 4.45 | 13.75 | Not influential |
| 5 | Provision of transportation | 89 | 4.31 | 17.25 | Not influential |
| 6 | Trust worthiness | 55 | 3.67 | 33.25 | Very little influential |
| 7 | Price | 85 | 2.09 | 72.75 | Moderately highly-influential |
| 8 | Other incentives | 5 | 4.42 | 14.5 | Not influential |

## Decision: Credit

One of the important characteristics of rural credit market in India is the co-existence of two distinct sectors: the formal sector comprising commercial banks, credit cooperatives and regional rural hanks; and the informal sector having a wide variety of lenders viz. agricultural money lenders, professional money lenders, landlords, traders and commission agents, shopkeepers, relatives and friends. (Birthal and Singh, 1993). Government is trying very hard to evade implications of informal credit markets, especially in rural area, through many credit policies. State is trying to make formal credit system more accessible, affordable and efficient in rural areas so that it can cater to farmers credit requirements more efficiently

According to farmer's perception in study area, factors like capital unavailability with the farmers (100%), accessibility of formal credit sources (99%), interest rates (99%) and amount of credit required by the farmers (95%) influence the credit borrowing behaviour of the farmers. Among the farmers who chose the above mentioned determinants, most of them ranked interest rate first, accessibility second followed by credit required, capital unavailable with the farmers and purpose in third, fourth and fifth rank respectively. According to descriptive percentage analysis, interest rate was under highly-influential category, accessibility under moderately highly-influential and all other factors under very little influential category. (Table 11)

It was observed that crop loan at 0.75% to farmers was the most-efficient and well-implemented credit policy in the study area. Almost all the farmers, who were eligible for this credit, from banks, co-operative societies and NGO's, availed this benefit. Formal sources disbursed up to Rs. 50,000 per acre for sugarcane crop as crop loan at 0.75% interest while Primary Agricultural Co-operatives Societies provided with no interest. There are SHG's and NGO's, like Shri Shakti Sanga, Grameena Koota and Manjunath Sanga, which gave credit to farmers at same rate of interest.

However, there are some procedural constraints in these credit policies. For example, if the land is not registered in a particular farmer's name they cannot avail the credit from formal sources. It was found that many farmers did not have their land registered in their name because of their sibling's disputes, so they were not able to get credit from formal sources and they had to resort to informal sources paying high interest rates. There were also interesting anecdotes of farmers using this credit for different purposes like some farmers availed credit from formal sources as crop loan or jewellery loan at 0.75% and lent it to others informally at higher interest rates. It was also observed that late payments from sugar mills impact the repayment plan of farmers and cost them high. The opportunity cost of late payment from sugar mill is quite disturbing as they cannot avail loan for cultivation of crop for the next season until they repay the previous loan which forces farmers to switch to informal sources with high interest as they neither have returns from previous season at that point of time to repay the loan nor have capital to start the cultivation practices for next season.

**Table 11: Influential Categories of Different Determinants of Credit**

| Sl. No | Determinants | Average Mean Score | Average respondent score | Descriptive percentage | Influential category |
|---|---|---|---|---|---|
| 1 | Accessibility | 99 | 2.07 | 73.25 | Moderately highly-influential |
| 2 | Interest rate | 99 | 1.26 | 93.50 | Highly-influential |
| 3 | Procedure | 44 | 3.75 | 31.25 | Very little influential |
| 4 | Purpose | 63 | 3.61 | 34.75 | Very little influential |
| 5 | Capital unavailability with the farmers | 100 | 4.00 | 25.00 | Very little influential |
| 6 | Credit required | 95 | 3.96 | 26.00 | Very little influential |

## Major Decisions at Micro-Level and Major Determinants of Sugarcane Cultivation Accordingly

The list of micro-level decisions given in the table was ranked by farmers according to their importance level. Most of the farmers opined allocation of area and choosing the source of credit were most important decisions. Land and capital are two important factors that influence the decisions to a large extent. Here, results also point out to these two factors in terms of decisions like allocation of area to sugarcane crop and choosing the source of credit to cultivate the crop. In diversified farms, allocation of area under each crop plays an important role in realising the profit, managing the risks and making use of available resources. Sugarcane is a commercial crop and yields higher profits compared to other crops grown in the region. But farmers also would like to grow some crops like paddy for self-consumption, otherwise buying rice from market would turn out to be a very costly affair for them. Consequently, even though sugarcane is expected to give higher returns, based on the available resources and needs of farmers, they have to decide upon optimum area to be allocated under sugarcane.

Sugarcane involves intensive method of cultivation and cost of cultivation is also quite high compared to other crops. Therefore, capital is an important factor for cultivation of sugarcane and may not be available with the farmer for various reasons. In that case, farmers borrow money from different sources and choosing the source of credit plays an important role as it affects the cost of cultivation through interest rates on credit. Formal sources of credit in the study area are providing crop loans to farmers up to Rs.50,000 per acre at 0.75 % per month but there are some constraints to it like; farmers who does not have land in their name and who have not cleared the previous loan are not eligible. Sometimes, due to delayed payments from sugar mills, farmers will not be able to repay the loan and become defaulters or borrow money from informal sources at exorbitant interest rates to repay it. In either of the cases, farmers will be at a loss. Therefore, farmers' perception is that choosing the source of credit is very important decision which will directly impact their socio-economic status.

Sugarcane is a water-intensive crop and frequency of irrigation is one of the major decisions that farmer has to manage during the course of his actions on the field. Study area is part of Cauvery command area and canals are the main source of irrigation but most of the farmers own bore wells to supplement the canal water for their farms. Water will be available to farmers twice in a month according to a rotational plans designed by the irrigation department. Sugarcane growers have plan and

schedule their irrigation according to the availability of water in canal and manage protective irrigations from bore wells. Likewise, choice of sugarcane to be grown is based on expected income, risk involvement and method of cultivation along with decision regarding choice of market to sell their crop were moderately highly-important decisions in sugarcane cultivation.

The variety chosen will result in terms of yield obtained, and in sugarcane especially, varieties' importance is directly connected to expected yield. Farmers choose different varieties based on their expected yield, duration, tolerance to pest, diseases and water stress. In study area, famers obtain their seed sets from sugar mill and the variety will also be chosen by sugar mills to a larger extent keeping both farmers and millers considerations. Therefore, farmers control on choice of variety is limited.

According to farmers opinion, decisions like method of irrigation and harvesting fall under less important category. Most of the farmers follow flood and furrow method of irrigation as they find other method of irrigations economically unviable and choose sugar mills as the market because of dwindling numbers of jaggery processing units as alternate market for sugarcane in the study area.

Decision regarding fertilizer application and choice of planting season were categorised under not important category as most of the farmers followed fertilizer application according to their practice rather than recommended dosage of fertilizer and planting season was mostly decided based on the harvest of previous crop in the field. (Table 12)

**Table 12: Micro-level Decisions and Their Importance Categories**

| Sl. No. | Micro decisions | Average respondent score | Descriptive percentage | Importance category |
|---|---|---|---|---|
| 1 | Choice of crop | 3.8 | 68.88 | Moderately high important |
| 2 | Allocation of area to sugarcane | 1.6 | 93.33 | Highly-important |
| 3 | Choice of planting season | 9 | 11.11 | Not important |
| 4 | Choice of variety | 6.2 | 42.22 | Relatively less important |
| 5 | Frequency of irrigation | 3.6 | 71.11 | Moderately high important |
| 6 | Method of irrigation | 7.4 | 28.88 | Less important |
| 7 | Fertilizer application | 9.4 | 6.66 | Not important |
| 8 | Harvesting | 7.6 | 26.66 | Less important |
| 9 | Choice of market | 4.2 | 64.44 | Moderately high important |
| 10 | Choice of credit source | 2.6 | 82.22 | Highly-important |

## Micro-Level Decisions Under Optimisation Theory Frame Work

Major determinants identified using the methodology mentioned under data methodology section are listed in table 5.1. The major determinants identified which influences the micro-level decisions of sugarcane growers are interest rate on credit available for particular crop, amount of land available for cultivation, accessibility to formal credit sources, accessibility to market, water availability with the farmer for crop cultivation, sugarcane price, expected yield of different varieties cultivated in that region, expected profitability from sugarcane, method of irrigation they have adopted and availability of labour.

**Table 13: Major Determinants of Sugarcane Cultivation at Farm-level**

| Sl. No. | Determinants | Total score |
|---|---|---|
| 1 | Interest rate on credit | 467.50 |
| 2 | Amount of Land available with the farmer for cultivation | 411.20 |
| 3 | Accessibility to formal credit sources | 366.25 |
| 4 | Market accessibility | 349.00 |
| 5 | Water availability with the farmers | 295.75 |
| 6 | Sugarcane price | 291.00 |
| 7 | Yield of varieties being cultivated in that region | 271.50 |
| 8 | Profitability of sugarcane crop | 270 |
| 9 | Method of irrigation | 268 |
| 10 | Labour availability | 247 |

## Conclusions

Understanding the stakeholders and their characteristics will always help in understanding the sector better. Sugar sector is one such sector which is long prone to crisis because of various issues. It is also well-known that most of the policies in sugar sector impact all the stakeholders but do not balance their interests equally. Therefore, evaluating and understanding the responses of different stakeholders to these policies is very much important. The micro-level decisions and their decision-making process are the best way to understand the stakeholders response to policies. Therefore, in attempt to understand the micro-level decisions of farmers who are one of the important stakeholders of the sugar sector, the major decisions were analysed. Determinants like land availability, water requirement of the crop and profitability from the crop influenced the choice of crop among farmers. Further, to allocate certain amount of area to each crop or selected crops in cropping pattern, land available with farmers (net cultivable land), water available with farmers from various sources, expected profit and method of cultivation of those crops were influential. Sugarcane is an annual crop and mostly it is planted in June or January. Factors like, time of rainfall and water availability from different sources determined the choice of planting season. Choice of variety gets little more importance in case of sugarcane because of reasons like, it is a commercial and annual crop. If a farmer is not satisfied with the variety for any reasons, he has to wait for a year to correct his last decisions unlike other field crops. Yield of that particular variety, availability of seed sets of that variety and peer group influence will actually determine the selection of variety for cultivation by farmers. Sugarcane is water-intensive crop so frequency of irrigation and method of irrigation are important decisions at micro-level. Water availability, type of soil, method of irrigation in case of frequency of irrigation and instalment cost, cost of irrigation and against water availability, in case of method of irrigation, are major influential factors. Cost of fertilizer and fertilizer availability determine the fertilizer application and permit from sugar mill and crop maturity will decide the harvesting pattern of sugarcane farmers. Choice of market between sugar mills and jaggery processing units was influenced by its accessibility and price majorly. Finally, choice of credit source by farmers mainly depends on interest rate and accessibility.

Over all, interest rate on credit, amount of land available for cultivation with the farmers, accessibility to formal credit sources and market, water availability with the farmer for crop cultivation,

sugarcane price, expected yield from different varieties and expected profit from sugarcane were found to be major determinants which influences the micro-level decisions of sugarcane growers.

Based on the choice of determinants for each decision by farmers, the decision-making type can be understood. Farmers follow different decision-making process to take different decisions. The decisions listed above are categorised into different categories based on their major determinants Table 6.1.

**Table 14: Decisions under different heuristics category**

| Representative Heuristics | Available Heuristics | Anchoring Heuristics |
|---|---|---|
| Choice of crop | Choice of planting season | Allocation of area |
| Choice of variety | Fertilizer application | Harvesting |
| Frequency of irrigation | | |
| Choice of market | | |
| Choice of credit source | | |
| Method of irrigation | | |

Micro decisions such as choice of crop, choice of variety, frequency of irrigation, choice of market and choice of credit source will fall under representative heuristics because farmers have chosen determinants by comparing to similar situations in the past and their outcomes. While, choice of planting season, method of irrigation and fertilizer application are categorised under available heuristics, as farmers have made decisions regarding these based on what is vivid information to them and what they can recall immediately while making decisions. Allocation of area and harvesting pattern of sugarcane farmers will follow anchoring heuristics because farmers make adjustments to their decisions every cropping season based on the extra information they get or from the past experiences.

This study draws some significant policy implications such as sugarcane is highly-institutionalised crop and policies in terms of low interest rates on credit given and encouraging formal credit sources to become more accessible and affordable to sugarcane farmers would help them very much. Market is another important factor that influences and controls sugarcane farmers micro-level decisions. Unfortunately, current market structure for sugarcane is turning monopsonic in nature given the declining trend in jaggery processing unit. State can intervene here and help jaggery processing units by encouraging research and development activities towards processing of jaggery and some technologies to make it less labour intensive in order to protect the market structure for sugarcane. Though there is already lot of emphasis on drip irrigation, this has not been successful due to some practical constraints with technology. State can focus on researches to solve those problems to boost the adoption rate of drip irrigation technology among sugarcane farmers.

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