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Decision-Making Model of Agriculture

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Abstract

Farm-management practice varies significantly among farmer. The processes that farmer go through while making operational decision regarding technical intervention. Farmer has different approaches to decision-making so it is important to describe the discrepancies to pinpoint places where management-skill can be upgraded. This study describes & reflects the contextual, knowledgeable and inferential dimensions of farm manager's organizational decision-making cognitive work. A conceptual-modeling system has been created that organizes decision-making actions according to a collection of cognitive processes like perception, understanding, target reasoning, preparation, and judgment. Throughout the manufacturing process, these processes are enabled on a regular basis. The framework can be used to describe difference in management behavior & efficiency as well as to identify promising improvement paths. The obtained results serve as excellent resource for public policy-makers to obtain relevant data and adopt policies that improve the quality of life of people in the agricultural sector as well as the entire population of a nation based on the sector's importance. A promising development could be achieved by specifically simulating the farmers' decision making process instead relying on only normative approach. This system results in enhancing smart farming practices in future that helps farmers and the entire population in decision-support-system for easy and fast farming approaches, effective that enhances the crop produce and helps in better economic development.

Keywords: Agriculture, Design, Decision, Farmers, Making, Management.

Introduction

Many factors have contributed to the environment becoming more complex in recent years which also include our rising people and its demand for food, energy and water, the scarcity of arable property for increasing food manufacture, and increased burdens on natural resource. On the one hand, the extent of available knowledge and information assistances from each area of sciences continue to increase. Problem of handling all this data & expertise become more complex, & there is a chance of information overload. The flood of knowledge is causing a greater understanding of the interconnectedness of what were previously treated as separate elements and processes. Agriculture system sciences is a multidisciplinary discipline which studies how complex agricultural systems behave. While studying agriculture system in the nature with information that characterizes how specific organization behave under unique situations is beneficial, it is difficult or impractical in several cases. Systems model of component and its connections, taking into account agriculture development, natural resource & human factor is essential for scientific analysis of an agro-ecosystem. For specific purposes, models needed to understand & predict all over agricultural-ecosystem efficiency. Data are necessary to create, test, and run models so that inference about real system simulated using "experiment" which is based on models while studying a system. The "state of agricultural system research," comprise of the state of agriculture system models and all supportive methods & knowledge used in analyzing and communicating the findings of agriculture system's studies to help direct decisions and policies.

Since farm and field experiment require a significant amount of resource and might not providing enough information in time and space to define acceptable and efficient organization practices, agricultural system models are becoming increasingly relevant in progress of maintainable land administration across varied agri-ecological & social economic condition. The necessary soil, administration, environment, and social economic data are accessible, models can assist land managers and policymakers in identifying administration option for

optimizing sustainable goal through time and space. They will aid in the identification of possible risk area where in-depth field study might be conducted.

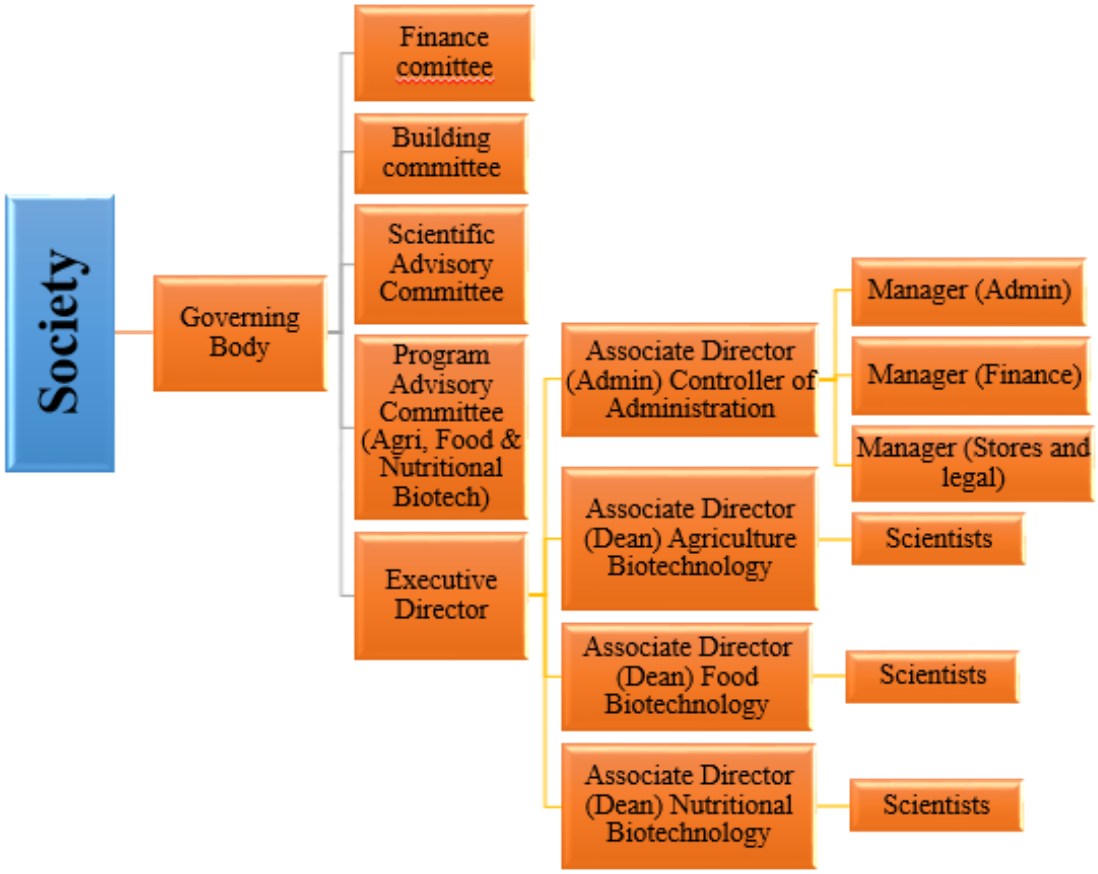

Figure 1: Illustrating Decision Making Model flowchart in Agriculture that supports Decision-Making System

Farm advisor and another expert whoever deal with farmer and policymaker mostly use DSS software packages, though some may be used directly by the government. Decision-making agriculture model (Figure 1)[1] started with society first then pass to the various governing body or committees that further examined by scientists or associated managers.

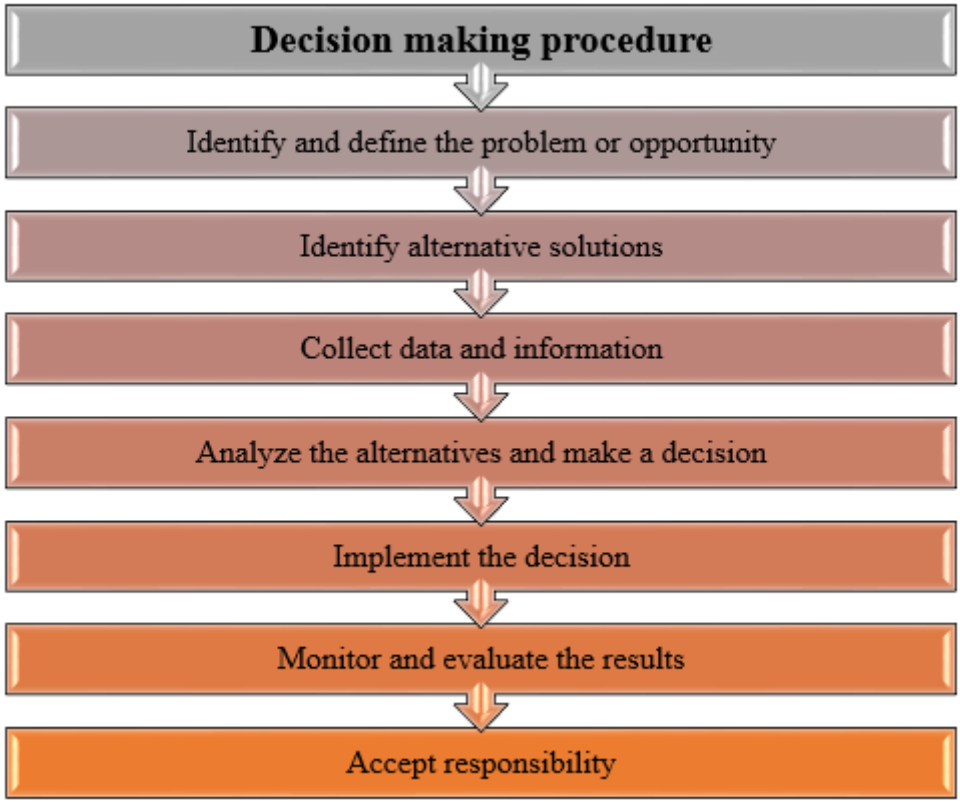

Figure 2: Illustrating various steps involved in Decision-Making Model of Agriculture

Decision making model is multi-stepped process (Figure 2). "A manager make decision to study every item without taking any time," or 'there is not sufficient time to reflect every item in the list' according to this multi-step decision-making process. Those assumptions are right, but as someone with minimal decision making experiences which considers slowing down the supposed process, considering every phase, and then speeding up your thought process only after you have a thorough understanding of each. One can miss a significant step & make incorrect decisions if one don't take the time to understand the procedure (Figure 2).

- Describe briefly the present situation.
- long-term Review or personal goal
- Evaluate whether the present situation is "on the track" to attain lasting goals. If yes, here might be no need to change at the time. If no, this might be a suitable time to reflect replacements.
- If changes appear essentially: recognize the alternative, define why are genuine alternative, identify that changes to accomplish, which is a state goal to the alternative. Study how that goal for the changes bring into line with lasting goals.
- Identify norms for determining whether to appliance a substitute that is the lowest the alternatives are must be project to accomplish beforehand will it be implemented.
- Recognize a suitable process to examine the alternate that is why this logical method is suitable for the examination.

- Classify data desirable to thorough the examination; reflect source for data, evaluate how data be used in examination choice process.

- Conduct the analysis, evaluate the results, and make a decision on whether or not to incorporate the substitute creäte on results of the examination and alternative's objectives (decision criterion). Create a succinct rationale for your decision.

- Change a course of act or application, whether decision is for introducing an option or proceed with the existing procedure. Determine the steps taken to bring the decision into motion, and build a timeline for each move. set metrics for determining whether or not progress is acceptable; understand how metrics apply to alternative targets and long lasting goals as well.

- Put strategy into action.

- Observe progress and review application practice; in other words, monitor the business.

LITERATURE REVIEW

To be effective in agriculture in today's competitive climate, farmers need better learning, occupational experience, & a comprehensive understanding of technology & resources. Farmers normally choose crops for cultivation based on their conventional knowledge and previous farming experience, but due to natural disasters, a farmer's forecasts can be incorrect. To assist farmers in making crop cultivation decisions, a decision-making tool must be created. N. Deepa & K. Ganeesan [2] studied the Decision making instrument for the selection of crop for agricultural development & found that water, Soil, season, help, infrastructure and input were among 26 input variable listed & characterized in six large head of major variable. There are multiple sub-variables for each key variable in Decision-making Agriculture. Meyer and Kirsten[3] studied the Demonstrating the marketplace view and policy alternative for the sector of wheat in the South Africa and found that the model is used to simulate the effects of policy shifts, global markets, and the output climate on domestic rates, supply and demand level. Three circumstances are investigated: abolition of wheat import price, a 12% devaluation in the interchange rate, and merging of import tariff abolition and 12% depreciation in the exchange rate. B.A. Keating and McCown [4] recognized two main components of the farming system: the biologically physical ‘Manufacture System' of crop, pasture, livestock, climate and soil as well as some physical outputs & inputs and the ‘Administration System,' which consists two of individuals, principles, priorities, expertise, resource, decision-making and monitoring opportunities.

W Edwards [5] reviewed the literature of no-risk choice, the presentation of theory of riskless choice to safety economic, theory of risk choice, transitivity of choice, and theory of game & geometric decision function are all covered of decision making. Janos Fulop [6] explained that Root causes, restricting assumptions, framework and organizational boundaries and interfaces, and any stakeholder problems must all be identified as part of decision-making phase. The aim is to articulate the problem in a simple, one-sentence problem statement that includes both the initial and final conditions. G.Loewestein, Lerner, et al.[7] highlighted and coordinated new emotion-related advances in decision science, and organize the analysis around a general theoretical framework for understanding the various ways in which state of mind play an important role in decision-making. The framework will help to integrate the broad range of results from recent studies and shed new light on many key topics in decision theory, such as how people cope with unpredictable outcomes and how they discount delayed costs and benefits. A.Etzioni[8] introduced a new model of agricultural decision modelling. It makes it easier for us to respond to new knowledge when it becomes available. It also aids us in achieving diverse objectives. This latest model is simply an old model that has been used by doctors and many administrators for decades. Mixed scanning, also known as adaptive decision making, entails two of judgment: general, fundamental choice regarding organization goal & policy and limited, investigational decision which is based on depth analysis of dedicated of fact & options. E Shafir and Tversky [9] studied the application of a variety of psychological concepts to the study of individual decision-making and used the definition of diminishing sensitivity to

evaluate the shape of the value feature that represents people's perceptions of gains and losses in the agricultural decision-making process. K L Milkman, Chugh, et al. [10] studied how Decision making can be improved in Agriculture and found that decision-making mistakes are costly and growing more costly, decision-makers are sensitive, and academic lessons are likely to follow from studies on change, the time has come to concentrate attention on the quest for solutions that will enhance bounded judgment. F C Lunenburg [11] studied that there are two main decision-making approaches that have been established. The rational model depicts decision-makers as being fully rational, looking through ideal data to make the best decisions possible. Decision makers' intrinsic imperfections, as well as the social and organizational environments in which they are embedded, place constraints on their ability to process knowledge required to make complicated decisions (bounded rationality), limiting decision makers to less-than-optimal solutions. Focusing on the natural strategies used by farmers could enhance understanding of the decision taken. Some thoughts have been discussed that are concentrating on important concept like: objective, ambiguity, preference, anticipation & rationality. Farmer use heuristics to: (i) pick the appropriate details that is to be considered; and (ii) simplify the decision-process and make it tractable. To analyze in-situ individual management actions, explain performance differences between farmers, and help identify potential improvement.

DISCUSSION

Cropping strategy choices Selection and design have been carried out using a number of methods focused on various priorities and at various scales. The key finding shows that (1) harvesting plan project decision have largely approached as a stationary idea, that is, though they were on its own decision once a revolution or taken merely once a time (2) modeling the attainment of appropriate harvesting plan is based on single economic norm optimization process rather than a multi-standards valuation; and (3) harvesting plan strategy decision have largely been approached as a still idea, that is, as if it is a single choice. New harvesting strategy decision model would necessitate a novel modeling paradigm in order to assist farmers in their decisions. A promising development could be achieved by specifically simulating the farmers' decision making procedures instead relying on distinct normative approach. The decision making model planned in four key constituents (Figure 3 & 4): Climatic data processing tool, Crop models, Hydrological models and Economic models. These are interconnected to one other.

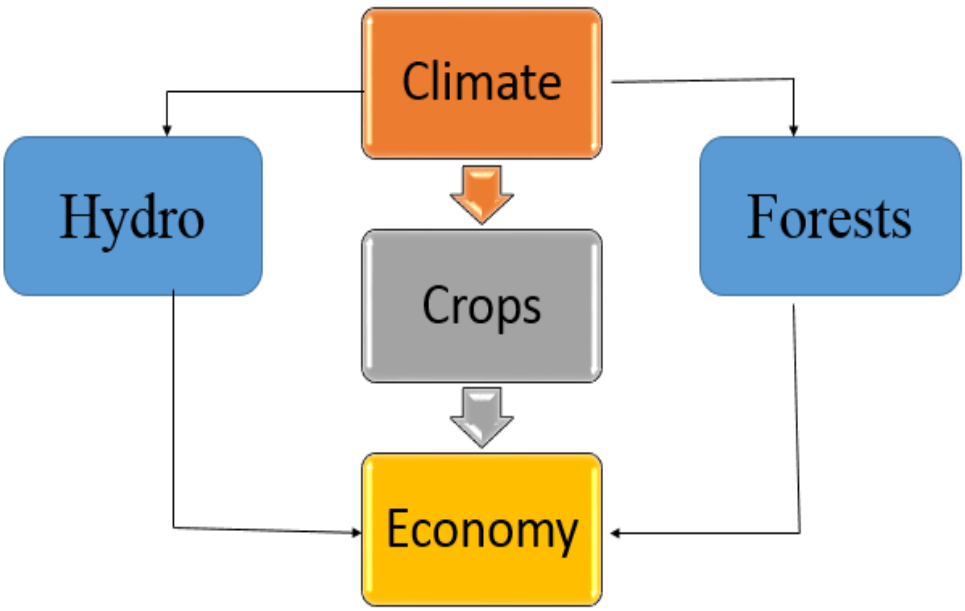

Figure 3: Illustrating the design of interconnected Decision-Making Model of Agriculture

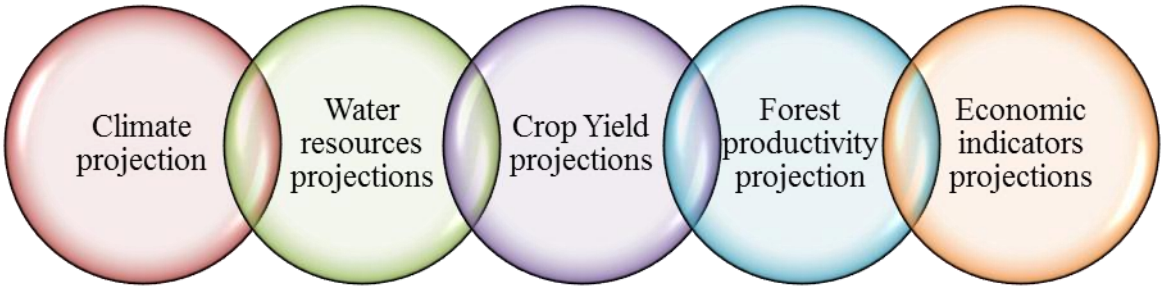

Figure 4: Design of various projections that are interconnected the farming model of Agriculture (Decision- Making Model)

1. *Climate Data Processing:*

The modeling framework includes tools for generating period chain of biological-climate variable from perceived climate time sequence and General Circulation Model output as well. A method for estimating the start of rising season and duration of growing cycle is also included in the modeling framework. Programmable-Logic-Device (PLD) is a tool that was adapted from AgroMetShell, the(FAO) Food-and-Agricultural-Organization crop yield predicting program for project. These two variable are calculated using a time series analysis of precipitation and reference evapotranspiration.

2. *Crop Simulation:*

The AquaCrop crop model is more sophisticated than Water-Balance-Model (WABAL) in terms of simulating crop response to water. AquaCrop, for example, distinguishes between crops transpiration and soil vaporization, simulate root growth, canopy development, and water stress, and estimates biomass manufacture and the produce. The effects of carbon dioxide concentration in troposphere is also engaged into consideration. Cotton, potato, maize, quinoa, soybean, rice, sugar beet, tomato, sunflower & wheat are already available.

3. *Hydrological modelling:*

One model is established on new form of Watercourse is included in the modeling framework. Watercourse is spatially spread rainfall run off model that simulates flow gathering & intensity in water catch area. It has been used in variety of sinks all over the globe. For climatic change effect study in the agriculture area, this hydrological model may be used in a variety of ways. Stream might have used to evaluate the accessibility of water for the purpose of irrigation scheme at the size of a watershed under climate change scenarios. This model can have used to calculate total real recycle water supplies at the national scale.

4. *Economic Modelling:*

The evolution of a country's economy and the changes caused by crop yield variations expected under climate change scenarios. This model permits the user for specifying a variety of activity that generate a single product, each accounting for diverse crop and regional differences in crops yield as well. A shift parameter in the operation production functions is used to simulate the impact of crop yield variations. Both endogenous variables are estimated using the By contrasting benchmark and "shocked" conditions, the effects of shifting yields can be measured.

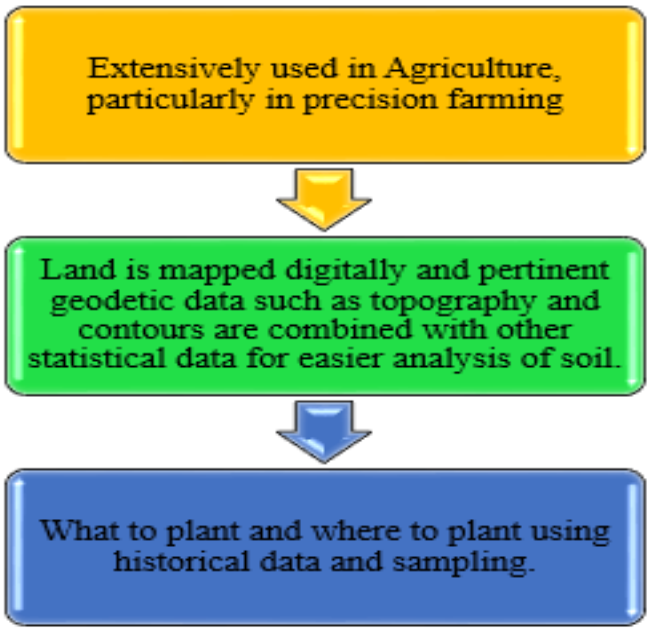

Figure 5: Illustrating flow-chart of Decision-making in agricultural application

Modeling and simulating agriculture production process, includes administration process which is liable for complex activity arrangement, is feasible. It is a unique feature are the information representation capabilities, which are based on ontology of manufacture administration domain (resources, activities and their interdependencies), also resources distribution algorithm, which uses a devoted restraint fulfillment method. The structure is compatible for study of centralized decision-making by focus on activity judgement in a rapidly altering setting like representative of agriculture manufacture system which must deal with uncontainable pouring influences like climate. By offering a comprehensive & practice oriented view of agriculture operation, the model platform complements conventional farm analysis tools. Simulation of manufacturing processes aids in the understanding, analysis, and design of certain processes. Simulation allows for the evaluation and comparison of (re)designed systems that are difficult to reduce to ad hoc adjustments in system design parameter values. Simulation offers measureable estimate of effect so that a method strategy is expected to take on practice efficiency, allowing for the selection of the best design based on quantitative evidence.

There are various applications of Decision-making in Agriculture (Figure 5). Decision-making models are broadly used in Agriculturing, particularly in precision agriculture. Land is charted numerically and valid geodetic information like landscape and outlines are joined with another arithmetical data for ease examination of the soil. It is helpful in decision support system like what and where to plant by using past data and its cross sampling. Choosing a course of action from a range of alternatives open to the decision maker is what decision making is all about. These models are used to investigate how farmers make decisions about input use, technology adoption, and so on. The key points are that farmers' decision-making is marked by adaptability, versatility, and complex processes. Depending on the farmer's versatility and expectation adaptation, capabilities is reactive process. Decision stage is modelled in space and time, various modeling method are used, and some of the method can be joined to present a consecutive decision-making processes.

CONCLUSION

Decision making theory is an attempt to explain the variables that affect choices in a systematic way. Agriculture is still in its early stages of growth and will still be so remain a hypothesis with a major hole in it, since the real situation is very different. The outcome of a series of decisions taken by a group of people is always unpredictable a deviation from any individual's original purpose. Different forms of decision-making

exist, ranging from intentional problem-solving to automatic, involuntary decision-making. If he realizes it or not, a decision-maker has a diverse collection of priorities that are connected to many facets of his life. Understanding the formulation of priorities includes awareness of these targets. One of the earliest and most strongly developed foci of research in human geography was an interest in the spatial patterns of agricultural production. Using policy-relevant models to represent decision-making Insights from economics and sociology are merged. It is relatively straightforward and uncontroversial to state that the decisions were taken in good faith. Farmers' decisions are guided in part by a consideration of economic gains, as well as other psychological and social factors determinants. Modelling interrelating farmer's decision at countryside stage. Traditional financial models donot reflect specific farmer and they are often directly three-dimensional. they might able to make expectations at common degree of agri-ecological areas, but they are not much better at demonstrating the decision of single farmer in a actual landscape.

Agriculture is becoming increasingly important as a primary source of food supply to feed the world's population. Agriculture, on the other hand, provides numerous benefits to the nation, including food and non-food products, transportation, and environmental balance. The need for food security puts pressure on decision-makers to ensure that our planet has enough food for everyone. Choosing a path of section from a collection of alternatives open to the decision maker is the essence of decision making. These models are used to investigate how farmers make decisions about which inputs to use and which technologies to implement. Modeling behavior has progressed to the point that different models have been used and new ones are being developed for agriculture in both developed and developing countries. It is potential to model & simulate agriculture manufacture process, which include administration process that control complex activity scheduling. The structure is compatible to the learning of centralized decision making approach in rapidly altering climate, the one feature of agriculture manufacture system that must manage with overwhelming dynamic factor like weather. The recreation platform complements old-fashioned agriculture analysis methods by provided that a rounded and process-concerned with view of agriculture operation. Manufacturing process recreation helps in the comprehension, study & design of complex processes. In agriculture, decision-making models are widely used, specifically in precision agriculturing. Land is numerically charted, and relevant geodetic information including landscape and outlines are combined with another arithmetical data to facilitate soil examination. What decision making is all about is picking a course of action from a variety of options available to the decision maker. These models are used to learn more about how farmers make decisions about inputs, technology adoption and other topics. Farmer's decision making categorized by flexibility, adaptability, and dynamic process, among other things. Adaptation is a reactive operation which depend on the farmers' flexibility & expectation proficiencies. The value of artificial intelligence tools is evident in the process of developing agricultural public policies, which allows for the planning of potential outcomes and consequences of policy implementation. Artificial intelligence (AI) tools become excellent tools for public-policymakers from which one can retrieve applicable data & pursue the policies which increase the superiority of a life of the people in agriculture sector & the entire population of country as well. In future, Decision-making farming practices helps in performing smart agriculture practices that increases the produce of crop multiple times which efficiently helps farmers in easy farming, consumes less time, earn their living and also helps in improves the economic condition of the country.

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