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COMPUTERISED DECISION SUPPORT SYSTEM FOR SUGAR INDUSTRY: A LITERATURE REVIEW

Pisal D.T[1]

Ajay Kumar[2]

Abstract

Decision making has been around as long as management and leadership probably longer. In the full theories of bureaucracy, decisions lay fully in the domain of managers and leaders. There is a need for development of a decision support system that will assist managers in making unstructured decisions that will minimize the risk of decision making and reduce the uncertainties. The present review of literature has been made to give an outlook on the information collected by researcher in the area of decision support system in the different international journals and the various work contributed in this area. This review has been conducted to present a research model and research questions to give a path for further research.

Key Words: Decision Support System, Literature Review, Decision Making

1. **Name : Pisal D.T –** Asst.Professor SVPMS Institute of Management Malegaon (bk), Baramati. pisaldt@gmail.com
2. **Dr.Ajay Kumar –**Director JSPM,JICA Tatawade , Pune ajay19_61@rediffmail.com

REVIEW OF LITERATURE:

This review focus on the decision support system used for sugar industries in the different parts of the world and the different technologies used to improve the performance and increase the productivity of the sugarcane industry,

1 Grundy M J and Smith D M (1996) :- The researcher focus on building a strategic information system for sugar industry. The system is being designed to meet the needs of those who require spatial overview of the sugar industry and its environment. Data are held in a geographic information system and relational database. The researcher concludes that the data should be in the digital format could be available and it will make a decision maker in various aspects of making policy decisions. Consequently it will be useful to those who are responsible for planning in the various sectors of the industry.

2. Jose A.Diaz., (2000) :- The researcher has goal to optimize the sugarcane transport in harvest season. The main objectives of his studies was-

1. Identification of logistical bottlenecks in the sugarcane transportation.
2. To provide integral solutions to these bottleneck which will support the decision making process.

3. To develop a effective DSS for allocation of result of each team on a daily basis. The researcher suggested a model called ARENA where information is gathered for each team, regarding resource utilization (i.e. cutting machine, tractor, truck and trailers), waiting time, queue length and total quantity of cane transported and the fields to be harvested are specified according to the distance to the factory. According to the simulation optimization approach, the main control factor considered for every team the number of allocated resources and the average truck speed. The total quantity of cane to be transported and the arrival travel time for a complete cycle are considered as output variables.

3.J.P.Shim (2002):- The researcher focus on the past, present and future of decision support technologies. The researcher discuss the technology and organizational development of decision support technologies, as decision system was defined as the computer system that dealt with a problem where at least some stage was semi structured or unstructured problem. The research focuses the evolution of DSS

technologies and issues related to DSS development. The researcher tried to focus the four powerful DSS tools including data warehouse, OLAP, data mining and web based DSS. The web has created a new paradigm for DSS to use a optimum based DSS and active decision support for the next millennium.

4. Y.L.Everingham., (2002) :- Sugarcane is mainly dependent on climate and this play a vital role in increasing and decreasing the sugar plantation. The rain may interrupt the crushing season so forecasting of the climate is very important. The factors which the researcher pointed out are what is the size of the crop, when to start the harvesting, when to start the milling operation, when to finish milling, how much will be sucrose content in the crop, how much will be the sugar production, how much sugar to forward sale and what will be the optimal shipping and storage requirement.

The sugar value chain is important so that when we have to start and what will be the end date of completing the milling operation and considering the climatic conditions the sugar crushing season has to plan all this things so that the efficient production can be achieved.

5.Kenneth N. Mckay (2003):- The researcher focus on a case study where an integrated planner is responsible for planning, scheduling and dispatching. The integrated planner needs a seamless system for the generation from the daily level through the generation of 5-7 year plan. The study focus on two combinations of two information system an ERP (Enterprise Resource Planning) and APS (advanced planning and scheduling). The DSS starts from planning subtasks and the data manipulation functions are combined to support a specific subtasks of the planner. The automated decision making would be little benefit to the planner.

6. R A Lawes., (2005) :- The researcher has studied the industry information in sugarcane production system in Australian sugar industry. There are different parameters like rain, variety, farm of origin; timely harvesting and rationing make impact on production of sugarcane and sucrose content in the sugarcane.

The information can provide valuable insights into the sugarcane production system and assist in decision making in the industry. The analysis of information improves the production and presents the sugar industry with the opportunity to fully understand the production environment and then modify aspect of the farming system accordingly.

The information play a major role in production system, if utilized it can give a comparison of new varieties, rainfall data, soil data and other necessary information which will improve productivity.

7. B.Sashikala (2005):- The researcher focus on a decision support system for making better decisions. Decision Support System helps in making organization more effective by giving it a competitive advantage. It offers management a powerful tool in meeting demands of managerial work. In today's environment managers will be empowered to make their own decisions based on the organized feedback from peers, customers or from top management and hence knowledge based organization depends heavily upon computer based DSS. The researcher concludes in the study that DSS is used for solving structured, unstructured & semi structured decision making in this complex world.

8. Esteban Lopez Milan., (2006) :- The researcher proposes a linear programming model to solve the problem of cost minimization of sugar cane removal and its transportation from the fields to the sugar mill at operational level in Cuba. The model presented by the researcher is capable to solve the problem of cost minimization of sugarcane transport from fields to the mills for a working day. The model determines the capacity of road and rail transport capacities for transportation cane to ensure an uninterrupted supply of it to the mill.

The mathematical formulation of the model integrates rail and road transport system emphasis on the reduction of transportation cost. The model also controls sugarcane freshness through the constraints of minimum supply to the sugar mill with direct transport. The model allows sugar mill manager to schedule automatically daily transport plans based on either objective criteria or those that have been acquired through professional experience.

9.Caroline Lejars , (2008) :- The simulation tool helps sugarcane growers and millers in designing and accessing the new was of organizing cane supply management within a mill area. The researcher has focused on the problem of cane supply management in Reunion and one of the mill in south Africa. The study shows the impact of the rearrangement of supply cane management makes a better delivery allocation by improving the mill performance and process scheduling.

The researcher focus on main objectives for modeling the supply chain-

1. Restructuring mill areas to take closer or reallocation of delivery zones or mill into account.
2. Matching capacities throughout the chain(harvesting, transportation, crushing)
3. Changing rules that govern cane flow management to benefit cane quality, variability within a supply area, while ensuring a regular supply if cane to the mill.
4. Assessing the impact on sugar production of innovative cultural techniques or the mill area i.e. new varieties or harvest mechanism.

   The model shows that sugar gain will be obtained by rearranging supply scheduling according to quality based zoning within a mill area.

10. P.C.Tewari., (2008) :- Increasing demand for sugar and heavy initial investment for installation of a new plant or the expansion of the existing plant have made the government realize the importance of existing plants in the country. It is always easy to increase the production in the existing sugar plants with proper planning of the available resources.

The researcher has focused on the system of crystallization and its subsystem the main objectives are –

- Failure and repair rates for each subsystem are constant and statistically independent
- Separate repair facility is available for each subsystem at any point of time, there is no waiting for service
- A repaired unit id performance wise as good as new and
- The stand by unit is the same nature and capacity as active units.

The model deals with the quantitative analysis of the entire factor i.e. maintenance storage and state of nature which inform the maintenance decisions associated with the crystallization unit of sugar industry.

11. Michael E. Salassi and F.Gil Borker (2008):- The study reveals the harvest cost studies in Louisiana and U.S. The total cost of harvest accounts 32.5 % of total production cost. The study focus on waiting time requires to the trucks to unload the

sugarcane in the mill as the waiting time increases the unloading time and empty truck return time to the farm increases. The study was conducted to estimate the cost of waiting time on harvest cost and to develop a framework for coordinating harvesting and transport of sugarcane to minimize waiting time. Mathematical programming model results the ability to coordinate harvest and delivery schedule can reduce truck waiting time at the mill. The model develop here provide a framework for scheduling sugarcane harvest at the farm and delivery to the mill with goal of distributing mill delivery out more early over the delivery time window thereby indirectly reducing the waiting time.

12.Manpreet Singh (2008):- The researcher focus on decision support system for farm management. A model developed for the farmer to access online interactive and flexible information for their farm management, the farmer will able to access the necessary information regarding various government policies for agriculture ongoing socio-economic research and the different benefits for the entrepreneur for investing in particular area of farm management. The model also helps the farmer to increase productivity by rising per hector in food grain, thus leading to economic growth. The DSS with all the ready information help the farmers can get all the information on just a click of the mouse.

13. Genia Kostka (2009) :- The researcher focus a study on availability of land for production of sugar in India and China. The study revels challenges to increase the production of sugarcane per hector, in productivity china has achieved 2.7 % annual yield growth since 1997, while India has seen yield decrease of -0.1 % per year over the same field. The researcher concludes in his study that sugarcane will be the only source for fossil fuel in the next generation, because bio-ethanol production has increased significantly over the last decade as the need to reduce Co_2 emission has gained increasingly prominence in energy policies it only emits up to 90% less Co_2 than gasoline.

14. P.V.Gal ., (2009) :- The study focuses on modeling of sugar cane supply planning. Planning and operating a sugarcane mills supply requires a sequence of decisions classified according to their time steps from daily to long term and their management scale from field level to the mill this decision require-

1. Investment in capacities and new equipment.

2. Seasonal supply planning at the supply area level and

3. Daily logistics to ensure a regular flow of raw material from farmers field to the mill.

These decisions are interdependent since the capacities along the chain impact on the management of raw material which flows both at the seasonal and at daily levels. The mill capacity will selected according to the expected farmers production. This capacity will control the demand and hence the required harvest and transport capacities along the upstream supply chain.

The research was carried out in conjunction with an investigation into different harvest mechanism strategies at a South African sugar mill. The mills weekly crushing capacity, the length of the milling season and logical harvest and transport capacities were balanced to meet supply demands over different planning horizons. The model pair was used by the researcher successfully to explore the mills area response in terms of the number of harvesters, vehicles, length of the milling season and sensitivity of risk.

15.Cristina Ofelia Stanciu (2009):- The researcher focus on decision support system architecture according to the researcher study there are three types of architectures .The network architecture, the centered architecture and the hierarchy architecture. The network architecture model has its own database, it has own integration model and its own dialogue model, the model and the database form the complex, similar to network station and a complex are controlled by an integration unit. The controlled architecture each model depends upon a single dialogue model and communicates with a single database. The hierarchical architecture dialogue model is divided into the database module a supplementary level is added in order to increase the adaptability by facilitating the addition of new model.

16. Joao Jose de Assis Rangel., (2010) :- The researcher has studied the and proposed a simulation model to evaluate the sugarcane supply system to mills. The model addressed on the whole, harvest operations (cutting and shipping), transportation and unloading at the mill. The model could adequately asses the relation of the freight and the lead time, the fleet of trucks and discount apart from the cost of cutting and shipping, related to the amount to be paid by the sugarcane load furnished to the mill.

The researcher proposes the model considering the impact of the freight and of the lead time in the value of the load of sugarcane supplied to a mill. The analysis accounts quantifying the waiting time of the raw material from harvesting to unload within the mill.

17. C.Lejars., (2010) :- The researcher focus on some important points such as quality of sugar and he proposed a model which is analyzing the quality of sugar and proposes a payment system. The different parameters have been used for measuring the quality of sugar instead of only tonnage delivery to the mill for the basis of payment of sugarcane. Quality based payment systems are designed to create incentive to improve mill performance, cane quality and cane yield. Concerning quality the encouragement should be high sucrose content in the cane and have more fiber rate which will be used as fuel for renewable energy. The model enables the user to access the payment system for multipurpose cane (sugar, electricity, ethanol etc.) .

Conclusion of Review of Literature

Thus various researchers have studied the different aspects of the sugar industry and decision support system technologies. It should be emphasis that whenever a sugar industry is established it influences the economy of the region in all its angles. In the present study the attempt has been made to study the role of decision making and after implementation the various aspects of planning and decision making become more concrete and more cost effective which increases the performance of the sugar industry in various angles. A few researchers has studied this aspect and no study yet has been done on the role of decision support system in sugar industry in India to fill this gap the present study is the sincere effort made by the researcher

The need of today's sugar industry is analyzed information not data, the researcher designed a computerized decision support system that will help the sugar industry in the semi structured decisions and planning process. The Decision support system plays a vital role in making fast and accurate decisions to predict the production and use the capabilities of the sugar industry to compete in the global market.

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