

## **“Deployment of an ERP in Cooperative Sugar Industry: An Opportunity or a Challenge?”**

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### **Abstract**

Computerization in Cooperative sugar industry ranges in its scope from simple applications like MS Excel up to Sugar ERP developed by Vasantdada Sugar Institute and many more. Such systems are used from standalone PCs up to a huge LANS and smart cards created and maintained by MIS departments. Researcher in current work wants to highlight success and failure factors and reasons in focus Cooperative sugar industry in Maharashtra. Going beyond traditional concerns of system ‘productivity’ and ‘efficiency’, System Effectiveness concerns extend to all systems - engineering, business and social systems all alike. Recent trends in the field of Computer Science and Information technology are intended not only to provide information systems for data processing in the organizations but also to bring technology on the interfaces i.e. processes should be given priority for improving effectiveness of the system. To achieve this, the only solution is designing and implementation of an Enterprise Recourse Planning Systems.

It is observed that effective utilization of an ERP will not only help act as a powerful tool in enhancement of system’s performance but also results in improvising effectiveness of these practices. Scheming an ERP can bridge this space in effectiveness of computerization enhancement of system’s performance. Paper discusses the challenges faced in the factories where In-spite of automation, performance is not up to the mark.

**Keywords: ERP System, Knowledge sharing**

### **I. INTRODUCTION :**

Unlike other industries such as metal, engineering, heavy engineering, production etc. sugar industry is still in search of best techno based methods for effective utilization of the men and material i.e. sugar cane.[4] Majority of sugar factories have fully automated machineries and equipments due to which laborious work is handled by different types of machines[3][6] Many of them are also implemented information systems in the form of ERP or a software system developed in Visual FoxPro etc rendered by different vendors. These systems provide the facilities like data maintenance, querying the data and retrieving them in the form of various MIS reports. These reports are mainly related with farmers & shareholders, cane collected, harvesting contractors & transporters and other production related reports like daily production, recovery, yield, molasses production etc. It is expected that after effective utilization of IT applications & web services for production & marketing the system performance should increase manifolds. Comparative analysis of same performance parameters in different sugar factories using various ERP systems as a automation tool is carried out which clearly indicated that the real reason of being successful for a sugar factory is not in using the ERPs but in using the information effectively within the department and across the departments. [10] Irrespective of the nature of the system , the integrity in the information system is the key point in giving success to every stakeholder. To achieve overall integrity in Information System, individual entity should achieve its immediate goal, which in turn contributes to the achievement of operable goal of the sugar factory.

There are 179 co-operative sugar factories [5] in Maharashtra. Out of them 36 sugar factories use either type of Information Systems out of which 20 have full versions of ERP like VSIsugar ERP and

some customized systems developed in Visual FoxPro. Though they are highly sophisticated IS yet they are capable of only data maintenance. There is absence of Inter-departmental data usages and data coordination in turn not contributing in growth, development and expansion of sugar industry economically; resulting in need of not only an MIS but also an IIS. Information is restricted in a structural form rather than having an object oriented approach. Absence of application of IT in processes, results in lack of IT applications on interfaces, which can act as a base for building, Information Integrity System which itself acts as a Decision Support System.

Overall sugar industry not only needs the best-suited ERP but more appropriately an integrated information system which initially acts as a Database Management System, then like a Decision Support Systems guiding the decision making in uncertain conditions and ultimately stand-in as an Expert System. It will improve the effectiveness of the processes in sugar industry and there after can generate the opportunities of increasing business from various angles. In nutshell Information Integrity System will enhance the methods of improving processes, giving a chance to upgrade individual performance of every stakeholder under consideration and will bring Information Technology on interfaces so as to identify the problem generate feedback and to improve technology infrastructure as a whole. Broadly, financial performance of a sugar factory can be calculated on the basis of following things.

- 1) Element wise average cost per ton of cane crushed
- 2) Element wise average cost per quintal of cane crushed
- 3) Cash conversion cost per ton of cane
- 4) Conversion cost per ton of cane
- 5) Total cost of production per ton of cane / per quintal of cane

## **II. COOPERATIVE SUGAR INDUSTRY AND AN ERP**

A co-operative unit is a distinctive form of business organization. All the same it shares with all other firms, problems relating to management. Even after accepting the fact that a co-operative business has its special features, its chief aim in the competitive world of today will have to be "survival". A co-operative unit must function in a businesslike manner in its operations and must practice the rules of business which ensure continuance. E.g. cost must be controlled, services must be rendered economically, capital must be accumulated and protected. Decisions about these and other matters, however, are taken by the Co-operatives in a different frame work of ideas from those of management of a private or a public enterprise.

With the passage of time, the scale of operation is bound to increase in the co-operative sector and technically the enterprise grows more and more elaborate and complex. Under these situations, most of the problems, appear similar for any enterprise. While certain problems are peculiar to co-operative sugar industry such as, for instance democratic control, special relationships between the management and members of society, committees and staff etc. All the same a cooperative sugar industry must retain flexibility while it continues to grow in size. This is necessary to meet competition from large aggressive business having greater freedom of action.

Sugar Industry is one of the important agricultural product processing industries not only in Maharashtra but also in India. Microprocessor based electronic instrumentation and control of a system for process modernization has already been adapted at different levels; but the percentage of computerization and effective applications of Information Integrity Systems is still underutilized. Unlike other industries such as metal, engineering, heavy engineering, production etc. sugar industry is still in search of best techno based methods for effective utilization of the men and material i.e. sugar cane. Majority of sugar factories have fully automated machineries and equipment due to which laborious work is handled by different types of machines. Many of them have also implemented information systems in the form of ERP or a software system developed in Visual FoxPro etc. rendered by different vendors.

These systems provide the facilities like data maintenance, querying the data and retrieving them in the form of various MIS reports. These reports are mainly related with farmers & shareholders, cane collected, harvesting contractors & transporters and other production related reports like daily production, recovery, yield, molasses production etc. It is expected that after effective utilization of IT applications & web services for production & marketing the system performance should increase manifolds. Comparative analysis of some performance parameters in different sugar factories using various ERP systems as a automation tool is carried out which clearly indicated that the real reason of being successful for a sugar factory is not in using the ERPs but in using the information effectively within the department and across the departments. Irrespective of the nature of the system, the integrity in the information system is the key point in giving success to every stakeholder. To achieve overall integrity in Information System, individual entity should achieve its immediate goal, which in turn contributes to the achievement of operable goal of the sugar factory.

There is absence of Inter-departmental data usages and data coordination in turn not contributing in growth, development and expansion of sugar industry economically; resulting in need of not only an MIS but also an IIS. Information is restricted in a structural form rather than having an object oriented approach. Absence of application of IT in processes, results in lack of IT applications on interfaces, which can act as a base for building, Information Integrity System which itself acts as a Decision Support System.

The concept of Information System is devaluated by considering each entity individually thereby creating a loophole for integrity. E.g. Farmers database as well as Soil database are maintained for the record keeping of farmers and soil separately but they have no linkage with each other so as to guide a particular farmer regarding the quality improvement of his land. Overall sugar industry not only needs the best-suited ERP but more appropriately an integrated information system which initially acts as a Database Management System, then like a Decision Support Systems guiding the decision making in uncertain conditions and ultimately stand-in as an Expert System. It will improve the effectiveness of the processes in sugar industry and there after can generate the opportunities of increasing business from various angles. In nutshell Information Integrity System will enhance the methods of improving processes, giving a chance to upgrade individual performance of every stakeholder under consideration and will bring Information Technology on interfaces so as to identify the problem generate feedback and to improve technology infrastructure as a whole.

The researcher has tried to study the impact of applications of IT on the performance of sugar industry. These applications are present either in the form of various information systems or in the form of online systems or in the form of web supported tools for marketing of sugar even at international level. Development of information systems for sugar industry had been remained a challenge always though the efforts have been made to do so in varied platforms like dos based systems, Novel NetWare and in FoxPro etc. Right from 2005-06 Windows 2003 along with IBM server have been used to form structured optical fiber network and cat cabling techniques are also in use.

Maximum applications in this area take care of very routine activities like printing of pay slips, keeping accounts, handling share transfer, costing etc. But they are common in all industries. There are other important areas which no other industries have catered are as follows:

1. Cultivator/cane grower's accounting
2. Transport and Harvest contractor's accounting
3. Designing and implementation of dynamic harvesting schedule.
4. Optimization of available fleet strength without delaying in transport of harvested cane and synchronizing harvest and transport team efforts with least cost.

Researcher has seen the actual use of such information systems and other allied IT applications and also searched for its use for improving performance of sugar industry especially w. r. t. decision making which is the everyday crucial task in cooperative sector. It was observed that the current

information system is not providing the required help in decision making which is ultimately dampening the overall process of decision making and the actions taken thereafter. Processes involved in any sugar industry are of two types viz. Sugar technology related processes where automation is already in existence since many years and Finance related activities which heavily involve dynamic decisions making and regularization of finances for daily activities in seasons and off season. IT applications can help these financial transaction and financial activities very well through proper designing of an information system.

One of such system developed by Vasantdada Sugar Institute has been considered as base and the various areas automated with its help are also considered in the current work. Highly sophisticated information systems implemented in other types of industries like mechanical and heavy engineering industries not only manipulate the databases but they also act as knowledgebase system and even help a inexperienced person to take right decision. The similar type of functioning is also expected by information systems in sugar industry so that maximum problem related with cooperative sector can be solved without wasting hundreds of man hours and huge data related with cane growers and other stake holders.

Since production process in any sugar industry actually takes place in farms and not in factory IT applications are also supposed to provide help in the routine activities related with every stage of crop development. Secondly since cooperative sugar industry has to deal with thousands of farmers, harvesters, transporters etc. in short time span of the sugar cane development which is of 9 months to 12 months and even can be of 15 months decisions related with fertility of soil of each and every farmer, information related with different varieties of seeds and pesticides, harvesting methodologies etc. should reach to cane growers in proper time which is a challenge in front of current information systems. Hence the title.

### **III. RESEARCH METHODOLOGY:**

Researchers have used case study as a primary methodology for research due to the fact that sugar industry is a neglected area for IT researcher as compared to other types of industries. The reasons may be social or political impact on the sector and the availability of primary as well as authentic data. Secondly, the researcher assumed that with the help of theoretical experiments (experimental research), sugar industry as a case for study can be solved. Efforts may not only be taken to merely design computer software but a real time system which accepts the challenges like unexpected situations/errors. In gist, this qualitative type of research work was intended to analyze the case of sugar industry specifically one which has got advanced IT application in use. Current work was carried out to suggest a change in processes theoretically and if given a chance this change can be even tested. Stratified sampling technique was used so as to concentrate on only cooperative sugar factories in Maharashtra. Further, judgmental sampling technique was used to select few sugar factories out of them. Interviewing Managing Directors as well as people in charge of EDP department gathered primarily data. Two different types of questionnaires were designed. First one to extract information related to the processes followed in sugar industry and second one to dig out data associated with the functioning of EDP dept. Lots of technical as well as financial. data was gathered through published sources like Annual reports of sugar factories. [*Annual & Technical Performances of cooperative Sugar Factories in Maharashtra*], Vasantdada Sugar Institute], actual reports generated through the current ERP system were studied. Secondary data were collected through various publications by VSI and from the sample sugar factory itself. It was mainly bifurcated into two types of performance of sugar factory a) Technical performance – related with sugar technology based aspects and machine automation b) Financial performance – related with efficiency, effectiveness and production of sugar per year.

#### **IV. QUALITATIVE ANALYSIS OF CURRENT SCENARIO IN A CO-OP UNIT**

Generally, an information technology-based IS covers those parts of the business processes where information handling can be effectively automated. The nature of this IS requires every information processing option to be specified and programmable. The modern IS relies on the establishment of generalized, systematic behavior and cannot recognize the diversity of human preferences and behavior. The information technology-based IS also requires every data item used by the IS to be uniquely and precisely defined, and storable on a computer. This represents an information engineer's view: a hard view of information.

Many websites were referred for knowing various perspectives of IT applications in sugar industry. The scope of data available on these sites is not restricted to local as restricted to Maharashtra but it is also national as well as international. Some of the websites like [www.fcamin.nic.in](http://www.fcamin.nic.in), [www.dgftmumbai.nic.in](http://www.dgftmumbai.nic.in), [www.dgftdelhi.nic.in](http://www.dgftdelhi.nic.in), [www.mahasugar.gov.in](http://www.mahasugar.gov.in) etc. were reviewed for updating the knowledge regarding the technological involvement of Govt. department like National Information Center in designing innovative IT applications for cooperative sugar industry.

Enterprise Resource Planning (ERP) systems are one of the most important developments in corporate information systems (Davenport, 1998; Hitt et al. 2002; Upton and McAfee 2000) and in Information Infrastructure (II) ( Hanseth and Braa2001) during the last decade. The business interest in ERP systems can be explained by the benefits associated with the implementation and utilization of ERP systems (Robey et al., 2002). The benefits are related only in part to the technology, most of these stemming from organizational changes such as new business processes, organizational structure, work procedures, the integration of administrative and operative activities, and the global standardization of work practices leading to organizational improvements, which the technology supports (Hedman and Borell, 2003).

The System Application Product (SAP) is implemented in India at various production oriented industries like Cement Industries, Food Processing Industries to improve the production quality, quantity and profitability to the company and end users. With respect to cane management at present, the information about cultivation of cane by the farmers to the industry is not transparent due to manual method and lack of proper supervision. This makes inconvenience to get matured cane to the factory; as a result one cannot expect the good yield of sugar cane and recovery of sugar. As a result both the farmers as well as the industries have to face financial crisis. In view of this, to overcome the above all inconveniences, factories intend to implement ERP for sugar cane cultivation, harvesting and transportation of cane to the industry.

The implementation of ERP systems is a difficult and costly organizational experiment (Robey et al., 2002). Davenport (1998) described the implementation of ERP systems as "perhaps the world's largest experiment in business change" and for most organizations "the largest change project in cost and time that they have undertaken in their history". The costs and time frame related to implementing an ERP system can be illustrated by the case of Nestlé, which had invested, by the end of 2003, US\$ 500 million in an ERP system. In 1997, the American subsidiary started the project and in 2000 the global parent decided to extend the project into a global solution (Worthen, 2002).

#### **V. UNIQUE REQUIREMENTS OF SUGAR INDUSTRY**

- Cane Management system
- Plantation Details
- Cutting order details
- Cane weighing and crushing management system
- Cane calendaring systems
- Cane accounting system tightly integrated with Cane management system
- The objective of an ERP is
- to cater to the complete business requirements of sugar mills

- to keep above unique requirements into consideration,
- to provide an integrated manner and ensure absolute integration with business activities exclusive to cooperative filed.

The modules need to be integrated into one another by way of data integration capabilities and a few modules to the extent of process integration. The application must ensure low redundancy of data entry, thereby improving speed and ease of operations. The application has to be built with enhancing productivity and competitiveness of the user organization by adopting process maturity in each of the modules. It must provide practices to facilitate easy adoption at units without much of customization.

## **VI. LOOPHOLES IN THE CURRENT SYSTEM:**

### *A. Farmer related*

Lack of perfect database regarding varieties of sugar cane, date of planting, yield and quality estimation to decide harvesting date and supply permits. No usage of computers to decide schedule of cane supply/ purchase from farmers. Absence of regulation in the harvesting schedule. Integrated plant protection management is missing. Unavailability of suitable crop rotations and intercropping to suit specific soil-water and general agro climatic conditions. Soil fertility depletion, Scarcity of irrigation water and power shortage. Varietal planning and quality seed material are not available. Nutrient management is imbalanced. Negligence towards insect pests, diseases and weeds is a very common limitation of knowledge of farmers.

Unavailability of Farm implements and machinery. High cost of inputs due to unavailability of farm labor. There is a

tremendous competition from other crops. Climate changes like floods, high temperature etc. are also major source of nuisance. Ratoon management is neglected. Price of Sugar Cane and Sugar is always a topic of arguments. Professional management of share holders and gate cane members is lacking. Technology transfer is lacking along with economic fluctuations .

### *B. Harvester related:*

Non availability of suitable tools and implementation to increase labor efficiency is missing. Effectiveness of operations through various power (bullock, tractor) is not available with harvesters as they are available with farmer. Well trained, knowledgeable and enthusiastic staff who should confidently able to demonstrate the recommended cane production technology in farmers fields. Continuous training and evaluation of field staff is required. Appreciation of good, successful performers and suitable action against non performers must be tackled by respective sugar factory. All best possible transport arrangements to avoid staleness due to excess harvesting or shortage of cane to avoid stoppages.

### *C. Chit boy related:*

Unavailability of Cane department structure for efficient transaction of duties and responsibilities related to cane development, harvesting and supply. Very less remuneration given to chit boys and lack of operational research farm for technology testing. No supervision of cane harvesting since ratoon performance depends on quality and proper harvesting. All of the chit boys have very heavy daily workload and they have to travel long distances in the farms where there is lack of vehicle availability. Absence of techno based equipments to test the actual growth and allied parameters related to crop and soil is a major area of concern.

## **VII. OBSERVATIONS AND RECOMMENDATIONS**

Generally, an information technology-based IS covers those parts of the business processes where information handling can be effectively automated. The nature of this IS requires every information processing option to be specified and programmable. The modern IS relies on the establishment of generalized, systematic behavior and cannot recognize the diversity of human preferences and behavior. The information technology-based IS also requires every data item used by the IS to be uniquely and precisely defined, and storable on a computer. This represents an information engineer's view: a *hard* view of information

Computerized information systems of today do make mistakes. This alarming reality is requiring research attention to questions of: *Errors in information systems* that are made but not corrected in spite of application controls, *Poor integrity of information systems* and of information there from, Finding methods, techniques and technologies for controlling, maintaining and improving Information Integrity (I\*I). In this work the researcher has analyzed current information.

All of above aspects indicate lack of technology and use of only information but not the system. Information systems are doing very well as far as intra departmental usages are concerned but enter departmental data transfer or interfaces are not managed by current system. Another important point to be noted here is there is no error database maintained so that the information system will handle same type of errors well next time the same error happens.

There is no cross check across or process of evaluation of data between two departments and that is why there can not be assurance about the data to be up to date. Feedback control is missing due to which same procedures are still in use which were there since the installation of the application software though there can be various factors affecting the environment negatively. Thus the researcher has felt the need of not only change the current information system but also to replace it with integrity information system which will bridge the gaps between the actual and expected performance of information system ultimately improving the effectiveness of the overall system. These points are made clear through primary data collected and by collecting some of the secondary data elements.

Researchers have studied actual performances financial and technological to find out the reasons of failure of the current information systems prevalent in the domain area. Lots of databases are maintained like farmers, shareholders, contract labors, soil etc. This data was utilized for intra dept. working but inter dept. usages like linking of farmer database to soil, to shareholders, to gate cane members etc. was absent. Information Integrity System can prove as a gateway to efficiently utilize the whole data so as to enhance the yield in turn increasing the profit of sugar factories.

With innovations in IT, the volume and speed of information processing and decision-making have undergone sharp increases. Accordingly, business enterprises for their strategic and competitive survival are looking for bigger business opportunities.

Information is a composite good of interrelated attributes, namely, usefulness (relevance), usable factor and integrity.

Integrity of a set of information is inverse amount of distortion and noise present. Integrity attributes are Accuracy, Consistency and Reliability of information. All of the above add to the validity before and after information generation which is the actual implication of technology for achieving desired effectiveness of current information system and for improvising better performance.

There is A shift beyond MIS...For competitive survival, *shift* is to Business, i.e., Strategic, Information System.

This shift is from Data Storage and Retrieval to Information Evaluation, Storage and Retrieval. It calls for going beyond Quality Information System. Information Integrity System is the only solution to bring uprightness among different processes with the help of stakeholders which can be achieved by working on the loopholes related to each entity in detail and by creating a combination of man machine system which can bridge the gap between expected and actual performance. This integrity can be viewed upon by data integrity, process integrity, system integrity, environment integrity , human integrity to achieve the expected performance. Current work is the suggestion of framework of I\*I system considering the root stakeholders like farmers, harvesters and chit boys.

The scope of the proposed system is restricted in view of only three stakeholders but which can be extended to any number of stakeholders in sugar industry after doing cost benefit analysis. To improve overall effectiveness of the information system suggests the following:

**Preventive measures:**

- Basic education to farmers, harvesters and chit boys.
- Economic support in the form of subsidies and shares
- Efficient irrigation management
- Adequate power supply

- Integrated and balance nutrient management program
- Clean Cultivation Techniques.

**Protective measure:**

- Use of non-competitive crops having ability, which can improve cane yield, suppress weeds, increase income and improve soil fertility
- Integrated pest and disease management with cultural, biological and chemical methods.
- Weed management with mechanical and chemical methods.
- Weather Forecasting Techniques
- Efficient distribution of finances

**Technology Transfer Programmes :**

- Designing of various physical instruments for verification of crop and soil stages.
- Training and demonstration of those physical instruments to farmers and chit boys.
- Basic Computer education to the staff in sugar factory
- Input Supply Services
- Financial Support
- Publications, broad cast, telecast
- Strengthening Cane Development department
- Linkages with Research Stations Development department, Funding agencies etc.

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