E-HRM in Indian Sugar Industry: Differentiating Tool in Competitive Market

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ABSTRACT

The sugar industry of India is one that is highly labour oriented and has several processes, starting from cane- production, harvesting to sugar-production and sales. There are several departments in one sugar factory, which in themselves contain home to enormous functions. The application of IT to these departments gives optimization of processes, which is the need of the day for Sugar Industry. The change in Information Technology is faster than any other processes in the organization. One of the major hurdles which the HR department needs to cross, is the changing technological environment. This paper studies the application of Software, like E-HRM, M-Commerce and wireless technologies, for all the aspects of sugar Industry as a whole. This shall cover the scope of below three stages of Sugar Industry: cane-farming, factory processes, sugar-sales. The states of Maharashtra are focused for data collection.

The need of the Sugar industry is to optimize costs by streamlining processes; and use of IT to achieve this will be the competitive advantage. We discuss the several areas where data collection, reporting, task management, delegation of responsibility can be tracked and accuracy can be improved by use of IT

Keywords: Cane maturity, E-HRM, harvest management, payroll accounting, and recovery.

Introduction

India produced 18.8 million tons of sugar in 2009-10, which was 3.8 million tons higher than the initial estimation. Sugar and sugarcane production in India typically follow a 6 to 8 year sugar cycle, wherein 3 to 4 years of higher production followed by 2 to 3 years of lower production. After two consecutive years of declining sugar production (2007-08 and 2008-09), production resurged in 2009-10, and is set to gain strongly in the year 2010-11. The demand supply flow affects the sugar industry and the sugarcane growers. The industry faces the problem of excess sugar in the consecutive years when the sugarcane production is higher, the sugarcane harvesting needs to be well planned so the sugar mills can get the matured and fresh cane and the sugar growers can be benefited by timely harvesting of their sugarcane which will affect for better sugar cane yield, the losses occurred duly by non harvesting of sugarcane in proper time can have a big loss to sugarcane grower, as well as sugar mills because of unsecured environmental factors changing day by day which ultimately change the mindset of sugarcane grower and attract to different cash crops . The post harvest sugar lose is one of the most vexing problems of sugar industry and has attracted widespread attention in the recent years.

Sugar Factories in Maharashtra and their Growth

Co-operative sugar factories in Maharashtra are acting as a tool of economic change in rural Maharashtra since 1960s. Co-operative movement helped in transforming rural agriculture economy in to thriving social movement in western Maharashtra in particular.

In developing economy like India, it is important to have social obligation to follow in regard to balanced growth of region and to reduce unwanted effects industrialization. In this endeavor agriculture or agro based units can play important role as effective growth centers for social reforms. This is because of location of these units in rural area and potential of these and its ancillary units to provide employment to population in the vicinity of their home and thereby reducing load on urban infrastructure and creating necessary infrastructure in rural area.

Among agro based processing units, co-operative sugar factories in western Maharashtra achieved this expectation to great extents. There productivity and diversification in the areas of by-product manufacturing such as rectified spirit, paper helped in creating additional employment in these areas

The Indian sugar industry uses sugarcane in the production of sugar and hence maximum number of the companies is likely to be found in the sugarcane growing states of India including Uttar

Pradesh, Maharashtra, Gujarat, Tamil Nadu, Karnataka, and Andhra Pradesh. Uttar Pradesh alone accounts for 24% of the overall sugar production in the nation and Maharashtra's contribution can be totaled to 20%. There are 453 sugar mills in India. Co-operative sector has 252 mills and private sector has 134 mills. Public sector boasts of around 67 mills.

Information Flow in Conventional Sugar Industry
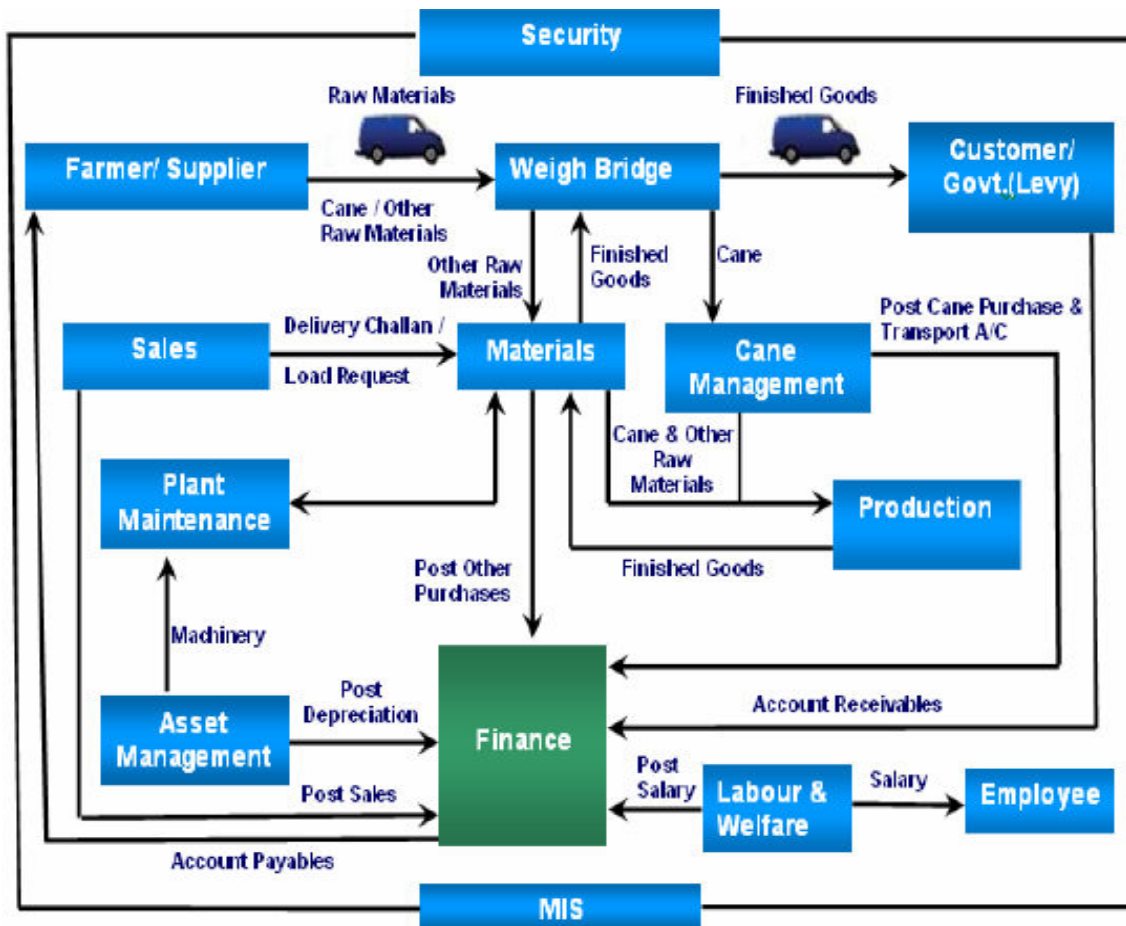
Information Flow for Co-operative Sugar Industry

Figure 1: Information flow in a conventional cooperative sugar industry

Concept of E-HRM

The processing and transmission of digitalized HR information is called electronic human resource management (e-HRM). E-HRM is the application of IT for HR practices which enables easy interactions within employee and employers. It stores information regarding payroll, employee personal data, performance management, training, recruitment and strategic

orientation. Information technology is changing the way HR departments handle record keeping and information sharing. It decreases the paperwork substantially and allows easy access to voluminous data. The employee can also keep track of his/her achievements without having to go through litigious procedures. It uses intranet or other web technology channels. It can also be used for implementation of different HR strategies. The authorization of different HR functions can be distributed through E-HRM.

Competitive business environments have compelled the organizations to think speedily to innovate and excel for their survival. Technology advancement is one of the powerful driving forces. It has reshaped the way we communicate, live, work and also the way a business is conducted. Corporations need to shift from physical technology to information technology, from capital centered economy to human centered economy, and further from conflict to cooperative working relationships. Since many years now, information technology seems to be affecting individuals and organizations communication and behaviors. The change in Information Technology is faster than any other processes in the organization. One of the major hurdles which the HR department needs to cross is the changing technological environment. The IT possibilities for HRM are endless; in principle all HR processes can be supported by IT. Computers have simplified the task of analyzing vast amounts of data and they can be invaluable aids in HR management, from payroll processing to record retention. With computer hardware, software and databases, organization can keep records and information better as well as retrieve them with greater ease. E-HRM is the relatively new term for this IT supported HRM, especially through the use of web technology. E-HRM is the new field of technology that is widely spreading in organizations around the world. It aims at transforming the HR functions into one that is paperless, more flexible and resource efficient. With the state of IT, HRM has become more effective through the use of e-HRM technologies. E-HRM has the potential to change the way traditional HRM functions are performed. For e.g. in the analysis and design of work, employees in geographically dispersed locations can work together in virtual teams using videos, e-mail etc. Under recruitment function, job openings can be posted online, and candidates can apply for jobs online. On compensation and benefits issues, e-HRM will make it easy for employees to review salary and bonus information and seek information about bonus plans.

According to Biswanath Ghosh [2002], in an organization the most valuable input is the human element. The success or failure of an organization depends to a large extent on the persons who

manage and run the organization. In business the greatest asset is the human resource of the enterprise and not the plant, equipment or the big buildings it owns. There was a time when manpower was considered as a cost factor but not it is recognized as an investment. The e -HRM can range from basic personnel records to sophisticated networks of sub-systems with definite purposes. Today most of these will be computer systems. The manpower information system can provide necessary information in a form which can be integrated with any other business data. With most data base systems, there are facilities to pull out any of the data and present them in the required form. In the view of Michael Armstrong [2003] e-HR provides information required to manage HR processes. These may be core employee database and payroll systems but can be extended to include such systems as recruitment, e-learning, performance management and reward. The system may be web-based, enabling access to be remote or online and at any time. The information provided by the e-HR process can communicated across organizations. If posts static data such as information on HR policies and communications about employer facilities such as learning opportunities and flexible benefits. It can include links that enable managers and other employees to interface directly with HR applications and make changes or enquiries.
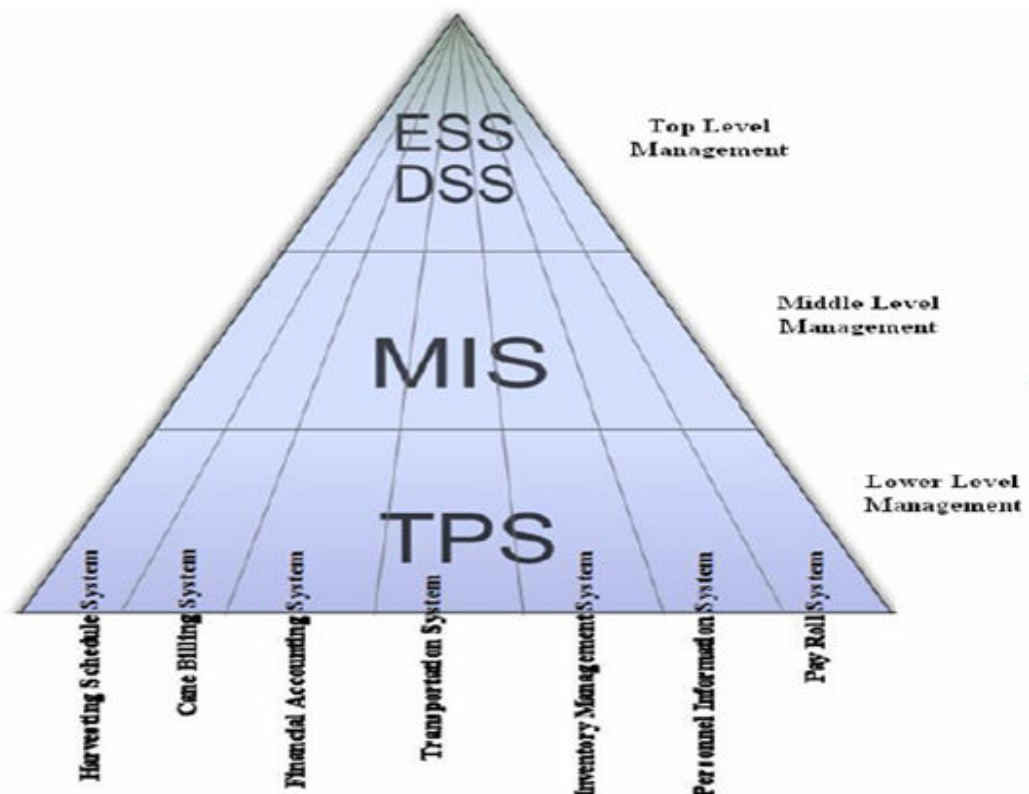

Figure 2: Conceptual based Information System for Sugar Co-operative Management

Objectives: E -HRM is designed to achieve the following objectives*:*

1. To offer an adequate, comprehensive and on-going information system about people and jobs at a reasonable cost;

2. To provide support for future planning and also for policy formulations;

3. To facilitate monitoring of human resources demand and supply imbalance

4. To automate employee related information;

5. To enable faster response to employee related services and faster HR related decisions and;

6. To offer data security and personal privacy.

Scope of E-HRM:

1. A decisive step towards a paperless office;

2. Higher speed of retrieval and processing of data;

3. More consistent and higher accuracy of

4. information/report generated;

5. Fast response to answer queries

6. A higher internal profile for HR leading to

7. better work culture

8. More transparency in the system

9. Significant reduction of administrative burden

10. Adaptability to any client and facilitating management;

11. Integral support for the management of human resources and all other basic and support processes within the company;

12. A more dynamic workflow in the business process, productivity and employee satisfaction.

Benefits of E-HRM:

1. Standardization

2. Ease of recruitment, selection and assessment

3. Ease of administering employee records Reductions to cost, time and labour

4. Access to ESS training enrollment and self-development

5. Cost and ESS

6. Location and timeliness

HRM goals: The main goals of e-HRM are as followed:

1. Improving the strategic orientation of HRM

2. Cost reduction/efficiency gains

3. Client service improvements/ facilitating management and employees.

E-HRM outcomes: According to Beer et al(1984) all E-HRM activities, will implicitly or explicitly be directed towards distinguish four possibilities: high commitment, high competence, cost effectiveness and higher congruence. These outcomes, in turn, may change the state of HRM in an organization, in to a new HRM state. E-HRM will change the nature of the HR department by making less administrative tasks for the HR department and therefore less administrative positions, more focus on the strategic goals of the organization.

Application of E-HRM In Sugar Industry

Harvest Management Solutions: (Using Tablets with wireless connectivity)

It is a known fact that maximum losses in the Sugarcane Factories is due to untimely harvesting seasons and input of immature cane. As of today, the so called "slip-boys" makes the entries of the amount of the harvested cane from the farms, and that is considered in its totality while making payments to the farmers. However, there is no guarantee of the weight of the cane and the amount of cane actually harvested (immaturely or not). His can be controlled using Mobile application for harvesting drives. Below are the actual steps for its utility

1. Every Cane collection centre at the village will have tablets to submit the records on the immediate basis to the headquarter of the sugar factory. These will contain the GPS – location of the place from where reading is taken, the name and photo-proof of the farm and the farmer, on that particular date. Since we will use the GPS-enabled tablets here, it will be very much accurate to provide exact readings.

2. The above tablet based harvesting reports will be useful to track the labour work and the amount of time spent on each day for the activity

3. Online reading submitted to the headquarter will enable immediate tracking for transport timing

4. Once the cane is dispatched from farm, there will be estimated time of delivery to the factory, and hence the "Crushing" process can be easily pipelined to efficiency based on the cane delivery timings estimated.

GPS-Location enabled Tablets for taking reading of harvest

Cane harvest details are recorded by field agent/slip boy; these are online updated to Central Server, so that the Factory has accuracy of PLACE, TIME, QUANTITY of the harvest made

Desktop client App (for admin) + Central SERVER
SUGAR FACTORY HEADQUARTERS

Photo2: At Harvest (maturity) – month11to13

Photo1: At Cultivation Stage (plantation) – month1

Figure 3: E-HRM Reporting for Cane Harvest Process

In Figure 3, the Mobile Tablet is used to record the photos of the 2 stages of the sugarcane. The "Photo1" is taken by the Factory personnel at time of farmer has planted the sugarcane crop. Then after the maturity, when the harvesting is scheduled, the "Photo2" is taken and that is used as a proof to track that the crop is at maturity at time of harvest. This ensures maximum recovery and eliminates malpractices of immature cane harvest and thereby reduces factory losses.

InFigure2 (below), it can be seen the difference in conventional (left) and digital (right) reporting of the harvest. The conventional report could be manipulated, and difficult to track. The digital report, as seen in the figure2 (below right side), clearly shows the ability to track the report, the name of the entry taker, the GPS-location of the harvest programme, with the date and photo of when the entry was made.

Figure 4: Manual forms to Digital Mobile forms.

Conventional Harvest Report -- Vs -- Digital/Computerized Report

1. Harvest Planning

2. Harvest Tracking: Location and sensor data is derived from harvesters to determine daily harvest progress. Field efficiencies are calculated for the harvester. Harvester group managers can use progress data to manage resources.

3. Delivery Consignment

4. Harvest Analysis

Sustainable Sugarcane Farming

Farming of sugarcane has been a challenge day-by-day considering the water scarcity and labour cost rising. Hence, it is the need of hour to set processes in cultivation of sugarcane to obtain maximum tonnage/acre with minimal costs and time.

   Major challenges Faced are:

1. Water Scarcity

2. Labour costs increasing

3. Electricity problems at remote areas for farms

4. Unseasonal rainfall

5. Sub-optimal yields, less recovery obtained

In order to overcome such cultivation issues, use of Information Technology is an effective method as explained below:
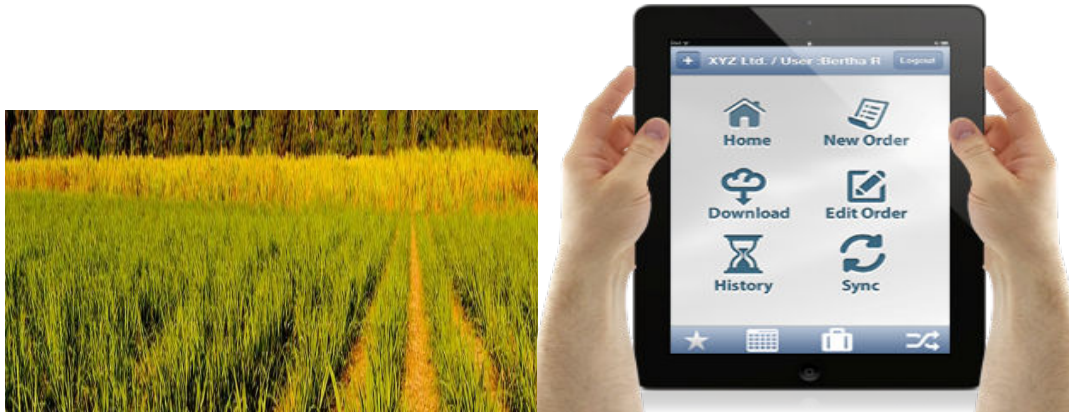

Figure 5: Use of Information Technology

Cane Management System

1. Provide objective data on sustainable approaches to harvesting and processing (eg. tillage, irrigation, chemical use and transport)

2. Measure and communicate the effectiveness of government-funded extension programs

3. Report environmental best practice to shareholders

4. Help companies comply with certification requirements (eg organic, genetically modified)

5. Help companies comply with food industry standards (eg European Union)

6. Provide agronomy advisors with the best available data to inform decision-making.

✓Sustainable Farming using tracking apps for recording the trends of soil salinity, water-level, and other important parameters

✓Tracking of the results of the effort of the farmer

✓GPS location based tracking of the productivity

✓Low cost solution to manage labour remotely and track the efficiency.
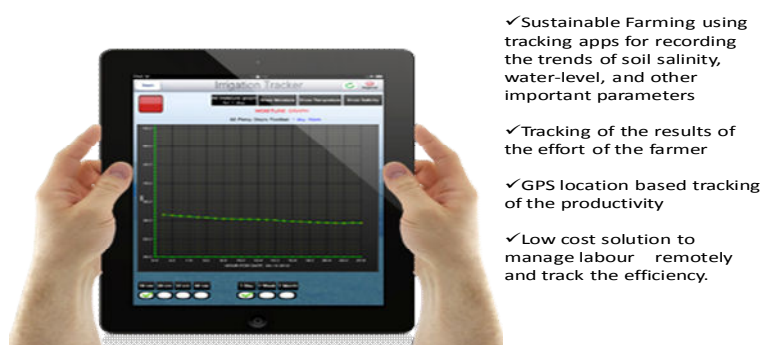
Figure 6: Use of Information Technology for Cane Management System

7. Contractor accounts: for transporters, loading contractors, invoice verification/ Generation, control on truck movements, Integration with financial management system.

8. Growers Payment: Cane payment, society payment, commission computation, loan deduction and accounting, interest computations, integration with financial management system.

Employee Reporting & Payroll Accounting Systems:

1. Using Barcode Scanners: these are barcodes giving all information about any employee of the factory, and kept on the ID-card of the employee. For any authentication, they can just swipe their cards, and access the permission. This reduces headache of monitoring and surveillance.

2. Enable tracking shift timings, attendance and appraisals of the labour

3. Attendance & salary management: Pay slips, salary register, earning & deductions, leaves details.

4. P/F & Bonus: P\F & Bonus account, annual p/f calculation.

The software provides Multi-layered security. The first layer of security is applied at the front-end i.e. user-role accessibility as defined by the administrator. The security is completely foolproof due to encryption

Technique designed by us. The second layer comes into play at the back-end i.e. RDBMS level and finally at the front end security i.e. software password

The software provides further security by maintaining user-wise modification history for most of the important modifications carried out by the users such as Farmer modification, Purchie-Cancellation etc

Security can be further enhanced by keeping a snap-shot of the weighment through a digital camera for the purpose of monitoring the weighment activity at any point of time. This feature can be activated on demand.

All important modifications and entries record the user code so that any transaction can be traced out for any specific user.

All entries are made after proper validation. For instance Farmer code is validated against Society Purchie number at the time of Purchie feeding. This restricts the entry of wrong Farmer code or Society Purchie Number

Data Analysis & Interpretation

Computerization in General Management Functional Area

The following table discusses the level of computerization in general department as fully computerized, computerization initiated and manual operations. This department has six sub functional areas called department's viz. general administration, Vehicles, Guesthouse, Legal, Civil and Irrigation and Watch and Ward.

This study relates to selected sugar factories in western Maharashtra state of India, which includes seven districts viz .Kolhapur, Sangli, Satara, Pune, Ahmednagar as specified by the district under western Maharashtra belt by commissionrate of sugar from the administrative perspective. The sugar factories studied on the magnitude of its problems and prospects relate to computerization in selected units.

In total, 13 sugar factories are considered for the analysis as below:

Kolhapur - Pad. Dr. D.Y. Patil S.S.K

Sangli - Rajarambapu Patils.S.K. Ltd.

Sangli -Vasantdada Shetkari S.S.K

Sangli -Sarvodaya S.S.K. Ltd

Satara-Rayat S.S.K. LTD.

Satara - Pratapgad S.S.K LTD

Pune - Shri Vighnahar S.S.K LTD

Pune - Ghodganga S.S.K. Ltd.

Ahmednagar – Saikrupa Sakhar Karkhana Ltd

Ahmednagar – Dr, Baburao Bapuji Tanpure S.S.K

Ahmednagar – Shri Dnyaneshwar S.S.K

Ahmednagar – Pad. Dr. Vithalrao Vikhepatil S.S.K Ltd

Ahmednagar - Prasad Sugar And Allied Agro Products Ltd

Table-1: Status of Computerization in General Management Functional Area

Sr.	Department	Small Units			Large Units		
		Manual	Computerization Initiated	Fully Computerized	Manual	Computerization Initiated	Fully Computerized
1	General Administration	5 (41.37%)	6 (50%)	1 (8.33%)	2 (33.33%)	3 (50%)	1 (16.67%)
2	Vehicles	11 (91.66%)	-	1 (8.33%)	6 (100%)	-	-
3	Guesthouse	11 (91.66%)	-	1 (8.33%)	6 (100%)	-	-
4	Legal	10 (83.33%)	1 (8.33%)	1 (8.33%)	5 (83.3%)	-	1 (16.67%)
5	Civil and Irrigation	8 (66.67%)	2 (16.66%)	2 (16.66)	3 (50%)	2 (33.33%)	1 (16.67%)
6	Watch and Ward.	10 (83.33%)	1 (8.33%)	1 (8.33%)	6 (100%)	-	-
	Average	76.34	13.88	9.72	77.77	13.88	8.33

Source: Primary Data

The above table provides about the status of computerization in General Management Functional Area. In general administration department, there are very less (8.33%) small sugar units that are fully computerized and a half of the small sugar units (50%) have initiated computerization and about 42% of the sugar units have not yet started computerization. In the large sugar units, a few units (16.67%) are fully computerized, a half of the large sugar units (50%) have initiated computerization and the remaining (33.33%) are still being managed by their operations manually.

In a small sugar units 8.33% of the vehicle departments are fully computerized and the remaining (91.66%) of the units were found to have been doing their work manually. On the other hand in a large sugar units vehicle departments (100%) are not initiated computerization.

It has been interpreted that, in case of the guesthouse department 8.33% of the small sugar units are fully computerized and the remaining (91.66%) have continued their operations manually, whereas in case of large sugar units guesthouse departments operations none are computerized. (100%)

In a small sugar units majority (83.33%) of legal departments carried out their operations manually, whereas a few (8.33%) of the units are fully computerized and initiated computerization. In large sugar units 83.33% of legal departments did not use the computers and the remaining (16.67%) units are fully computerized.

In small sugar units, 66.67% of Civil and irrigation departments were not computerized whereas 16.7% of the units were fully computerized and initiated the computerization. In a large sugar unit, 50% of Civil and Irrigation departments have performed their work manually, a few units (33.33%) have initiated computerization and the remaining units (16.67%) are fully computerized.

In a small sugar unit, 83.33% of Watch and Ward departments have not done computerization, whereas 8.33% of the departments are fully computerized and initiated computerization. In a large sugar units all (100%) of the Watch and Ward departments are functioning manually. The present status of computerization has been also exhibited through a Graph No.5.1

Looking towards averages of six sub functional areas of general department, it revealed that majority of the (76.34%) small sugar units are functioned manually, a few units (13.88%) have initiated computerization and meager (9.72%) units were fully computerized. In large sugar units, 77.77% of the sub departments performed their operations manually, a few units (13.88%) have initiated computerization and very less (8.33%) units were fully computerized.

From above interpretation and Graph No.5.1, it has been learnt that, irrespective of whether unit is small or large, the status of computerization is almost the same and there is no significant difference in the status of computerization in General departments of a small and large sugar units.

	Manual	Computerisation intiated	Fully Computerised
■ Small Sugar Unit	76.34	13.88	9.72
□ Large Sugar Unit	77.77	13.88	8.33
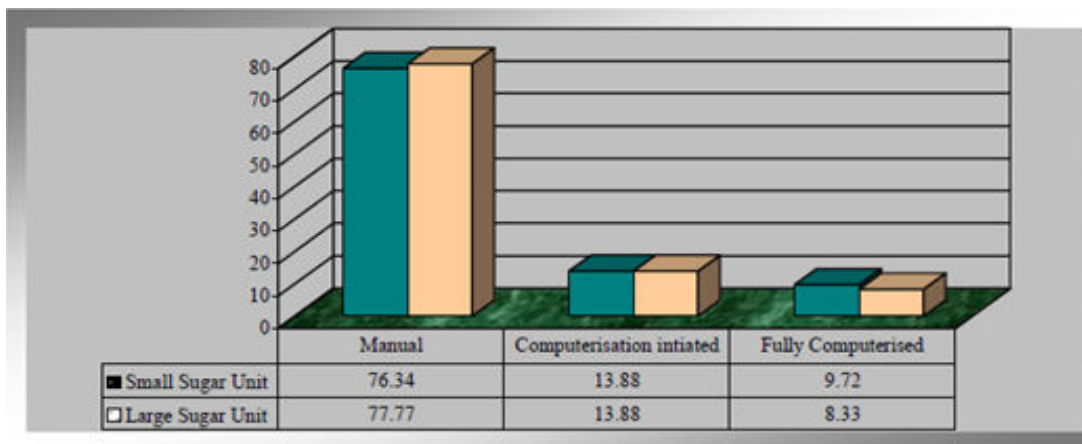
Graph-1: Status of Computerization in General Department

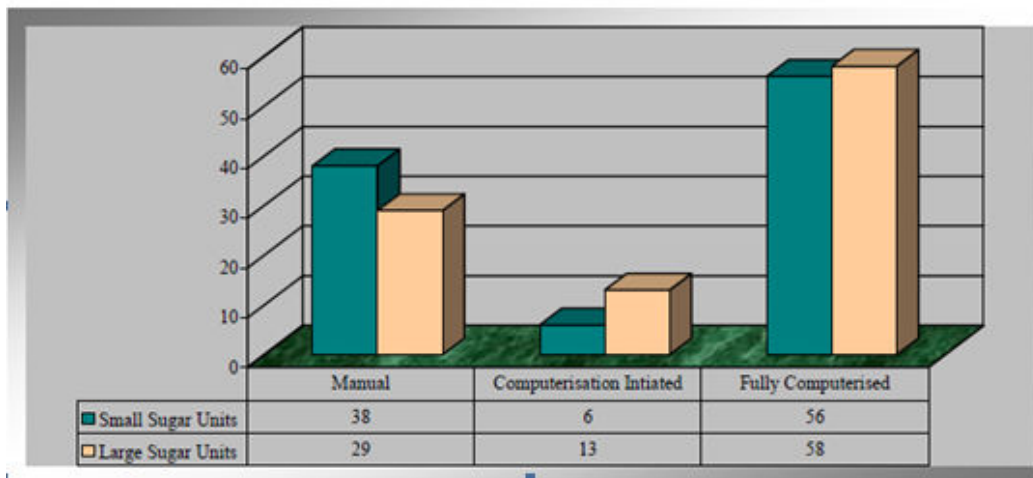*Computerization in Agriculture Functional Area:*

Table No. 2 discusses the level of computerization in agriculture department. This department has four sub functional areas called department's viz. Cane Development, Harvesting, Weigh Bridge and Transport Scheduling. The following table speaks about the level of computerization among the departments as follows.

Table-2: Status of Computerization in Agriculture

Sr.	Departments	Small Units			Large Units		
		Manual	Computerization Initiated	Fully Computerized	Manual	Computerization Initiated	Fully Computerized
1	Cane Development	6 (50.0%)	-	6 (50.0%)	2 (33.33%)	1 (16.67%)	3 (50.0%)
2	Harvesting	3 (25.0%)	1 (8.33%)	8 (66.67%)	1 (16.67%)	1 (16.67%)	4 (66.67%)
3	Weigh bridge	1 (8.33%)	1 (8.33%)	10 (83.33%)	1 (16.67%)	-	5 (83.33%)
4	Transport Scheduling	8 (66.67%)	1 (8.33%)	3 (25.0%)	3 (50.0%)	1 (16.67%)	2 (33.33%)
	Average	38	6	56	29	13	58

The above table reveals that 50% of the cane development departments in small sugar units performing work manually and 50% of them are fully computerized. In large sugar units, 50% of the sample units are fully computerized, 16.67% have initiated computerization and the remaining (33.33%) of the units are functioning manually.

In small sugar units, 66.67% of the harvesting departments are fully computerized, 8.33% of the units have initiated computerization and 25% of them are functioning manually. In large sugar units, 66.67% units are fully computerized, 16.67% of the units have initiated computerization and the remaining (16.67%) units operating manually.
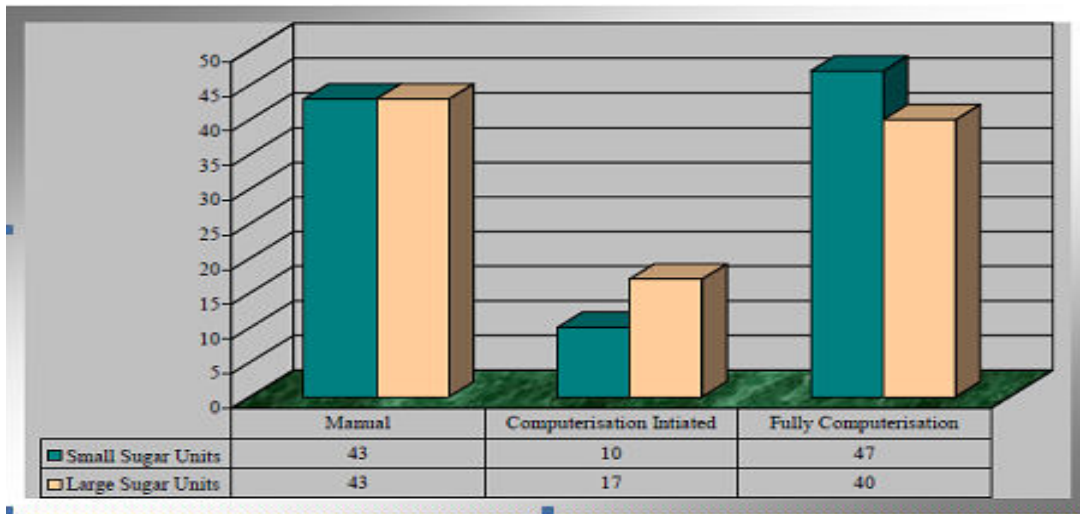
	Manual	Computerisation Intiated	Fully Computerised
Small Sugar Units	38	6	56
Large Sugar Units	29	13	58

Graph-.2: Status of Computerization in Agriculture Department

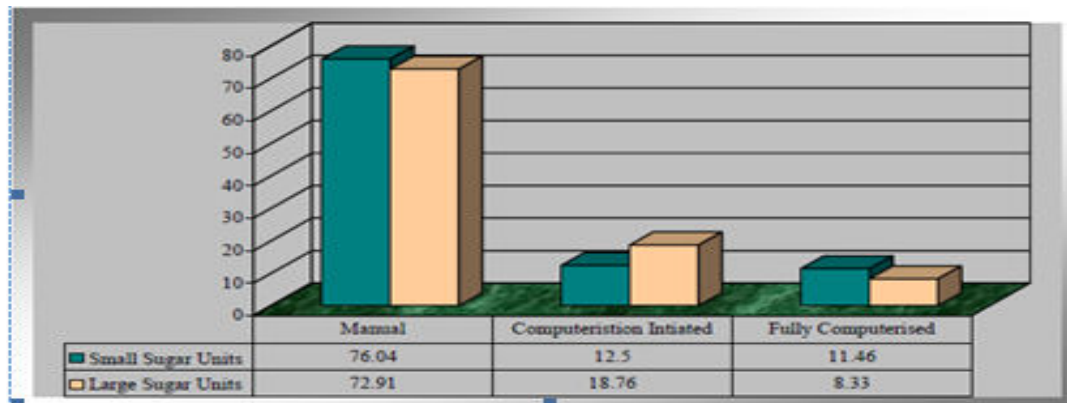*Computerization in Labour and Welfare Functional Area:*

The following table discusses the present status of computerization in Labour and Welfare department as fully computerized, computerization initiated and manual operations. This department has five sub functional areas called departments viz. Recruitment and Selection, Time office (Attendance System), Payroll, Personnel Information and Medical and Sanitation.

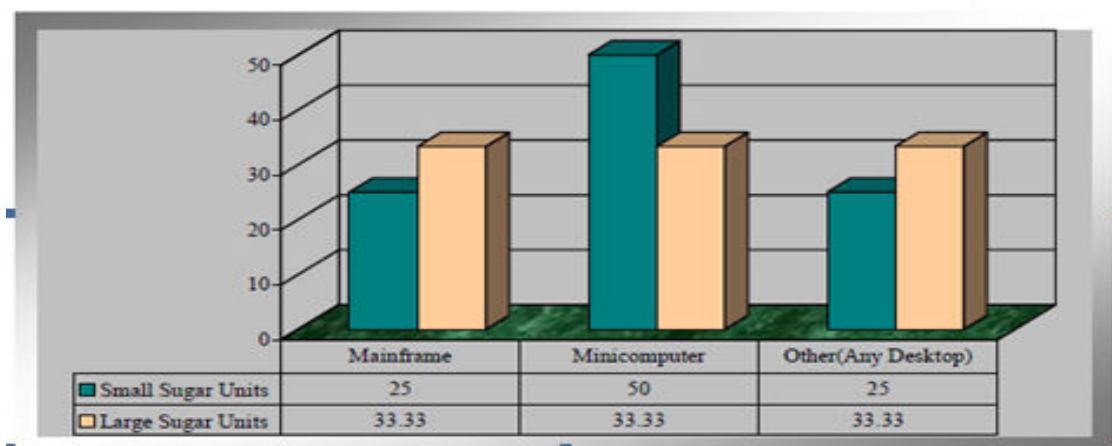**Table-.3:** Status of Computerization in Labour and welfare Department

Sr.	Departments	Small Units			Large Units		
		Manual	Computerizati on Initiated	Fully Computerized	Manual	Computerizati on Initiated	Fully Computerized
1	Recruitment and Selection	8 (66.67%)	1 (8.33%)	3 (25%)	5 (83.33%)	-	1 (16.67%)
2	Time office	4 (33.33%)	-	8 (66.67%)	2 (33.33%)	-	4 (66.67%)
3	Payroll System	-	1 (8.33%)	11 (91.67%)	-	2 (33.33%)	4 (66.67%)
4	Personal Information System	3 (25%)	3 (25%)	6 (50%)	1 (16.67%)	2 (33.33%)	3 (50%)
5	Medical & Sanitation	11 (91.67%)	1 (8.33%)	-	5 (83.33%)	1 (16.67%)	-
	Average	43	10	47	43	17	40

	Manual	Computerisation Intiated	Fully Computerisation
Small Sugar Units	43	10	47
Large Sugar Units	43	17	40

Graph-3: Status of Computerization in Labour and welfare Department

	Manual	Computeristion Intiated	Fully Computerised
Small Sugar Units	76.04	12.5	11.46
Large Sugar Units	72.91	18.76	8.33

Graph-4: Status of Computer Based Process Automation

	Mainframe	Minicomputer	Other(Any Desktop)
Small Sugar Units	25	50	25
Large Sugar Units	33.33	33.33	33.33

Graph-5: Status of Different Type of Servers Used by Sugar Units

	In-house Development	Outsourcing	Readymade Package	In-house development and Outsourcing.
Small Sugar Unit	33.3	33.3	25	8.3
Large Sugar Unit	33.3	33.3	0	33.3
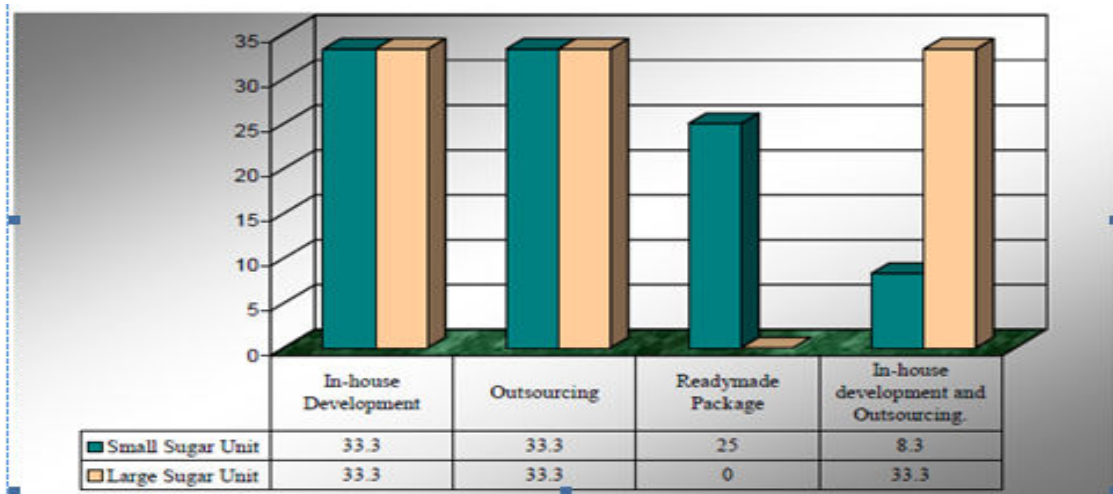
Graph-6: Software Development Approach used by Sugar Units

	Cane Development	Harvesting Schedule	Weighbridge	Transport Scheduling
Small Suagr Units	50	25	8.3	66.7
Large Sugar Units	33.33	16.7	16.7	50
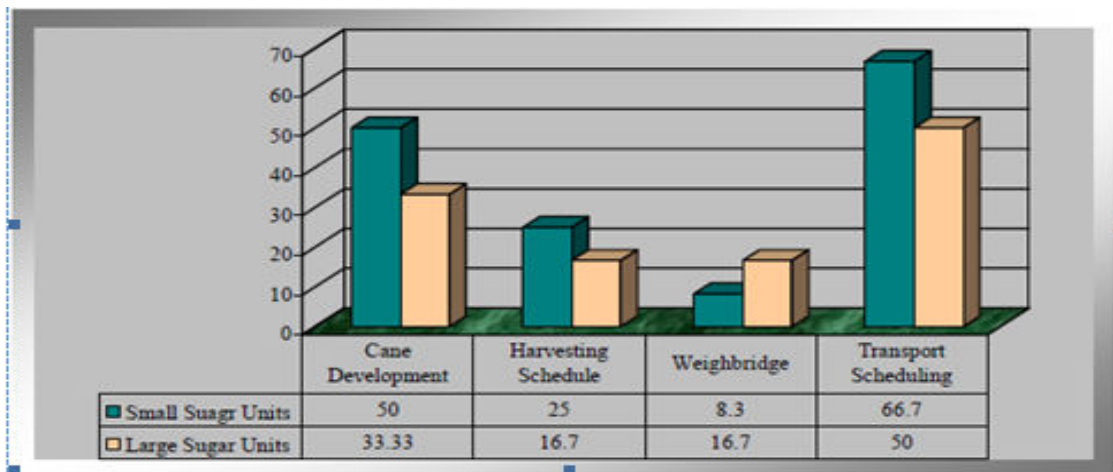
Graph-7: Uncovered Areas of Computerization in Agriculture

Challenges

Co-operative sugar factory faces multifaceted computerization problems viz., bottlenecks in IT implementation, integration of various business modules, technology selection, necessitating trained manpower requirement, accessories maintenance and innovation. These problems impede smooth functioning and create an obstacle to achieve the predefined organizational goals.

Training the personnel to on computerization, and time to get acquainted with newer interfaces is the major challenge to implement information technology in the Sugar Industry.

Conclusion

As seen from the data analysis as shown in previous section, there is tremendous scope for E-HRM in Sugar Industry in India. Despite the challenges, it is a worthwhile investment to every stakeholder of the Sugar Industry ranging from farmers, promoters, employees, management.

Considering the multifaceted Sugar industry, E-HRM and Mobile Application utility for its functions is useful to improve efficiency and reduce costing. This has the following implications:

1. Improve the manpower management across various departments

2. Analyze and measure the labour efficiency and performance, and accordingly decide the appraisal

3. Accuracy and reliability of reporting

4. Scalability through automation of processes

5. Control of timelines, schedules

6. Improve recovery rate of sugar factories

7. Improve cane production by farmer, by use of IT applications like Irrigation tracker

8. Water saving through software controlled pumps

9. Overall Sugar Industry gets benefitted by use of cutting edge software technology

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