

Volume 8, Issue 8, August 2020

International Journal of Advance Research in Computer Science and Management Studies

Research Article / Survey Paper / Case Study

Available online at: www.ijarcsms.com

Management Information System in Manufacturing Units

Dr. P.Devaraju

Faculty Member,
Dept. Computer Science & Technology,
S.K.University,
Anantapur, A.P, India,

I. INTRODUCTION

A secure place to live, regenerate and sustain has been the endeavor of all living beings in the world, human being distinguishes himself in this act by using shelters for purposes other than living, which are projects (irrigation and power), administration, providing services, transportation, production, distribution, sales, and the list goes on. All these endeavors of human beings invariably need cement, which has replaced other traditional agents of bonding. Today's technology driven competitive environment offers customers a global range and quality in products at an affordable price at a flick of a button.

Though it is an objective of manufacturing firms to increase their sales, also of paramount significance is transforming the traditional firms to keep pace with ever changing technological environment. Information and Communication Technology (ICT) is highly dynamic and is characterized by *faster*, *cheaper* and *flexible* processing technologies swarming the manufacturers and customers at highly short intervals. Today's new millennium is highly competitive business world and is marked by firms using Internet and Networking technologies to provide appropriate information, across the organization for integration of operations and effective decisions to streamline the flow of work internally, and also to create electronic links with its Customers, Suppliers and others externally.

Today using Management Information Systems (MIS) along with Networks and Internet technology to enhance efficiency, increase profitability and finally gain competitive edge is inevitable for all business firms eyeing success. Knowledge of Information Systems is now crucial for survival, sustenance and expansion, new product development, new jobs and workflows and finally transformation.

Multinational or geographical expansions by firms are to increase their sales and to exhaust and exploit cost effective operations available globally. This objective to reduce the cost of the product is accomplished, through developing and using MIS and related technology, which offers the ability to control, communicate, and coordinate all business functions. Thus, enhancing firm's capability, to offer global quality products and services, at competitive prices to customers across the world. All major industrial economies of yesterday are knowledge and information based service economies today, which are swiftly shifting their manufacturing operations to low wage countries to achieve cost reduction in operations, and Indian economy can be no exception which employs highest number of information workers.

Employees in manufacturing sector is on decline today and people in education, healthcare, banks, insurance firms etc., are on the rise. Knowledge and information works now account for a major share in GDP. Many of the products like credit cards, reservation systems, overnight package delivery, etc., available today are knowledge and information intense products.

Investments in Information Systems and technology in all the firms are rising, government and institutional support by way of Information Technology parks and cities to attract investments are available in all the states.

Firms Competitive Environment: All the above factors influence the firm in its organization and management efforts. Firms of the past that were hierarchical, centralized, structured, based on fixed standard operating procedures that are now required to transform themselves into flattened, decentralized flexible organizations, that rely on instant information to offer mass customization to its customer in place of mass produced product. ICT orientation is enhancing levels of knowledge, learning and decision making of individual employees in their operations. Organization's effective relationships with its customer, supplier and employee, and its core business processes are digitally influenced, coordinated and focused, by applying MIS to produce a highly qualitative product or service, to gain a competitive edge. MIS based firms are characterized by their near total reliance on MIS & ICT which forms the core of their business processes used to enhance the speed of data processing.

II. ROLE OF MIS

Conventional and traditional organizations faced erosion of their market by IT oriented firms, and needed to resolve for self-evaluation, which involved identifying, evaluating and transforming various core processes. This in turn led to refining and redefining of processes in the organization. An organization endowed with enhanced and refined processing abilities gained by MIS is assured of a competitive edge. Thus, employing MIS based process evaluation and transformation, to gain competitive edge became inevitable by all the firms planning to survive and develop. It is now a common phenomenon or norm for all successful firms to have an MIS approach. Thus, the secret of success is clear and all firms wishing to grow should confirm to the writing on the wall. A spate of literature on MIS in Journals and magazines, and various offers of MIS courses by different universities, is an indication of the growing prominence of MIS as a tool to gain competitive edge in today's highly competitive world.

III. MIS AND THE FIRM

The role of MIS in providing enviable success, by lending support to decision-making, coordination, and control is irrefutable. Besides MIS aids managers and workers in their effort to analyze problems, model complex subjects, and create new products by using variety of complex organizational data. Data, *which is a record of an event or a transaction*, is also called as *streams of raw facts representing persons and events in the organizational environment*. These are given meaningful and useful shape and are called information, fit for use by employees to enhance the quality of their routine decision-making. This is the core content of MIS. Conversion or Transformation of data into information includes key activities of *input process and output*. Input captures data from within the organization and also from its external environment. Processing consists of five important stages of classification, sorting or rearranging, summarizing and aggregating, performing calculations and selection of choice, converts raw data into meaningful and useful information. Output transfers the information to managers for their use of it at various levels and in different functional departments. Successful firms depend to a great extent on formal, organizational computer based information system in which data are defined, so are the procedures for collecting, storing, processing and disseminating of data. Formal MIS can either be computer based or manual, the latter is most prevalent in small firms in their earlier stages in any country. Of course, manual processing is also based on systematic structure and hence cannot to be neglected, as they form the foundation for MIS based on Hardware and Software technology to expedite processing.

IV. UTILITY OF MIS

Firms now use information to improve their performance, profits, and to create value for the organization. MIS increases firms Return on Interest (ROI), enhance firms' strategic positions increases value of firms stock. The information value change which data is transformed to various stages that add value. Better management decisions efficient business processes, lead to higher profitability and are determinants of the decision to invest in any new Information System. The business perspective displays the organizational and managerial nature of MIS providing solutions by application of ICT to face the challenges from

the environment. Awareness of organization, management and ICT dimensions of systems is essential for a manager to understand MIS and their ability to provide solutions to problems and challenges from business environment.

Firms have three levels Viz Top, Middle and Bottom level, and also different functional specializations like Marketing, Manufacturing, Finance, Accounting and Human Resource Departments. Key elements of a firm are its objectives, people, and structure, operating procedures, politics and culture. MIS is an integral part encompassing all, more so in firms like banks, credit reporting firms, share brokering and reservation systems for airways, railways and roadways. A structured work, hierarchy and formal standard operating procedures achieve coordination of work in a firm. Top-level covers high authority and responsibility, which decrease as are, goes down to middle and bottom level. Standard operating procedures are the formal rules developed over long time to guide employees in a variety of activities to accomplish objectives. Informal practices run parallel to the formalized and written down work practices. Present day firms need various kinds of skills and people as against conventional firms. Examples are knowledge workers (engineers, architects, and scientists) to design product or services, data workers to process paper work and production or service workers (mechanics, fitters, turners, packers etc.).

Management is “the process of planning, organizing, leading and controlling of physical, human, financial, and informational resources to accomplish the organizational objectives efficiently and effectively”. Managers make decisions and determine action plans to solve problems; they perceive challenges in the environment and design organizational strategies to respond, and allocate resources and responsibilities. They also take lead in new product development, creative works driven by new knowledge and information where ICT is used in redirecting and redesigning the organization. Senior managers take the lead in long-range strategic decisions concerning what products and services to produce, what markets to expand. Middle managers lead and coordinate the programs of senior management. Operational managers are held responsible for firm’s daily activities and targets.

Information Technology is the third most influential invention of the mankind after alphabets and numbers and the combination of these two, which is mathematics and algebra. Information Technology industry is the fastest growing and the only largest after automobile industry is also called as sunrise industry. ICT influences have left no field in the world untouched and encompass all the activities of human kind. Hence there can be no doubt that the same has influenced the Cement industry. ICT now a days, is no doubt an inevitable tool for managers trying to enhance their efficiency in various decisions made every day, covering gamut of organizational activities and processes. MIS precisely specifies what to be accomplished but the ICT prevailing today greatly enhances the speed of processing, examples online stock markets, ticket reservation and ATM’s. A firms ICT infrastructure consists of computer hardware, software, storage technology and communication technology. Computer hardware is the physical equipment used for input, processing, and output activities in an MIS. It consists of the following; the Central Processing Unit; various input, output, and storage devices; and physical media to link these devices together. Computer Software consists of the detailed preprogrammed instructions that control and coordinate the computer hardware components in an Information System. Storage technology includes both the physical media for storing data, such as magnetic or optical disk or tape, and the software governing the organization of data on these physical media. ICT consists of both physical devices and software, to link the various pieces of hardware and transfers data from one physical location to another. Computers and communications equipments can be networked for sharing voice, data, images, sound, or even video. Information Infrastructure represents resources shared by everyone in the organization and forms the foundation on which a firm can develop its MIS. Skillful design and management of Information Infrastructure accomplishes the MIS objectives.

V. APPROACHES TO MIS

A high level of acceptance of ICT applications undoubtedly supports the amazing growth of ICT applications in diversified fields, covering every aspect of human kind. All studies are the results of mutual contributions, so is the case of MIS in which Information Technology is just a tool enhancing the speed of processing in MIS. Many approaches on Information System prove MIS as a multi disciplinary field. Figure 1.2 brings out major disciplines contributing problems, issues, and

solutions in the study of MIS. Basically MIS in a firm is a social technical system and is also affected by behavioral approaches. Besides hard physical technology substantial, social, organizational and intellectual investments are essential for effective performance of MIS.

VI. CEMENT INDUSTRY: INTRODUCTION

Cement is a key infrastructure industry. It has been decontrolled from price and distribution on 1st Mar', 1989 and de-licensed on 25th Jul', 1991. However, the performance of the industry and prices of cement are monitored regularly. The constraints faced by the industry are reviewed in the Infrastructure Coordination Committee meetings held in the Cabinet Secretariat under the Chairmanship of Secretary (Coordination). The Cabinet Committee on Infrastructure also reviews its performance.

VII. INDIAN CONTEXT

In India it came to be established during the beginning of 20th century. In fact the cement era in India commenced with the establishment of a small cement factory at WASHHERMANPET in Madras in 1904 by South India Industry Ltd. a company that dates back to 1879. The potential capacity of this plant was only 10,000 metric tonnes per annum. This was the first attempt of manufacturing Portland cement with cat carious seashells as a principal raw material. There was sufficient demand for that product, but because of technological defects and inadequate supply of raw material, the plant didn't operate economically, a later on collapsed. India is ranked fourth in the world after China, Japan, and USA in cement production. Yet the per-capital consumption of cement in India is however low at 70 to 80kgs against the world average of around 220kgs.

Cement industry in India is eight decades old. However, the growth has not kept pace with period of its existence. Decades of government control have restricted the growth of industry. The real foundation stone of the present industry was laid in the year 1942, when a small factory was established Porbandar in Kathiwar by India Cement Company Limited. This factory commenced its production in 1914 at a rate of 199 metric tonnes per day. This company adopted "dry process". This plant had easy access of limestone quarries of Porbandar.

Salient features

- Indian cement industry is the second largest in the world with an installed capacity of 151.69 MTPA. It accounts for nearly 6% of the world production.
- There are 128 large plants and around 365 mini plants. The industry presents a mixed picture with many new plants that employ state-of-the-art dry process technology and a few old wet process plants having wet process kilns.
- Production from large plants (with capacity above 1 MTPA) account for 85% of the total production.
- The cement industry has achieved significant progress in terms of reducing the overall energy intensity.
- Dry process plants that the weighted average thermal energy consumption was 734 k.Cal/kg clinker, and weighted average electrical energy consumption was 89 kWh/tonne of cement. The best energy consumption is 692 kCal/kg. Clinker and 66 kWh/ton of cement.

Pre Implementation of MIS in Different Cement Manufacturing Units

	1995	1996	1997	1998	1999
Production (Million Tonnes)	0.86	0.91	1.07	1.11	1.01
Turnover (Million Rupees)	2736.5	2835.6	3502.0	3901.5	3001.5
Net profit (Million Rupees)	47.8	59.6	101.5	89.8	105.0
Employee Number	590	610	610	652	652

Post Implementation of MIS in Different Cement Manufacturing Units

	2003	2004	2005	2006	2007	2008
Production (Million Tonnes)	0.95	1.05	1.21	1.02	0.80	1.05
Turnover (Million Rupees)	3238.6	3517.5	3807.5	3251.6	3051.2	3378.2
Net profit (Million Rupees)	96.8	102.8	78.8	48.9	58.9	76.3
Employee Number	645	630	630	620	625	625

VIII. NEED FOR THE STUDY

Distinction through quality has been the foremost objective in any industry from the days the world new business. Higher sales as a result of brand preference are the result of product distinction. Present day cement industry is no exception and is exhausting all efforts towards this end. Technological improvements and its applications are employed in this industry. The present study rise to address the influences or technological breakthroughs in Information, Communication and Technological (ICT) their applications in the cement industry. A study of this kind is an appropriate requirement as it is concerning with latest technological applications which is the need of the hour.

IX. SCOPE OF THE STUDY

The present study refers to the oldest industry of the mankind, which was away from applications of technological breakthroughs and advancements. It's only recently that the technological breakthroughs and advancements in ICT are being applied to cement industry. Hence the scope of study is with reference to the latest and most inevitable factor that is ICT and the influences of the same in cement manufacturing units of Rayalaseema region in Andhra Pradesh. The scope of the study is with respect to five selected units and at various levels and departments in these units.

X. OBJECTIVES OF THE STUDY

The study, which covers different information aspects in its evaluative process, tries to accomplish the following mentioned objectives

1. To establish varying importance to MIS in cements manufacturing units.
2. To establish Information Architecture and Infrastructure in cement manufacturing units.
3. To establish degree of improvement as a result of MIS implementation.
4. To establish effective performance and success of MIS implemented cement-manufacturing units..
5. To offer operative MIS framework for effective functioning of cement manufacturing units.

XI. HYPOTHESIS

H1: Appropriate, controlled, and flexible information is an essential for organization efficiency.

H2: Organizational capabilities can be enhanced by user oriented MIS.

XII. SOURCE OF DATA

External and internal sources are the main sources of data for a study this nature. Internally, opinions of the employees are gathered by questionnaire method regarding MIS and its various facets. Secondary data is gathered from earlier researches referring to cement industry, libraries of universities and documents and records of the cement manufacturing units.

XIII. RESEARCH METHODOLOGY

Organizing the efforts of the analyst to derive maximum mileage is the objective of methodology. Questionnaire used to elicit the views of respondents is the outcome of discussions held with managers in the cement manufacturing firms working at top, middle and bottom levels of management. Further various dimensions for MIS are selected to encompass levels of management, information characteristics, user involvement and organizational performance to make the study comprehensive.

XIV. SAMPLE

Andhra Pradesh comprises of 33-cement manufacturing firms spread across the state. Five of these firms all from Rayalaseema are selected for the study. A sample size of 300 employees is fixed to make the study more representative. The total number of employees in each firm forms the base for size based proportionate representation. Intensity of MIS in firms is considered for further higher representation to firms with high intensity. Ultimately number of employees at top, middle and bottom level in each firm is the base for percentage wise sample size for appropriate level wise representation for all the firms.

Industry Name	SAMPLE (%)
Penna cement	25
The indian cements (yerraguntla)	15
The indian cements (Chilamkur)	25
Panyam cements	10
Zuari cements	25

XV. STATISTICAL TECHNIQUES

To make the study more comprehensive, exhaustive and prescriptive, Coefficient of Correlation, Chi-square test and t-test are applied, to arrive at meaningful results.

XVI. LIMITATION OF THE STUDY

Any study of this nature can never be an exception from limitations. Though every care has been taken and all intervening factors considered, still, some limits mentioned here are inevitable

1. The study is confined to selected firms in cement industry in Rayalaseema region.
2. The study is carried on at a time period and hence is also influenced by prevailing factors during the period.
3. The study is the result of a sample size, considered to enable the smooth conduct and hence is not a total representation of the whole.
4. Human element factor in participation of a research is one of the influencing limitation factors.

XVII. STUDY DESIGN

Management Information Systems (MIS) and Information and Communication Technology (ICT) – these terms have become the catchwords of century. No industry, no firm, no work place, no employee has been left out its influence. MIS and ICT and their applications are spreading across the world at an astonishingly faster pace. The globalization occurring across the world or sweeping the as added further impetus to the concept. Application of MIS in the firm encompasses behavioral, management and technological facets, practically prove in the fact that it leaves no factor untouched. The severe and stiff competition outside the firm, an imminent need for effective performance of the firm imposes a dire requirement for implementing and managing MIS. Prevailing competition forces an organization not only to manage its internal factors but also it external factors like customers and suppliers.

The level of intensity of MIS in the firms is assessed in the form of very low to very high and the selected firms are categorized to very low, low, moderate, high and very high. This is done to assess and evaluate different dimensions of MIS practices in the firms with various MIS intensity levels. To enable an effective conduct of five firms from Rayalaseema cement

industry are chosen, to render locational and preference as the analyst and also the institute are located in the same region. The firms with various intensity levels of MIS also offer advantageous situations for the analysis.

The total number of employees in different firms was used to provide numerical representation. Further number of employees in each firm at different levels of management is considered for selecting employees from each firm. Thus, total for selecting employees from each firm, number of employees at each level of the firm and also the level of intensity of MIS are the basis for deciding number of respondents from each firm. The total respondents are 300 spread across all the firms 86 per cent male and 14 percent female. They are further distributed as, 30, 90, and 180 in Top, Middle and Bottom levels of management. The selected respondents fall in the age group of 29 – 49 and above. The sample consists of a little less than half from under graduation and a little more than half with graduation and post-graduation qualification. Half of the respondents fall in Rs.9000-Rs.15000 salary group where as above 21 per cent belong to Rs. 15000 and above category and one third falling into below Rs.9000 category. Among the sample 27 per cent have above 15 years of experience, 44 per cent between 06 and 15 years of experience, and 28 per cent between 01 and 05 years of experience. Among these trained in MIS aspects are 74 per cent and rest of them untrained. Married are 81.33 per cent the rest being unmarried. Various aspects of MIS technical, non – technical, behavioral, managerial were concerned in the study along 17 dimensions and 69 statements. The characteristics of information is of para mount significance and to identify the perception of selected employees a questionnaire with 9 dimensions 49 statements were used to elicit employee opinion on a 4 point scale ranging from Always Appropriate to Can't Say. Another important factor of MIS is levels of user involvement in MIS development for which the employee perceptions are collected through questionnaire with 8 dimensions and 40 statements which are also 4 point scale ranging from Always Appropriate to Can't Say. The collected data were tabulated 99 x 300 matrix form and statistical analysis was one with the help of SPSS package. For arriving at the scientific and meaningful findings appropriate statistical techniques were used. Besides, the data were also shown with appropriate graphic representation. Measures of central tendency were used to classify the respondents under two patterns of information viz., appropriate information and inappropriate information based on employees' perceptions of MIS.

XVIII. MAJOR FINDINGS OF THE STUDY

MIS dimensions and Management Levels

The correlation values derived for the findings of the respondents at all levels proved that their exist a positive relation between characteristics and levels of management in the firms with high MIS intensity. These findings clearly indicate the relevance and applicable nature of information for decision-making among employees in various levels of management in the firms. It is also an indication that effort should be at high level on part of the firm to make the employee ready for MIS implementation. The sole responsibility of making the employee aware of the need for information to decision making, rests on the firm and its policies. The study proved that in the firms with high levels of MIS intensity it was established that there was a significant correlation.

MIS Dimensions and Age, Sex, and Marital Status

Employee perceptions in all the firms were administered with a chi-square and the findings proved to be less than or greater than is and this establishes the insignificance of age, sex and marital status. On the other hand it is proving that is age, gender and marital status are not at all affecting MIS dimensions. This establishes the fact that irrespective of age, gender and marital status we live in an environment greatly influenced by information technology, were organization is not exception for this.

MIS dimensions and Education, Experience, Income and Training

The selected firms are with various levels of MIS, which were classified as high and low levels for the purpose of the study. This means a high and low level of MIS activity in the firms. This has enabled us to establish a significant relationship between education, training, experience and income to that of MIS dimensions. In the chi-square analysis clearly establishes significant

association of the above-mentioned factors to various dimensions of MIS. Comprehensively this leads us to conclude that in these days of information age certainly education is changing and consolidating the attitudes of not only employees but also every one. Training is another vital factor exposing employees to latest technologies and applications. Experience enriches performance and no doubt technology will always add to the quality of performance. Higher salaries always mean higher disposable income and higher abilities to spare and spend money. All these are reminded to once again reassure the fact derived from the study that these factors significantly associated to MIS dimensions in organization. In particular the study found the association to be high in the firms with high levels of MIS activity.

MIS and Organizational; Performance

The study, which is of empirical nature, attempts to establish significance of relationships between MIS dimensions and production, profit, turnover and number of employees. This is an effort to reinforce the fact that MIS ultimately should lead to higher profitability, efficient production operations, higher turnover, all these accomplished with a reduction in number of employees. Secondary data on production, profit, turnover and number of employees gathered from the firms on the basis of pre and post implementation of MIS are administered with a t-test to prove and confirm significant and insignificant association of the same among the firms with low and high MIS activity.

The t-test results thus derived confirm a qualitative transformation in the firms with high MIS activity.

XIX. IMPLICATION OF THE STUDY

1. Organizations of all kinds have a structure and at each level information are consumed to arrive at a decision. The relevance, acceptability and applicability of the information in all these levels of management are of significant and high importance. A firm to become successful needs to provide appropriate information to gain competitive edge.
2. The present ICT influence in encompassing every aspect of our life so also the organizations. As we use and live in ICT environment irrespective of age, sex and marital status so do we in our organizations and hence any discrimination on these lines is to be avoided.
3. Excellence is the result of education and training further experience enriches excellence and is highly rewarded in a competitive environment. The study confirms significant association with these factors and MIS dimensions and hence stipulates a requirement of using them in the highly educated and experienced as change the leaders.
4. The study having also considered various factors of performance establishes a significant association between these factors and MIS and thus highlights the need of MIS implementation by all firms to covet success.

References

1. Gordon, B. Davis "Management Information Systems, Conceptual Foundations, Structure and Development" , pp-6, Tata McGraw-Hill, New Delhi, 2001.
2. Kenneth C. Laudon and Jane P. Laudon "Management Information systems, Managing the Digital firm", pp-8-9, Pearson education, Delhi, 2004.
3. Jack T. Hogue " Decision Support System and the traditional Computer Information System Function: An Examination of Relationships during DSS Application Development" Journal of MIS, Volume, Volume 2 Number 1 Summer 1985.
4. Handfield, RobertB., and Ernest L. Nochols, Jr. "Introduction to Supply Chain Management", Upper Saddle River, NJ:Prentice Hall (1999).
5. <http://www.mit.gov.in>
6. <http://www.nasscom.org> and <http://www.escindia.org>
7. Johnston, Russell, and Michael J. Vitale, "Creating Competitive Advantage with Interorganizational Information Systems". MIS Quarterly 12, no.2 (June 1998).
8. Panduranga Vithal, M., "Information System and Effective Management Control", Doctoral Thesis, 1998, Delhi University.
9. Erika Toomey "Technologies of the Future", Jan 2005, E-Business, The ICFAI University Press, pp-33-37.
10. Kenneth C. Laudon and Jane P. Laudon "Management Information systems, Managing the Digital firm", pp-8-9, Pearson education, Delhi, 2004.
11. Gordon, B. Davis "Management Information Systems, Coneptual Foundations, Structure and Development" , pp-6, Tata McGraw-Hill, New Delhi, 2001.

12. Robert G. Murdick Joel R. Ross and James R. Claggett “ Information Systems for Modern management” pp. 1, PHI, New Delhi, May 2001, Third Edition.
13. Keen, Peter G.W., “Shaping the future: Business Design through Information Technology. Cambridge, MA: Harward Business School Press (1991).
14. Iivari, Juhani et al “A Dynamic Frame work for Classifying Information Systems Development Methodologies and approaches” Journal of MIS, Vol. 17, No. 3, Winter 2001, pp-179 – 238.
15. Bakos, J Yannis. “The emerging Role of Electronic Marketplaces on the Internet”, Communication of the ACM 41, no.8 (August 1998).
16. Brynojolfsson, E.T., T.W. Malone, V.Gurbaxani, and A. Kambil. “Does Information Technology Lead to Smaller Firms: Management Science 40, no.12 (1994).
17. Allen, Brandt R., and Andrew C. Boynton. “Information Architecture: In Search of Efficient Flexibility”. MIS Quarterly 15, no.4 (December 1991).
18. C D Pomeroy “ Setting Trends in the Cement Industry” The Royal Society, 16-17 February 1983 , 202-203.
19. Nachiket Moghe “Cement Industry – Going Regional”, www.domain-b.com, 6th March 2000.
20. G. Jayaraman ”Technological Trends in Cement Industry - Energy and Environmental impact”, Article in www.greenbusinesscentre.com, Associate Director, Price Waterhouse, Chennai.
21. www.cement.org