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# CONTENTS

Sr. No.	TITLE & NAME OF THE AUTHOR (S)	Page No.
1.	TEACHER EDUCATION AND ITS MANAGEMENT IN THE ERA OF GLOBALIZATION <i>NEENA ANEJA</i>	1
2.	A SOCIO ECONOMIC ANALYSIS OF AGRICULTURAL LANDLESS LABOURERS <i>DR. S. RAMASAMY, R. MAHESH &amp; A. PALANISAMY</i>	3
3.	FINANCIAL LITERACY: AN EMPOWERMENT FOR FINANCIAL INCLUSION <i>DR. MAMTA JAIN, SHYAMA BOHRA &amp; DR. T. N. MATHUR</i>	7
4.	DOES FINANCIAL DEVELOPMENT CAUSE ECONOMIC GROWTH? A TIME SERIES ANALYSIS FOR INDIAN ECONOMY <i>DR. VIJAY KUMAR SHARMA &amp; NEERAJ KUMAR</i>	12
5.	A STUDY ON MARKET INTEGRATION AND PRICE DYNAMICS OF INDIAN NATURAL RUBBER (RSS 4 GRADE): DOMESTIC VS. INTERNATIONAL MARKETS <i>DR. M. KANNAN</i>	17
6.	EFFECT OF ERP SOFTWARE ON PERFORMANCE OF INDUSTRIES IN SME SECTOR <i>PRASANNA BYAHATTI &amp; DR. FAISAL U.</i>	21
7.	A STUDY ON THE PERCEPTIONAL ATTITUDE AND KNOWLEDGE TOWARDS MGNREGA IN TAMILNADU WITH SPECIAL REFERENCE TO TIRUCHIRAPPALLI DISTRICT <i>DR. G. JOHN &amp; GEORGIA. L. THINAKARAN</i>	25
8.	EMPIRICAL ANALYSIS OF MACROECONOMIC INDICATORS AS DETERMINANTS OF GDP OF PAKISTAN BY USING ARDL APPROACH <i>AHSAN KHAN</i>	28
9.	EMPOWERMENT OF WOMEN THROUGH SELF HELP GROUPS <i>DR. GAYATHRI BALAKRISHNAN.R. &amp; SHANTHAMANI.N</i>	34
10.	AN EFFECTIVE STUDY ON FOREIGN DIRECT INVESTMENT IN INDIA <i>RAJASHEKAR.</i>	38
11.	A STUDY ON FINANCIAL DERIVATIVES AND ITS EFFECT ON INDIAN CAPITAL MARKET <i>K. RAJENDRA PRASAD</i>	41
12.	ENTREPRENEURSHIP DEVELOPMENT IN INDIA <i>KRUNAL SONI</i>	43
13.	POPULATION AND DEVELOPMENT: A BRIEF REVIEW <i>DR. DEBASHIS MALLICK</i>	48
14.	DECODING THE OIL PRICE CRISIS – 2014 <i>DR. SUSHMITA, MOHD RUMMAN &amp; HARSHIT BAJAJ</i>	53
15.	PROSPECTS OF GENETICALLY MODIFIED CROPS IN INDIA: CHALLENGES AND ISSUES <i>DR. FAIZANUR RAHMAN</i>	59
16.	TRADE LIBERALIZATION EFFECTS ON INCOME DISTRIBUTION AND POVERTY IN CAMEROON <i>JUMBO URIE ELÉAZAR &amp; TCHOUMO TEMGOUA HERMANN ROSTAND</i>	65
17.	BRANDING NEXT GENERATION PRODUCTS: ISSUES AND CHALLENGES <i>SANTHOSHA. B. M &amp; RAGHUNANDAN M .V</i>	71
18.	THE CONTRIBUTION OF MICROFINANCE TO SUSTAINABLE DEVELOPMENT IN RWANDA <i>SYLVIE NIBEZA</i>	75
19.	SMEs IN INDIA: ROLE AND RELEVANCE IN ECONOMIC DEVELOPMENT <i>RAMA RANI</i>	82
20.	EMERGING TRENDS IN GENDER BASED EMPLOYMENT STRUCTURE IN RURAL INDIA <i>JYOTI RANI</i>	85
	<b>REQUEST FOR FEEDBACK &amp; DISCLAIMER</b>	<b>88</b>

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**EFFECT OF ERP SOFTWARE ON PERFORMANCE OF INDUSTRIES IN SME SECTOR**

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**ABSTRACT**

ERP is a system which provides up to date information, coordinates between different departments and enables the decision makers to take decisions for organization's overall objectives rather than the departmental or functional objectives. The ERP softwares build information base and provide knowledge base for planning and control of the business through the business function management. There are different modules for different functions like production, finance, sales and distribution, materials management etc. ERP supports a central database and connects to different modules. There are various leading ERP softwares available. The large scale industries are successfully implementing ERP software. They are able to afford the huge cost involved in implementation of ERP software. Equally important are small and medium industries in Indian economy. In terms of value, this sector along with micro businesses contributes to manufacturing output and total exports of the country. This sector employs about huge workforce throughout the country. Micro, medium and small enterprises provide maximum opportunities of jobs. ERP brings about reduction in lead time, reduced quality cost, up to date information, decision making capacity, increased customer satisfaction etc. in industries. The data is collected from select industrial units which have implemented ERP software. These industrial units belong to manufacturing sector from Belgaum, Hubli, Shimoga, Hospet and Bangalore and are engaged in production of castings and components. The study shows that SMEs have derived benefit in terms of profit and also in intangible factors such as customer satisfaction, capacity utilization, information flow and quality. It is found that SMEs have a major role in implementing ERP software and can increase their performance if their employees properly understand the use of ERP software. Most of SMEs prefer low cost ERP instead of branded ERP softwares. Most executives/managers of SMEs have recommended ERP implementation

**KEYWORDS**

ERP, module, lead time, cost reduction, information flow.

**INTRODUCTION**

Business organizations are facing great pressures to improve profitability, customer satisfaction, market share, value addition to the products and services they deliver to their customers. Especially manufacturing firms in industries like textiles, chemicals, FMCG, engineering goods etc. are constantly striving to improve the quality and reduce the total cost. They are turning to the use of information technology to make some decisions, which will help them in overcoming a few of these problems and improve efficiency.

To derive benefits from technology a system has to be developed that provides information across all functions cutting departmental barriers. Such systems enable optimum use of all the resources of the organization. This is where Enterprise Resource Planning (ERP) software will be useful. ERP is a system which provides up to date information, coordinates between different departments and enables the managers to take decisions for organization's overall objectives rather than the departmental or functional objectives.

The ERP packages build information base and provide knowledge base for planning and control of the business through the business function management. The ERP is the main system, interfaced or assisted by the other systems in the organization. These systems may stand alone or form a part of the manufacturing or commercial processing systems.

There are many features of ERP software. The important ones are security authorization, referencing responsibility and the implementation of business rules. These are provided to safeguard the organization from illegal practice and also to protect the valuable information from misuse. These features help to keep the system, the information and the data integrity at the highest level. The ERP is activated by its users. The security is built for the authorized usage and also for selective access. The implementation of the most of ERP packages begin with enterprise modeling which defines the enterprise structure, the authority functions, the processes and the business rules. The enterprise model is the platform for the ERP system implementation. There are different modules for different functions like production, finance, sales and distribution, materials management etc. ERP supports a central database and connects to different modules

It is found that many companies are implementing ERP software for the following reasons, to enable improved business performance, to support business growth requirements, to improve responsiveness across the company and to take advantage of untapped market. There are benefits related to profits, communication, performance, delivery schedule etc. The cost and time involved for implementation of ERP software is also important.

The ERP solutions are user friendly which is a major advantage offered by ERP software. The user friendly approach can be used to manage the business with varying business conditions. The solution provides trial posting, simulation for production schedule, the flexible valuation procedure etc. ERP also provides intelligent support in business management. Benefits of ERP in industries include reduction in lead time, on time shipment, reduced quality cost, up to date information, decision making capacity, increased customer satisfaction, improved supplier relationship.

**LITERATURE REVIEW**

The SMEs are turning their attention towards ERP software that is expected to fetch benefits. ERP implementation costs include software, hardware and personnel. The software and hardware costs are easily quantifiable but not personnel cost (Davenport, 2000). Dong (2001) proposed a conceptual model exploring the impact of top management on Enterprise Systems (ES) implementation.

Earlier ERP was mostly implemented by large scale industries in view of affordability in terms of cost and requirement. It is not only large scale companies, but also SMEs have the need to go in for ERP software. Koh et al. (2006) concludes that SMEs have the same needs as large enterprises but face different challenges in view of their financial constraints and capabilities. Buonanno et al. (2005) confirm that SMEs either do not have sufficient resources or are not willing to devote a significant portion of their resources to a complex ERP implementation process. Rao (2000) also holds that SMEs are more vulnerable than



large companies. It is seen that SMEs either do not have sufficient resources or are not willing to devote their resources as compared to large scale enterprises. There is a need for more research for ERP for SMEs.

A deeper understanding of the ERP implementation at SMEs is needed to ensure coordination between different departments. Huin (2004) holds that unless differences between SMEs and large enterprises are clearly understood, ERP projects in SMEs will not reach the desired outcomes. Those facts reveal that the ERP for SMEs definitely demands specific research and analysis other than previous investigations primarily targeting large enterprises. Lussier et al. (2008) notes that understanding small business is an important area of research. The contribution of SMEs is extremely important to the economy and rapid growth. This growth is essential for providing immediate employment opportunities. Ramirez (2005) has summarized main challenges faced by SMEs in Latin America as Lack of training, Limited training in development of human resources, Lack of information systems, Lack of efforts to promote technological innovation.

Muscattello et al. (2003) adopted a case study research methodology to analyze implementation activities in order to establish criteria that lead to a successful installation. They indicate that "effective executive management commitment can help a project achieve success" and that the choice of the "executive sponsor" is significant.

Based on a review of the literature, Loh et al. (2004) propose a framework depicting primary factors that may influence the success of ERP implementations in SMEs. In many countries including Latin American countries SMEs suffer from HR training, appropriate financing and lack of information system. A better information system which is cost effective and suitable for SMEs can be considered by SMEs. It is seen that ERP for SMEs definitely demands specific research other than the studies which focused on large enterprises. It can be noted that understanding of small business is an important area of research.

Rana Basu (2012) found that only eight of twenty five issues are contributing 80% of total contribution. Hence eight issues are regarded as key issues being extracted from review section in context to ERP implementation in SMEs of developing countries like India. He identified the most important issues that would actually lead to successful ERP implementation and to prioritize the issues against the benefit criteria by applying TOPSIS (Technique for order preference by similarity to ideal solution) method. Those issues are education & training, support from top management, properly defined goals & objective, project team competence, project management, change management, proper selection of package and effective communication.

Also the important benefit criteria that appeared frequently in the literature (Shang & Seddon, 2002), have been taken into account for analysis are efficiency in overall business, improved decision making and planning, better utilization of resource, organizational empowerment, improvement in productivity and quality.

Buonanno et al. (2005) contribute with an empirical research analyzing factors affecting ERP adoption and compared SMEs to large scale companies. Their study presents correlation between company size and ERP adoption. A similar comparison between large companies and SMEs is also embraced by Bernroder et al. (2001) but focused specifically in the ERP selection process. They have identified the differences which are related to staffing the group performing the selection process. Basically, large scale organizations engage more manpower in decision making processes than SMEs. SMEs select ERP with less complex models and less expensive methods.

Maldonado Miguel (2009) analyzed the factors impacting the success of ERP implementations in 49 small and medium enterprises with empirical assessment in Latin American countries. He has analyzed the importance of six factors in successful implementation of ERP software. They are change management, ease of use of ERP, ERP project success, ERP business improvement success and ERP user satisfaction. It is found that relationship implying the ease of use of ERP and ERP business improvement has been corroborated. Similarly that relationship implying the ERP user satisfaction and change management has been corroborated. Further the relationship implying ease of use and ERP user satisfaction has been correlated. The relationship implying project implementation success and ERP user satisfaction has been confirmed. The association between project implementation success and business improvement has been correlated.

Zach Ondrej (2012) observed that SME context influences ERP system implementation. Furthermore, the owner-managers significantly influenced almost all issues across the ERP life-cycle, such as ERP system selection, implementation team work and system customization. Even though the CEOs justified the ERP system implementation, their motivation was limited to replacing the old legacy systems. This shows that the lack of strategic perspective in SMEs might limit the ability to acknowledge the potential of ERP implementation.

Maleki (2010) has identified 14 critical success factors which have critical role in successful implementation of ERP software in SMEs in Karnataka. The most important factor in successful implementation of ERP software is appropriate training. The second most important factor is top management support, the third being project management. The last important factor is project champion.

Large scale firms have manpower and implement complex ERP system. But SMEs have limited manpower which make them to go in for less complex ERP system. There is a potential for implementation of ERP software by SME as they are the next logical adopters.

## SCOPE AND SIGNIFICANCE OF THE STUDY

The opportunities for industrial growth have increased significantly after the liberalization of economy in India in 1991. MNCs have established their businesses either as a subsidiary or as a joint venture with Indian companies. The increase in FDI, the liberalization policies of the government, improved infrastructure in transport, communication and education etc. have resulted in increased investment in a number of sectors. The large scale industries have made major contribution to the industrial growth. Equally important are small and medium scale enterprises (SMEs). SMEs are trying to capture the market and fill the void which is not covered by large scale industries. In India the Small scale industries (SSI) sector contributes significantly to the total exports of the country. As the SMEs are seeking to increase their productivity and skill sets to compete with large scale industries, they are concentrating on the use of information technology for optimal utilization of resources. ERP software is one of the technologies SMEs can adopt. The large scale industries are able to afford the huge amount of investment required for ERP in order to reduce cost, increase market share and achieve their objectives.

The research is extensive in the field of implementation of ERP software, critical success factors for implementation of ERP software and post implementation evaluation of ERP software. In addition, literature has mainly focused on large enterprises and only few studies have attempted to validate the proposed models empirically (Somers et al., 2004). The focus of ERP software vendors was on large scale industries. The need for implementation of cost effective and affordable ERP software is felt by SMEs. The results from this research will definitely contribute to the adoption of ERP software by small and medium scale industries in Karnataka.

This study is aimed to look into the effect of implementation of ERP software in small and medium enterprises (SMEs) with respect to customer satisfaction, quality improvement and information flow. The statistics available on SMEs which have implemented ERP software in Karnataka are quite a few. The data about the number of small and medium industries in Karnataka is obtained from the Department of industries, Government of Karnataka.

## RESEARCH DESIGN

Descriptive research decision was taken up to study the implications of ERP software in SMEs in Karnataka. The researcher contacted thirty units in SME sector located in different industrial estates in Karnataka. The population consists of all the SMEs in Karnataka which have implemented ERP software. For collecting the sample data the researcher used snow ball sampling method. There are a number of industrial estates. Among them the researcher has selected following places for the study: Bangalore, Belgaum, Hospet, Hubli, and Shimoga. The selection of above five areas is completely based on level of industrialization activities and their importance in the regional development.

The data is collected from primary and secondary sources. The data collected by the researcher is directly from the sources such as executives, managers or employees of the organizations. It is collected through questionnaire by post, email or interview method. Sources of secondary data include reports published by Ministry of industries, publication by Centre for Monitoring Indian Economy (CMIE), Security Exchange Board of India (SEBI) etc. journals, websites.

The researcher has considered has following parameters to evaluate the effect of ERP post implementation: Sales Revenue, Profit after tax, Reduction in lead time of raw materials, Reduction in lead time of finished goods, Reduction in process Cycle time, inventory ratio, debtor's ratio, Working Capital turnover ratio.

There are other factors also which are equally important for the organization's success. They are Quality Improvement, Information Flow, Customer Satisfaction and Capacity utilization.

**DATA ANALYSIS AND INTERPRETATION**

Effect of ERP on performance parameters such as profitability, cost reduction, etc are taken as parameters. After the implementation of ERP software these parameters will be affected. If lead time for procurement of raw material finished components decrease, it is beneficial to the organization. If there is increased customer satisfaction, information availability, capacity utilization and quality improvement in the organization, then the organizations will benefited.

In the questionnaire every question has five possible answers in case of a parameter. The respondent gives his/her response as follows:

Option1: parameter highly decreased (coded as -2)

Option2: parameter decreased (coded as -1)

Option3: parameter remained same (coded as 0)

Option4: parameter improved (coded as +1)

Option5: parameter highly improved (coded as +2)

If the set of all responses are considered equally likely, it can be said that probability of response being any one of these answers is 0.2. So, probability of parameter remaining same or decreasing is 0.6 (cumulative sum) and hypothesis is set up for testing this for the variables Sales revenue, profit after tax, Lead time reduction etc. It is seen that in the response to all of the above, no firm reported decrease in sales revenue and profit after tax after implementation of ERP software. No firm reported lead time increase after implementation of ERP software which is a benefit for the firm. The other parameters like information flow, quality of products, capacity utilization and customer satisfaction have either improved or remained same after implementation of ERP software.

The data for the three years are taken for analysis for small scale industries and medium scale industries separately. The number of negative signs or zeros is counted for each parameter out of total responses. The probability of getting negative or zero responses out of all responses p equals to 0.6 is taken as null hypothesis.

Null hypothesis is rejected in favor of alternative if number of negative or zeros is very less. In the alternative we go on taking different values of p like 0.5, 0.4, 0.3, 0.2, 0.1 etc and a chi square test is applied to test the discrepancy between frequency of negative counts under null and alternative hypothesis.

It is observed that the chi square statistic goes on decreasing first and then increases. So, in the alternative we take that value of p which minimizes chi square statistic. The best value of p is obtained by fitting a Bernoulli distribution to the frequency data and p is obtained using mean frequency. This method is called method of moment estimation.

For example if out of 36 responses 3 are negative and 33 are positive the best p value will be 1-(33/36) (that is 1-mean).

The results are summarized below.

H0: The probabilities of getting zero or negative counts for Quality variable is p = 0.6

Against

H1: The probabilities of getting zero or negative counts for Quality variable is p = 0.25

**TABLE NO. 1: CHI SQUARE VALUES FOR PARAMETERS**

Probabilities of negative or zero count	X	Observed frequency (O)	Expected Frequency (E)	(O-E) <sup>2</sup> / E	Chi Square
p = 0.6	0	9	21.6	7.35	18.375
	1	27	14.4	11.025	
p = 0.5	0	9	18	4.5	9
	1	27	18	4.5	
p = 0.4	0	9	14.4	2.025	3.375
	1	27	21.6	1.35	
p = 0.3	0	9	10.8	0.3	0.4285
	1	27	25.2	0.128571	
p = 0.25	0	9	9	0	0
	1	27	27	0	
p = 0.1	0	9	3.6	8.1	9
	1	27	32.4	0.9	

(Source: Survey data)

The same kind of analysis is done for different variables for medium and small scale industries separately and results are summarized below.

**TABLE NO. 2: SMALL SCALE INDUSTRIES**

Indicator	Alternative Hypothesis p
Sales Revenue	0.083333333
profit after tax	0.083333333
Reduction in lead time raw materials	0.25
Reduction in lead time finished goods	0.027777778
Reduction in process Cycle time	0.111111111
inventory ratio	Nearly zero
debtor's ratio	0.069767442
Working Capital turnover ratio	Nearly zero
Quality Improvement	0.214285714
Information Flow	Nearly zero
Customer Satisfaction	0.047619048
Capacity utilization	0.214285714

TABLE NO. 3: MEDIUM SCALE INDUSTRIES

Indicator	Total counts	Alternative Hypothesis p
Sales Revenue	40	0.275
profit after tax	40	0.375
Reduction in lead time raw materials	42	0.261904762
Reduction in lead time finished goods	42	0.285714286
Reduction in process Cycle time	40	0.225
inventory ratio	46	0.173913043
debtor's ratio	44	0.181818182
Working Capital turnover ratio	44	0.181818182
Quality Improvement	45	0.244444444
Information Flow	60	Nearly zero
Customer Satisfaction	45	0.177777778
Capacity utilization	45	0.39

## CONCLUSION

As all p values are below 0.4 it can be said that the overall probability of getting 'Non improvement' of parameters is less than 0.4 : It is found that the parameters have shown overall improvement significantly. There is improvement in financial performance measured in terms of profitability and lead time has reduced in most of the firms. The important ratios like inventory turnover ratio, debtor turn over ratio and working capital turnover ratio have also shown improvement. The non financial parameters like quality, customer satisfaction, capacity utilization and information flow have improved significantly. The categorical regression shows that non financial parameters have influence on improving the financial parameters to a considerable extent. As internet usage and applications are spreading fast, SMEs can get connected to their ERP vendors' network and gets online support for their day to day transactions using ERP. The Government can play a major role in promoting use of ERP software to SSI units.

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