

INVESTIGATION AND ANALYSIS OF WITH AND WITHOUT ERP SYSTEMS IN MANUFACTURING AND AUTOMOBILE ORGANIZATIONS

S.V. Doddaiah^{1,*}, Dr. Aravindrao.M. Yadwad², Dr. S.B. Mallur³, Anand I C

1. Research scholar, Visvesvaraya Technological University “Jnana sangama”, Belgaum-590018, Karnataka state, India,
2. Professor, Department of Mech. Engg. National Institute of Engineering, Mysore-570008 Karnataka State, India,
3. Professor, Department of Mechanical Engineering, UBDT collage of Engineering, Davangere-577001. Karnataka State, India,
4. Associate Professor, Head of SDSC, National Institute of Engineering, Mysore-570008 Karnataka State, India
5. Associate Professor, Department of Business Administration, Vidyavardhaka College of Engineering, Mysuru

1. E-mail ID-doddaiahsv@gmail.com

2. E-mail ID-aravindlata@gmail.com

3. E-mail ID-sbmallur@gmail.com

5somashekharic@vvce.ac.in

Abstract: Enterprise Resource Planning (ERP) systems, if implemented successfully, can bestow impressive strategic, operational and information-related benefits to the adopting firms. A failed implementation can often spell financial doom. Currently, most of the information about the failures and successes are based on reports on implementations in large manufacturing and service organizations. But enterprise resource planning vendors are now steadily turning their marketing insights on small and medium-sized manufacturers. There are mixed results of success and failure in different Organizations. The time is ripe for researchers to gather, analyze and disseminate information that will help these firms to implement their projects successfully. The present project is an attempt to analyze the performance of Organizations (manufacturing and automobile) with and without ERP systems in Mysuru district. The research focuses on business performances that foster with and without ERP systems and are developed using information gleaned from case studies in various organizations. To improve productivity and overall business performance, Enterprise Resource Planning (ERP) is one of the solutions for manufacturing and automobile service organization in order to face the global challenges.

KEYWORDS: Enterprise resource planning (ERP), Automobile Service Organisation, Manufacturing organisation.

Introduction: Enterprise resource planning (ERP) systems can be regarded as one of the most innovative developments in information technology (IT) of the 1990s. With the growing interest of many organizations in moving from functional to process-based IT infrastructure, ERP systems have become one of today's most widespread IT solutions. According to Heald and Kelly (1998), it was projected that, in 2002, organizations' total spending on ERP applications would reach \$72.63 billion. What have motivated organizations to implement ERP systems are their integration and standardization capabilities, flexible client/ server architecture, and their abilities to drive effective business reengineering and management of core and support processes (ComputerWorld, 1998).

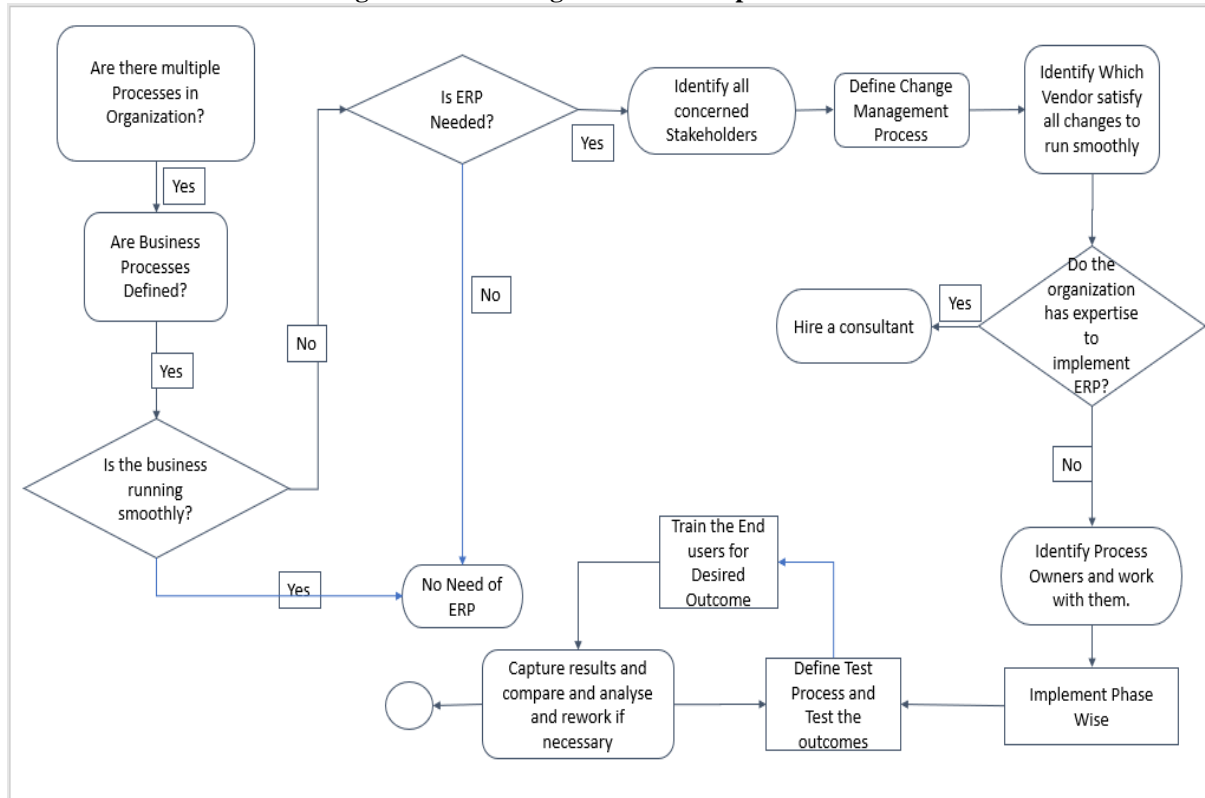
Today's ERP systems stem from Material Requirements Planning (MRP) and Manufacturing Resource Planning (MRP-II). ERP is benefited to most of the organizations in reducing inventory and manpower, improving productivity, increase in revenue/profit, on time delivery and many more intangible benefits [2]. Almost all large scale firms have either implemented or in process of implementing ERP. However, large firms are not only ones impacted by ERP systems, but Small- and medium-sized firms also make extensive use of ERP systems [3].

As the widespread application of ERP systems continues, the need for a new research agenda to address various issues in this context has never been more urgent. ERP repeatedly topping the list of themes in major academic information systems (IS) conferences reflects the dire need for research in this rapidly emerging field. In one aspect, ERP combines both organizational business processes and total organizational IT into one integrated

system [4]. Both IT practitioners and researchers are still not able to determine the potential impact of ERP adoption on adopting organizations.

Implementation:ERP systems affect both the internal and external operations of an organization. Hence successful implementation and use are critical to organizational performance and survival. Figure 1 showsERP implementation, brings with it tremendous organizational change, both cultural and structural. This is on account of the best practice business processes that ERP systems are based on. This calls for ERP implementations to be looked at from strategic, organizational and technical dimensions. The implementation thus involves a mix of business process change,software configuration to align the software and the business processes.

Figure 1: Block diagram of ERP implementation



There are two strategic approaches to ERP system implementation. The first approach is where a company goes for the plain vanilla version of ERP. Here the organization has to reengineer the business process to fit the functionality of the ERP system which brings with it major changes in the working of the organization. This approach will take advantage of future upgrades, and allow organizations to benefit from best business processes. The second approach is where the ERP system is customized to fit the business processes of the organization. This will not only slow down the implementation but also will introduce new bugs into the system and make upgrades difficult and costly. ERP vendors’ advice organizations to take the first approach and focus on process changes.

One major factor for failure is considering ERP implementation to be a mere automation project instead of a project involving change management. It is a business solution rather than an IT solution, as is perceived by most organizations. Yet another reason for failure is over customization of the ERP system. Therefore, organizations need to very carefully go about their ERP implementations, if they are to be successful. Most large companies have either implemented ERP or are in the process of doing so. Several large companies in India, both in the public and private sectors, have successfully implemented ERP and are reaping the benefits. Some of them are Godrej, HLL, Mahindra & Mahindra and IOC. With the near saturation in the large enterprise market, ERP vendors are looking to tap the potential in the SME segment.

Based on a comprehensive review of much of what has been written so far about ERP, **Figure 2**, highlights the major streams of ERP research. This paper, by reviewing available studies and exploring future research avenues, aims to present a new agenda to further the research on the ERP phenomenon. In particular, the paper highlights several dimensions relating to ERP adoption, technical aspects of ERP, and ERP in information systems (IS) curricula.



Figure 2. Major streams of ERP research

India, after globalization, is being transformed by its application of IT, from a poor and isolated society to a major force in the global economy. ERP penetration in India is very slow but progressive. This paper aims at evaluating the performance of manufacturing companies especially in and around Mysuru, to ascertain whether ERP is benefited to them and how, and what were the critical factors which lead to success or failure. A survey in one industrially advanced city of India is done followed by a detailed case study of one firm in other part of India to evaluate the performances of ERP implementation [6]. The next section discusses the relevant literature review.

Literature Review

Robin Poston [12] had undertaken case study in one of the Indian companies which had implemented ERP and found changes in manager’s job for the organization chosen. They found, use of power increased significantly with ERP implementation. This facilitated the change process and was consistent with all management levels. They also found that flexibility of the organization had increased with ERP. Executives were spending less time in implementation and the free time is employed more in planning activities. They found that standardization, specialization, and formalization had increased due to ERP implementation.

Jaiswal presented the case studies of the two companies who have implemented ERP. He provided insights into adoption of ERP along with Business Process Reengineering. He referred survey done by Confederation of Indian Industries which also showed that adoption of ERP in India is prevalent mostly in the large companies and the SME sector has not yet achieved the desired level of ERP adoption.

The review of literature of the research work so far in the area of ERP has concentrated on ERP adoption (Pre-Implementation, Implementation and Post-Implementation), technical aspects, impact and benefits and other important related issues. ERP systems have now reached a level of maturity where both software vendors and users understand the technical, human resource and financial resources required for implementation and ongoing use. The continuing development of ERP systems has been considered by many researchers and practitioners as one of the major IT innovations in this decade.

ERP implementation also brings in changes in business processes, and functional changes that might be necessary for the ERP implementation to be successful. Involving all the stakeholders and their buy in and confidence will be a major factor in adopting to the new ERP process.

In Manufacturing Industries, involvement of all the resources living and non-living becomes part of the resources. One cannot exclude any of them to be successful implementation of ERP with necessary changes in business process.

<u>Characteristics</u>	<u>WITH ERP</u>	<u>WITHOUT ERP</u>
Process implementation	Trackable and implemented with sufficient process change	Not trackable and don't know the process owner and its success implementation
Human Resource Planning	Can be trackable and be able to follow labor laws and not violate.	Might have to put few other resources to track them and not put over work on resources
Track Materials using Inventory Management	Should be able to track in and out of materials used from the warehouse. Track warehouse and their content	Should be trackable but difficult to track and consolidate all the materials of the same type.
Vendor Management	All the vendors that the company has interacted and what they have supplied, when and how much and what kind of material or products were shipped or delivered.	Cannot consolidate and might not be trackable
Leave Management	Track employees in and out of their work to finalize their payroll based on their employee status.	Laborious and tedious if not integrated with an ERP system.
Budget Management	Seamless integration will help manage the budget and its expenditure	Need to manually track and might mess up the final consolidation
Estate or Building Management	All the buildings and their make their complete physical information including roads and electricity.	Not traceable as to what they have and if any repairs come not trackable on the work spent.
Legal Case Management	Track all the legal cases that have been filed against and or on some other party	Physical and might not know what is the outcome, if any.
File Tracking	Should be able to know the tracking of files submitted and who has it and has it been completed	Need to manually track or is LOST in the pile.
HR Recruitment System	Track the hiring process and smoothly complete the hiring process of any recruit.	Everything to tracked physically and lot of paper work and not environment friendly.
Training Management	Track the training taken by the employees and if needed get them trained for their current job to be efficient	Need to maintain, but not possible for any company which are than 10.
Customer Management	Track new and old customers what has been bought or serviced and improve Customer Relationships	Might lose unless the person involved is still there to know the information of that customer.
Sales Management	Track and identify the trend in the	Difficult to analyze the sale and

	sales and be more productive.	trends.
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Table 1: Characteristics with ERP and without ERP

Objectives Of the Study:Literature review finally helps in formulating the objectives of studying and analysing of the performance of Organizations with and without ERP systems in select manufacturing industries and automobile service sector located in and around Mysore.

1. To investigate ERP system aspects of manufacturing industries and automobile service sector, focusing on,
 - Enterprise characteristics.
 - ERP Impact, success and failure analysis

Methodology:A detailed case study in one ERP adopted company were carried out. A survey was undertaken to find out the ERP status and reasons for successor failure of an ERP implementation. The approach could be to use either a large sample size or a small one. According to Thorn, a survey of a large sample size requires a lot of time and effort. A large survey also requires a lot of attention as to follow ups on non-respondents and also less accurate than a smaller but responsive sample . An understanding of this literature along with constraints made it possible to analyze a small sample size.

A list of about 200 manufacturing industries and automobile service sector located in and around Mysore was collected. Out of these companies, ERP adopted companies were sorted out. It was done by surfing on their websites, phone calls, sending e-mails to the companies, data collected from ERP vendors etc. 90 companies were found with ERP implementation either completed or in process of implementation. A structured questionnaire was designed based on the initial feedback received against a pilot questionnaire and subsequent personal discussions with the academicians, experts, consultants, statistical analyst and few ERP users from the ERP adopted companies. The questionnaire was then administered to 90 ERP adopted manufacturing industries and automobile service sector through personal visits, email to few company contacts, and periodic reminders to them by phone.

Challenges to implement ERP software: ERP implementation unquestionably is a challenging process. Plus, getting it wrong is no less than a nightmare for any business. Thus, it is advisable to keep ERP implementation under proper control for a smooth and successful embracement of the same all across the organisation. Here is a checklist of some of the biggest challenges faced by businesses of all sizes when implementing ERP solutions.

- **Selection challenges**
- **Technical challenges**
- **Data quality challenge**
- **Managerial challenges**
- **Psychological challenges**

The benefits of ERP in any organization are listed below as given by Garg and Venkitakrishnan. (2006)

- Reduced Planning cycle time
- Reduced manufacturing cycle time
- Reduced inventory
- Reduced error in ordering
- Reduced requirement of manpower
- Enables faster response to changing market situations
- Better utilization of resources
- Increased customer satisfaction
- Enables global outreach
- Reduction in Job Time

Benefits from ERP are mainly of two kinds:

Tangible Benefits: Tangible benefits (Figure 3) are those benefits which can be quantified in monetary terms. Many researchers have been held to study the tangible benefits that are generally derived of the ERP implementation in organizations. According to a survey of 62 Fortune 500 companies by Benchmarking Partners, Inc. for Deloitte Consulting, the most important tangible benefits realized after successful implementation of ERP system. The survey results are given in table given below:

Table 2: Tangible benefits with Enterprise Resource Planning software

S.No.	Tangible Benefits	% of Companies
1	Revenue / Profit Increase	11
2	Inventory Reduction	32
3	IT Cost reduction	14
4	Procurement Cost reduction	12
5	Transportation / Logistics Cost Reduction	9
6	Maintenance Reduction	7
7	Personnel reduction	27
8	Productivity Improvement	26
9	Cash Management Improvement	11

Source: Adapted from Mary Sumner (2009)

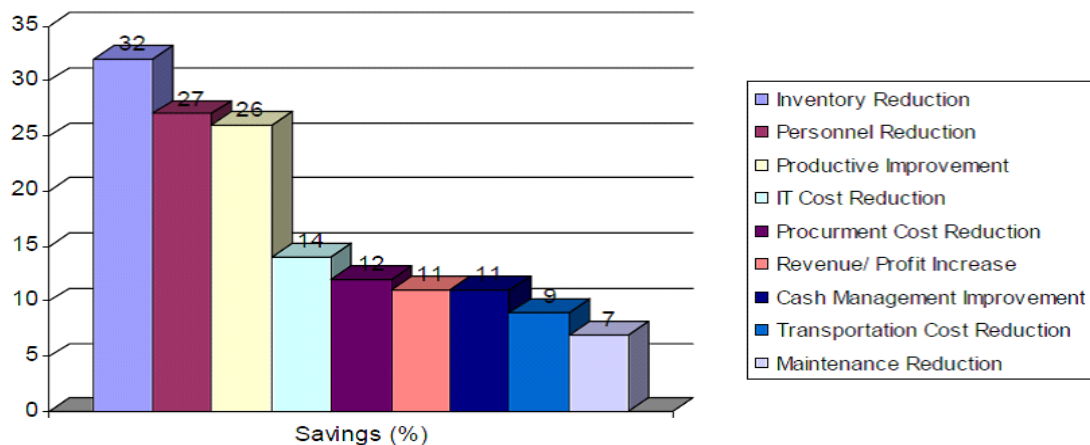


Figure 3: Tangible benefits with Enterprise Resource Planning software

2. Intangible Benefits: Intangible benefits (Figure 4) are those that cannot be quantified in monetary terms but they do have a very positive and significant business impact. Information availability is a big factor. Information can enable manager to make better decisions about how to allocate resource effectively. In addition, improved customer responsiveness, process integration, and increased flexibility though intangible, can lead to tangible benefits (Mary Sumner, 2009)¹⁵. The table given below gives some of the important findings on intangible benefits:

Table 3: Intangible benefits with ERP

Sl.No.	Tangible Benefits	% of Companies
1	Information visibility	55
2	New / improved process	24
3	Customer responsiveness	22
4	Process Integration	13
5	Product Standardization	12
6	Flexibility	9
7	Globalization	9
8	Business Performance	7
9	Supply / Demand Chain Efficiency	5

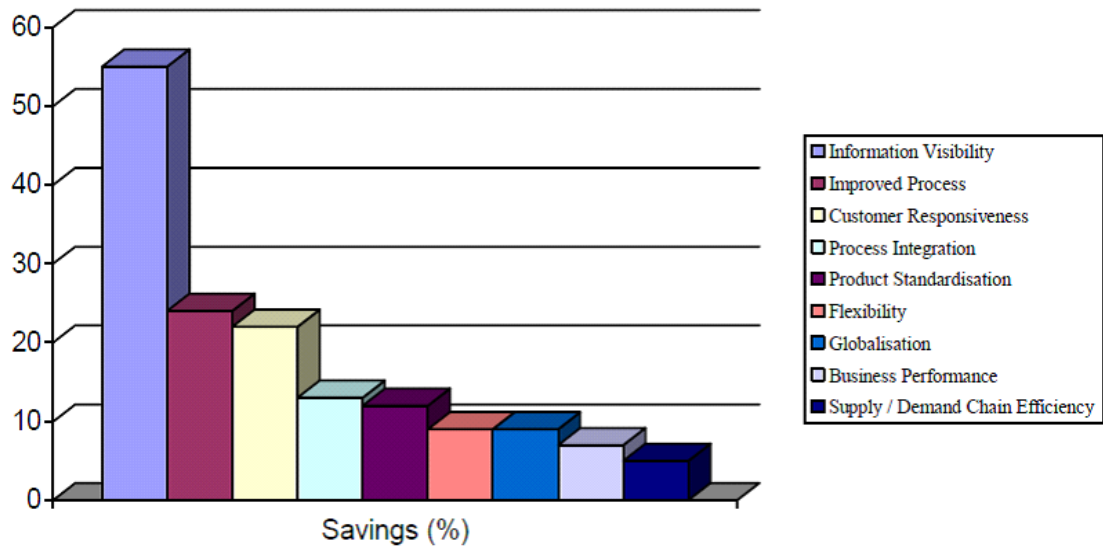


Figure 4: Effect of ERP on various Intangible Costs

QUESTIONNAIRE

Some questions were of Yes/No type and were asked for justification of their response. The broad format of the questionnaire is given in Table 3.

TABLE 4: QUESTIONNAIRE FORMAT

Sl.NO	Description of Information	Question type
1	Information about respondents Organization	Descriptive
2	Information about the respondent	Descriptive
3	Information about their ERP system	Descriptive
4	Reasons/Motivational force to implement ERP system	Information system reasons Organizational reasons
5	ERP implementation Process	Customization and Business Process Reengineering, Goals of ERP implementation
6	ERP Benefits	Tangible benefits Intangible benefits Effects of ERP Return On Investment Overall impact of ERP Reasons for ERP Success Reasons for no success of ERP

SURVEY RESULTS

The majority of organizations do not have the internal expertise necessary for achieving ERP success. As they don't hire an experienced third-party, they limit their level of benefits realization and reduce their potential ROI. The companies to which questionnaire was sent and received, the data was analyzed by grouping the companies according to turnover and type of ERP software in their companies.

ERP SYSTEM IN ORGANIZATION

The primary step in any ERP implementation is the selection of the software that is to be used. Table 4 and 4.1 represents the observations on different ERP software implemented/ used by the industries.

Table 5: Manufacturing Sector with ERP Implemented:

SL.NO	NAME OF COMPANY	ERP SOFTWARE
1.	AT&S India Pvt Ltd	SAP R/3
2.	Shri Bhagat Industries	ERP 9
3.	Ashoka Leyland Pvt Ltd	Oracle 8i
4.	Gangothri mills Pvt Ltd	ERP 9
5.	AB Autobrakes Pvt Ltd	ERP 9
6.	Rangsons Electronics Ltd	Microsoft Navision
7.	Rane (Madras) Ltd., Mysore	SAP R/3
8.	Bhoruka Extrusion Pvt Ltd	SAP R/3

Table 6: Automobile Sector with ERP Implemented:

SL.NO	NAME OF COMPANY	ERP SOFTWARE
1.	Automotive axles limited	MFG/PRO
2.	Royal Enfield Pvt ltd	SAP

Table 7: Reasons for ERP implementation

Sr. No.	Name of Company	Reasons for ERP implementation
1	AT & S India Pvt. Ltd., Mysore	<ul style="list-style-type: none"> To become most competitive producer of high quality and cost effective products To become world's best performing supplier of interconnection applications
2	Rangsons Electronics Ltd., Mysore	<ul style="list-style-type: none"> To become a global leader in electronic manufacturing To assure the highest level of customer satisfaction
3	Automotive Axles Limited, Mysore	<ul style="list-style-type: none"> To be a world class quality supplier of competitive products To retain leadership in Indian markets for Rear Axles To enhance export business
4	Rane (Madras) Ltd., Mysore	<ul style="list-style-type: none"> To gain strategic advantage To provide superior product and services to customers To maintain market leadership

Many organizations are adopting ERP system for different organizational/ business reasons. Consolidation of present market, to gain strategic advantage, organizational growth and customer satisfaction are the main motivational force to go for ERP implementation. As ERP is complex and costly venture, so many industries are spending crores of rupees on ERP investment. Table 6 represents the observations on cost and duration of ERP implementation.

Table 8: Cost and duration of ERP implementation.

Sr. No.	Name of Company	Cost of ERP package	ERP Implementation Time	
			Planned	Actual
1	AT & S India Pvt. Ltd., Mysore	2 Crores	1 Year	1 Year
2	Rangsons Electronics Ltd., Mysore	75 Lakhs	1 Year	1 Year
3	Automotive Axles Limited, Mysore	1 Crore	8 Months	1 Year 9 Months
4	Rane (Madras) Ltd., Mysore	3 Crores	1 Year 6 Months	1 Year 9 Months

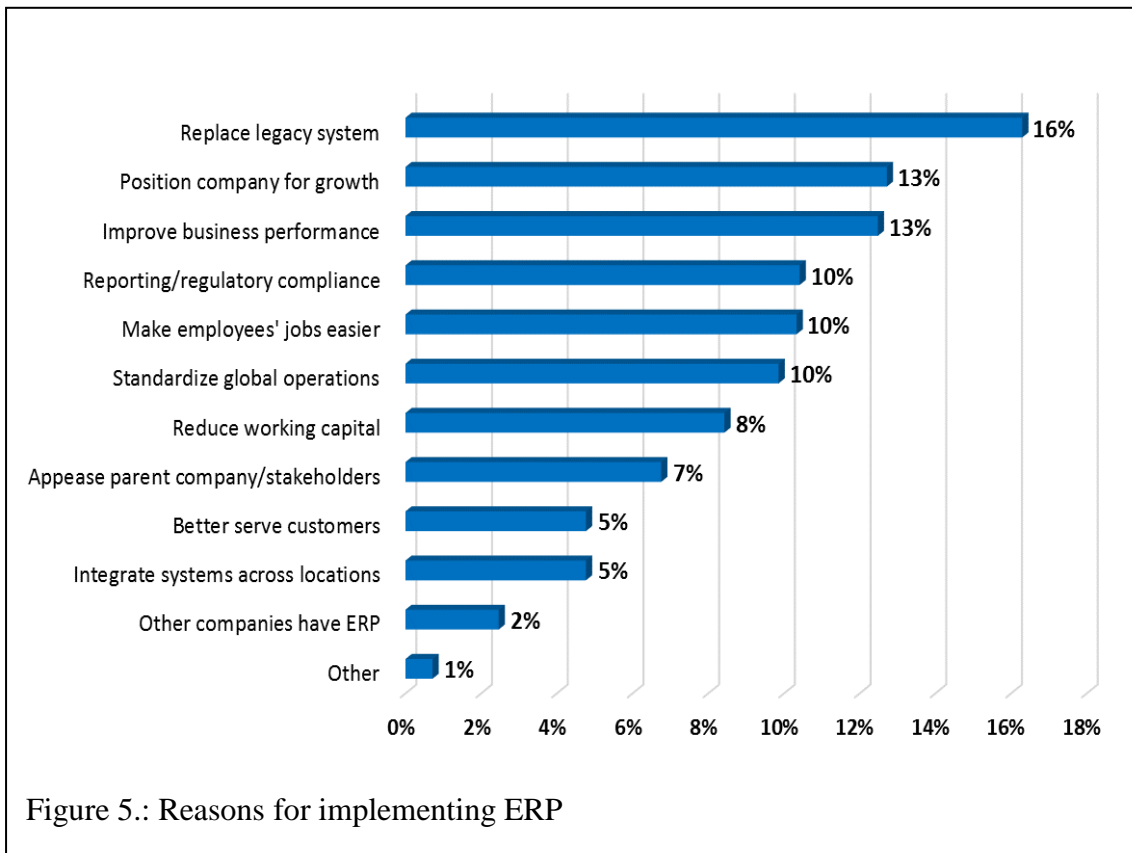
Respondent Overview

- **81%** of organizations are either **in the process of implementing ERP software** or **have completed implementation.**
- **14%** of organizations are **in the process of selecting software.**
- **5%** are **in the process of upgrading software.**

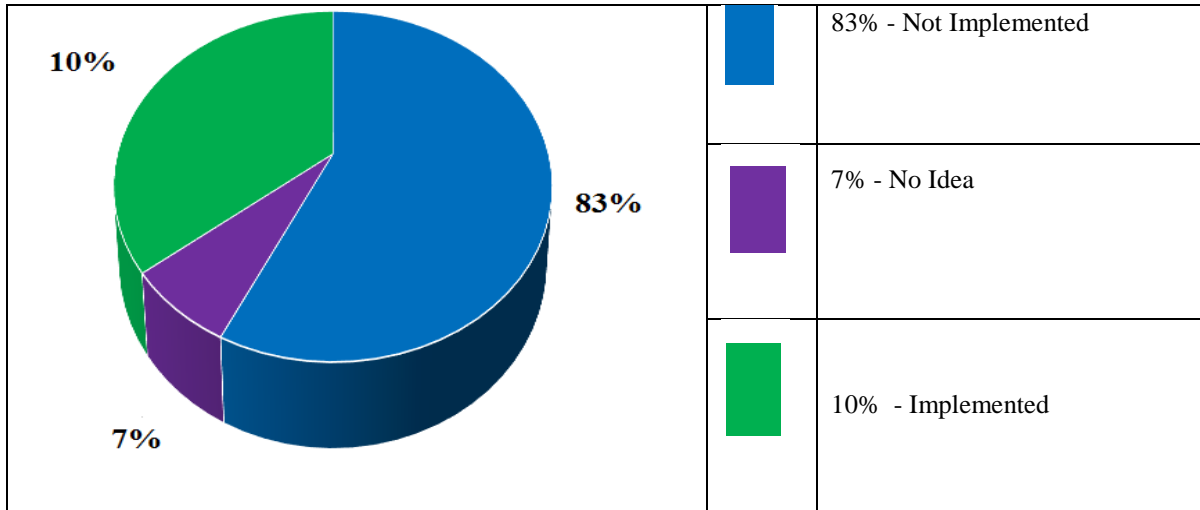
The most common reason for implementing ERP was to replace old ERP or legacy systems (15-percent).

Reasons for implementing ERP:

- 49% Replace out-of-date ERP software
- 16% Replace home grown systems
- 15% Replace accounting software
- 20% Replace non-ERP systems / had no true system



Implementation Outcome:Automobile Service Organization



Implementation Outcome:Manufacturing Organization

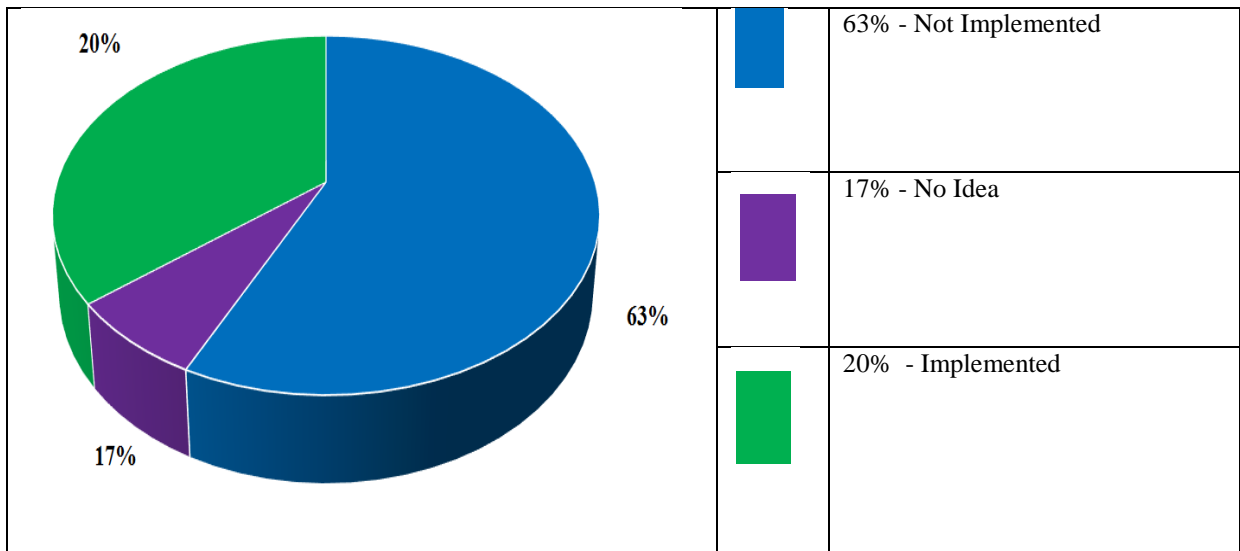


Figure 6.: Comparison of Results

CONCLUSION:With a survey of manufacturing and automobile Organizations in Karnataka and subsequent detailed case study in some ERP implemented Organizations; this study analyzes various parameters of ERP implementations. It is revealed that with clear goals of ERP implementation and proper ERP software selection, the companies are benefited in reducing inventory, improving customer service and other intangible benefits. The top management support, strong and meaningful training program are found to be the enabling factors of its success.ERP now is found successful in most of the cases.More and more companies should go for local or global ERPimplementation to ripe the benefits of it.

References

1. Alexis Leon, “ Enterprise Resource Planning ”, Tata McGraw-Hill Publishing Company Limited, New Delhi, (2007).
2. AnandTeltumbde, “ A Framework for Evaluating ERP Projects”, International Journal of Production Research, Vol. 38(17), (2000), pp. 4507-4520.
3. David C. Yen, David C. Chou and Jane Chang, “ A Synergic Analysis for Web-based Enterprise Resource Planning Systems.”, Computer Standards and Interfaces, Vol. 24, (2002), pp.337-346.
4. E. J. Umble, R.R. Haft and M. M. Umble., “Enterprise Resource Planning: Implementation procedures and critical success factors”, European Journal of Operation Research, Vol. 146(2), (2003), pp. 241-257.

5. F.R. Jacobs and Elliot Bendoly, "Enterprise Resource Planning: Developments and Directions for Operations Management Research", *European Journal of Operation Research*, Vol. 146(2), (2003), pp. 233-240.
6. Garg Venkitakrishnan, (2006). "ERP Concepts and Practice", Prentice Hall India. 5.
7. Gupta A., (2000), "Enterprise resource planning: The emerging organizational value systems", *Industrial Management & Data Systems*, Vol. 100 (3), pp. 114-18. 6.
8. Jaideep Motwani, Dinesh Mirchandani, Manu Madan and A. Gunasekaran, "Successful implementation of ERP projects: Evidence from two case studies", *International Journal of Production Economics*, Vol. 75, (2002), pp. 83-96.
9. Jan Olhager and Erik Selldin, "Enterprise Resource Planning survey of Swedish Manufacturing Firms", *European Journal of Operation Research*, Vol. 146(2), (2003), pp. 365-373.
10. Joseph Sarkis and R.P. Sundarraj, "Managing Large-Scale Global Enterprise Resource Planning Systems: A Case Study at Texas Instruments", *International Journal of Information Management*, Vol. 23, (2003), pp. 431-442.
11. Kale P. T., Banwait S. S., Laroia S. C., (2007), "Review of Key Performance Indicators of Evaluation of Enterprise Resource Planning System in Small and Medium Enterprises", XI Annual International Conference of Society of Operation Management, India
12. Michael Roseman and Jens Wiese, "Measuring the Performance of ERP Software- a Balanced Scorecard Approach", *Proceedings of the 10th Australian Conference on Information Systems*, (1999), pp. 773-784.
13. Purnendu Mandal and A. Gunasekaran, "Issues in implementing ERP: A case study", *European Journal of Operation Research*, Vol.146(2), (2003), pp. 274-283.
14. Rajendra Nargundkar, "Marketing Research", Tata McGraw Hill Publishing Company Limited, New Delhi, Second Edition, (2003).
15. Robin Poston and Severin Grabski, "Financial impacts of enterprise resource planning implementations", *International Journal of Accounting Information Systems*, Vol. 2, (2001), pp. 271-294.
16. S. Sadagopan, "ERP: A Managerial Perspective", Tata McGraw-Hill Publishing Company Limited, New Delhi, (1999).
17. Shari Shang and Peter B. Seddon, "A Comprehensive framework for Classifying the Benefits of ERP Systems", *The University of Melbourne, Economics of Innovation and New Technology*, 3;4, 1995.
18. Study Material on "Management Challenges in ERP Implementation", "SDM Institute for Management Development", Mysore, (2006).
19. Sue Abdinnour-Helm, Mark L. Lengnick-Hall and Cynthia A. Lengnick-Hall, "Pre-implementation attitudes and organizational readiness for implementing an Enterprise Resource Planning System", *European Journal of Operation Research*, Vol. 146, (2003), pp. 258-273.
20. Thomas H. Davenport, "Putting the Enterprise into the Enterprise System", *Harvard Business Review*, (July-August 1998), pp. 121-131.
21. Toni M. Somers and Klara G. Nelson, "The impact of strategy and integration mechanisms on enterprise system value: Empirical evidence from manufacturing firms", *European Journal of Operation Research*, Vol. 146(2), (2003), pp. 315-338.
22. Vincent A. Mabert, Ashok Soni and M. A. Venkataramanan, "The impact of organization size on enterprise resource planning (ERP) implementations in the US manufacturing sector", *International Journal of Management Science, Omega*, Vol. 31, (2003), pp. 235-246.
23. Vinod Kumar Garg and NK Venkitakrishnan, "Enterprise Resource Planning: Concepts and Practice", Prentice Hall of India Private Limited, New Delhi, (2006).
24. Vinod Kumar, Bharat Maheshwari and Uma Kumar, "ERP Systems Implementation: Best Practices in Canadian Government Organisations.", *Government Information Quarterly*, Vol. 19, (2002), pp. 147-172.

http://en.wikipedia.org/wiki/List_of_ERP_vendors, (2007).
