CHAPTER 6
THE SUMMARY
CONCLUSIONS & SUGGESTIONS

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THE SUMMARY, CONCLUSIONS AND SUGGESTIONS

This chapter is divided into three parts - The summary, conclusion and recommendations. The summary presents a chapter wise outline to provide an overview of each chapter, bringing out the gist of each chapter. In the section “conclusions”, an attempt has been made to highlight the major findings of the work vis-a-vis the research objectives. The section on suggestions contains suggestions derived from the limitations of the study.

6.1 THE SUMMARY

Earlier, manufacturing and inventories were handled by the companies on the basis of the stock holding capacity to satisfy customer demand; based on the experiences that customers would order, what they had ordered in the past and quantity was also determined according to previous orders. Also, due to the intensified and accelerated competition, manufacturing companies were facing a constantly changing, uncertain environment from external agencies and hence, were constantly searching for efficient information technology tools to gain better control of their business.

Information in manufacturing organizations is often housed in different organizational units. While each of these information pieces can only support a specific business activity, organizational performance is hampered due to the lack of integrated information. ERP system is the most ambitious use of IT by businesses and incorporate best business practices into one integrated software application package that affects every function within a business. The implementation of ERP system could bring an entirely new information technology infrastructure to an organisation. An ERP implementation will break up the existing hierarchical structure and recreate it along the lines of the newly established business processes and their interdependencies. ERP system usually cross traditional departmental boundaries and create new processes, so
that the company can take full advantage of the benefits of the ERP system. But, this change in processes further leads to complexity, resistance and may result in failure of ERP projects. Also, since ERP system are expensive, the decision to install an ERP system necessitates a choice of mechanisms, both to determine whether an ERP system will be successfully implemented and, once implemented, whether it will be successful. In the case of ERP system, whose effects on organizational processes and performance are intrinsically profound and wide-ranging compared to those of traditional IT limited to some spheres of organization; evaluation activities may be an issue of great concern. The information relevant to the research topic has been presented in the form of seven chapters.

First chapter in the present study highlights the conceptual framework, rationale of the study and objectives of the study. The present research work endeavours to understand the effects of ERP systems on Organizational Performance and Productivity (With Special Reference to Manufacturing Companies of Pithampur and Dewas Industrial Area). In view of these research objectives, the four concepts involved in the study viz. manufacturing companies, ERP, Organizational Performance and Productivity were introduced in a conceptual framework that consisted of these sub-sections. ERP sub-section comprehensively covers ERP systems and includes meaning, architecture, modules, ERP project life cycle, implementation and vendors of ERP.

Previous research has already established that compared to other types of investments, information technology investments are insufficiently or not at all evaluated. This can be partly explained by the lack of adequate IT evaluation methods and tools. Hence, the rationale of the study was placed against the background of continued emphasis on effects of ERP on the organizational performance and productivity. The objectives of the study were to study effects of ERP on organizational performance and productivity, effect of demographics on the changes caused by ERP system, ERP in implementation phase, relationship between ERP in implementation phase and post implementation phase and to determine the general configuration of ERP in different manufacturing companies,
The second chapter reviews national and international research papers pertaining to ERP system and organizational performance and productivity. The chapter starts with literature related to manufacturing companies and ERP. The chapter then covers the literature related to motivations behind ERP installation ERP and its benefits, followed by the studies related to measurement model for ERP success in the project phase, ERP and other studies etc. The chapter further moves on to determine the performance indicators and models for measuring organizational performance and productivity and then discusses how and why the Balanced Scorecard approach is used to evaluate the implementation of ERP software. The chapter finally throws light on relationship between ERP systems and organizational performance and productivity. Thus, this chapter, by identifying the lacunae in the available literature, has set the logic for the subsequent chapters of the study.

Chapter three throws light on the Research Methodology. The chapter describes the nature of the study, the process followed to achieve the objectives of the study in terms of research paradigm, sample size, sampling technique and gives detailed description of the tools used for the data collection and data analysis.

On the basis of literature review, imperative dimensions of organizational performance and productivity were explored using BSC model and project success factors were identified for assessing the success of an ERP system in the implementation stage. The choice of independent and dependent variables was based on the rationale of the study and outcome of literature review. The sampling unit of research is ERP user who is working in a manufacturing company situated at Pithampur and Dewas industrial areas. The normality of collected data and reliability of the scales were tested using Kolmogorov-Smirnov Test and Cronbach’s alpha method respectively. Paired T-test, Independent sample T-test, ANOVA, Mean Analysis, Percentage Analysis and structural Equation Modelling were used for the analysis.

The fourth chapter focuses on the results obtained in the course of present research study. The results obtained during the study were classified and described in three
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sections viz. Layout of Tests, Detail of Significant Results and Summary of the Results. The Layout of tests contains the outline of different tests carried out during the course of the research work. The tests and their results were classified and presented in the form of five broad categories of researches: Effects of ERP on Organizational Performance and Productivity, Effect of demographic variables (age, gender, educational qualification and designation) on change caused by ERP system in organizational Performance and Productivity, Perception of ERP users towards different components of ERP system in the installation phase, Relationship between components related to ERP system in implementation phase and changes caused by ERP system in post implementation phase and general configuration of ERP system. At the end of each category of tests, a summary of significant results was presented.

Paired T-test was adopted to identify the difference in organizational performance and productivity after adoption of ERP systems. The chapter identifies the significance of respondent demographics through hypothesis testing on the change in organizational performance and productivity due to ERP system. Independent sample t-test and ANOVA were used to test these hypotheses. It also gives an insight into the responses with respect to ERP systems in the implementation stage. The relationship between different resources involved in implementation stage and organizational performance and productivity was analyzed using Structural Equation Modelling (SEM) technique. Percentage analysis was done to study the different general characteristics of ERP and manufacturing companies. The Grand Summary of Results was framed based on reclassification and combination of significant results obtained through the five categories of statistical tests. It formulated a framework of linking the significant results with various concepts and practices.

Chapter five critically analyzes and examines the grand summary of the results. The results of various tests were examined and carefully collated with appropriate explanations and references to related studies under five sub-sections that pertain to the discussion of results. The study discusses the results related to effect on organizational performance and productivity. The study moves on to discuss the impact of
demographic variables on changes caused by ERP on organizational performance and productivity. Besides, it is also important to measure the success of ERP system in implementation stage since; organization performance can be highly affected by the successful implementation of the project. The study then tries to discuss the relationship of different components of ERP system in implementation phase and changes caused by ERP on organizational performance and productivity. The analyses, interpretation of results, the reasons for variations and their implications were included wherever appropriate.

Chapter six is divided into three parts - The summary, conclusion and recommendations. The summary presents a chapter wise outline to provide an overview of each chapter, bringing out the gist of each chapter. In the section on "conclusions" chapter an attempt has been made to highlight the major findings of the work vis-a-vis the research objectives. The section on "suggestions" contains suggestions derived from the limitations of the study.

Chapter seven contains the implications of the present research work for academia, manufacturing organizations and vendors. They also throw light on the future research directions for the researchers and practitioners in the area of ERP systems.

A section on references contains the alphabetical listing of the various sources of information, such as Books, Periodicals, Articles, Journals and websites from which information has been collected. A section on appendices contains the instrument employed for the collection of data, analysis of the instruments to confirm their validity, reliability and normality of the sample.
6.2 THE CONCLUSION

The results of the study led to understand the effect of ERP on organizational performance and productivity. The conclusions have been drawn in the light of the objectives which were framed for carrying out the present study. The study has successfully achieved its objectives as concluded below:

Objective 1: To determine parameters for measurement of organizational performance and productivity in the post implementation phase and study the effects of ERP on organizational performance and productivity.

Three facets of Balanced Score Card model namely Internal Process, Innovation, Learning and Growth and Customers, Suppliers and External Agencies were used as a base for identifying the organizational performance indicators. The study found a significant difference in over-all organizational performance and productivity after ERP installation. An in-depth analysis shows that except External Agencies, all the performance indicators comprising three facets of BSC model were significantly affected by ERP system.

Objective 2: To study the effect of demographic variables on changes caused by ERP on organizational performance and productivity.

Designation of the ERP user significantly affects the change in over-all organizational performance and productivity and all the facets of BSC model due to ERP systems. Gender of the user does not significantly affect the change caused by ERP system on over-all organizational performance and productivity and all the facets of BSC model.

Age does not significantly affect the change caused by ERP system on over-all organizational performance and productivity. However, it was found that change in one of the facet of BSC model - innovation, learning and growth of organization is dependent on the age of the ERP user while change in other two facets internal process and customers, suppliers and external agencies were not affected by the age of the user.
Educational qualification significantly affects the change in over-all organizational performance and productivity due to ERP systems. It was found that educational qualification of the ERP user significantly affects the change in internal process of organization, while, innovation, learning and growth and customers, suppliers and external agencies were not affected by the educational qualification of the user.

**Objective 3: To ascertain different components of ERP in the implementation phase and study the perception of ERP users.**

The degree of project success was assessed in terms of 5 components that are mainly required to produce a Computer-Based Information system i.e hardware and networking, software, people (Vendor, User, Top Management and Consultant), data and procedure. The study showed that mean value for all components except user resource was positive. This indicated that user resources were not properly handled during ERP implementation. However, the positive value for 7 components lies in the range of 0.559 to 0.785, which indicated that users were not greatly satisfied with the implementation phase.

**Objective 4: To develop and test a quantitative model for depicting the relationship between components related to ERP in implementation phase and changes caused by ERP on organizational performance and productivity.**

Through, Structural Equation Modelling, the model was developed after removal of some items whose factor load was less than 0.7. The PLS modelling approach involved two steps - validating the measurement model and then fitting the structural model. The former is accomplished primarily by reliability and validity tests of the measurement model, followed by a test of the explanatory power of the overall model by assessing its explained variance, and the testing of the individual hypotheses. An association was found between hardware resources and the three facets of BSC model (Internal Process; Innovation, Learning and Growth; Customers, Suppliers, External Agencies). An association was also found between user resources and internal process and between project management resources and internal process. However, the other resources did not have any significant impact on the change in performance indicators.
Objective 5: To study the general characteristics related to ERP in different manufacturing companies.

The study indicated that SAP was the only ERP which was installed in all manufacturing companies. All of them used same windows operating system and database. None of the company used a time more than 3 years for implementation. 5 Companies went for major customization and minor BPR and 3 companies went for major customization and major BPR and 2 companies went for minor customization, major BPR while 2 went for minor customization and minor BPR. HRM module was found to be prevalent in all the companies, followed by Production Management, Inventory Management and Financial Management.

Objective 6: To unlock new vistas of research to provide guidelines and develop a base for applications of the findings in terms of the implications, as these can provide a blue print for a higher level of success in similar projects in the future.

The present study has revealed that organizational performance and productivity were affected by ERP systems. The study was carried out with its own limitations in terms of time and other resources. Therefore, the results need to be testified by conducting the same research on larger sample and on different time period and geographical areas. Also, different type of organizations can be taken for the evaluation of ERP system. The study would be useful for researcher in terms of further elaboration by using financial aspect of the company. The study has provided implications for the organizations that are interested in purchasing ERP or wanted to maximize the performance in the company. It will further help the vendors to focus on the loop holes so as to maximize the organizational performance and productivity. They can improve the services so that ERP implementation phase is a success.

6.3 THE SUGGESTIONS

All researches have flaws due to the inherent limitations in any given method. In an attempt to compensate for such limitations, the study has been designed to include responses from employees of manufacturing companies who have worked in an
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organization without ERP system and are working after ERP installation. Nevertheless, tradeoffs still had to be made for the several limitations of this study including:

- The study has only considered manufacturing companies. As such, there were not many manufacturing organizations using ERP systems in the area and they have some special characteristics of manufacturing with a unique organizational culture. Therefore, findings cannot be generalized to a broader population including service organizations. A similar study examining the same subject in a diverse sample of other types of organizations could serve to further extend and enhance these findings in different types of industry.

- The sample of the study was restricted to manufacturing organizations having ERP systems installed in at least any two core areas. However, for a better picture of a specific module, this restriction can be removed and in-depth analysis for specific modules of ERP systems can be carried out.

- The geographic coverage of the study was limited to manufacturing organizations of Pithampur and Dewas, the results might not hold true in other organizations and environments belonging to other cities.

- While this report deals with major activities affecting the organizational performance, it could not adequately include financial tools in the questionnaire which could turn out to be a major weakness of the study.

- Although, the sample size is sufficient in these types of research, a large response would have increased the power of statistics and brought greater confidence to the results.

- The participant biases may not have comprised the data. The participant may not understand the question, not want to tell the whole truth or may not remember what
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happened. Further, time pressures may limit the participants' attention to each question, force a superficial answer.

- Also, longitudinal data gathered after a satisfactory time frame from the same companies, by surveying the same respondents, will reveal whether satisfaction level has changed and which factors, if any, contributed to this change.

- As this study was based on a self-administered exploratory survey, where only closed ended questions were used in the response sheet. This restricted the ability of researcher to ask open-ended questions, which may have assisted in offering a better understanding of effect of ERP on organizational performance and productivity.