



Study of Factors Affecting Success of ERP System Implementation in Iranian Organizations with Change Management Approach

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Abstract

In the developing world today, application of techniques which increase the speed of processing activities in businesses and simultaneously lead to an increase in profit and yield and reduce costs, has constantly been the center of attention of organizations. In this connection, the Enterprise Resource Planning is among instruments that are highly effective in this respect. But, implementation of the system involves a complex process that is often met with failure. Iranian organizations are not exempt from this rule and a limited number of them have been successful in implementing ERP. In this study, which is an applied research with descriptive survey method, first the explorations conducted in the field of factors affecting success of ERP system were examined. As a result, change management was identified as a vital factor in success of the implementation of ERP system. Then, change management strategies from the viewpoint of Kuzic and Thi van Hau including effective communication, top management support, effective training, project teams, presence of project champion, clear and systematic planning, broad participation of employees, incentives and feedback were used. Thus, effects of change management strategies in success of EPR system implementation were examined through using a questionnaire, which was distributed among experts of the Ministry of Cooperatives, Labor and Social Welfare, who were experienced in the field of implementation of an enterprise resource planning system. Statistical population of the research was 46 people and because of having access to all of them, the complete enumeration method was used in determining the sample. The validity of the questionnaire was determined through face validity by using viewpoints of experts and its reliability through Cronbach's alpha was 0.958, which is indicative of the strong reliability of the questionnaire. To examine the hypothesis of the research, binomial test was used, the result of which was indicative of the effective role of all change management strategies in successful ERP implementation except for the presence of project champion.

Keywords: Enterprise resource planning, change management, change management strategies, Binomial test

Introduction

Enterprise resource planning can be defined as a phrase comprising the three terms of Enterprise (a large enterprise/organization), resources (all resources available to the organization) and planning (looking to the future with a long-term view rather than looking at the current situation). The EPR systems are computerized systems that have been designed for processing corporate transactions and facilitating planning, production and customer response in an integrated and immediate form¹. Rapid development of information technology has provided many opportunities for business administration and led to the increase of efficiency of business operations of the companies. Among technologies employed for the development of business, ERP systems are well known among most industries and in the market as an infrastructural system for the development of main businesses or organizations². Organizations in which EPR system has been implemented are looking forward to massive effects and significant advantages of

these systems and also expect that most of their problems be solved with the implementation of the system. In practice, due to the prevailing complexities, it is difficult to meet all these expectations. Implementation of this system, however, often brings about positive effects such as increase in the quality of information and improvement of mechanization. But, what is interesting is that with enlargement of organizations and institutions, the need is felt for integrated information systems, that could control all sections and responsibilities existing in the organization by using a computer system, introduction of such systems at organizations and especially industrial organizations seem necessary. Process-orientation is the main philosophy of ERP system and its development in the organization involves major sections. For this reason, implementation of ERP system should be considered as a project with organizational dimensions. This approach requires changes in cultural, human, technical, structural and procedural dimensions across the organization. Change is tantamount to going out from one state and reaching and stationing in another. In organizational

concept, change is transformation of an organization from the status quo in at least one of the areas of organizational structure, technology, human resources, duties and production and services performances and reaching the desirable position. Usually, change is divided into four categories of change in the structure, technology, location and staff. In order to bring about change in the structure, changes should be made in organizational relationships or the ways of developing coordination, jobs and responsibilities should be re-designed or changes from structural point of view should be introduced. In technological change, the method things are being done and the way devices and equipment are used should be changed. The change in location is the change in the way systems and devices are stationed and finally the change in staff means changes that should be made in attitudes, skills and expectations. Today, due to the increasing use of information systems by organizations, information technology has been turned into one of the most important aspects of change. Users are obliged to use new processes, when new information systems are developed. Therefore, resistance against this change is normal³. In addition to being sensitive towards potential changes, the management in each organization should be able to show a proper reaction to it. Despite such an obligation, many ERP project managers would pay attention only to technical and financial aspects of the project and would ignore other aspects, which would prepare the ground for the failure of ERP implementation⁴. The management should be aware of the steps of the change process in order to increase the feasibility of its successful implementation and could be able to adopt a strategy for dealing with the change⁵. Therefore, the main aim of this study is to examine the successful experiences of ERP implementation and present an appropriate framework of change management for the successful implementation of ERP system.

Literature Review, Enterprise resource planning (ERP) system: The Inventory Generation and Control Society considers ERP system a method for effective planning and control of all the required resources to receive, generate, transmit and respond to the customer needs in all producing, services and distribution companies and regards it as a standard software package which is designed for the integration of the value cycle of an organization based on data basis from different modules with regard to specific work responsibilities. In other words, the ERP system is a computer-based system of information resources liable for change and setting that could cause integration of all processes, sections, information and resources with the help of a database and with the aim of effectively managing resources, provides immediate access to information in different fields and sections; the ultimate target of which is feeding data into the system only once⁶. The ERP system attempts to integrate all the departments and functions of a company in a single system, which could meet all the demands of those departments. This integrated system allows that the information be used on time and wherever necessary and uses a central base (where the data can be easily shared) for all the departments. With this integrated system, all the existing

barriers in the company for establishing a faster connection would be removed (barriers are removed) and through this workflow would be faster across the organization⁷. Implementation of ERP systems has led to outstanding progress in the business structure of organizations in the fields of efficiency, productivity, profitability, enhancement of service quality, escalation of customer satisfaction, reduction of costs and decision making⁸. The main advantage of implementation of ERP system in organizations is merging of all operational sections and integration of information flow within the framework of a single system⁹. ERP systems have enabled organizations to connect all business processes from the primary process of planning up to the final process such as after sale services to customers and made preparing integrated reports possible. Effective use of ERP systems in combining and integrating various information including accounting, production, distribution and human resources management has developed an integrated system of information which guarantees that the reserved information could be accessible at any time and in any stage of the business process that the staff and directors need them¹⁰. In addition, ERP can facilitate the automation of processes and increase business efficiency, improve quality and reduce administrative costs¹¹. Efficient and successful implementation of ERP involves considerable time and cost. Therefore, if an advisor claims that he/she could implement the ERP system within 3 to 6 months it should not be accepted decisively, because implementation of the system in such a short period of time is possible only when the organization is so small in which case implementation of the system is not logical or the system is going to be implemented in a small section of an organization in which case the ERP is nothing but an expensive software which not be beneficial to the organization. If ERP is implemented properly and with economic and organizational considerations, its profitability is certain¹².

Review of research conducted on main, key criteria for ERP system success : Lots of researches have been conducted both inside and outside the country about successful implementation of ERP system, each of which has studied the case from an angle and considered some criteria as the main and key factors for ERP system success. For example, in a research by Bernroider and Koch¹³, the key factors behind success of ERP system in large and medium-scale organizations have been mentioned as dependence on the operating system, improvement of the processes, internationalization of the software, developing flexibility in the organization and so on. In another research by Jiang¹⁴, which was carried out in Finland factors such as support of the top management, effective management of the project, training and so on were cited as the key factors for success of ERP system. Ful Hoon and Delgado¹⁵ enlisted seven factors as the key criteria for success of ERP system in an organization system including vision and business planning, change management, communication management, makeup, skills and wages of the implementing team, support of top management, project management, system analysis and technical

implementation. Meanwhile, other researchers have pointed to one or a number of factors as key factors for success of ERP system in Iranian organizations. Among them are Mahmoudi and Yazdannejad¹⁶ who in a research on localization of the process of selecting ERP system at the Commerce Ministry pointed to the human factor as an effective one in ERP system success. Also Ruholamini and Abdollahi examined security as one of the key issues in the implementation of ERP system¹⁷. In another research study by Khodaei Mahmoudi¹⁸, it was proposed that in order to overcome resistance of employees against change, the top management should consider measures such as study of the needs of the users and reasons behind their potential resistance against change, assessment of the status of the change management activities, confronting the situations through strategies and proper techniques for the ERP success. In another study by Yazdanpanah and Ne'mati in 2007 on factors effective on success of ERP implementation, training and support qualities were the most important factors while the cost of services was in the lowest rank¹⁹. In the prioritization, training quality including activities such as practical training of the work, training of the impact of the system on working

process and providing handouts and manuals; support quality including services during implementation of the system, after implementation services, regular upgrades of ERP copies and warranty; timetabled schedule quality including date of delivery and important implementation phases and traceability of the progress of the project; and service costs including implementation costs, support/logistic costs, consulting costs and training costs, were examined¹⁹. In another research conducted by Saremi et al⁴, factors such as working teams, renewed engineering, change management, support of managers and combination of these indexes in auto manufacturing industry were examined. As a result, it was mentioned that combination of these indexes in auto manufacturing companies would result in reducing costs and increasing competition potential and consistency of the systems though ERP implementation and clear understanding of ERP system would result in increased motivation of auto manufacturing companies to implement ERP system²⁰. Generally, the results of local and foreign examinations of factors behind success of ERP system implementation have been briefly shown in table-1.

Table-1
Key factors behind success in ERP system implementation

Researcher	Factors behind success of ERP implementation
Bernroider and Koch (2001) ¹³	Dependence on the operating system, improvement of the processes, location of the seller market, demands of the customer and provider, international software, flexibility developed in the organization, prospect customer satisfaction, guidelines from the controlling organization, flexibility and conformity of the software, capacity of added creativity, short time for implementing, good support
Jiang (2005) ¹⁴	Support of top management, effective project management, renewed engineering of business processes, conformity of training software and hardware, motivation of users
Ful Hoon and Delgado (2006) ¹⁵	Vision and business planning, change management, communication management, makeup, skills and wages of the implementing team, support of top management, project management, selection and analysis of the system, and technical implementation
Faqri et al (2006) ¹²	Communication and consultation, systematic planning
Yazdanpanah and Ne'mati (2007) quoted by (Mahmoudi and Ahmadi, 2008) ¹⁷	Training of the staff, incentives
Saremi et el (2007) ⁴	Working teams, renewed engineering, change management, support of the managers and combination of these indexes
Ruholamini and Abdollahi (2008) quoted by (Mahmoudi and Ahmadi, 2008) ¹⁷	Security
Mahmoudi and Yazdannejad (2009) ¹⁶	Human factor
Arnoldina (2010) ²¹	Support of top management, proper project management, definition of interests of organization and those interested, regular and effective training to the staff, improvement of processes, management of organizational changes, sound definition of project targets
Nah et al (2003) ²² , Hawking et al (2004) ²³ , Ngai et al (2008) ⁸ , Motwani et al (2005) ¹⁰ , Mandal and Gunasekaran (2003) ²⁴ , Foster et al (2007) ²⁵ , Khodaei Mahmoudi (2007) ¹⁸ , Aladwani (2001) ²⁶	Change management

While the ERP system enjoys clear advantages for business, but its implementation in many projects has faced numerous problems and in many cases failed or been stopped due to negligence towards scheduled costs/time²⁵. The findings of the review indicate that change management is an important factor in the success of ERP system implementation in an organization, which will be discussed in the next part.

Change Management and Enterprise Resource Planning (ERP) system: In order to meet their future needs, organization should develop a sound understanding of developments in the world and put into operation the most efficient strategies by taking into consideration the results of evaluation of the status quo and the desired situation. The administration in any organization should be able to react properly towards changes and be acquainted with the steps of change process for its successful implementation in order to be able to adopt the appropriate strategy for its realization⁵. Change management is a principal process which includes planning, organizing, implementing changes from disturbing the status quo till reaching the state of full preparedness for the activities in the future and at the start of the process of change, while the organization is working, it is neither in the past situation nor in the future. Therefore, it needs to consider preliminaries for passing through the status quo to the changed situation and all the stakeholders should be informed of the situation. Attitude towards change in the management world is a systematic outlook based on the process, the main infrastructure of which in organizations is human beings. According to a research conducted by Foster et al, the highest level of resistance to change could be seen in the lower level staff while operational, middle and senior managers show less resistance. The root cause of resistance to change among the low-level employees could be considered in fear of the unknowns and lack of awareness, job security, being accustomed to the existing ways of working, and fear of complexity of work and so on²⁷.

Successful implementation of ERP systems requires cooperation and participation of all sectors related to business in order to provide an opportunity for all processes and sectors of the business to take advantage of the benefits of this system²⁵. If resistance against change impels managers to establish closer relations with the staff, reassess the decisions related to the change and search for finding new ways, it will then be constructive²⁸. A study conducted on 100 top Chief Information Officers of Fortune Magazine showed that change management is one of the five important and vital factors for the successful implementation of ERP system projects²². Hawking et al in their studies on barriers to the successful implementation of ERP system found out two out of three barriers for ERP system implementation related to change management²⁹. In a research study conducted in 2001 by Aladwani²⁶ on the implementation of ERP systems, change management was found as an important factor in determining successful implementation of ERP²⁶. Recently Ngai et al in their study on 48 articles found 18 key

factors in successful ERP implementation, among which strategies of change management and having specific programs could be cited⁸. Although studies have been carried out to identify key factors in the successful implementation of ERP, so far limited research works have been conducted in the field of concentrating on the best solutions, including change management. If strategies of change management are put into action and issues involved in changes and the possibility of facing failure of ERP systems are predicted soundly, problems in connection with ERP system implementation or confrontation with failure would reduce²⁵. In a research conducted by Foster et al in 2007²⁵, the findings showed that 90% of companies which were implementing change management in the implementation of ERP system believed that it had great effect on the successful implementation of the project. In Kuzic and Thi van Hau study³⁰ nine factors were mentioned as the main strategies for change management in successfully implementing ERP. They include support of the top managers, carrying out group works (projects teams), presence of a champion to support project manager who would provide for achievement through imposing strong influence on the change process in the organization (champion of the project), clear and systematic planning, massive participation of the staff to reduce resistance towards change, effective communication to change negative attitude towards change and confronting resistance of the staff versus change, feedback as a catalyst for identifying and understanding sources of staff resistance, creating an opportunity for coordination and arrangement with changes through effective training and, creating strong feelings towards accepting new systems through incentives, which have been used in this study.

Conceptual Framework of Research: To explain how strategic components of change management effectively influence successful ERP system implementation, a conceptual framework is presented in this part of the study, which is driven from the nine effective factors of change management strategies from the viewpoint of Kuzic and Thi van Hau³⁰ and ERP system. Figure 3 shows the conceptual framework of this study.

The Conceptual framework of the research which has been shown in the above figure is based on hypotheses that are described below: Change management strategic components including effective communication, top management support, effective training, project teams, presence of project champion, clear and systematic planning, massive participation of employees, incentives and feedback are vital in success of change management process. Change management strategic components including effective communication, top management support, effective training, project teams, presence of project champion, clear and systematic planning, massive participation of employees, incentives and feedback are vital in success of implementation of ERP system. Change management is a critical factor in the successful implementation of ERP system.

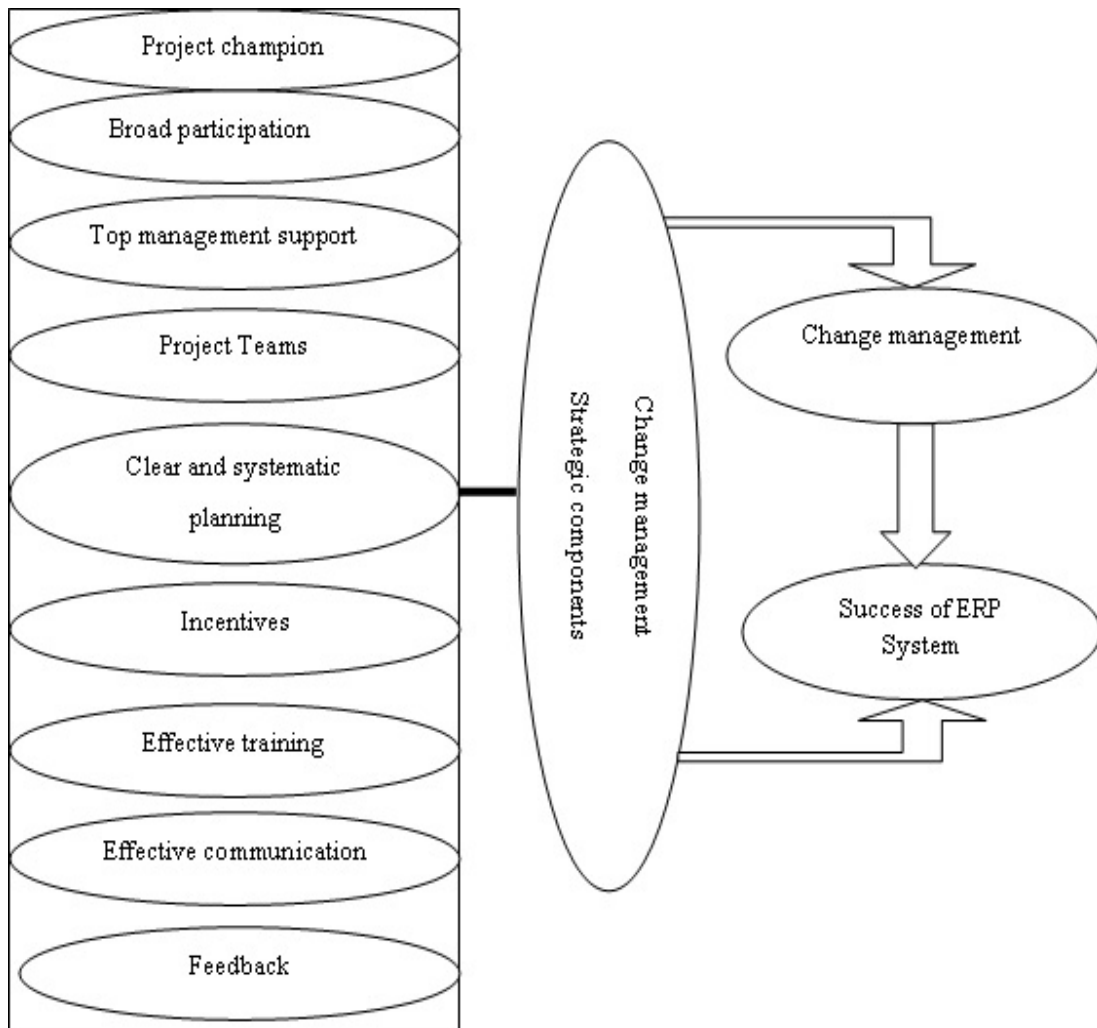


Figure-1
Conceptual framework of the research

Methodology

Research method: The present study is an applied research in terms of its nature and target because an applied research is not to satisfy deep curiosity of the researcher but rather is to solve an individual, group or social problem. From the viewpoint of data collection method, it is descriptive survey; because the goal of researcher in this study is the objective, real and disciplined description of characteristics of a situation or a subject matter. In other words, in this study the researcher tries to report what exists without any interference or subjective deduction and draws exact conclusions from the situation.

Statistical population and sample: The statistical population of this study is all experts at different levels of the Labor and Social Welfare Ministry who are experienced in ERP system field, including 46 people, and having access to all the population, the complete enumeration method was used in

determining the sample.

Data Gathering tools : Data gathering tool in this study is a questionnaire that was prepared after examining relevant texts and related indexes were extracted.

Validity and reliability of research: To assess validity of the questionnaires in this study, first a preliminary questionnaire was compiled after examining relevant texts and library references. It was then put at the disposal of a number of professors and experts and after collecting their viewpoints and comments, corrections were made in the questionnaire. In fact, face validity was used to assess the validity. Face validity is a type of validity which is usually employed for the study of the components of a measuring instrument. If the questions of the questionnaire are indicative of characteristics that the research intends to measure, the test is valid. Therefore, face validity is the structural characteristics of the measuring tool which is

included in it simultaneously with designing of the test. Face validity of a test is usually determined by those who are skilled in the subject of study .Therefore, face validity depends on the judgment of the jury.

Reliability: In this study, Cronbach's alpha was applied by using SPSS software to measure reliability. To this end, the preliminary sample including 30 questionnaires was collected and then by using the data collected out of these questionnaires and from SPSS software, the rate of confidence coefficient was calculated through Cronbach's alpha. The findings of this analysis have been shown in table-2.

Table-2
Cronbach's alpha of the research questionnaire

Variable	Cronbach's alpha
Top managers support	.986
Project teams	.983
Project champion	.917
Clear, systematic planning	.781
Broad participation	.938
Effective communication	.712
Feedback	.941
Effective training	.939
Incentives	.852
Change management	.901
ERP System	.890
Total	.958

Data analysis tools: In this study, SPSS software is used to analyze the collected data.

Results and Discussion

Kolmogorov–Smirnov test: In order to evaluate the normality of the variables in this study, this test will be used. Results are presented in table-3. H0: the related variable is normal. H1: the related variable is not normal.

Wherever the figure corresponding to the significance of the test is bigger than the significance level (0,05) the null hypothesis is accepted. According to the results of the test, all variables of the research are abnormally distributed and in continuation we will use tests with abnormal assumption for confirmation or rejection of the hypothesis.

Binomial test: To review and confirm or reject the hypotheses of the present study, binomial test is used; which is a nonparametric test in which success and failure is discussed on the basis of an attribute value. By success and failure, it means the presence or absence of a variable in the population under study. The results could be seen in table-4.

What the study of hypotheses specifies is that all the hypotheses except for the presence of a champion to support project management in success of ERP system implementation and change management process are accepted. Therefore the final model of the research is shown in figure-2.

Conclusion

Intense global competition, rapid changes³¹ and movement of organizations towards development of a process in conformity with international standards and for accelerating rendering of services through effective strategies requires a clear and organized plan. In the meantime, enterprise resource planning is an efficient tool for realization of this purpose which enjoys many advantages.

Table-3
Results of normality of variables

Variables	Result (Kolmogorov...)	(Sig) coefficient	Normality
Top managers support	2.618	0	Rejection of normality
Project teams	1.699	0	Rejection of normality
Project champion	1.724	0.006	Rejection of normality
Clear, systematic planning	1.741	0.002	Rejection of normality
Broad participation	2.062	0.005	Rejection of normality
Effective communication	2.239	0.004	Rejection of normality
Feedback	1.785	0.005	Rejection of normality
Effective training	1.779	0	Rejection of normality
Incentives	1.617	0	Rejection of normality
Change management	1.541	0	Rejection of normality
ERP System	1.310	0	Rejection of normality

Table-4

Results of the binomial test

No.	Hypothesis	Test (binominal)	Sig	Result
1	Top Managers' support is vital in success of change management process	Group 2>3 , .87	0	Hypothesis accepted
2	Top managers' support is vital in success of ERP system implementation	Group 2>3 , .89	0	Hypothesis Accepted
3	Project teams is vital in success of change management process	Group 2>3 , .54	0.659	Hypothesis Accepted
4	Project teams is vital in success of ERP system implementation	Group 2>3 , .67	0.026	Hypothesis Accepted
5	Presence of a champion to support project management is vital in success of change management process	Group 3 ≥1 , .65	0.054	Hypothesis rejected
6	Presence of a champion to support project management is vital in success of ERP system implementation	Group 3 ≥1 , .65	0.054	Hypothesis rejected
7	Clear, systematic planning is vital in success of change management process	Group 2>3 , .87	0	Hypothesis accepted
8	Clear, systematic planning is vital in success of ERP system implementation	Group 2>3 , .93	0	Hypothesis accepted
9	Broad participation of staff in Enterprise resource management implementation is vital in success of change management process	Group 2>3 , .91	0	Hypothesis accepted
10	Broad participation of staff in Enterprise resource management implementation is vital in success of ERP system implementation	Group 2>3 , .85	0	Hypothesis accepted
11	Communication and consultation with staff are vital in success of change management process	Group 2>3 , .89	0	Hypothesis accepted
12	Communication and consultation with staff are vital in ERP system implementation	Group 2>3 , .85	0	Hypothesis accepted
13	Feedback management for identification and understanding of source of staff resistance is vital in success of change management process	Group 2>3 , .85	0	Hypothesis accepted
14	Feedback management for identification an understanding of source of staff resistance is vital in success of ERP system implementation	Group 2>3 , .76	0.001	Hypothesis accepted
15	Staff training is vital for success of change management process	Group 2>3 , .87	0	Hypothesis accepted
16	Staff training is vital for success of ERP system implementation	Group 2>3 , .83	0	Hypothesis accepted
17	Creation of encouraging factors is vital in success of change management process	Group 2>3 , .78	0	Hypothesis accepted
18	Creation of encouraging factors is vital in success of ERP system implementation	Group 2>3 , .78	0	Hypothesis accepted
19	Change management is vital in success of ERP system implementation	Group 2>3 , .70	0.011	Hypothesis accepted

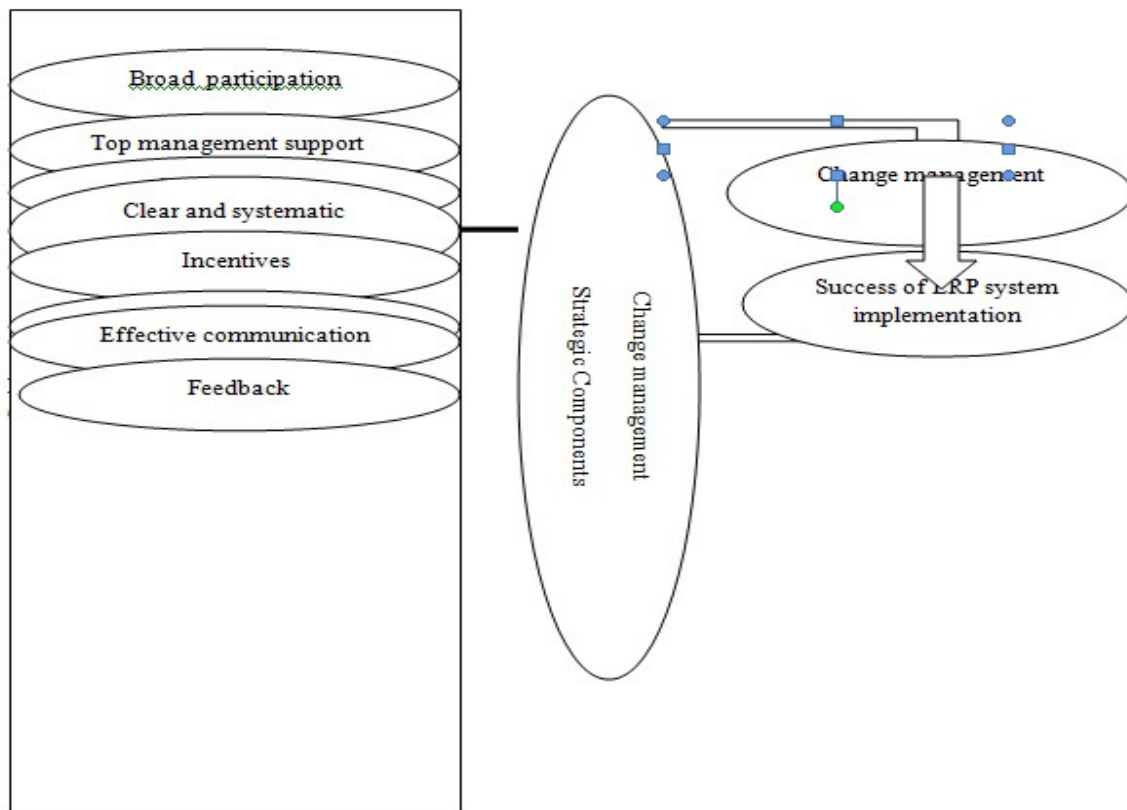


Figure-2
The final model of research

Zhang and Sedan referred to the advantages of ERP system implementation in five operational groups as well as information technology (IT), strategy, organizational and managerial infrastructure and that by supporting merge of the organization, development of creativity, admiration of learning, providing the required grounds for managers to plan, better management, reduction of costs and production time as well as productivity, ERP system results in promotion of an organization³². The findings of the present study shows that change management strategies which include broad participation of the staff for reducing staff resistance and carrying out group work in the organization, development of clear and systematic planning, development of grounds for consultation and communication with the staff for the removal of negative attitudes towards change, support of top managers, feedback management and creation of an opportunity for coordination with changes through training and creation of strong feelings for the acceptance of the change through incentives have effective role in success of change process and continuation of the results showed that change management for the application of enterprise resource management system in large organizations plays an important and key role. Also, the study indicates that presence of a champion in the process of passing through the status quo to the change situation is not effective in success of ERP. The reason could be considered in

the point that in the present world individuals with team approach are more effective than those with individualist ones and team thinking is more powerful in accepting changes by individuals and today, projects that are being implemented in organizations, have many complexities. So, it is practically impossible and unacceptable to attribute its success to an individual as a champion and runs counter to the team approach. Therefore, by practicing team approach and having champion teams, organizations would be capable of creating synergy and thus strengthen application of enterprise resource management.

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