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Surveying and Investigation the Effect of Knowledge Management on ERP Success

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Abstract

Nowadays, the business needs for an integrated, advanced information system is not questioned by organization-steering leaders, and an ongoing attempt is being made to catch up with innovation. What is questioned is the way to obtain this advanced technology, to insist on a platform and software-family selected previously, or to do a change. This paper discusses the initial findings of a two-phased study that focuses on empirically assessing the impact of knowledge management on the success of Enterprise Resource Planning systems. The research study uses information gathered from Iran National Petrochemical Company. Validation of the a priori model constructs through factor analysis identified two dimensions of knowledge management. Further analysis assessed the comparative differences perceptions of knowledge management in ERP, across four employment cohorts.

Original Article

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INTRODUCTION

Literature Review

KM part literature: While organizations try to start KM, one of the major concerns that emerge is how to accomplish it. Many companies that are attempting to initiate KM are unsure of the best approach to adopt. There seems to be general agreement in the literature that a combined social and technological approach is ideal. So the way forward will be paved if organizations are aware of the key factors that will make its adoption successful [1].

There is an extensive scope of factors that are able to affect success of KM implementation. Some researchers identify CSFs as critical areas of management planning and practices that must be addressed to achieve effectiveness. According to the researches and the surveys were done before, some of factors are more important and they will be precisely explore in continue [2].

Leadership role: In order to implement new management tools including KM effectively, organizations require new generation of leaders who change commanding to commanding-obedience as well as cause to flow throughout the organizations [3]. There are many tasks those leaders to do. They create an enthusiastic area in voluntary supply and sharing of knowledge, learning, new knowledge and ideas exploration into action starting them. Also they establish conditions in self-directed learning on individual level and organizational learning throughout the organization [4]. Leaders should include organizational knowledge as a key issue in organizational strategy, also employ and assess people to help knowledge development and allocate rewards to the duties. And finally define specified indicators to assess employees based on KM practices.

Organizational culture: Almost KM execution always involves a cultural change –not a complete evolution- and this makes culture an important subject [5]. Culture is perhaps the most influential factor in promoting or inhabiting the practice of KM. because of importance and position of culture, organization culture analysis is one of serious steps on KM activities. Once we should discuss about a knowledge-friendly culture that people have positive tendency to the knowledge, not to prevent

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knowledge sharing, learning is being done inside and outside of work areas. Experience, expertise and innovation substitute for organizational hierarchy and company recruits knowledge-based individuals [6]. Trust in knowledge sharing is a fundamental aspect. Under the shadow of the trust, change acceptance and tendency to adaptation with new terms and collaboration will be come into existence. Collaborative culture is another important terms in order to happen knowledge transfer between individuals and groups Because knowledge transferring requires individuals to come together to interact, change ideas and share knowledge to each other [7].Besides of trust, there are many variables such as openness, senior management support, communities, coordination among groups, and organization reward structure to study more relationship between organizational culture and knowledge sharing [8].

Organization strategy: Strategy can be considered as a factor balances between external environment (opportunities and threats) and company's internal capabilities (strength and weakness) has divided knowledge in three categories including core knowledge, advanced knowledge, and innovative knowledge [9]. He has also recommended organizations to describe their strategic knowledge map according to the knowledge category and also in comparison with competitors, to define the gap between what it must be done for competitiveness and what is really being done (strategic gap), and to adopt a knowledge strategy such as exploration, exploitation, aggressive, and conservative or a combination of them [10]. It is essential to define knowledge strategy to ensure knowledge management efforts is directed and supported by company's competitive strategy [11].

Processes and activities: Processes and activities designate a set of practices that must be done during KM implementation. These processes also involve knowledge life cycle. Many researchers have presented some related models pointing at creating, storing/retrieving, transferring, and exploiting to describe it [8]. According to Nonaka and Takeuchi [12] a KM process can be implemented by a technology-centered strategy for explicit knowledge and by a people-centered strategy for implicit knowledge. Some of actions can be used to do KM processes and activities are as follows: transferring of best practices including documentation and lesson learned, identification of knowledge gaps systemically and using well-defined processes to bring them together. Resources allocation to acquire external knowledge and transfer into the organization, participation of employees in project groups with other organization's employees, knowledge obtained from competitors, customers, suppliers and research centers.

Training and education: Knowledge management training and awareness workshops are essential. Training on the importance of knowledge sharing, training on the importance of KM for knowledge organizations are additional examples that company must be done. Since KM involves the use of information system infrastructure to capture important information, training on how to use the repository is extremely critical. Employees need to be trained in terms of writing, editing and formatting skills in order of them to input items to a knowledge repository, as information has to be presented in a standardized fashion [13]. Training and education include many practices. Some of them are as follows: setting formal training courses on collaboration and participation methods, learning by peers, teambuilding skills development, creative thinking, problem solving, documentation, persuading experienced employees to transfer their knowledge to newcomers, training out of organization [14]. Training and education is a factor deals with human dimension of KM, so it can fulfill a crucial role on JM implementation.

Information technology (IT): KM is interlinked with IT, as one seems to lead the creation of the other. It's widely accepted that databases, intranets, knowledge platforms and networks are the fundamental supporting blocks of KM. They make the recording of knowledge much easier to search for and to use. IT has been shown to increase the speed of knowledge flow and potentially lower the cost of information usage. There is a broad collection of information technologies that supports KM which can be applied and integrated into an organization's technological platform. They can be grouped into one or more of the following categories: business intelligence, knowledge base, collaboration, content and document management, portals, customer relationship management, data mining, work flow, search and e-learning [15]. Given the dependence of KM on information technology, KM is still perceived as information management by many organizations. As a result, it is often associated with technological solutions such as intranets and databases, organizations should recognize that IT is only a tool and no an ultimate solution [16].

Rewarding and motivation: All KM programs involve change and in order to provoke change individuals must be motivated sufficiently to be willing to suffer the stress of the change process to find benefit and subsequent commitment. Things that motivate individuals include:

- Matching not only to the individual's traits and preferences, but also to their competence profiles and performance histories.
- Fear and greed (these are two of the most fundamental drivers and though you may not wish to use them, they are important to remember).
- Attractive choice of action (compared with others).
- Improved power (associated with a perceived improvement in personal or positional power or promotional opportunity).
- Recognition (good opinion with respected individuals, managers, subordinates, and dependent on traits, perhaps also special awards/rewards. Recognition is the most powerful motivation after the event [17].

These items can be categorized in four titles namely social rewards, financial rewards, further security,

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and further opportunity/risk as motivator tools. Of course in a comprehensive view, in order to motivate individuals we can use new strategies such as quality of work life (QWL) that cause improvement organizational behavior of members [18].

Base on another view, the reward and incentive system of knowledge management should consist of push and pull rewards, e.g. rewarding people as part of their performance appraisals according to participation in the program (push) and incentivizing people to use the knowledge base to provide a platform for their innovative ideas i.e., providing them and their ideas with visibility in the organization (pull) [16].

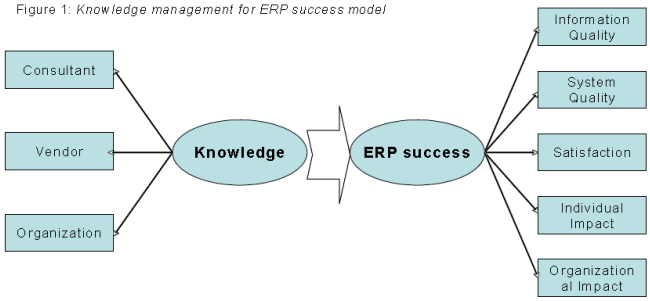
ERP: Nowadays, the business needs for an integrated, advanced information system is not questioned by organization-steering leaders, and an ongoing attempt is being made to catch up with innovation. What is questioned is the way to obtain this advanced technology, to insist on a platform and software-family selected previously, or to do a change [18]. Do change as fast as vendors offer, or stay for a while, especially in time of a financial crisis? Managers are repeatedly faced with these decision problems' cycle: install – use – unsatisfactory – select another – install a new one. One can believe in a learning process, but do not forget: an ERP is not simply a company-wide transaction-processing software - it needs much consulting and re-engineering experiences, in the same industry, in same position, even the same professionals to be involved in projects – which business can serve with this?

This paper argues that the way an organization introduces a (renewed) ERP system, including the implementation process, determines the extent of possible competitive business advantages. If the ERP project itself is burdened by misunderstandings, improper managerial behavior, false decisions in selecting and/or developing the software, failure in embedding the new processes into the organization body, then the organizational fit will not be successful in the long run (see e.g. the Standish Group's CHAOS Reports,[19]; the South-Korean survey by Hong, [20], or even thoughts about the real value of information after process-reengineering, by Mendoca . However, some of the benefits are visible at once even to the naked eye, but hidden problems, ERPROI and other methods could come far later and need precise control of the entire process – which is often more easily said than done [21].

Conceptual model and research hypotheses

The conceptual framework of research is based on the model as follows (figure 1). It facilitates the assessment process. The model includes two parts: KM part and ERP part. Also KM part is structured based on three CSFs in KM field, namely, Consultant, Vendor, Organization. Likewise ERP success part is structured is based upon the five perspectives of ERP namely, Information Quality, System Quality, Satisfaction, Individual Impact, Organizational Impact.

Figure 1. Knowledge management for ERP success model



This section deals with data analysis in detail such as tool and method of data collection, statistical population, validity and reliability of measuring tool (questionnaire), fit goodness of data distribution and exploration of causative relationships by exploratory and confirmatory factor analyses and path analysis, with exploring total effect of KM on the whole of ERP success and also total effect of KM practices on each of ERP dimensions.

- According to the literature review and measurement tools such as KMAT (Knowledge management assessment tool belongs to APQC and Arthur Anderson's) and OECD (Organization for economic co-operation and development) assessment tools, 26 indicators in each of KM and ERP fields are extracted and the questionnaire includes these indicators. The constructs in KM are based on CSFs and the ERP.
- Statistical population: KM was implemented in three subsidiaries of Iran NPC (National Petrochemical Company). In order to achieve analytical aims by structural equation modeling approach, it was required 208 cases to respond to questionnaire. So 230 questionnaires were distributed verbally or electronically. 207 cases were returned that 9 of them had incomplete response, so were eliminated, therefore we had 198 complete data from respondents with %86 rate of response.
- Construct validity and reliability of measurement tool (questionnaire). Divergent (discriminant) validity and convergent validity were tested by exploratory factor analysis (EFA), and confirmatory factor analysis (CFA) and Cronbach's Alfa Coefficient was used to assess questionnaire reliability both two parts of KM and ERP success.

EFA: Table 1 shows the result of EFA in detail. According to the table, Two indicators i.e., Kaiser-Mayer-Olkin index (KMO) (sampling sufficiency indicator) and Bartlett's test (significance indicator) achieved sufficient value (≥0.6 better for KMO and sig<0.05 for Bartlett's test) [22] for next analytical process. The outcomes of first-order EFA on 26 variables of KM was led to 3 principal components (factors) extraction and the second one was led to 1 factor, called KM. Similarly, in ERP part, 5 principal components were extracted in first order EFA and 1 in the second one, called ERP.

Using Cronbach'salfa coefficient, the reliability of questionnaire in each part of KM and ERP was determined. The results showed the measurement tool in mentioned

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parts were reliable. Table2 shows the result of reliability test.

Goodness of fit for principal components using Kolmogorov-Smirnov (K-S) test. K-S test was used to ensure whether data distribution were normal. Data distribution was important because in the next steps we need know which one of estimators was suitable for covariance matrix estimation. For example we should use an estimator which is not sensitive to data normality e.g., Generalized Least Square (GLS) estimator. Table 5-3 shows the results of K-S test.

Path analysis: In order to test research hypotheses, it is important to use path analysis. We used two types of output; Standard estimation for model confirmation and significance coefficient to test hypotheses. Also we use two methods of path analysis; the effect of KM practices on each of ERP dimensions separately and the effect of KM practices on the whole of ERP. To confirm the hypothesis of structural equation modeling in a significant path coefficient value must be greater than 1.96.

Table 1. EFA results in brief

Part	Analysis method	Kmo index	Bartlett's test		No. Of extracted factors	No. Of components after varimax rotation	Remaining variables in analysis process
KM	First-order exploratory	0.753	2326	0.000	8	7	23
	Second-order exploratory	0.892	780	0.000	1	Have no rotation	7
ERP	First-order exploratory	0.896	3611	0.000	5	3	17
	Second-order exploratory	0.717	205	0.000	1	Have no rotation	3

Table 5-2. The result of reliability test (Cronbach'salfa coefficient)

Part	Number of variables	Cronbach'salfa coefficient
Km	23	0.815
Erp	17	0.862

Table 5-3. K-S results relate to data distribution

Variable name	Mean	Standard deviation	Low limit	High limit	K-s statistics	Significance	Variable status
Information quality	3.38	.83	-0.14	.117	1.98	.001	Medium
System quality	3.39	.76	-0.17	.148	2.39	.000	Medium
Satisfaction	3.32	.81	-0.11	.068	1.53	.018	Medium
Individual impact	3.34	.78	-0.12	.083	1.71	.006	Medium
Organizational impact	3.48	.72	-0.10	.110	1.55	.017	Medium
Consultant	3.53	.77	-0.11	.128	1.81	.003	Medium
Vendor	3.61	.79	-0.13	.116	1.88	.002	Medium
Organization	3.34	.71	-0.11	.112	1.58	.013	Medium

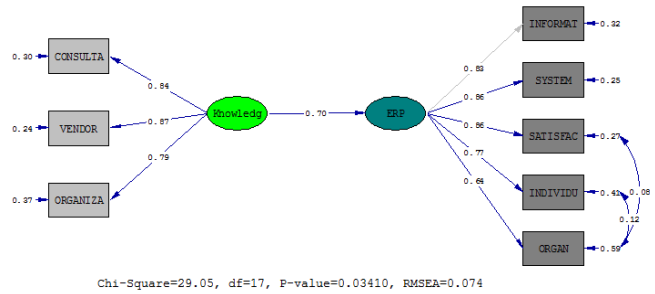

Diagram 5-3. The effect of KM practices on ERP dimensions (standard estimation).

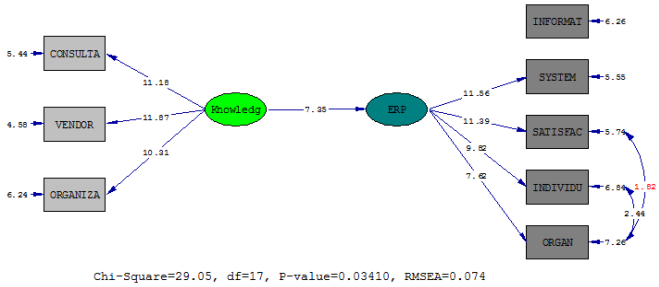

Diagram 5-4. The effect of KM practices ERP dimensions (significance coefficient).

CONCLUSION

This paper presented the preliminary findings of a study aimed at identifying and assessing the impact of knowledge towards the success of an ERP system. Information received from 207 respondents from NPC was used in the analysis. Responses were analyzed to statistically validate the constructs and sub-constructs employed in the survey instrument. The exploratory factor analysis identified four dimensions of ERP related knowledge: (1) Internal software specific knowledge, (2) External software specific knowledge (3) Internal organization knowledge and (4) External organization knowledge. The analysis using LISREL showed a strong positive association between knowledge and the ERP system success. The respondents were classified into four independent employment cohorts for further analysis (employment cohorts: Process Owners, Strategic users, Operational users and Technical staff), but these different cohorts did not show any significant differences in perceptions across the two knowledge dimensions.

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Further analysis is required to understand the complete influence of Knowledge and other possible dimensions of knowledge.

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