

Knowledge management: Awareness and adoption in the Oil and Gas Automation industry in Pakistan

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Abstract-Competition in the business world has forced the organizations to build competitive advantage. In this context, resource based view of the firm has gained popularity where human capital and knowledge management (KM) is deemed important for building a competitive advantage. Oil & Gas automation industry is characterized by intense competition, whereby different international players compete with each other on the basis of their expertise and capabilities. This study investigates awareness and adoption of KM within Oil & Gas automation sector corporations having some presence in Pakistan. Both end users and service providers within the sectors are sought their opinion regarding adoption and awareness of the KM in the industry. Moreover, perceptual differences of the service providers and end users are also sought in the study pertaining to the awareness, importance and implementation of KM. The study further highlights the barriers to KM implementation and also establishes relationship between KM and organizational performance. The findings of the study highlight KM as a multi functional concept, which contributes towards efficiency and effectiveness of an oil & gas organization in many ways. Further, implementation of KM is also deemed to be a multi-faceted task, which requires behavioral, cultural, managerial and resource based support both from individuals within an organization and from organization as an institution. Finally, the study confirms a positive impact of KM on organizational performance within Oil & Gas automation sector.

Keywords-Knowledge Management, Automation, Performance, Competitive Advantage

I. INTRODUCTION

The era of information technology emerged after the era of industrial revolution, which essentially was characterized by hostile trends like increasing competition, saturating markets, globalization, and emergence of services based industry. In order to cope up with these complexities, strategic view of business emerged where survival of the organizations in the marketplace became dependent upon building and

exploiting some core competencies. This necessitated effective management all of organizational resources in order to build some core competencies. With time the organization focus also shifted from tangible assets to intangible assets. One of such intangible asset is knowledge possessed by the organizations and its people [i]. The management of the knowledge has been a hot area of debate. Its value as a strategic asset is widely propagated both in literature and in practice [ii-iii]. The concept although is not new as according to [iv], KM also prevailed in ancient civilizations, in an informal manner. The concept of craftsmanship and apprenticeship in pre-industrialized era also indicate towards the knowledge possessed by the master. The master used to transfer the knowledge among the generations of apprentices over the time. The formalization of the concept started after the propositions of [v] who highlighted the resource based view of the firm. After that, KM became buzzword in context of the corporate strategy and organizations around the globe started to pursue KM in a formal manner. As a result various key positions relating to KM were added to organizational hierarchy and structure [vi].

Thus, in modern era, organizational success is associated with the ability of the firm to exploit its explicit and tacit knowledge [vii]. So, an ineffective framework of knowledge transfer is deemed for effective exploitation of the knowledge [viii]. The traditional benefits of KM and KM system include the ability of organizations to be more responsive, more flexible, more productive, more innovativeness and better decision making [iii]. The authors stated that KM has become need of the era and it is derived by the urge to disseminate best practices, share tactical knowledge and to encourage continuous improvement. This in turn, supports in new product and service developments, reduce rework and enable the organization to be more responsive to its clients [ix]. KM also provides an evolutionary platform for the emergence of new technologies. Furthermore, it improves existing processes of an organization. This on the whole, is considered beneficial for the organization [x].

But implementation of KM is not a simple task and requires considerable effort, support and resources from people (human resource), technology, processes and culture of organization [xi].[xii] on the other hand identified three forces that influence KM in an organization. These forces include managerial influences, resource influences and environment influences. Manager influences are further divided into four factors i.e. exhibition of leadership in KM activities, coordination of KM activities, controlling KM activities and measurement of KM activities. Resource influences pertain to the financial resources, human resources or material resources. Lastly, environmental resources are related to the external environment of the organization such like time, technology, market, fashion, competition and climate (educational, social, political, economic and governmental). The authors stressed that KM initiatives should have managerial support, appropriate financial resources, budgets and infrastructure to ensure the success of such indicatives [xiii]. Finally, eleven critical success factors were identified for the adoption of KM i.e. management leadership & support, culture, information technology, strategy & purpose, measurement, organizational infrastructure, processes & activities, motivational aids, resources, training & education and human resource management [xiv].

The propagation on the value of the Km has increased over time, but there have been confusions on the nature and conception of KM [xv,xxi]. There is also evidence that awareness of benefits of KM do not lead towards systematic implementation of KM [xix]. [xxv] points out that there is no one size fit all solution of KM implementation. Further, complexity on conception and implementation of KM also undermine its usability as a strategic asset [xix]. [xxvi] further elaborate the problems of Pakistani firm, which are unable to manage their knowledge assets and intellectual capital to better ends.

This study in tis regard provides first hand evidence into the oil & gas automation industry of Pakistan. The focus of the study is perceptions of end users and service providers of the industry. This would help practitioners and managers to understand the perceptual gaps on the KM and also explore the value of KM as a strategic asset. This study would further help them to use, channelize and manage KM for better ends.

II. RESEARCH METHODOLOGY

The purpose of this research is to explore perceptions and opinions of the individuals working in the Oil & Gas automation industry with regard to KM, its importance and implementation within the sector. Survey design is deemed suitable data collection technique for the study as this design enables the researcher to collect information regarding the

perceptions of the respondents in an appropriate manner. Thus, a questionnaire instrument was developed to collect the data. Questions included in the instrument were based on the past studies on the subject [xiii, iii, xv, xvi, xvii, xviii, xix, xx]. The questionnaire was composed of seven parts; where first part of the questionnaire was related to the general familiarity of respondents for the term and basic concept of KM, second part of the questionnaire contained questions relating to the importance of the KM, third part asked respondent regarding the implementation of KM system, fourth part contained the questions for the measurement of KM, fifth part had measurement scale of performance and sixth part solicited the responses of the respondents on the barriers relating to KM while the last part of the questionnaire contained questions relating to the demographics of the respondents. Questions included in section 2 to section 5 of questionnaire were asked on five point likert scale.

The questionnaires were floated among the service providers and end users within the Oil & Gas automation industry. It was ensured that the respondent's organization has some representation in Pakistan. Out of 200 total questionnaires floated 132 valid responses were generated (Response rate = 66%). Out of these 132 responses; 81 were service providers and remaining 51 were end users of the industry.

The collected data is analyzed using simple frequency distributions and descriptive statistics. Chi Square and independent sample t-test are also used to find difference of opinion between service providers and end users. Regression analysis is used to relate KM with organizational performance. Following hypothesis is tested in the study:

H0: There is no significant impact of KM on organizational performance in oil & gas automation industry.

H1: There is a significant impact of KM on organizational performance in oil & gas automation industry.

III. ANALYSIS

The analysis of the paper is divided into four sections, whereby first section provides demographical characteristics of the respondents, second section provides descriptive statistics on importance of KM, implementation of KM and barriers to KM implementation, third section established the perceptual differences of end users and service providers on KM importance and implementation and last section assesses the impact of KM on performance of organizations in oil & gas automation industry.

A. Demographical distribution of respondents

The demographical questions asked from the respondents were related to their gender, job nature and work experience. Most of the respondents were males

as only 3 females were found in the sample who were also from service provider category and remaining 129 respondents were male out of which 78 were from service provider group and remaining 51 were from end user group. Regarding the nature of the job, 30 respondents belonged to the managerial cadre(18 service providers & 12 end users) and remaining 102 respondents were of non-managerial responsibilities (63 service providers & 39 end users). With regard to the total work experience service providers on average had 6.22 (Standard Dev. = 7.31) years of work experience and end users had on average of 11.15 (Standard dev. =4.98) years of work experience and average experience of service providers with the current organization was 2.59 years (standard dev. = 3.79) and of end users was 4.24 years (standard dev. = 2.65).

B. Descriptive Statistics: Importance & Implementation of KM

Firstly, respondents were asked about their knowledge on KM. Out of total 81 service providers 69 knew about it, while 12 did not know about it. Entire 51 end-users seemed to know about the KM. Pearson Chi-Square of 8.311 (p-value < .01) indicated that there exist significant differences among the service provider and end user group with regard to their general awareness on KM. End users seemed to be more aware of the KM as compared to the service providers.

Secondly, respondents were asked as to whether their organization has implemented some system of KM or not. Out of 78 service providers who responded to this question 69 confirmed to have some KM system in their organization, while remaining 9 respondents responded otherwise. Out of total 51 service providers, 48 also accepted to have some KM system in their organization. Pearson Chi-Square value of 1.169 does not indicates any significant differences among both respondent groups i.e. service providers and end users. Functions of KM, like reduction in work, service improvements, quality improvements, better responsiveness improvements in decision-making and KM as strategic asset were deemed most important by the respondents, while functions like reduction in litigation cost, better conflict management and strengthening the relationship with suppliers and customer were considered least important by the respondents.

TABLE I
IMPORTANCE OF KM

	Mean	Std. Deviation
Reduction in rework	4.00	0.89
Service improvements	3.98	0.82
Quality improvements	3.98	0.84
Bettters responsiveness	3.98	0.97
Improvement in decision making	3.93	0.78

KM as strategic asset/ competitive advantage	3.93	0.78
Improvement in delivery time	3.79	0.87
Improvements in profits	3.71	0.87
Strengthening the relationship with suppliers & customers.	3.57	0.97
Better conflict management	3.57	0.92
Reduction in litigation cost.	3.47	0.90
Overall Importance Score	3.81	0.63

Table II provides the essentials of the implementation of KM in Oil & Gas automation industry. For implementation of KM, factors like supportive and encouraging culture and development of strategy with KM objective were deemed most important, while factor of appointment of KM manager was considered least important by the respondents.

TABLE II
ESSENTIALS OF IMPLEMENTATION OF KM

	Mean	Std. Deviation
Supportive and encouraging organizational culture	4.16	0.81
Development of a strategy outlining KM objectives	3.96	0.77
Integrated KM information system	3.84	0.91
Top management involvement & support	3.79	0.99
Preparation of budgets and allocation of resources	3.71	0.87
Appointment of KM manager	3.51	0.99
Overall Implementation Score	3.82	0.66

Table III provides further elaboration of the implementation of the KM system within the Oil & Gas automation industry by exploring the barriers to the effective implementation of the KM system. Overall, individual factors such like lack of will, lack of leadership and employee involvement are more significant barriers towards KM implementation.

TABLE III
BARRIERS OF KM IMPLEMENTATION

	Mean	Std. Deviation
Lack of will.	4.07	.97
Lack of proper leadership in the organization	3.79	1.08
Lower involvement of employees.	3.71	1.24
Lack of formal training.	3.61	1.06
Fear of people that sharing	3.52	1.10

knowledge would undermine their importance in the organization.		
Lack of trust between members of the organization.	3.44	1.25
Tendency of high potential people to work individually.	3.43	1.14
Time & costs constraints	3.36	1.13

C. *Perceptual differences of end users and services providers*

Table IV provides difference of opinion of service providers and end users with regard to the overall importance and implementation of KM system in the Oil & Gas automation industry. A significant t-value indicates that, the implementation of the KM system in Oil & Gas automation industry was perceived differently by service providers and end users, while importance of the KM was not perceived differently by end users and service providers. Thus, null hypothesis of 'there are no significant differences between perceptions of end users and service providers for importance and implementation of KM' was rejected in case of implementation of KM only.

TABLE IV
DIFFERENCE OF PERCEPTIONS OF SERVICE PROVIDERS AND END USERS

Perceptual Category	Groups	Mean	Std. Dev.	Mean Diff.	Prob.
Importance	Service Provider	3.79	.74	-.04 [.39]	.69
	End User	3.83	.42		
Implementation	Service Provider	3.73	.76	-.23 [2.29]	.02**
	End User	3.96	.41		

**Significant at 5% level of significance.

D. *Assessment of impact of KM on performance*

In order to assess the impact of KM on organizational performance, regression analysis is deemed suitable. It assumes KM as independent variable and statistically establishes its impact on organizational performance in oil and gas industry.

Tables V provide results of regression analysis of the study. R square indicates that almost 46.4% of the variation in the performance of the organization is explained by the KM in Oil & Gas automation industry.

The F statistics of the model is indicates that model is good fit at 1% level of significance.

TABLE V
REGRESSION RESULTS

Model	Unstandardized Coefficients		Standardized Coefficients		T	Prob.
	B	Std. Error	Beta			
1 (Constant)	1.475	.194			7.624	.000
KM	.584	.055	.681		10.614	.000
R-Square	.464		F-Statistics		112.658(Prob. <.01)	

a. Dependent Variable: Performance

The results indicate a positive and significant impact of KM on performance of the organizations in Oil & Gas automation industry. Thus, null hypothesis (H0) is rejected and alternate (H1) is accepted.

Overall, this study found significant differences between service providers and end users with regard to the awareness of the KM and also regarding the implementation of KM in oil & gas automation industry. KM overall seem to have multifaceted implicates for the contemporary organizations in the Oil & Gas automation industry, where KM effects various efficiency and performance related facets of the organization including reduction in rework, service & quality improvements, increased responsiveness & profits and better decision making. KM could also be proved to be strategic asset for the organization. The implementation of KM seem a bit complicated where factors like supportive culture, clear objectivity, integrated information system, top management support and budget allocations were deemed important factors for the better implementation of KM system. This entails that KM as a multifaceted concept requires integrated implementation efforts from all aspects of the organization. Various personal factors like lack of will, less leadership support, lack of employee involvement, no formal training and reluctance of people to share knowledge seemed significant barriers in implementation of KM system and practices within Oil & Gas automation industry. Further, KM was found associated with the organizational performance. These findings are consistent with the previous literature on the topic which deem KM as a strategic asset of the organization and deem KM beneficial for various aspects of the organizational efficiency and performance [xxi, iii, x, xvi, xvii). KM as a multifaceted concept having confusion is also widely elaborated [xxi, xxii, xxiii] and implementation of KM has always been considered tricky requiring support from people, culture, technology and other resources [xix, xxix, xxxii]. Lastly, studies also support the notion of a positive impact of KM on firm performance [xxiv, xvi]. Thus implementation of the KM although is a daunting, tricky and complex task; it could be very beneficial for the long-term survival and sustainability of the organization in a competitive marketplace.

IV. CONCLUSION

This study was conducted with an aim to investigate dynamics of KM within the Oil & Gas automation industry. The respondents of the study were both service providers and end users within the industry. The study indicated that KM has much importance for the Oil & Gas automation industry where the concept has multidimensional implications regarding various performance and efficiency related aspects of the organizations. It further was found that the implementation of the KM within the Oil & Gas automation sector a tricky task where by supportive culture, clear objectivity, integrated information system, top management support and budget allocations were deemed important factors for KM implementation. Further, significant perceptual differences were found between service providers and end users of the Oil & Gas automation industry with regard to the implementation and awareness of KM. The study also confirms a positive impact of KM on organizational performance in Oil & Gas automation industry. This study overall establishes the importance of the KM in Oil & Gas automation industry as a strategic asset or success factor but there lie many ambiguities regarding the conception and implementation of KM both as a concept and as a tool. Further research is necessary to explore the potential and implications of KM in various industries and there is also a need to draw a systematic procedure to implement the KM system within the organization. The conceptualization of the construct also needs clarifications and awareness with regard to the true conceptualization of the term is also important.

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Questionnaire

Dear Sir

I am conducting a research to understand the dynamics of Knowledge Management (KM) in Automation industry. Knowledge has become a driving force for organizational competence and effectiveness and managing this knowledge possessed by the organization through its people, processes, culture and technology could prove to be a competitive advantage in competitive environment today. Knowledge brings competence and competence enable the organization to better serve its customer's needs and demands. This research is being conducted to understand the perceptual gap among the service provider and service receiver in Automation industry with regard to knowledge management and the role it could play in growth and efficiency of the organizations operating in automation industry. The information collected through this questionnaire will remain confidential and would only be used for research purpose. Your assistance is highly appreciated.

Thank you!

Please answer the following questions before proceeding.

1	Do you know about Knowledge Management (KM)?	Yes	No
2	Does your organization have some knowledge management system in place?	Yes	No

Please proceed if the answer to above question is yes; leave the survey otherwise.

Use following scale to record your response

(1= Strongly Disagree) (2= Disagree) (3= Neutral) (4= Agree) (5= Strongly Agree)

Importance of KM

1	KM improves decision making within the organizations of automation industry.	1	2	3	4	5
2	KM improves the delivery time of the organizations in automation industry.	1	2	3	4	5
3	KM brings service improvements in the organizations of automation industry.	1	2	3	4	5
4	KM strengthens the relationship of the organizations in automation industry with both their suppliers and their customers.	1	2	3	4	5
5	KM brings quality improvements for the organizations in automation industry.	1	2	3	4	5
6	KM enables an organization to respond to customers in a quick manner in automation industry.	1	2	3	4	5
7	KM reduces rework in automation industry.	1	2	3	4	5
8	KM could prove to be a strategic asset/ competitive advantage in automation industry.	1	2	3	4	5
9	KM improves profits of the organizations in automation industry.	1	2	3	4	5
10	Knowledge management makes conflict management easier.	1	2	3	4	5
11	Proper implementation of knowledge management may result in reduction of litigation cost.	1	2	3	4	5

Implementation of KM system

1	An integrated KM information system is necessary for the implementation of KM system in the automation industry.	1	2	3	4	5
2	Appointment of KM manager is essential for the effective implementation of KM system in automation industry.	1	2	3	4	5
3	Top management involvement & support is required for effective implementation of KM system in automation industry.	1	2	3	4	5

4	A supportive and encouraging organizational culture is must for a better implementation of KM system in automation industry.	1	2	3	4	5
5	Preparation of budgets and allocation of resources is essential for effective implementation of KM system in automation industry.	1	2	3	4	5
6	Development of a strategy which outlines objectives of KM system is important for successful KM implementation in automation industry.	1	2	3	4	5
KM						
1	My company recognizes value of knowledge management as strategic asset.	1	2	3	4	5
2	We discuss and reevaluate our position on lost business opportunities; which are caused by inappropriate exploitation of available knowledge.	1	2	3	4	5
3	In my organization, knowledge management makes work easy and more productive.	1	2	3	4	5
4	Knowledge management makes it easier for us to monitor undergoing projects.	1	2	3	4	5
5	Knowledge management has brought flexibility into the working of my organization.	1	2	3	4	5
6	Knowledge management has improved our flexibility relating to the project works.	1	2	3	4	5
Performance						
Over the past two years, my organization has improved its ability to...						
1	Innovate new products and services.	1	2	3	4	5
2	Identify new business opportunities.	1	2	3	4	5
3	Co-ordinate the development efforts of different units.	1	2	3	4	5
4	Anticipate potential market opportunities for new product/ services.	1	2	3	4	5
5	Rapidly commercialize new innovations.	1	2	3	4	5
6	Adapt quickly to unanticipated changes.	1	2	3	4	5
7	Anticipate surprises and crises.	1	2	3	4	5
8	Quickly adapt its goals and objectives to industry/ market changes.	1	2	3	4	5
9	Decrease market response time.	1	2	3	4	5
10	React to the new information about the industry or market.	1	2	3	4	5
11	Be responsive to new market demands.	1	2	3	4	5
12	Avoid overlapping development of corporate initiatives.	1	2	3	4	5
13	Streamline its internal processes.	1	2	3	4	5
14	Reduce redundancy of information and knowledge.	1	2	3	4	5
Barriers						
What might be the barriers to the effective implementation of knowledge management system in any organization?						
1	Time & costs constraints	1	2	3	4	5
2	Lack of proper leadership in the organization.	1	2	3	4	5
3	Lack of will.	1	2	3	4	5
4	Lack of formal training.	1	2	3	4	5
5	Lower involvement of employees.	1	2	3	4	5
6	Lack of trust between members of the organization.	1	2	3	4	5
7	Tendency of high potential people to work individually.	1	2	3	4	5
8	Fear of people that sharing knowledge would undermine their importance in the organization.	1	2	3	4	5

Demographics

Gender: 1. Male 2. Female

Nature of Job: 1. Managerial 2. Non-managerial

Work Experience (Total): _____

Work Experience (With current organization): _____

Name of Current Organization (optional): _____

List of Responding Companies

Sr #	Company Name
1	Akzonobel
2	Chevron
3	Intech Process Automation
4	Interloop
5	Pall Corporation
6	RasGas Qatar
7	Sadara
8	Tengiz