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Knowledge Management: An Ingredient for Sustainability of Organizations

R. Sujatha and R. Krishnaveni
PSG Institute of Management, PSG College of Technology, PB. No. 1668,
Peelamedu, 641004 Coimbatore, Tamil Nadu, India

Abstract: Organizations undergo several challenges and face competition to sustain and create value to their stakeholders. Sustainability is a major concern, particularly for small and medium organizations. An investigation of the importance of knowledge management within organizations is the need of the hour and how it might impact on sustainability of the enterprises. Knowledge management is a process by which knowledge is created, shared, stored and utilized for the benefit of organizations. A thorough literature review and field study is conducted to highlight the extent of existence of platform for knowledge creation, factors affecting knowledge sharing, storage and utilization. Also how the knowledge management practices impact the work performance of employees. The result of this study will help to bring out the necessity for organizations to create an environment for enhancing the knowledge management practices for enhancing the capacity of employees to work and perform better. It is hoped that the research reported in this study would contribute to sustainable advantage of pump manufacturing firms in Coimbatore, a city in Southern part of India where there has been little evidence of implementation of formal knowledge management practices.

Key words: Knowledge management, sustainability, knowledge creation, work performance, utilization

INTRODUCTION

Sustainability is an evolving concept and organizations strive to be sustainable to meet the needs of the present world competitions. Organizations want to be economically, socially and environmentally sustainable (Schmidheiny, 1992; Elkington, 1998; Bansal, 2005). Economic sustainability is achieved through financial success like profitability, growth, earning of the organization. There are also a number of success factors which drive the organizations towards sustainability like organizational learning (Smith, 2012), human resource management process and systems like organizational effectiveness, leadership and values (Parkes and Borland, 2012), human resource development (Scully-Russ, 2012), technology (Du *et al*., 2013). Also flow of vital information into organization and keeping inappropriate information, also contributes to sustainability of organizations (Henning and Henning, 2013). Of all the earlier mentioned factors, the most which is intrinsic to an organization is the employees and their contribution towards the growth. Employee performance towards their work is the basic ingredient for success of organizations which drive them towards sustainability. Employees perform better, if they have the adequate resources and knowledge to carry out their work practices. Knowledge as an organizational asset can be leveraged, so that individuals can achieve better work performance and hence, the organizations can sustain. There is not enough evidence to showcase knowledge management as an enabler for work performance in organizations.

This study is undertaken to understand the extent of knowledge management practices and the relationship between knowledge management and work performance by developing an empirical model.

Review of literature and research hypotheses: Knowledge Management (KM) is defined as a systematic and organized attempt to use knowledge within an organization to transform its ability to store and use knowledge to improve performance (Robinson *et al*., 2001). Hlupic *et al*. (2002) suggests that knowledge management would give organizations the operational ability to identify their strengths and weakness, bring out the hidden potential of the employees, understand and respond as perceived by the end consumers. Organizations find that they have to share knowledge internally more efficiently and learn to adapt more quickly to external circumstances in order to retain their competitive advantage. Understanding the importance of knowledge management cycle (knowledge creation, sharing, storage and utilization) in organizations, a considerable body of literature addresses the management of knowledge from a variety of perspectives.

Corresponding Author: R. Sujatha, PSG Institute of Management, PSG College of Technology, PB. No. 1668, Peelamedu, 641004 Coimbatore, Tamil Nadu, India

Knowledge creation: Styhre *et al.* (2002) defines knowledge creation as the method through which new ideas are generated, incorporating activities, interactions and other organizational mechanisms. About two types of knowledge, tacit and explicit co-exist in an organization. Polanyi (1962) states that tacit knowledge is non-verbalized, intuitive, more unarticulated and resides within individuals. Explicit knowledge is more structured and available in codified form in the organization (Koulopoulos and Frappaolo, 1999). Nonaka and Takeuchi (1995) indentified a concept called ba and defines ba in knowledge creation, as a platform where knowledge is created, shared and exploited. Knowledge is created not just by an individual but through interactions among individuals in an environment. Nonaka and Toyama (2003) state that ba is a place where information is given meaning through interpretation to become knowledge and new knowledge is created out of existing knowledge through the change of meanings and contexts. There are four types of ba: originating, dialoguing, systematizing and exercising. The characteristics of each type of ba as given by Nonaka and Nishiguchi (2001) are:

- Originating ba is the place where individuals share feelings, emotions, experiences and mental models
- Dialoguing ba is a situation where by means of dialogue, individuals share their experience and abilities
- Systematizing ba is a place of interaction in a virtual world instead of sharing of space and time in reality
- Exercising ba supports focused training with mentors and colleagues through continued exercising. Learning by continuous self-refinement through on-the-job training or peripheral and active participation is stressed in this ba

The knowledge generated in each ba is eventually shared and forms the knowledge base for organizations. Social interaction has a positive influence on the dynamics of knowledge creation. The existence of formal and informal situations enables organizations to share abilities, experiences, emotions and know-how by means of face to face communication and contribute towards creating an environment for knowledge creation (Balestrin *et al.*, 2008). Jakubik focus on micro-level interactions and collaborative learning approach to knowledge creation. More number of interactions among the participants increases the knowledge creation process. Diversity of the members in a community also has an impact on knowledge creation process. Time spent together, trust and familiarity with learning approach increases the number of interactions. The presence of the four ba's enhances the creation of knowledge among employees and also the interactions and face to face communication among them facilitates the sharing of knowledge. Suppiah and Sandhu investigated the influence of organizational communications, personal interactions and mentoring/tutoring on knowledge sharing behavior of employees. The enabling conditions for knowledge creation like social interaction, communications also enables the knowledge sharing process in organizations.

Thus, the knowledge creation practices in organizations influences the knowledge sharing practices and then the employees work performance. Therefore, the following hypothesis is proposed:

- H_1: knowledge creation practices positively influences the sharing of knowledge in organizations

Knowledge sharing: The sharing of knowledge can be defined as the dissemination of information and knowledge throughout the organization (Ling *et al.*, 2009). The literature recognizes the existence of various factors that influence the organizational knowledge sharing activities. Sondergaard *et al.* (2007) studied impact of organizational factors, including organizational structure and its formal processes, meetings and hierarchies and individual factors like interpersonal relationships, personal and professional backgrounds on knowledge sharing. Lin (2007) examined the influence of individual factors (enjoyment in helping others and knowledge self-efficacy), organizational factors (top management support and organization rewards) and technology factors (information and communication technology use) on knowledge sharing process. Han and Anantatmula (2007) found that availability and usability of technology, leadership support and motivating structures have influences on knowledge sharing. Saenz *et al.* (2009) empirically tested the degree of influence of different knowledge sharing mechanisms like management focused KS, IT focused IS and people focused KS on the innovation capability of firms. Chatzoglou and Vraimaki (2009) found that attitude towards knowledge sharing, subjective norms about knowledge sharing, perceived behavioral control to knowledge sharing and level of IT usage had an impact on knowledge sharing. Zahra and Mohammad (2010) examined the influence of individual factors (anticipated reciprocal relationships, perceived self efficacy, expected extrinsic rewards) and organizational factors (organizational climate and level of ICT usage) on knowledge sharing behavior.

Once knowledge is shared with others, it has to be codified and stored in organizational memory for further use by employees. Knowledge is meaningful when it is codified, classified given a shape, put in a useful format and stored (Zaim, 2006). The literature evidence presented earlier, clearly shows that the presence of information technology systems in organizations stimulates the sharing of knowledge in organizations. Knowledge management systems incorporate various technologies like knowledge repositories, data warehouses, intranets to facilitate the creation, sharing and storage of knowledge both within and outside the firm's boundaries. Information technology as an enabling condition to knowledge sharing, also provides the necessary infrastructure for codifying and storing of knowledge (Duffy, 2000). Singh *et al.* (2006) suggest that IT can play various roles like providing collaboration for those searching for knowledge or information becoming an integrator of communication technology, helping to convert tacit knowledge into an explicit form providing static repositories of best practices. Thus, the knowledge sharing practices influence the storage of knowledge and then the work performance of employees. Therefore, based on the earlier arguments, the second hypothesis is proposed:

- H_2: knowledge sharing practices positively influences the storage of knowledge in organizations

Knowledge storage: According to Wang and Ahmed (2005), knowledge storage is recording knowledge, retaining and maintaining knowledge and clearly signposting the knowledge directory. Duffy (2000) states that information technology plays a vital role in managing storage and access to documents. Tacit and explicit knowledge needs different storage mechanisms. Explicit knowledge can be easily collected, documented, stored and retrieved through technology (Zaim, 2006). But, tacit knowledge that resides in the minds of the employees is hard to store. Tacit knowledge has to be codified and converted into explicit form before storing.

Olivera (2000) names knowledge repositories as organizational memory that is capable of collecting, storing and providing access to knowledge assets of an organization. The crucial factors lies in taking documents with knowledge embedded in them like memos, reports, presentations, articles, etc. and store them in a repository where they can be easily retrieved. The critical factor for many knowledge management projects is finding the right balance of structure to represent knowledge (Davenport *et al*., 1998). Lack of definite structure makes knowledge extraction very cumbersome. Organizations developing knowledge repositories must build some key terms and categories and maintain knowledge catalogues that is readily accessible across the organization. This is useful to search for the knowledge which the users require.

Nemati (2002) suggests that storing of knowledge is important for reusing it when needed and the knowledge can be available to everyone in the organization. Once knowledge is shared with others and stored, it may be utilized (King and Ko, 2001), in order to be helpful in individual learning (King, 2005). It will also be embedded in the practices, systems, products and relationships of the organization through the creation of knowledge-intensive organizational capabilities (Levitt and March, 1988). Thus, the storing of knowledge influences the use of it improving the work performance of employees. Therefore, the third hypothesis is proposed:

- H_3: knowledge storage positively influences the utilization of knowledge in organizations

Knowledge utilization: Knowledge use is defined as the integration of learning, so that the knowledge is broadly available and can be generalized to existing and new situations (Hoe and Mcshane, 2010). Knowledge use happens when knowledge is being applied to a business context (Holsapple and Joshi, 2002; Hoe and McShane, 2010). Utilization of the acquired knowledge can be transformed from being a potential capability to a realized and dynamic capability that impacts organizational performance (Zahra and George, 2002).

Work performance: There is a consensus among knowledge management researchers that knowledge management is a source of improved performance for the organization. Organizational performance is used as a measure of outcome of knowledge management practices and several studies are conducted to understand the relationship between knowledge management and organizational performance (Starns and Odom, 2006; Ho, 2008; Zack *et al*., 2009; Akroush and Al-Mohammad, 2010; Kruger and Johnson, 2011; Mills and Smith, 2011). Innovative performance as an outcome of knowledge management is also researched in various studies. Zhang *et al.* (2010) highlights that knowledge utilization is an important predictor for developing innovative products. Janz and Prasarnphanich (2003) found that creating a knowledge centered culture will lead to enhanced knowledge-related activities which in turn yields improvements in work satisfaction and performance. Bennett (2001) used sales force effectiveness, as an outcome of knowledge creation practices in selling function. These observations underlines that knowledge management practices have a major role in enhancing the performance of organizations and employees. Consequently for this study, personal

Fig. 1: Conceptual model

evaluation of work performance of employees in their job is used an outcome of knowledge management practices because it would be appropriate to measure the knowledge managed in an organization when it is embedded in their work practices and improves their efficiency, effectiveness and timeliness of doing a job. Hence based on the earlier theoretical foundation, the hypothesis is proposed as:

- H_4: the level of knowledge utilization practices positively influences the work performance of the employees

The conceptual model for the study is given in Fig. 1.

Objectives of the study: The given literature review identifies the importance of knowledge management practices including creation, sharing, storage and use of knowledge and the necessity to improve the work performance of the employees in pump manufacturing firms in India. The study presented here is mainly done to:

- Understand the extent of knowledge management practices among pump manufacturing firms
- Empirically understand the relationship between knowledge management practices and work performance

MATERIALS AND METHODS

Measures: A structured questionnaire was designed based on the extensive literature review. The primary focus of the study was to understand knowledge management practices and the impact on individual work performance. Hence, the questionnaire items were designed to capture extent of knowledge management practices, including knowledge creation, sharing, storage and usage and its impact on performance of employees. The questionnaire was constructed using a 5 point Likert scale where 1 represented strongly disagree and 5 for strongly agree. The questionnaire had three sections, the first part to capture the demographic information about the respondents like gender, age, education, work experience and position in the organization. The second part had four sections to capture knowledge management practices and third part to measure the work performance of employees. Table 1 describes the constructs and the questionnaire items.

Respondents: This descriptive research is conducted among the pump manufacturing firms in the city of Coimbatore in India. The pump manufacturing industry is on upward swing and continuously undergoing structural changes. The pump manufacturing firms in India are located as clusters in and around major cities like Ahmedabad, Kolkata, Hyderabad, Coimbatore, etc. The indigenous pump and motor industry in Coimbatore started way back in early 1900's and the first pump was developed in 1928 in Coimbatore. It becomes mandatory for these organizations to manage the knowledge that is in practice for than eight decades and use it for better work practices to enhance productivity, quality and service to customers and also for sustainable competitive advantage.

The sampling frame was decided as those pump manufacturing companies who were members of South India Engineering Manufacturers Association (SIEMA). There were about 103 pump companies listed in the website of SIEMA. Before the questionnaire was sent out to target respondents, a pilot test was conducted by sending the questionnaire to few experts in manufacturing sector to evaluate the validity and relevance of the items. Based on their suggestions minor refinements like deletion of overlapping questionnaire items were made. All 103 organizations were included in the study. The respondents were employees occupying middle level managerial positions and should have worked for >2 years in the organization because they know the functioning of the organization and will have the proficiency to fill the questionnaire. Hence, the sample for the research consisted of middle level managers and technical staff from the organizations who have a work experience of >2 years in the same organization. A total of 284 questionnaires were sent to the pump manufacturing organizations. The responses were obtained personally and through electronic mails. After regular follow-ups, a total of 195 replies were received giving a response rate of 68.6%. The year of establishment of the company and the

Table 1: Description of constructs

Constructs	Definitions	Questionnaire items
Knowledge creation	The extent to which organizations have the platform or space called ba for the individuals to engage in activities to create knowledge	Totally 16 questionnaire items are used to capture the knowledge creation practices, 4 questionnaire items for each of the knowledge creating ba like originating, dialoguing, exercising and systematizing ba
Knowledge sharing	The extent to which organizational factors like organizational climate, structure, opportunities provided by employees to share, top management support and reward systems are present to facilitate knowledge sharing. Also, employee focused factors like trust among employees, mentoring by senior employees, attitude to employees to share knowledge and technical factors like existence, effectiveness and comfort of using knowledge, sharing tools facilitate knowledge sharing practices	The 13 questionnaire items are used to capture organizational factors, 9 items for employee focused factors and 3 items for technology factors
Knowledge storage	The extent to which the organizations have systematic processes for gathering and storing knowledge held in manuals, documents, procedures and also the knowledge held by the employees	The 4 questionnaire items are used to capture knowledge storage practices
Knowledge utilization	The extent to which the organizations use the knowledge created and acquired by the employees with experience from previous projects and also the knowledge from external agents. Also, the availability of necessary technology to access and use the knowledge	The 4 questionnaire items are used to capture knowledge utilization practices
Work performance	The extent to which individuals produce work that is effective, efficient and on time	The 9 items instrument developed by Henderson and Lee is used to capture work performance. The work performance was scored in terms of efficiency, effectiveness and timeliness with 3 questionnaire items for each dimension

Table 2: Descriptive statistics

Items	Scale	Frequency	Percentage
Company establishment	1-25 years	102	52.3
	25-50 years	85	43.6
	>50 years	8	4.1
Age	20-30 years	38	19.5
	30-40 years	118	60.5
	40-50 years	27	13.8
	>50 years	12	6.2
Education	Graduation	153	78.5
	Post graduation	42	21.5
Work experience	1-5 years	22	11.3
	6-10 years	36	18.5
	11-15 years	95	48.7
	16-20 years	25	12.8
	21-25 years	12	6.2
	>25 years	5	2.6
Position in the organization	Production	88	45.1
	Quality control	45	23.1
	Administration	62	31.8

demographic data of the respondents like age, education, work experience and position in the organization are given in Table 2.

Most of the companies surveyed were established in <25 years. It was also found that most respondents were in the age group of 30-40 years (60.5%). Also, the respondents had undergone graduation (78.5%). In addition, the work experience of the employees was largely 11-15 years (48.7%). Finally, the statistics indicated that 45.1% of respondents belonged to production department, 23.1% of respondents in quality, control and 31.8% of respondents in administration, thus providing a wide spread of various positions in organizations.

Analysis criteria: The data analysis was done in two parts. A confirmatory factor analysis is used to derive whether the items relating to each of the four knowledge management practices like knowledge creation, sharing, storage and utilization loaded into the anticipated factors, as well as their reliability and validity confirmation. Cronbach's alpha was used for confirming the consistency of internal reliability. An $\alpha>0.7$ is taken as acceptable value. Second, the data were analysed using Visual PLS, a software package based on Latent Variables Path Analysis with Partial Least Squares. PLS path modeling provides a very flexible environment for the study of multi-block structure of observed variables by means of structural relationships between latent variables. The PLS path modeling approach was used to assess the proposed models. The PLS technique allows us to use multiple indicators to measure constructs. The hypotheses specified in this research posit the relationship between the constructs of knowledge creation, knowledge sharing, knowledge storage, knowledge utilization and work performance of the individuals. The results of the analysis were used to accept or reject the hypothesis based on the t-values of the relationships. A $t>1.96$ is considered to be significant at $p<0.05$. The t-value is the ratio of the estimated parameter to its standard error.

RESULTS

Reliability and factor analysis: To measure internal consistency reliability, Cronbach's alpha was used for the questionnaire items relating to knowledge creation,

sharing, storage and utilization of knowledge management practices and work performance. The alpha value for the knowledge creation is 0.801, knowledge sharing is 0.874 and knowledge storage is 0.821 and knowledge storage is 0.860 suggesting sound reliability criteria of >0.8. The work performance also generated high alpha value of 0.802. The composite reliability of the research model and AVE (Average Variance Extracted) are shown in Table 3. The AVE values for all the composites were >0.50. Also, the squares of the correlations among composites were less than AVE values showing validity of the questionnaire items. The questionnaire items of knowledge management practices for each of the four constructs were factor analyzed to establish dimensions of the responses. Table 4 shows the factor loadings.

The confirmatory factor analysis exceeded 0.5 and showed that the items relating to each of the knowledge management practices loaded onto the anticipated factors like originating, dialoguing, socializing and systematizing ba for knowledge creation, organizational factors, employee and technology factors for knowledge sharing practices and systematic process, tacit knowledge capture, knowledge catalogue and knowledge repositories for knowledge storage and usage of knowledge created by employees and other external agents and technology to access knowledge for knowledge utilization practices. Further, refinement of the scale was not required and the instrument was used for collecting data from the respondents.

Table 3: Reliability and AVE values

Parameters	Composite reliability	AVE	Cronbach alpha
Knowledge creation	0.865	0.618	0.801
Knowledge sharing	0.923	0.799	0.874
Knowledge storage	0.882	0.653	0.821
Knowledge utilisation	0.905	0.705	0.860
Work performance	0.894	0.738	0.805

Table 4: Factor loadings

Parameters	Factor loadings
Knowledge creation	
Originating ba	0.770
Dialoguing ba	0.879
Exercising ba	0.841
Systematizing ba	0.775
Knowledge sharing	
Organizational factors	0.914
Employee focused factors	0.915
Technology factors	0.860
Knowledge storage	
Tacit knowledge capture	0.827
Systematic process for gathering explicit knowledge	0.831
Maintenance of knowledge catalogue	0.847
Co-ordination of knowledge repositories	0.729
Knowledge utilization	
New knowledge embedded in work practices	0.854
Leveraging knowledge from external agents	0.834
Application of knowledge gained from previous experience	0.850
Technology to access knowledge	0.824

Research findings: The mean values of the sub-scales used in each of the four constructs are calculated to understand the extent of knowledge creation, sharing, storage and utilization practices among the organizations considered for the study. The results given in Table 5, show that mean scores of the questionnaire items of all the four constructs are >3, indicating a stronger existence knowledge management practices among the pump manufacturing firms. Among the four practices, knowledge creation and sharing scored similar mean values (3.68 and 3.70, respectively). Knowledge storage practice scored the lowest mean value of 3.39 and the knowledge utilization practice scored the highest mean value of 3.81 indicated a strong presence. The analysis of mean values provides an evidence for understanding the first objective of the study about the extent of presence of knowledge management practices among manufacturing firms.

Further, the sub-scales together bring out the extent of knowledge management practices in the organizations. So, the path analysis is carried out on the four constructs pertaining to knowledge management at the aggregate level along with work performance of the employees to understand the relationship between both. Figure 2 shows the resulting research model. It can be seen from Fig. 2 that all path directions matched those defined in the conceptual research model. In addition, the parameters of path from knowledge creation practices to sharing to storage and knowledge utilization indicated significant. All of the path coefficients were statistically significant and greater than which is considered meaningful. The relationship between knowledge creation, sharing, storage and usage were statistically significant and knowledge creation practices has an impact on knowledge sharing practices ($r = 0.872$ and $t = 54.523$, H_1 supported). Also, knowledge sharing practices showed significance and positive impact on knowledge storage ($r = 0.653$ and $t = 20.178$, H_2 supported) and the relationship between knowledge storage and usage was statistically significant ($r = 0.517$ and $t = 9.759$, H_3 supported). Hence, it is reasonable to conclude that knowledge management practices like knowledge creation, sharing, storage and utilization are prevalent in pump manufacturing firms and the practice of one positively influences the other.

Additionally, the knowledge usage and work performance relationship was statistically significant ($r = 0.349$, $t = 5.154$, H_4 supported). Thus, knowledge management practices have a positive impact on individuals work performance in terms of increasing their efficiency, effectiveness and timeliness of doing their work. Managerial implications are given after.

Table 5: Mean values of constructs and sub-scales

Constructs	Sub-scales	Mean	Overallmean
Knowledge creation	Originating ba	3.70	3.68
	Dialoguing ba	3.72	
	Exercising ba	3.75	
	Systematizing ba	3.56	
Knowledge sharing	Organizational factors	3.71	3.65
	Employee focused factors	3.74	
	Technology factors	3.65	
Knowledge storage	Tacit knowledge capture	3.47	3.39
	Systematic process for gathering explicit knowledge	3.48	
	Maintenance of knowledge catalogue	3.29	
	Co-ordination of knowledge repositories	3.33	
Knowledge utilization	New knowledge embedded in work practices	3.64	3.81
	Leveraging knowledge from external agents	3.87	
	Application of knowledge gained from previous experience	4.08	
	Technology to access knowledge	3.65	

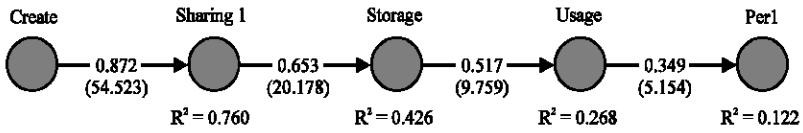

Fig. 2: Research model

DISCUSSION

It is obvious from the results that knowledge management practice is a significant variable affecting the performance of individuals. The results support hypothesis H_1, indicating that knowledge creation practices are significant in pump manufacturing firms. This finding is consistent with previous results (Bennett, 2001; Janz and Prasarnphanich, 2003; Peltokorpi *et al*., 2007). This implies that firms in pump manufacturing industry give importance to knowledge creation because the need for knowledge creation and renewal is particularly sensitive for small organizations (Martin *et al*., 2002). The results also indicate that knowledge creation happens through the four types of ba (Nonaka and Konno, 1998). Hence, manufacturing firms that would like to enhance the knowledge sharing among employees should form a platform which is physical or virtual that nurtures more formal and informal dialogues, communication, interaction and also should provide enough opportunities for exercising and practicing new concepts and ideas and learn by self-refinement. The mean values of the four ba's given in Table 5 shows that originating, dialoguing and exercising ba scored similar values (3.70, 3.72 and 3.75, respectively) but systematizing ba has a mean value of 3.56 which is comparatively low. Cyber space is not much utilized for interaction and knowledge creation and the existing IT infrastructure is a major obstacle for introducing new ideas and technologies in manufacturing industry. Cyber ba presumably improves the utilization of technology, disseminates knowledge quickly and precisely and promotes the generation of fresh ideas capable of elevating the firm to higher levels of efficiency (Bennet, 2001). Therefore, the suggestion is that organizations that are willing to enhance work performance and sustain in the long run should build an environment conducive for knowledge creation and also develop and utilize the necessary IT infrastructure for nurturing new knowledge.

Second hypothesis H_2 is supported by the study indicating that knowledge sharing practices are prevalent in pump manufacturing firms. Also, the study show cases that organizational, employee focused and technical factors, induce and support the employees to share knowledge leading to enhanced work performance. This result is consistent with previous findings (Sondergaard *et al*., 2007; Lin, 2007; Zahra and Mohammad, 2010; Saenz *et al*., 2009; Chatzoglou and Vraimaki, 2009; El Harbi *et al*., 2011). The mean values given in Table 5, indicates that organizational factors like organizational structure, climate, opportunities to share, top management support and reward system and employee focused factors like trust among employees, mentoring by senior employees and attitude scored similar values (3.71 and 3.74, respectively). Allowing employees to participate in decision making process and forming cross-functional teams and a supportive organizational climate helps in knowledge sharing. In addition, building mutual trust among employees, proper attitude and allowing employees to be mentored by senior colleagues, also promotes knowledge sharing. Mentoring programs

are benefit to organizations, as mentors share their tacit knowledge and demonstrate their skills and behaviors to others (Handzic and Hasan, 2003). Finally, the effect of information technology usage for knowledge sharing was examined and found that the mean value is comparatively low with 3.65 (Table 4). But, literature shows that existence and effective usage of knowledge sharing tools and level of comfort while using them supports and facilitates knowledge sharing (Merali, 2000; Huysman and Wulf, 2006). The manufacturing firms should provide emphasis on existence and usage of IT tools for knowledge sharing purposes. Hence, the suggestion is that a systematic effort to improve knowledge creation also tends to have better knowledge sharing practices; an effort in which relevant factors from different perspectives are considered.

Subsequent to knowledge sharing, hypothesis H_3 is also supported indicating that knowledge storage is practiced in pump manufacturing firms. The tacit knowledge held by employees is captured and stored in formal reports and also that explicit knowledge like manuals, documents and procedures are properly documented for future use. This result is consistent with previous studies (Gupta *et al*., 2000; Lim and Klobas, 2000; Gray, 2001; Egbu *et al*., 2005; Coakes, 2006; Ray, 2008). But the mean, Table 5 shows that mean values for maintenance of knowledge catalogue and repositories for storing knowledge is low (3.29 and 3.33, respectively). Knowledge catalogues and repositories are the means to store and access the knowledge for future use. And also, the overall mean value for knowledge storage practices is very low (3.39) when compared to other practices. This shows that organizations do not give adequate importance to storing the knowledge that has been created and shared. Hence, the suggestion through this research study is that the knowledge that is created and shared in an organization has to be documented and stored for further utilization to derive maximum benefits.

Finally the study supports hypothesis H_4, showing that knowledge that is created, shared and stored in the organization is utilized. This result is consistent with the previous studies (Bhatt, 2000; So and Bolloju, 2005; Koh *et al*., 2005; Chi *et al*., 2006; Fong and Lee, 2009). Also that knowledge utilization has significant impact and presumably improves work performance in terms of efficiency, effectiveness and timeliness. Table 5 also shows that knowledge utilization practice has a higher mean value of 3.81 compared to other knowledge management practices. This implies that the knowledge gained by employees from previous experience, projects or assignments when applied in their work yields better results. Further that organization should have sufficient technology and tools to access the knowledge that is stored and put to use. Hence, the suggestion is that extensive use of knowledge that is created and shared will work as a major catalyst and the manufacturing firms will be benefitted by better work performance.

The study also presented a significant understanding about the prevalence of knowledge management practices among pump manufacturing firms in this part of the region. The results in Fig. 2 shows that most of the knowledge that is created is shared and there is a greater impact between knowledge creation and sharing ($r = 0.872$ and $t = 54.523$). But then, the impact between sharing and storage and then utilization of knowledge shows reduced values ($r = 0.653$ and $t = 20.178$; $r = 0.517$ and $t = 9.759$) subsequently. This indicates, organizations have significant knowledge creation practices but knowledge sharing practices is not effective as knowledge creation and similarly knowledge storage and utilization. Also, the impact between knowledge utilization and work performance is $r = 0.349$ and $t = 5.154$ which has scope for further improvement. Hence, the knowledge that is as much created is not fully shared, the shared knowledge is not completely stored and also that stored knowledge is not adequately utilized. Hence, the suggestion is that manufacturing organizations can ensure that adequate systems and processes are available, so that knowledge whatever is created is shared, stored and utilized by the employees, so that they have the adequate knowledge to perform better and help the organizations to compete and sustain in the long run.

CONCLUSION

The findings generated from this study have implication for both practitioners and academicians throwing light on the nature of knowledge management practices, as well as better understanding of how organizations facilitate increased levels of knowledge creation, sharing, storage and utilization and perhaps increasing employee work performance. Research presented here, brings together well-accepted literature related to work performance of individuals and linking it with current research of knowledge management. Work performance as a measure of outcome of knowledge management practices in organizations has provided a metric to measure the extent of knowledge management practices which is often difficult to measure. Statistically significant hypothesis provide support for the robustness of the proposed research model, thus, providing enough evidence that the time and effort spent on establishing the knowledge management practices will yield capacity building of the employees and hence better performance in their work.

The study provides inputs to the practitioners in the manufacturing industry to understand:

- To what extent organizations provide the physical and virtual platform and space (called as ba by Nonaka and Konno (1998) for knowledge creation
- To what degree, organizational factors like organization climate and structure, cross-functional teams, top management support and rewards; employee focused factors like trust, attitude and mentoring and technology utilization influence knowledge sharing
- To what degree the organization has systems and processes to capture and store the shared knowledge
- To what extent the organization has means to access and utilize the knowledge that is created and stored

The answers to these questions provide meaningful insights for manufacturing firms to invest time and effort in creating structures, processes and systems to encourage learning and knowledge management.

The study presented here strongly suggests that increased levels of knowledge management practices will lead to increased employee work performance. This will further have a greater influence on the organizational performance (Carlucci and Schiuma, 2006; Anantatmula, 2007; Sigala and Chalkiti, 2007). This indicates that creating knowledge, sharing of knowledge that is created, storing of knowledge that is shared and utilizing of knowledge in the work practices of the employees will translate into improved efficiency of work outcomes, reaching higher levels of effectiveness in job and also ability to meet the time-lines and goals set in the organizations. This gives rise to second order benefits of increased organizational performance which will lead to sustainability and competitive advantage. Employees capacity is being built and they tend to perform better, if adequate knowledge is available to them for utilization which can be absorbed and embedded in their work. This leads to inclusive growth of all the employees paving way to sustainable growth of organizations as knowledge is an intangible asset which lies inherent within organizations and is unique to them.

The study can further be extended to understand other knowledge management facets like knowledge acquisition from outside the organization, knowledge identification, capture and refinement within the organization. Understanding the relationship of these practices with the work performance is one potential research area for further studies.

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