**The Interrelationship between Knowledge Management and Technology Knowledge Management Enabler - A Case study of Employees of Sudanese Ministry of Petroleum and Minerals**

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**Abstract:** This study mainly focused on the relationship among the variables of the Knowledge Management Processes (KMP) and the variables of the Technology Knowledge Management Enabler (TKME), the relationship between the knowledge creation KC and the knowledge storage KS, the relationship between the knowledge creation KC and the knowledge distribution KD, the relationship between the knowledge creation KC and the knowledge application KA, the relationship between the knowledge storage KS and the knowledge distribution KD, the relationship between the KS and the KA finally the relationship between the KD and the KA. The paper depends on a simple random sample of size 400 items. A questionnaire of 27 variables or question was used to collect data from employees of Sudanese ministry of petroleum and minerals during January 2019. In the final results, there are positive relationships among the studied variables. There were highly significance positive correlations between the items of the knowledge KC, KS, KD and KA. Also there were highly significance positive correlation between the components of the KMP and the TKME.

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1. **Introduction**

According to Hana (2012), employees and generally human resources are indispensable components for organizations. The competitive advantage of organizations lays mainly in the way their employees use their knowledge, experience and skills (Chai, Wang, Song, Haiman & Brombacher, 2012; Argote & Ingram, 2002). All employees have knowledge independently of the kind of jobs they do (Wang & Wang, 2012; Beazley, Boenisch, & Harden, 2002). Today the intangible assets are in the capital of knowledge and are the most important and the most valuable things for organizations (Levy, 2011; Cabrera, Collins, & Salgado, 2006; Beazley et al., 2002; Drucker, 1985). To use knowledge capital effectively it is very important that there is continuous (continual) knowledge transfer, especially inside the organization. Every employee must have the necessary knowledge, experience and skills needed for their work when the previous incumbent leaves the organization (Eucker, 2007; Leonard, 2005). Retaining as much knowledge continuity as possible ensures the minimum of amount change (Levy, 2011). This can help address human resources problems (for example letter of resignation, death of employee).

Knowledge Management is the explicit and systematic management of vital knowledge - and its associated processes of creation, organization, diffusion, use and exploitation.

Knowledge assets have often become more important to companies than financial and physical assets and are often the only way for a company to distinguish itself from its competitor & gain competitive advantage.

Lost knowledge given the enormous of baby boomers that will be changing jobs or retiring in next few years cause productivity cost of an employee leaving 85% of their base salary due to their replacement’s mistakes, lost knowledge and lost skill ( Beazley et al, 2002)

Relate to the concept of knowledge half-life, from which it is found that knowledge reaches obsolescence, on average, in 500 days, but can be much quicker in some areas.

- Lost knowledge obviously has a cost, estimated that $115 billion sits idle in lost knowledge affiliated with production technologies.

- An astounding example of this is the loss of the original computer source code, written in the 1950’s, that spawned the Y2K software crisis, has cost businesses worldwide an estimated $1 trillion (Petch, 1998), Dalkir, (2011)

This paper presents the concept of mastery of knowledge management process and its importance, and the relationships between the items of the knowledge management process and the relationship with Applied study on the employees of the Sudanese ministry of petroleum and minerals. This paper concentrated on knowledge management process and technology knowledge management enabler. There are other papers will study knowledge team, business process management and decision making process.

This paper cares about the descriptive and the inferential statistics in collecting and analyzing data.

**1-2 Research Problem**

Military governments that have governed Sudan for more than 50 years were not priorities and interests of knowledge management and its requirements. A strong relationships are expected between components of the KMP and the TKME.

**1-3 Research Objectives**

To identify the relationships that connect the elements of KMP and the TKME.

**1-4 Hypotheses**

H1: There is a positive relationship among the variables of the (KMP) and the variables of the (TKME).

H2: There is a positive relationship between the KC and the KS

H3: There is a positive relationship between the KC and the KD

H4: There is a positive relationship between the KC and the KA

H5: There is a positive relationship between the KS and the KD

H6: There is a positive relationship between the KS and the KA

H7: There is a positive relationship between the KD and the KA

H8: There is a positive relationships between the TKML from one side and KC, KS, KD and KA from other side.

**1-5 Definition of the variables:**

ThevariablesKMP1**,** KMP2,…, KMP32 were defined in the attached questionnaire in the appendix1 and the variables TKME33, TKME34,…, TKME37 were defined in the attached questionnaire in the appendix2. The Knowledge Creation (KC) was the average of the variables KMP1, KMP2,.., KMP7. The Knowledge Storage (KS) was the average of the variables KMP8, KMP9,.., KMP15. The Knowledge Distribution (KD) was the average of the variables KMP16, KMP17,.., KMP25. The Knowledge Application (KA) was the average of the variables KMP26, KMP27,.., KMP32. The Technology Knowledge Management Enabler (TKME) was the average of the variables TKME33, TKME34,.., TKME37.

**1-6 Determination of the sample size:**

A simple random sample of the employees of Sudanese ministry of petroleum and minerals was used in this research.

Formula (1) was used to determine the sample size.



n is the required sample size

P is the percentage occurrence of a state or condition

q = 1- p

e is the percentage maximum error required

Z is the value corresponding to level of confidence required

By putting z=2, p=q=0.5 and e=0.05 we have n=400

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**2- Analysis of Data**

Table (1) shows total Cronbach's Alpha, that was 0.937. In table (2), there is no Cronbach's Alpha greater than 0.937 therefore, all variables should be in the questionnaire.

**Table (1): Reliability Statistics**

|  |  |  |
| --- | --- | --- |
| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
| .937 | .936 | 37 |

**Table (2): Item-Total Statistics**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
| KMP1 | 138.90 | 324.762 | .600 | . | .938 |
| KMP2 | 138.69 | 329.392 | .499 | . | .939 |
| KMP3 | 138.55 | 334.884 | .284 | . | .940 |
| KMP4 | 138.44 | 333.720 | .322 | . | .940 |
| KMP5 | 138.93 | 320.737 | .612 | . | .938 |
| KMP6 | 138.85 | 325.324 | .522 | . | .938 |
| KMP7 | 138.90 | 326.516 | .473 | . | .939 |
| KMP8 | 138.95 | 324.301 | .553 | . | .938 |
| KMP9 | 138.75 | 324.293 | .543 | . | .938 |
| KMP10 | 138.94 | 324.175 | .552 | . | .938 |
| KMP11 | 138.87 | 323.761 | .612 | . | .938 |
| KMP12 | 138.69 | 323.919 | .574 | . | .938 |
| KMP13 | 139.04 | 321.648 | .552 | . | .938 |
| KMP14 | 138.91 | 328.237 | .447 | . | .939 |
| KMP15 | 138.92 | 322.319 | .585 | . | .938 |
| KMP16 | 138.85 | 322.113 | .611 | . | .938 |
| KMP17 | 138.64 | 335.269 | .309 | . | .940 |
| KMP18 | 138.77 | 328.869 | .516 | . | .938 |
| KMP19 | 138.55 | 329.216 | .503 | . | .939 |
| KMP20 | 138.94 | 326.778 | .529 | . | .938 |
| KMP21 | 138.95 | 325.359 | .571 | . | .938 |
| KMP22 | 138.73 | 330.546 | .458 | . | .939 |
| KMP23 | 138.85 | 323.311 | .619 | . | .938 |
| KMP24 | 138.77 | 329.169 | .454 | . | .939 |
| KMP25 | 139.62 | 324.522 | .374 | . | .941 |
| KMP26 | 138.75 | 327.954 | .574 | . | .938 |
| KMP27 | 138.83 | 327.759 | .595 | . | .938 |
| KMP28 | 138.89 | 326.943 | .559 | . | .938 |
| KMP29 | 139.03 | 327.378 | .469 | . | .939 |
| KMP30 | 138.88 | 327.022 | .613 | . | .938 |
| KMP31 | 138.81 | 327.448 | .542 | . | .938 |
| KMP32 | 138.91 | 322.270 | .651 | . | .937 |
| TKME33 | 138.86 | 322.129 | .674 | . | .937 |
| TKME34 | 139.11 | 320.106 | .616 | . | .938 |
| TKME35 | 139.02 | 323.842 | .684 | . | .937 |
| TKME36 | 139.07 | 325.892 | .455 | . | .939 |
| TKME37 | 138.87 | 322.618 | .626 | . | .937 |

Table 3 shows that, KMO and Bartlett's test. The sample size is quite enough because KMO measure was 0.846, which is greater than 0.5 and because, the P-value (Sig.) was 0.000, the number of the variables was suitable for the study.

**Table (3): KMO and Bartlett's Test**

|  |  |
| --- | --- |
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | 0.846 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 8530.876 |
| df | 666 |
| Sig. | 0.000 |

Table 4 shows that, most of the correlation coefficients among the variables of the Knowledge Management Process (KMP) and the variables of the Technology Knowledge Management Enabler (TKME) were highly significance. There were no significant correlation between TKME33 and KMP17, TKME34 and KMP3, TKME35 and KMP4, TKME36 and KMP14, TKME36 and KMP19. Only five pairs of variables out of 160 pairs of variables have insignificant correlation, that means 97% of the variables have positive significant correlation.

**Table (4): Correlation Coefficients Among The Variables of The (KMP) and The Variables of The (TKME)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | TKME33 | TKME34 | TKME35 | TKME36 | TKME37 |
| KMP1 | Correlation Coefficient | .327\*\* | .320\*\* | .295\*\* | .234\*\* | .350\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP2 | Correlation Coefficient | .373\*\* | .257\*\* | .312\*\* | .209\*\* | .272\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP3 | Correlation Coefficient | .102\* | .048 | .143\*\* | .129\*\* | .233\*\* |
| Sig. (2-tailed) | .042 | .335 | .004 | .010 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP4 | Correlation Coefficient | .187\*\* | .110\* | .048 | .138\*\* | .103\* |
| Sig. (2-tailed) | .000 | .027 | .336 | .006 | .040 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP5 | Correlation Coefficient | .431\*\* | .422\*\* | .461\*\* | .212\*\* | .325\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP6 | Correlation Coefficient | .237\*\* | .196\*\* | .260\*\* | .007 | .275\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .893 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP7 | Correlation Coefficient | .261\*\* | .281\*\* | .212\*\* | .202\*\* | .253\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP8 | Correlation Coefficient | .455\*\* | .398\*\* | .448\*\* | .273\*\* | .265\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP9 | Correlation Coefficient | .431\*\* | .181\*\* | .290\*\* | .139\*\* | .281\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .005 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP10 | Correlation Coefficient | .345\*\* | .237\*\* | .406\*\* | .338\*\* | .216\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP11 | Correlation Coefficient | .403\*\* | .405\*\* | .485\*\* | .333\*\* | .446\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP12 | Correlation Coefficient | .308\*\* | .343\*\* | .452\*\* | .319\*\* | .315\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP13 | Correlation Coefficient | .442\*\* | .394\*\* | .429\*\* | .191\*\* | .251\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP14 | Correlation Coefficient | .462\*\* | .197\*\* | .314\*\* | .076 | .178\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .131 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP15 | Correlation Coefficient | .350\*\* | .354\*\* | .299\*\* | .192\*\* | .389\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP16 | Correlation Coefficient | .344\*\* | .302\*\* | .400\*\* | .200\*\* | .415\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP17 | Correlation Coefficient | .050 | .322\*\* | .259\*\* | .291\*\* | .320\*\* |
| Sig. (2-tailed) | .316 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP18 | Correlation Coefficient | .388\*\* | .316\*\* | .333\*\* | .285\*\* | .209\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP19 | Correlation Coefficient | .285\*\* | .135\*\* | .284\*\* | .075 | .251\*\* |
| Sig. (2-tailed) | .000 | .007 | .000 | .134 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP20 | Correlation Coefficient | .400\*\* | .381\*\* | .429\*\* | .253\*\* | .243\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP21 | Correlation Coefficient | .398\*\* | .391\*\* | .392\*\* | .249\*\* | .332\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP22 | Correlation Coefficient | .244\*\* | .314\*\* | .331\*\* | .208\*\* | .278\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP23 | Correlation Coefficient | .478\*\* | .483\*\* | .402\*\* | .222\*\* | .233\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP24 | Correlation Coefficient | .260\*\* | .384\*\* | .249\*\* | .183\*\* | .225\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP25 | Correlation Coefficient | .248\*\* | .239\*\* | .250\*\* | .116\* | .139\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .020 | .005 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP26 | Correlation Coefficient | .264\*\* | .355\*\* | .471\*\* | .300\*\* | .360\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP27 | Correlation Coefficient | .497\*\* | .412\*\* | .365\*\* | .198\*\* | .340\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP28 | Correlation Coefficient | .403\*\* | .353\*\* | .395\*\* | .317\*\* | .321\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP29 | Correlation Coefficient | .310\*\* | .452\*\* | .356\*\* | .289\*\* | .265\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP30 | Correlation Coefficient | .536\*\* | .327\*\* | .433\*\* | .183\*\* | .330\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP31 | Correlation Coefficient | .423\*\* | .454\*\* | .437\*\* | .335\*\* | .409\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KMP32 | Correlation Coefficient | .433\*\* | .375\*\* | .381\*\* | .215\*\* | .341\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| \*. Correlation is significant at the 0.05 level (2-tailed). |
| \*\*. Correlation is significant at the 0.01 level (2-tailed). |
| Correlation with red color is insignificant at the 0.05 level (2-tailed). |

Table 5 shows that, all the correlation coefficients among the Knowledge Creation (KC), Knowledge Storage (KS), Knowledge Distribution (KD), Knowledge Application (KA) and Technology Knowledge Management Enabler (TKME) were highly significance.

**Table (5): Correlations among KC, KS, KD, KA and TKME**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | TKME | KC | KS | KD | KA |
| TKME | Pearson Correlation | 1 | .619\*\* | .710\*\* | .696\*\* | .750\*\* |
| Sig. (2-tailed) |  | .000 | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KC | Pearson Correlation | .619\*\* | 1 | .716\*\* | .739\*\* | .623\*\* |
| Sig. (2-tailed) | .000 |  | .000 | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KS | Pearson Correlation | .710\*\* | .716\*\* | 1 | .764\*\* | .643\*\* |
| Sig. (2-tailed) | .000 | .000 |  | .000 | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KD | Pearson Correlation | .696\*\* | .739\*\* | .764\*\* | 1 | .727\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 |  | .000 |
| N | 400 | 400 | 400 | 400 | 400 |
| KA | Pearson Correlation | .750\*\* | .623\*\* | .643\*\* | .727\*\* | 1 |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 |  |
| N | 400 | 400 | 400 | 400 | 400 |
| \*\*. Correlation is significant at the 0.01 level (2-tailed). |

Table 6 shows that, the sample size, mean, median, mode, standard deviation, minimum and maximum value of the variables of the research.

**Table (6): Descriptive Statistics of the variables**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | KMP1 | KMP2 | KMP3 | KMP4 | KMP5 | KMP6 | KMP7 | KMP8 | KMP9 | KMP10 |
| N | Valid | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| Missing | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mean | 3.82 | 4.03 | 4.17 | 4.29 | 3.79 | 3.88 | 3.82 | 3.77 | 3.97 | 3.78 |
| Median | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Mode | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Std. Deviation | .850 | .767 | .802 | .806 | 1.008 | .938 | .961 | .938 | .953 | .945 |
| Minimum | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Maximum | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

|  |
| --- |
| Belongs to table (6) |
|  | KMP11 | KMP12 | KMP13 | KMP14 | KMP15 | KMP16 | KMP17 | KMP18 | KMP19 |
| N | Valid | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| Missing | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mean | 3.86 | 4.03 | 3.68 | 3.81 | 3.80 | 3.87 | 4.09 | 3.95 | 4.18 |
| Median | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Mode | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Std. Deviation | .877 | .924 | 1.065 | .913 | .980 | .951 | .713 | .769 | .770 |
| Minimum | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| Maximum | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

|  |
| --- |
| Belongs to table (6) |
|  | KMP20 | KMP21 | KMP22 | KMP23 | KMP24 | KMP25 | KMP26 | KMP27 | KMP28 |
| N | Valid | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| Missing | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mean | 3.78 | 3.77 | 4.00 | 3.87 | 3.95 | 3.11 | 3.98 | 3.90 | 3.83 |
| Median | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 3.00 | 4.00 | 4.00 | 4.00 |
| Mode | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Std. Deviation | .856 | .863 | .764 | .888 | .848 | 1.307 | .739 | .723 | .805 |
| Minimum | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 |
| Maximum | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

|  |
| --- |
| Belongs to table (6) |
|  | KMP29 | KMP30 | KMP31 | KMP32 | TKME33 | TKME34 | TKME35 | TKME36 | TKME37 |
| N | Valid | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| Missing | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mean | 3.69 | 3.85 | 3.91 | 3.82 | 3.86 | 3.62 | 3.70 | 3.65 | 3.85 |
| Median | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Mode | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Std. Deviation | .922 | .735 | .804 | .890 | .867 | 1.029 | .788 | 1.030 | .908 |
| Minimum | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| Maximum | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

**3- Results (Finding):-**

* The sample size and the number of the variables are suitable for the research.
* All the assumed hypotheses are investigated and found correct.
* 97% of the variables have positive significant correlation.
* 3% of the variables have insignificant correlation.
* Most of the correlation coefficients among the variables of the **KMP and the variables of the** TKME were highly significance.
* All the correlation coefficients among the Knowledge Creation (KC), Knowledge Storage (KS), Knowledge Distribution (KD), Knowledge Application (KA) and Technology Knowledge Management Enabler (TKME) were highly significance.

**4- Conclusion:-**

* There are significant correlations among The variables of the KMP and the variables of TKME.
* There are mutual effect between the KMP and the TKME.
* The KMP and the TKME will not separate.

**5- Recommendations:-**

* Sudanese Ministry of Petroleum and Minerals should be interested the KMP and the TKME.
* To do further study including knowledge team, business process management and decision making process.
* Perform the same study in other Sudanese ministries.

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**Appendix**

Appendix1: Knowledge Management Process (KMP)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Variable** | **I: Knowledge Creation:** | **Please tick** |
|  | **SD** | **D** | **N** | **A** | **SA** |
| 1 | KMP1 |  A number of mechanisms have been used to create or acquire knowledge from different sources such as volunteers, clients, donors or competitors. |  |  |  |  |  |
| 2 | KMP2 | Policies are placed to allow employees to present new ideas without fear and ridicule. |  |  |  |  |  |
| 3 | KMP3 | It is important to capture the experiential knowledge of staff for organisational use. |  |  |  |  |  |
| 4 | KMP4 | It is important to capture lessons learnt at various stages of the project |  |  |  |  |  |
| 5 | KMP5 | The experiential knowledge of staff is usually converted into written documents accessible to the organisation. |  |  |  |  |  |
| 6 | KMP6 | Staff are encouraged to find alternative solutions to promote construction projects. |  |  |  |  |  |
| 7 | KMP7 | New knowledge is usually created to solve specific problems during project development. |  |  |  |  |  |
|  | **Variable** | **I: Knowledge Creation:** | **Please tick** |
|  | **SD** | **D** | **N** | **A** | **SA** |
| 8 | KMP8 | Different mechanisms are used for collating sources and types of knowledge. |  |  |  |  |  |
| 9 | KMP9 | There is a standard process for storing reference material such as policies, procedure manuals, standards, guidelines, strategies, directory of expertise, ideas, notable successes or other practical information. |  |  |  |  |  |
| 10 | KMP10 | Databases or information technologies are utilized to store reference material. |  |  |  |  |  |
| 11 | KMP11 | Various written documents such as newsletters or manuals to store captured information from employees and others are available. |  |  |  |  |  |
| 12 | KMP12 | There is a register or database of skills, expertise and knowledge sources. |  |  |  |  |  |
| 13 | KMP13 | Records and written documents are used to store knowledge. |  |  |  |  |  |
| 14 | KMP14 | Computer and other digital information media storage are used.  |  |  |  |  |  |
| 15 | KMP15 | There is a system to control the tangible knowledge assets.  |  |  |  |  |  |
|  | **Variable** | **III: Knowledge Distribution** | **Please tick** |
|  | SD | **D** | **N** | **A** | **SA** |
| 16 | KMP16 | knowledge in a form that is readily accessible to employees. |  |  |  |  |  |
| 17 | KMP17 | There are libraries, resource centres or other forums to disseminate knowledge or expertise. Like |  |  |  |  |  |
| 18 | KMP18 | There are regular symposiums, lectures, conferences, or training sessions to share knowledge and ideas. |  |  |  |  |  |
| 19 | KMP19 | Key domain experts are readily identified and contacted. |  |  |  |  |  |
| 20 | KMP20 | It is easy to find out who knows in my organisation. |  |  |  |  |  |
| 21 | KMP21 | Metaphorical representation and imaging of knowledge are utilised to distribute knowledge. |  |  |  |  |  |
| 22 | KMP22 | There are team works and regular meetings to transfer knowledge.  |  |  |  |  |  |
| 23 | KMP23 | Documents, publications and internal information network are used to distribute knowledge.  |  |  |  |  |  |
| 24 | KMP24 | Training and openness in the exchange of thought and dialogue are applied to distribute knowledge.  |  |  |  |  |  |
| 25 | KMP25 | Experienced staff members are encouraged to mentor the novice staff members |  |  |  |  |  |
|  | **Variable** | **IV: Knowledge Application:** | **Please tick** |
|  | **SD** | **D** | **N** | **A** | **SA** |
| 26 | KMP26 | Individuals are asked to keep stored knowledge current and up to date |  |  |  |  |  |
| 27 | KMP27 | Outcomes from previous experiments feed into the new organisation’s projects to improve them |  |  |  |  |  |
| 28 | KMP28 | There are mechanisms to convert knowledge into action plans. |  |  |  |  |  |
| 29 | KMP29 | There is a policy to review information on a regular basis. |  |  |  |  |  |
| 30 | KMP30 |  There are mechanisms for developing new ideas or ways of doing things from existing practices. |  |  |  |  |  |
| 31 | KMP31 | Barriers that stop individuals, experts and administrators from reaching to the knowledge are removed. |  |  |  |  |  |
| 32 | KMP32 | Staff members are encouraged to apply their implicit knowledge and experience to subsequent projects. |  |  |  |  |  |

**Appendix2: Technology Knowledge Management Enabler (TKM)**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Variable** |  | **Please tick** |
|  | SD | **D** | **N** | **A** | **SA** |
| 33 | TKME33 | My organisation keeps pace quickly with changes in technology.Technology is up-to-date in organisation  |  |  |  |  |  |
| 34 | TKME34 | There is a use of office automation systems (E- mail, automated retrieval of information, word processing, audio-video conferences) to carry out administrative tasks.  |  |  |  |  |  |
| 35 | TKME35 | Artificial intelligence systems are used in organisation.  |  |  |  |  |  |
| 36 | TKME36 | Information t**echnology** infrastructure is available. |  |  |  |  |  |
| 37 | TKME37 | Information t**echnology** supports collaborative work and intra-organisation communication  |  |  |  |  |  |

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