

References

- [1] "Competitive Strategy;," in *Competitive Strategy: Techniques for Analyzing Industries and Competitors*, 1998, pp. 1-32.
- [2] A. Frost, "Three KM Models," 2010. [Online]. Available: <http://www.knowledge-management-tools.net/three-km-models.html>.
- [3] "tutorialspoint - Models of KM Cycle," [Online]. Available: http://www.tutorialspoint.com/knowledge_management/models_of_km_cycle.htm. [Accessed 4 8 2016].
- [4] "SECI model (Nonaka Takeuchi)," [Online]. Available: http://www.12manage.com/methods_nonaka_seci.html. [Accessed 5 8 2016].
- [5] D. M. A. Pasha and D. S. Pasha, "Innovators Knowledge Services - Knowledge Portal (6.3)," [Online]. Available: <http://www.innovators.edu.pk/node/204>. [Accessed 5 8 2016].
- [6] "Theoretical Models of Information and Knowledge Management," [Online]. Available: http://www.tlu.ee/~sirvir/IKM/Theoretical_models_of_Information_and_Knowledge_Management/the_choo_sensemaking_km_model.html. [Accessed 5 8 2016].
- [7] D. M. A. Pasha and D. S. Pasha, "Innovators Knowledge Services - Knowledge Portals (6.4)," [Online]. Available: <http://www.innovators.edu.pk/node/205>. [Accessed 5 8 2016].
- [8] S. Drago and Alexandru, "Theoretical Models of Information and Knowledge Management," 2009. [Online]. Available: http://www.ann.ugal.ro/eco/doc2009_2/cristea_capatina.pdf. [Accessed 5 8 2016].
- [9] "HOW AT&T MANAGED KNOWLEDGE THROUGHOUT THE DIRECTTV AND AT&T MERGER," 2016. [Online]. Available: https://www.apqc.org/knowledge-base/download/373263/K06829_ATT_2016_KM_Conference_Overview.pdf. [Accessed 18 8 2016].
- [10] "OPENTEXT," [Online]. Available: <http://www.opentext.com/who-we-are/press-releases?id=92>. [Accessed 18 8 2016].
- [11] [Online]. Available: <http://www.prnewswire.com/news-releases/verizon-wirelesstm-selects-generation21tm-knowledge-management-software-as-a-nationwide-training-solution-76795072.html>. [Accessed 18 8 2018].
- [12] Vandna Sharma, "A perceptual study on KM," *International Journal of Educational Management*, pp. Vol. 26 Iss 3 pp. 234 - 251, 2011.
- [13] [Online]. Available: <https://www.coursehero.com/file/p4l8qm1/Cingulars-clients-are-often-the-ultimate-beneficiaries-of-the-companys/>. [Accessed 18 8 2016].

- [14] [Online]. Available: http://paper.ijcsns.org/07_book/201211/20121108.pdf. [Accessed 18 8 2016].
- [15] M. Steve, "The Design and Implementation of Effective Knowledge Management Systems," [Online]. Available: http://mackinstitute.wharton.upenn.edu/wp-content/uploads/2013/01/2005_2006___Morrissey___Steve___The_Design_and_Implementati on_of_Effective_Knowledge_Mgmt_Systems.pdf. [Accessed 18 8 2016].
- [16] [Online]. Available: http://www.providersedge.com/docs/km_articles/KM_The_Boygues_Telecom_Way.pdf. [Accessed 18 8 2016].
- [17] "KNOWLEDGE MANAGEMENT STRATEGY TO INCREASE THE INNOVATION OF THE TELECOMMUNICATION COMPANY," [Online]. Available: <http://www.jitbm.com/12th%20volume/rahadi9.pdf>. [Accessed 18 8 2016].
- [18] "Organizing Knowledge in Implementation of Knowledge Management as Strategy for Competitive Bussiness at PT Telkom," [Online]. Available: <https://core.ac.uk/download/files/379/11734698.pdf>. [Accessed 18 8 2016].
- [19] "Creating Global Talents and Opportunities (section G)," [Online]. Available: http://www.telkom.co.id/UHI/CDInteraktif2013/EN/0088_konsistensi.html. [Accessed 18 8 2016].
- [20] [Online]. Available: <http://documents.bmc.com/products/documents/12/90/91290/91290.pdf>. [Accessed 21 7 2016].
- [21] J. W. X. Shi, "CROSS-CULTURAL COMPARISON OF HOFSTEDE'S DIMENSIONS," *ternational Journal of Business and Management*, vol. 6, p. 5, 2011.
- [22] "Geert Hofstede," itim international, 2016. [Online]. Available: <https://geert-hofstede.com/>. [Accessed September 2016].
- [23] I. Nonaka, "A Dynamic Theory of Organizational Knowledge Creation," Vols. *Organization Science*, Vol. 5, No. 1 (Feb., 1994), pp. 14-37, p. P207, 1994.
- [24] M. Armstrong, *Armstroneg's Handbook*, 2012.
- [25] N. Anderson, F. Lievens, K. v. Dam and A. M. Ryan, "Future Perspectives on Employee Selection:," *Key Directions for Future Research and Practice*, p. 487–501, 2004.
- [26] D. Pollitt, "Human Resource Management International Digest," pp. pp. 6 - 8, 2007.
- [27] Tzimas, "An integrated e-recruitment system for," 2012.
- [28] "Knowledge Management Inc," Knowledge Management Inc, [Online]. Available: <http://www.knowledgemanagement.net/index.php>. [Accessed 18 8 2016].

Appendix A: Online survey questions

Number	Question	Dialog	Mobitel	Etisalat	Hutch	Airtel
1	I am working in an engineering job at...					
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
2	I believe an engineering solution greatly contributes to the success of the telecommunication business					
3	I believe Knowledge management system is important to capture situational knowledge and update individual knowledge					
4	I believe knowledge management is very important for the mobile telecommunication engineering field					
5	Do you have a Knowledge management system to capture tacit knowledge (situational knowledge)?					
6	I believe our organization's management promotes synergy among employees					
7	Our Management encourages "Participation of employees in decision-making"					
8	I believe organization management always absorbs uncertainties when an employee make some mistake while testing a new idea or a new concept					

9	Our organization provide formal training programs to newly recruited engineers and technical officers to interact technical experts in the organization					
10	Newly recruited engineers and technical officers frequently engage with technical experts in the organization					
11	We often have a gathering to interact and build good relationship between employees					
12	I trust my boss					
13	I trust my subordinate					
14	I trust my peer workers					
15	We often have brainstorming sessions when there is a new problem or a critical decision to be taken					
16	We frequently update an internal forum to share new ideas, concepts, and trends					
17	Management encourages Functional conflicts (Functional conflicts are conflicts that are important to improve efficiency and effectiveness of the business operation)					
18	Engineering division maintains proper operational and planning manuals and keep them up-to-date					
19	We continuously update an internal knowledge management system and share knowledge					
20	Newly recruited Engineers and technical officers refer manuals frequently					
21	Newly recruited Engineers and technical officers frequently access the internal knowledge management system to obtain knowledge					
22	We provide opportunities to Self-assessment of employee's knowledge by having frequent quizzers and tests					

23	Management encourages to share quality information among the employees					
24	Management always encourages competition among employees					
25	Management encourages constructive criticism to provide better service to customers (constructive criticism is referred to as criticism or advice that is useful and intended to help or improve something, often with an offer of possible solutions)					
26	Employees in our organization are willing to share knowledge					
27	When there is a problem or doubt, I can easily reach a technical expert in our organization					
28	Our organization has a proper career progression plan based on individual competency					
29	I believe the organization provide great opportunities to enhance my knowledge					
30	I am willing to contribute knowledge management system to uplift shared knowledge					

		Strongly oppose	Somewhat oppose	Neutral	Support	Strongly Support
31	If management introduces a Knowledge management system to share knowledge, are you willing to Support?					
32	What are features that you expect from Knowledge management system?					

Appendix B: Sample size calculation

Total population (N) = 1200

Confident interval = 90%

Margin of error (E) = 10%

$$\text{Sample size} = \frac{\frac{Z^2 \times P \times (1 - P)}{E^2}}{1 + \frac{(Z^2 \times P \times (1 - P))}{N \times E^2}}$$

For optimal sample size $P = 0.5$,

90% confident interval $Z = 1.65$

$$\text{Sample size} = \frac{\frac{1.65^2 \times 0.5 \times (1 - 0.5)}{0.1^2}}{1 + \frac{(1.65^2 \times 0.5 \times (1 - 0.5))}{1200 \times 0.1^2}}$$

Sample size = 64

Appendix C: Relative weight calculation

- F1 function relative weight calculation

Expert	Q9	Q10	Q11	Q12	Q13	Q14	Q27	Q30
Expert 1	12	32	27	3	3	4	12	7
Expert 2	15	27	31	5	5	7	6	4
Expert 3	8	33	32	3	4	4	11	5
Expert 4	9	28	30	6	7	6	11	3
Expert 5	6	30	30	8	6	4	10	6
Average Weights	10	30	30	5	5	5	10	5

$$F1 = 0.1Q9 + 0.3Q10 + 0.3Q11 + 0.05Q12 + 0.05Q13 + 0.05Q14 + 0.1Q27 + 0.05Q30$$

- F2 function relative weight calculation

Expert	Q15	Q16	Q17
Expert 1	25	63	12
Expert 2	22	60	18
Expert 3	15	57	28
Expert 4	17	62	21
Expert 5	21	58	21
Average Weights	20	60	20

$$F2 = 0.2Q15 + 0.6Q16 + 0.2Q17$$

- F3 function relative weight calculation

Expert	Q18	Q19
Expert 1	35	65
Expert 2	30	70
Expert 3	25	75
Expert 4	30	70
Expert 5	30	70
Average Weights	30	70

$$F3 = 0.3Q18 + 0.7Q19$$

- F4 function relative weight calculation

Expert	Q20	Q21	Q22
Expert 1	15	75	10
Expert 2	17	65	18
Expert 3	16	70	14
Expert 4	12	68	20
Expert 5	15	72	13
Average Weights	15	70	15

$$F4 = 0.15Q20 + 0.7Q21 + 0.15Q22$$

- F5 function relative weight calculation

Expert	Q2	Q3	Q4	Q6	Q7	Q8
Expert 1	4	4	3	25	18	46
Expert 2	6	4	5	26	20	39
Expert 3	8	6	4	24	22	36
Expert 4	4	5	6	24	20	41
Expert 5	3	6	7	26	20	38
Average Weights	5	5	5	25	20	40

$$F5 = 0.05Q2 + 0.05Q3 + 0.05Q4 + 0.25Q6 + 0.2Q7 + 0.4Q8$$

- F6 function relative weight calculation

Expert	Q26	Q27	Q28	Q29	Q30
Expert 1	37	8	7	11	37
Expert 2	45	10	12	13	20
Expert 3	45	12	10	8	25
Expert 4	38	12	9	10	31
Expert 5	35	8	12	8	37
Average Weights	40	10	10	10	30

$$F6 = 0.4Q26 + 0.1Q27 + 0.1Q28 + 0.1Q29 + 0.3Q30$$

- F7 function relative weight calculation

Expert	Q23	Q24	Q25	Q26	Q29
Expert 1	40	6	5	45	4
Expert 2	45	7	5	36	7
Expert 3	50	4	4	38	4
Expert 4	47	5	6	36	6
Expert 5	43	3	5	45	4
Average Weights	45	5	5	40	5

$$F7 = 0.45Q23 + 0.05Q24 + 0.05Q25 + 0.4Q26 + 0.05Q29$$

Expert list is as below:

- Mr Chamara Prasanga Kumara- Senior manager Radio Access Operations, Mobitel
- Mr Raveendra Manimelwadu -Senior manager Core network operation, Mobitel
- Mr Hasitha Amarasinghe-Manager Broad band planning, Mobitel
- Mr Hasitha Hemal Ranaweera - Manager converge charging operation, Dialog
- Mr Dhanushka Senanayake - Manager radio network planning, Dialog

Appendix D: Survey Feedback

1) I am working in an Engineering job at...

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dialog	29	43.3	43.3	43.3
	Mobitel	19	28.4	28.4	71.6
	Etisalat	6	9.0	9.0	80.6
	Hutch	6	9.0	9.0	89.6
	Airtel	7	10.4	10.4	100.0
	Total	67	100.0	100.0	

2) I believe Engineering innovation & new solution greatly contributes to the success of the telecommunication business

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	1.5	1.5	1.5
	Neutral	3	4.5	4.5	6.0
	Agree	15	22.4	22.4	28.4
	Strongly agree	48	71.6	71.6	100.0
	Total	67	100.0	100.0	

3) I believe Knowledge management system is important to capture situational knowledge and update individual knowledge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	1.5	1.5	1.5
	Neutral	4	6.0	6.0	7.5
	Agree	24	35.8	35.8	43.3
	Strongly agree	38	56.7	56.7	100.0
	Total	67	100.0	100.0	

4) I believe knowledge management is very important for the mobile telecommunication engineering field

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	1.5	1.5	1.5
	Neutral	3	4.5	4.5	6.0
	Agree	19	28.4	28.4	34.3
	Strongly agree	44	65.7	65.7	100.0
	Total	67	100.0	100.0	

5) Do you have a Knowledge management system to capture tacit knowledge (situational knowledge)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	49	73.1	73.1	73.1
	Yes	18	26.9	26.9	100.0
	Total	67	100.0	100.0	

6) I believe our organization's management promotes synergy among employees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	1.5	1.5	1.5
	Disagree	5	7.5	7.5	9.0
	Neutral	20	29.9	29.9	38.8
	Agree	34	50.7	50.7	89.6
	Strongly agree	7	10.4	10.4	100.0
	Total	67	100.0	100.0	

7) Our Management encourages "Employees participation in decision making"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	1.5	1.5	1.5
	Disagree	11	16.4	16.4	17.9
	Neutral	22	32.8	32.8	50.7
	Agree	26	38.8	38.8	89.6
	Strongly agree	7	10.4	10.4	100.0
	Total		67	100.0	100.0

8) I believe organization management always absorbs uncertainties when an employee make some mistake while testing a new idea or a new concept

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	3.0	3.0	3.0
	Disagree	12	17.9	17.9	20.9
	Neutral	20	29.9	29.9	50.7
	Agree	26	38.8	38.8	89.6
	Strongly agree	7	10.4	10.4	100.0
	Total		67	100.0	100.0

9) Our organization provides formal training programs to newly recruited engineers and technical officers to interact with technical experts in the organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	5	7.5	7.5	7.5
	Disagree	20	29.9	29.9	37.3
	Neutral	13	19.4	19.4	56.7
	Agree	20	29.9	29.9	86.6
	Strongly agree	9	13.4	13.4	100.0
	Total		67	100.0	100.0

10) Newly recruited engineers and technical officers frequently engage with technical experts in the organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	13	19.4	19.4	19.4
	Neutral	12	17.9	17.9	37.3
	Agree	36	53.7	53.7	91.0
	Strongly agree	6	9.0	9.0	100.0
	Total	67	100.0	100.0	

11) We often have gatherings to interact and build good relationship between employees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	8	11.9	11.9	11.9
	Neutral	15	22.4	22.4	34.3
	Agree	36	53.7	53.7	88.1
	Strongly agree	8	11.9	11.9	100.0
	Total	67	100.0	100.0	

12) I trust my boss

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	3.0	3.0	3.0
	Disagree	3	4.5	4.5	7.5
	Neutral	11	16.4	16.4	23.9
	Agree	34	50.7	50.7	74.6
	Strongly agree	17	25.4	25.4	100.0
	Total	67	100.0	100.0	

13) I trust my subordinates

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	4.5	4.5	4.5
	Neutral	11	16.4	16.4	20.9
	Agree	36	53.7	53.7	74.6
	Strongly agree	17	25.4	25.4	100.0
	Total	67	100.0	100.0	

14) I trust my peer workers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	4	6.0	6.0	6.0
	Neutral	6	9.0	9.0	14.9
	Agree	43	64.2	64.2	79.1
	Strongly agree	14	20.9	20.9	100.0
	Total	67	100.0	100.0	

15) We often have brainstorming sessions when there is a new problem or when a critical decision has to be made

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	14	20.9	20.9	20.9
	Neutral	15	22.4	22.4	43.3
	Agree	34	50.7	50.7	94.0
	Strongly agree	4	6.0	6.0	100.0
	Total	67	100.0	100.0	

16) We frequently update an internal forum to share new ideas, concepts, and trends

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	3	4.5	4.5	4.5
	Disagree	34	50.7	50.7	55.2
	Neutral	19	28.4	28.4	83.6
	Agree	11	16.4	16.4	100.0
	Total	67	100.0	100.0	

17) Management encourages Functional conflicts

(Functional conflicts are conflicts that are important to improve efficiency and effectiveness of the business operation)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	1.5	1.5	1.5
	Disagree	12	17.9	17.9	19.4
	Neutral	29	43.3	43.3	62.7
	Agree	22	32.8	32.8	95.5
	Strongly agree	3	4.5	4.5	100.0
	Total	67	100.0	100.0	

18) Engineering division maintains proper operational and planning manuals and keep them up-to-date

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	12	17.9	17.9	17.9
	Neutral	23	34.3	34.3	52.2
	Agree	28	41.8	41.8	94.0
	Strongly agree	4	6.0	6.0	100.0
	Total	67	100.0	100.0	

19) We continuously update an internal knowledge management system and share knowledge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	8	11.9	11.9	11.9
	Disagree	26	38.8	38.8	50.7
	Neutral	18	26.9	26.9	77.6
	Agree	13	19.4	19.4	97.0
	Strongly agree	2	3.0	3.0	100.0
	Total		67	100.0	100.0

20) Newly recruited Engineers and technical officers frequently refer manuals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	1.5	1.5	1.5
	Disagree	12	17.9	17.9	19.4
	Neutral	23	34.3	34.3	53.7
	Agree	28	41.8	41.8	95.5
	Strongly agree	3	4.5	4.5	100.0
	Total		67	100.0	100.0

21) Newly recruited Engineers and technical officers frequently access the internal knowledge management system to obtain knowledge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	4	6.0	6.0	6.0
	Disagree	23	34.3	34.3	40.3
	Neutral	30	44.8	44.8	85.1
	Agree	10	14.9	14.9	100.0
	Total		67	100.0	100.0

22) We provide opportunities to Self-assessment of employee's knowledge by having frequent quizzers and tests

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	3	4.5	4.5	4.5
	Disagree	36	53.7	53.7	58.2
	Neutral	18	26.9	26.9	85.1
	Agree	9	13.4	13.4	98.5
	Strongly agree	1	1.5	1.5	100.0
	Total		67	100.0	100.0

23) Management encourages to share quality information among employees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	1.5	1.5	1.5
	Disagree	16	23.9	23.9	25.4
	Neutral	16	23.9	23.9	49.3
	Agree	26	38.8	38.8	88.1
	Strongly agree	8	11.9	11.9	100.0
	Total		67	100.0	100.0

24) Management always encourages competition among employees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	7	10.4	10.4	10.4
	Agree	22	32.8	32.8	43.3
	Neutral	27	40.3	40.3	83.6
	Disagree	10	14.9	14.9	98.5
	Strongly disagree	1	1.5	1.5	100.0
	Total		67	100.0	100.0

25) Management encourages constructive criticism for providing better service to customers

(Constructive criticism refer to criticism or advice useful and intended to help or improve something, often with an offer of possible solutions)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	1.5	1.5	1.5
	Disagree	9	13.4	13.4	14.9
	Neutral	22	32.8	32.8	47.8
	Agree	32	47.8	47.8	95.5
	Strongly agree	3	4.5	4.5	100.0
	Total		67	100.0	100.0

26) Employees in our organization are willing to share knowledge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	3.0	3.0	3.0
	Neutral	9	13.4	13.4	16.4
	Agree	41	61.2	61.2	77.6
	Strongly agree	15	22.4	22.4	100.0
	Total		67	100.0	100.0

27) When there is a problem or doubt, I can easily reach a technical expert in our organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	7.5	7.5	7.5
	Neutral	6	9.0	9.0	16.4
	Agree	38	56.7	56.7	73.1
	Strongly agree	18	26.9	26.9	100.0
	Total		67	100.0	100.0

28) Our organization has a proper career progression plan based on individual competency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	11	16.4	16.4	16.4
	Disagree	14	20.9	20.9	37.3
	Neutral	21	31.3	31.3	68.7
	Agree	19	28.4	28.4	97.0
	Strongly agree	2	3.0	3.0	100.0
	Total		67	100.0	100.0

29) I believe the organization provide great opportunities to enhance my knowledge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	1.5	1.5	1.5
	Disagree	9	13.4	13.4	14.9
	Neutral	20	29.9	29.9	44.8
	Agree	31	46.3	46.3	91.0
	Strongly agree	6	9.0	9.0	100.0
	Total		67	100.0	100.0

30) I am willing to contribute knowledge management system to uplift shared knowledge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	1.5	1.5	1.5
	Disagree	1	1.5	1.5	3.0
	Neutral	7	10.4	10.4	13.4
	Agree	38	56.7	56.7	70.1
	Strongly agree	20	29.9	29.9	100.0
	Total		67	100.0	100.0

31) If management introduces a Knowledge management system to share knowledge, are you willing to Support?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat oppose	1	1.5	1.5	1.5
	Neutral	4	6.0	6.0	7.5
	Support	25	37.3	37.3	44.8
	Strongly Support	37	55.2	55.2	100.0
	Total	67	100.0	100.0	

Appendix E: Concept variables and question mapping

Concept	Variable	Sub variable	Indicators	Measurement unit	Source	Question number
Socialization (Individual tacit to group tacit knowledge)	Interaction	Technical interaction	Training program	Likert scale	Nonaka (1996)	9,10,14,27
		Cognitive interaction	Informal gathering	Likert scale	Nonaka (1996)	11
	Trust	Mutual understanding with superior	Trust with superior	Likert scale	Author	12
		Mutual understanding subordinate	Trust with subordinate and peers	Likert scale	Author	13,14,30
Externalization (Tacit to Explicit conversion)	Group interaction	Brainstorming discussion	Frequency of having brain storming sessions when confronting new problems or critical decisions need to be made	Likert scale	Nonaka (1995)	15
		Discussion forum	Frequency of updating Forum	Likert scale	Author	16
	Functional conflict	Challenge ideas	Arguing and evaluating idea	Likert scale	Nonaka (1995)	17

Concept	Variable	Sub variable	Indicators	Measurement unit	Source	Question number
Combination (Separate explicit knowledge to systematic explicit knowledge)	Documentation	Updating Manuals	Frequency of updating manuals	Likert scale	Nonaka (1995)	18
	Online knowledge system	Central location for information	Frequency of Updating online knowledge management system	Likert scale	Author	19
Internalization (Explicit to tacit Knowledge)	Information access	Accessing Manuals	Reading manuals	Likert scale	Nonaka (1995)	20
		Accessing online knowledge Management system	Accessing online central training system	Likert scale	Author	21
	Assessing knowledge	Self-assessment	Frequency of having quizzers and tests	Likert scale	Author	22
Organization culture (Organization Environment)	Working environment	Freely allow to share quality information	Frequency of sharing quality information	Likert scale	Author	23,26,29
		competition among the employees	How often Management encourage competition among employees	Likert scale	Author	24
		Constructive criticism	How often Management encourage constructive criticism	Likert scale	Nonaka (1995)	25

Concept	Variable	Sub variable	Indicators	Measurement unit	Source	Question number
Leadership (Knowledge management Direction)	Perception	Knowledge management Contribution to the business	To what extent KM Contribute to the success of Telecommunication business	Likert scale	Author	2
		Importance of knowledge Management	How much Importance of knowledge Management	Likert scale	Author	4,3
	Cohesiveness	Synergy among employees	How much management promoting synergy among employees	Likert scale	Author	6
		Participation in decision making	To what extent employee participation in decision making	Likert scale	Author	7
	Uncertainty	Absorbing uncertainty	To what extent leader absorb uncertainty	Likert scale	Author	8