The Grounded Process of KMS Adoption: The Case Study of Knowledge Sharing and CoPs in Oil and Gas Industry in Malaysia

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Abstract. This paper presents the adoption of a knowledge management system (KMS). It is an innovation in the field of IT and its adoption rests within the literature of IT adoption theories. This research documents via Grounded Theory (GT), the adoption of KMS at an Oil and Gas Industry in Malaysia. The model generated offer insights into the technology process adoption scenario, and documents 12 factors arising which can prove useful in stimulating employees to go online and share.

Keywords: KMS adoption, positive factors, grounded theory.

1 Introduction

Nowadays, organizations experience a rapid growth in IT, and they use IT to manage their knowledge. However, an IT system alone does not guarantee successful knowledge management. Adoption of the IT innovation depends upon the human factor as well.

Despite the benefits of tools & technology in managing knowledge, only some organizations are successful in achieving their goals. For some companies the tools and technology provide benefits, yet there is a lack of adoption [1][2]. In addition, how tools and technology facilitate knowledge sharing and CoPs is still questionable [1][2][3][4]. When use of tools and technology is low, some organizations choose to abandon the innovation [5]. In this case study, active users of online knowledge sharing and virtual CoPs are only at 15%. Therefore, literature demands for qualitative research in providing an understanding and exploring some positive factors that influence KMS adoption within the particular context of Malaysia.

2 Background on the Research Area

2.1 Theories Used in IT Adoption

Fichman conducted the first review of IT adoption studies. He examined 18 studies conducted between 1981-1991, which asked questions related to improving technology assessment, adoption and implementation. The most widely accepted theory for IT adoption was the innovation diffusion theory of Rogers. Strongest results were noted when researchers examined: "(1) individual adoption, and/or (2)

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independent use technologies that impose a comparatively small knowledge burden on would-be adopters." These were instances in which the assumptions of innovation diffusion theory held [6].

In the literature on IT adoption from 1992-2003, 11 theories are noted as described in Table 1 below. Some of the studies examined individual adoption of IT, and others examined organizational adoption of IT. In this study, the researchers conducted both individual and organizational analysis of IT adoption.

Table 1. Theories used in individual and organizational IT adoption research (adopted from Jeyaraj, 2006)

Theory	Main Author(s)	Used in Individual Adoption Studies	Used in Organizational Adoption Studies
Theory of Reasoned Action	Fishbein & Ajzen (1975)	x	
Innovation Diffusion Theory	Rogers (1983, 1995)	x	x
Social Cognitive Theory	Bandura (1986)	x	
Diffusion/Implementation Model	Kwon & Zmud (1987)		x
Technology Acceptance Model	Davis (1989)	x	
Perceived Characteristics of Innovation	Moor & Benbasat (1991)	x	
Theory of Planned Behavior	Ajzen (1991)	x	
Tri-Core Model	Swanson (1994)		x
Technology Acceptance Model II	Venkatesh et al. (2003)	x	
Unified Theory of Acceptance and Use of Technology	Venkatesh et al. (2003)	x	
Critical Social Theory	Green (2005)	x	

To date IT adoption studies have examined the 135 factors, as seen in Appendix A [7].

2.1.1 Innovation Diffusion Theory

According to Rogers, an innovation is defined as, "An idea, practice, or object that is perceived as new by an individual or other unit of adoption" [8]. Hall and Khan described adoption as, "The choice to acquire and use a new invention or innovation." [9]. Rogers described diffusion as, "The process by which an innovation is communicated through certain channels over time among the members of a social system" [8].

Rogers proposed four main elements that influence the spread of a new idea: the innovation itself, communication channels, time, and a social system. A communication channel is the medium by which an individual communicates the message to another. Time is the period of making an innovation-decision. The rate of adoption is the speed at which members of a social system adopt the innovation. A social system is a set of interrelated units that are engaged in joint-problem solving for a common goal.

There are five steps in the process of innovation diffusion at an individual level. The original process of innovation diffusion identified: awareness, interest, evaluation, trial and adoption. The current process of innovation diffusion notes: knowledge, persuasion, decision, implementation and confirmation.

Awareness or knowledge is the stage at which an individual is exposed to an innovation. However, the person lacks information about the innovation and is not inspired to find more information about it. The interest or persuasion stage is when an individual is interested to know more information about an innovation. The evaluation or decision stage is when an individual will look at the advantages and disadvantages of the innovation. Then they will decide to adopt or to reject it. The trial and implementation stage is when an individual realizes the usefulness of an innovation and starts to look for more information about it. Employment of the innovation will vary depending upon the situation. The adoption and confirmation stage is when an individual decides to continue using the innovation and may use the innovation to its fullest potential.

Rogers suggested two factors that individuals consider when making a decision about an innovation: 1) Is the decision to adopt made freely and implemented voluntarily? 2) Who makes the decision? Based on these two factors, there are three types of innovation decisions: optional innovation-decisions, collective innovation-decisions and authority innovation-decisions. Optional innovation-decisions are made by those who are distinguished from others in a social system. Collective innovation-decisions are made by a group within a social system. Authority innovation-decisions are made by members of a social system, who are influenced by powerful others.

It is to be noted that there are several intrinsic characteristics of innovations that influence an individuals' decision to adopt or reject an innovation. Relative advantage means the improvement of the innovation over previous generations. Compatibility is when an innovation fits an individuals' life. Complexity is the ease or difficulty of use. Trialability is how easy and/or difficult it is for an innovation to be adopted. Observability is the visibility of the innovation to others.

As part of the discussion in the context of IT adoption studies the innovation diffusion theory is worthy of revisiting. The adoption S-shaped curve indicates the percentage of persons adopting an innovation on the y-axis and time on the x-axis, with the outcome being market saturation over time. This certainly appears to be the goal of all adoption-diffusion studies be they at the individual or the organizational level [8].

3 Methodology

Methodologically, this study employed GT. GT is a qualitative research method increasingly common in use in various disciplines. This method is recommended for hard sciences as well as social sciences [16]. Its application to information systems is very helpful for explaining phenomenon, developing context-based and process-oriented descriptions [10] [11] [12].

GT is a suitable approach for situations where researchers are trying to reveal participants' experiences, perceptions, and build a theoretical framework based on reality [13]. In this regard, the researchers would like to explore the employees' experiences and perceptions in real situations thus the data is revealed by the employees. As the

research interest herein is to generate new insights for the existing literature and to understand in depth about the innovation adoption process of a KMS, the researchers employs an inductive approach of qualitative research by adapting the process and design of a GT approach instead of applying a deductive, hypothesis testing approach. This study is explorative and interpretive in nature. It looks into the concepts that build the innovation adoption process of a KMS. Therefore, a GT approach is most suitable to employ in this study for the following reasons.

The GT approach offers a set of procedures for coding and analyzing data, which keeps the analysis close to the data and presents the inductive discovery about the phenomena of the study. These procedures are structured and organized which leads the researchers to theory development [14]. As a result, the researchers are confident in the area of conceptualizing because it includes the resources of developing theoretical propositions from the data itself.

This study contributed to the research literature on GT by determining two new methodological process sequences as noted in Table 2 which innovatively combines the approaches of both Strauss and Glaser.

Table 2. Grounded theory methodology [15][16]

No.	GT Approach for This Study	Author
1	Start with having a general idea of where to begin.	(Strauss & Corbin, 2008)
2	Theoretical sensitivity comes from immersion in the data.	(Glaser, 1992)
3	Conceptual descriptions of situations.	(Strauss & Corbin, 2008)
4	The theory is grounded in the data.	(Glaser, 1992)
5	The credibility of the theory is from the rigor of the method.	(Strauss & Corbin, 2008)
6	The researcher is vigorous.	(Strauss & Corbin, 2008)
7	The data reveals the story.	(Glaser, 1992)
8	More rigorous coding and technique is defined. The nature of making comparisons diverges with the coding technique. Labels are carefully crafted at the time. Codes are derived from micro-analysis which analyzes data word by word.	(Strauss & Corbin, 2008)

The researchers conducted theoretical sampling and data collection process was constant and it is ceased when further data was no longer adding to the insights already gained. This indicator is called theoretical saturation. At this point, it was not necessary for further analysis because the analytical framework was saturated [15][17]. The further data of this study had not added new things therefore the theoretical model has been discovered at respondent number 8.

In terms of a process model of the analytic sequence of GT in this study (see Figure 1), the researchers explored in depth open, axial, and selective coding, and discovered conceptual process constructs of: bubbling, exploring, and arising.

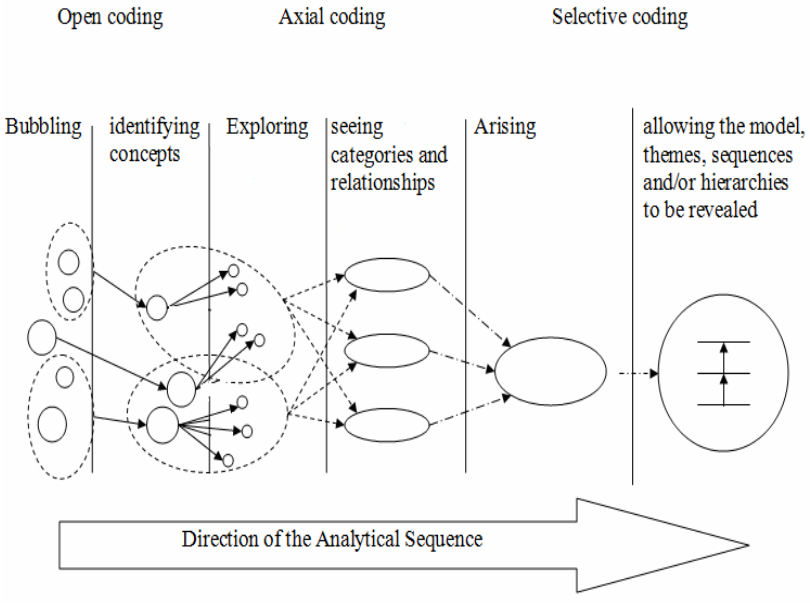

Fig. 1. The GT analytical process in the data analysis (adapted from Warburton, 2005)[18]

Next, the researchers will describe and discuss the results of this study.

4 Results and Discussion

4.1 Demographic Findings

The demographic findings of this study are the participants' gender of 75% female and 25% male (see Figure 2). Participants job positions were 50% executives, 25% senior managers, and 25% managers (see Figure 3).

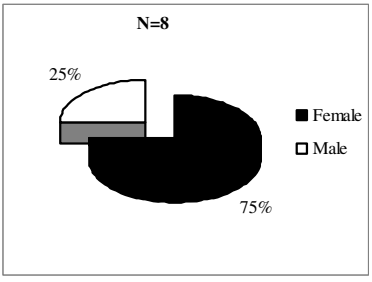

Fig. 2. Participants' Gender

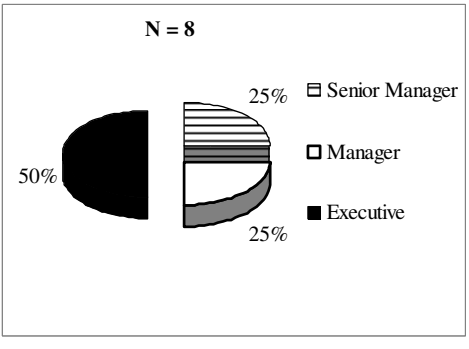

Fig. 3. Participants' Job Positions

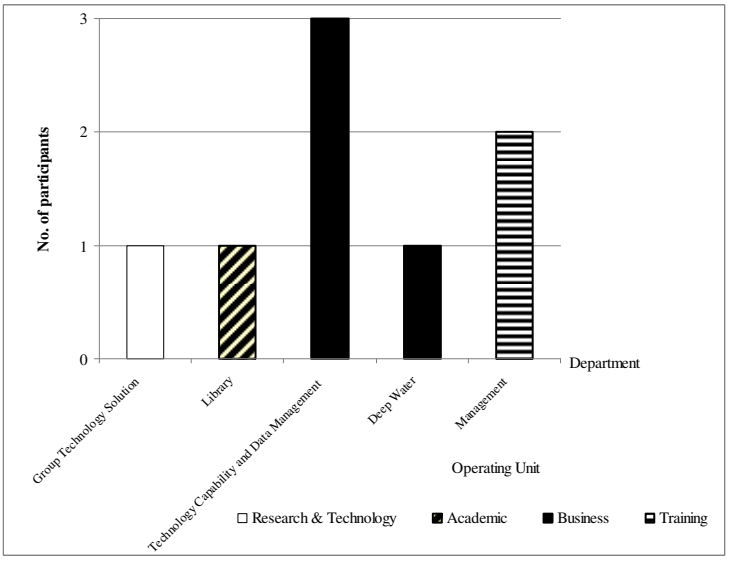

Fig. 4. Participants' Departments and Operating Units

The various management teams contributed very meaningful data to this study because of their knowledge and experiences with IT adoption, particularly the KMS. Figure 4 illustrates the distribution of the departments in which the participants worked and their operating units. The highest numbers of participants in this study were from the technology capability and data management department, which is under the business-operating unit.

4.2 Grounded Process of KMS Adoption

First and foremost this study derived the Grounded Process of KMS Adoption (see Figure 5). This model is a synthesis of the 8 models derived from the respondents and consists of three themes: Technology, Individual, and Process.

It is derived from and grounded in the data which explored the adoption of a KMS, at the leading oil and gas conglomerate of Malaysia with subsidiaries in 32 countries. At the Technological level, efficiency in terms of ease of use and being fast are important qualities, as well as, the technology satisfying a need and providing an experience of fulfillment. The experience of flow state proved essential at the Individual/People level along with self-benefit. The importance of knowledge sharing, organizational creativity and thus creation, and organizational growth are prominent

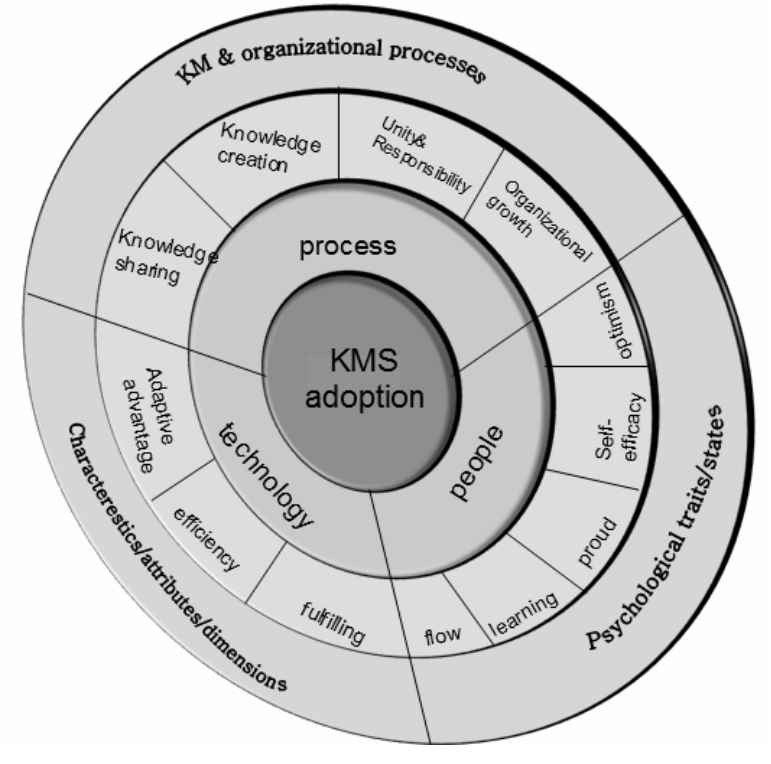

Fig. 5 Model of KMS Adoption: The Grounded Process

among the findings in the Process component of the model. Also, unique qualities of proud, optimism, unity and responsibility are noted which arise in part from the Islamic cultural values of the same nature, as the company in the case study is located in Malaysia, a primarily Islamic nation, with subsidiaries located in primarily Islamic nations around the world.

In addition, this study extends a new frontier by exploring the adoption of a KMS via the use of GT. Also, this study advanced the field of IT adoption studies by noting an additional 12 factors which arose from the data, see Table 3.

Table 3. Factors Findings

1. Adaptive Advantage
2. Arousal & Control
3. Creation
4. Efficiency
5. Fulfilling
6. Knowledge Sharing
7. Learning
8. Optimism
9. Organizational Growth
10. Proud
11. Responsibility & Unity
12. Self-benefit

5 Conclusion

In conclusion, analysis of the adoption of KMS at company in case study revealed 15% active user at this time. Now, the company is facing the adoption gap and will have to call upon top management support to increase the rate of adoption. In order to stimulate employees to adopt system, as well as, to enhance knowledge in the field of IT adoption the researchers offers the following model for future scholars to explore (see Figure 5). In addition, this study advanced the field of IT adoption studies by noting an additional 12 factors, which arose from the data. The factors findings are: efficiency (ease of use/faster), fulfilling, adaptive advantage, flow (arousal and control), learning, proud, self-benefit, optimism, knowledge sharing, creation, organizational responsibility, organizational unity, and organizational growth.

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Appendix A

1. Adaptable Innovation
2. Administrative Intensity
3. Age
4. Anxiety
5. Attitudes
6. Behavioral Intention
7. Business Computerization
8. Buying Center Participation
9. Career Ladder
10. Centralized Planning And Control
11. Championship
12. Communicability
13. Communication Amount
14. Communication
15. Communications Media Quality
16. Compatibility
17. Competition
18. Competitor Scanning
19. Complexity
20. Computer Avoidance
21. Computer Experience
22. Computer Self-Efficacy
23. Consequences
24. Cost
25. Culture
26. Customer Interaction
27. Customer Power
28. Customer Support
29. Delegation Of IT Tasks
30. Developer Involvement
31. Ease Of Use
32. Education
33. Elapsed Time
34. End-User Characteristics
35. Environmental Complexity
36. Environmental Dynamism
37. Environmental Instability
38. Evolution Level Of IS
39. Experience
40. External Pressure
41. Extrinsic Motivation
42. Facilitating Conditions
43. Formalization of Systems Development
44. Gender
45. Government
46. Hierarchical Level
47. Image
48. Impact On Jobs
49. Industry Type
50. Influence (Coercive)
51. Influence (Peer)
52. Information Intensity
53. Information Sources (External)
54. Information Sources (Internal)
55. Information Sources
56. Infusion
57. Internal Experimentation
58. Internal Pressure
59. Intrinsic Motivation
60. IS Department Size
61. IS Maturity
62. IS Planning
63. IS Slack
64. IS Structure
65. Job Task Difficulty
66. Job Task Variation
67. Job/Role Definition
68. Job/Role Rotation
69. Learning Responsibility
70. Management Risk Perception
71. Managerial Training
72. Middle Management Support
73. Maturity
74. Net Dependence
75. Network Externality
76. Network Size
77. Observability
78. Opinion Leadership
79. Org Culture
80. Org Size
81. Org Structure (Centralization)
82. Org Structure (Formalization)
83. Org Structure (Integration)
84. Org Structure (Routinization)
85. Org Structure (Specialization)
86. Outcome Expectations (Performance)
87. Outcome Expectations (Personal)
88. Outsourcing propensity
89. Perceived barriers
90. Perceived Behavioral Control
91. Perceived Benefits
92. Perceived Usefulness
93. Performance Gap
94. Personal Innovativeness
95. Playfulness
96. Problem Difficulty
97. Problem Importance
98. Process Integration
99. Production Scale
100. Productivity Index
101. Professionalism
102. Professionalism
103. Quality Orientation
104. Quality Orientation
105. Relative Advantage
106. Resources
107. Response To Risk
108. Result Demonstrability
109. Risk (Operational)
110. Risk (Strategic)
111. Satisfaction
112. Scope
113. Sector
114. Slack Resources
115. Strategic Role Of IS
116. Strategy
117. Subjective Norms
118. System Quality
119. Teamwork
120. Technological Diversity
121. Technology Policy
122. Tenure
123. Top Management Characteristics
124. Top Management Support
125. Trialability
126. Trust
127. Uncertainty
128. User Involvement
129. User Participation
130. User Satisfaction
131. User Support
132. User Training
133. Vertical Coordination
134. Visibility
135. Voluntariness