The Impact of Learning on Innovation Performance across Different Organizational Levels
不同組織層面之間學習對創新績效的影響

Submitted to
Department of Systems Engineering and Engineering Management
系统工程及工程管理学系
in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy
哲学博士學位

by

Ho Ka Yan Karis
何嘉恩

June 2012
二零一二年六月
Abstract

There has been plenty of research on the relationship between learning and innovation performance. However, most previous research has focused on one level either organizational, team level or individual level. This research aims to explore the influence of learning on innovation performance across different organizational levels.

A three-level conceptual model was developed based with six formulated hypotheses to reflect the complicated relationship among learning environment, team learning, individual learning, team innovation performance, and individual performance. Empirical data was collected from a survey of 266 engineers who work in manufacturing/engineering companies in Hong Kong/China. The conceptual model and the hypotheses are tested using Structural Equation Modeling (SEM).

The results demonstrated that the team level is the core of initiating and maintaining learning within an organization. Team learning directly contributes to team innovation performance. With support from the organization-learning environment, a team fosters individual learning and improves individual innovation performance, which in turn enhances team innovation performance. Surprisingly, although it supports the team’s learning, the organizational-learning environment does not have a direct significant impact on team innovation performance.
Case study was conducted to assess the relationship between learning and innovation in a Hong Kong/China manufacturing company. Its new product development team (NPD-X) was formulated in 2004. Various problems and low performance in new product development were experienced in three-year operation. Management was frustrated about the team outputs. They participated in this study as case company for seeking solutions to their undefined problems. An assessment was conducted with the NPD-X. This assessment revealed that the case company had not provided the team with an organizational learning environment. Its team learning capacity was low. What is more, it was found out that there was a big difference between team members and the top manager, in terms of organizational learning environment and management support. A series of suggestions were given to the company based on the assessment.

The research results have both practical and theoretical implications. For a company, that would like to improve innovation performance, team learning is one of the key factors to consider. A well-established learning team will be the key to enhance team innovation performance. Lastly, a supportive learning environment at the organizational level should also be established. This needs the support of top management rather than their direct involvement.

The innovations and contributions of this research include: (a) Three-level conceptual mode of learning and innovation, (b) SEM testing for a multi-level conceptual model of learning and innovation, (c) Combined survey and case study in one Organizational Learning research project, (d) Selected Hong Kong / China Region as the research scope,
(e) the proposal of TEAM as the core of Organizational Learning, and (f) linked peer-influence theory to the development of team learning capacity.

This research has a few limitations that could be examined in future research. To measure organization innovation performance, information about company strategy, financial and business performance, granted patents, etc. should be collected. With limited time and workforce to collect sufficient information set from different local companies, this variable was not included in the conceptual model testing of this study. Empirical study on the impact of learning to this variable should be done in the future research. This research only conducted a case study in one case company. Future research can consider employing Action Case Study in order to develop managerial practices for enhancing learning capacity and innovation performance in organizations. Finally, alternative data analysis methodology, a hierarchical linear modeling (HLM), can also be used for data analysis in future research work.
# Table of Contents

Abstract ................................................................................................................................. i
Acknowledgement ................................................................................................................. iv
Table of Contents .................................................................................................................. v
List of Tables ......................................................................................................................... ix
List of Figures ....................................................................................................................... xi

Chapter 1  **Introduction** .................................................................................................. 1

1.1 Research Background ................................................................................................. 1
1.1.1 Debates on Organizational Learning ................................................................. 1
1.1.2 Deficiencies on the Relationship between Learning and Innovation Performance ........................................................... 3
1.1.3 Deficiencies on Studying cross Different Organizational Levels ................................. 5
1.1.4 Needs on Implementing in Hong Kong / China ....................................................... 6

1.2 Research Objectives .................................................................................................... 8

1.3 Scope of the Study ........................................................................................................ 11

1.4 Potential Contributions of the Study ......................................................................... 11

1.5 Thesis Structure .......................................................................................................... 13

Chapter 2  **Literature Review** ....................................................................................... 16

2.1 Basic Concepts ............................................................................................................ 16
2.1.1 Definition of Organizational Learning ................................................................. 16
2.1.2 Organizational Learning Environment ................................................................. 19
2.1.2.1 Management support ............................................................................. 21
2.1.2.2 Openness and autonomy .................................................................... 22
2.1.2.3 Knowledge sharing system .................................................................. 23
2.1.2.4 Incentive and recognition for learning ............................................... 24
2.1.3 Team Learning Capacity ...................................................................................... 24
2.1.3.1 Team composition and relationship ...................................................... 28
2.1.3.2 Team learning spirit ............................................................................. 29
2.1.3.3 Knowledge transfer and integration ..................................................... 29
2.1.3.4 Team communication ......................................................................... 30
Chapter 6  Discussion and Implications ................................................................. 136

6.1 Discussions ................................................................................................. 137

6.2 Implications .................................................................................................. 139

6.2.1 Theoretical Implications ......................................................................... 139

6.2.1.1 Implications for organizational learning theory .......................... 139

6.2.1.2 Implication for the level of trust between managers
and employees ...................................................................................... 141

6.2.1.3 Implication of developing training approach for
team learning ......................................................................................... 142

6.2.1.4 Implication of the power of peer influences ............................. 143

6.2.2 Practical Implications ............................................................................. 145

6.2.2.1 Mutual communication .................................................................. 145

6.2.2.2 Utilize the power of peer influences ........................................... 146

6.3 Concluding Remarks ..................................................................................... 146

Chapter 7  Conclusions ......................................................................................... 147

7.1 Summary of This Research ........................................................................ 147

7.2 Innovation and Features of the Research ................................................. 149

7.3 Limitations and Future Research ............................................................... 150

7.3.1 Limitations .............................................................................................. 150

7.3.2 Future Research ...................................................................................... 152

7.3.2.1 Study of organizational innovation performance ......................... 152

7.3.2.2 Action case study ............................................................................ 153

7.3.2.3 Application of different model testing ......................................... 154

7.4 Concluding Remarks ..................................................................................... 154

References ......................................................................................................... 156

Appendix I: Questionnaire .................................................................................. 176

Appendix II: Q-Q Plot of the Variables ............................................................... 182

Publications during PhD Study ......................................................................... 190
List of Tables

Table 1: Research Questions with Corresponding Objectives .................. 9
Table 2: Factors of Organizational Learning Environment ..................... 22
Table 3: Factors of Team Learning Capacity .................................... 27
Table 4: Factors of Individual Learning Capacity .............................. 32
Table 5: Models Comparison ....................................................... 44
Table 6: Summary of Variable Measures (Organizational Learning Environment) .......................................................... 54
Table 7: Summary of Variable Measures (Team Learning Capacity) ........ 55
Table 8: Summary of Variable Measures (Individual Learning Capacity) ... 56
Table 9: Summary of Variable Measures (Innovation Performance) ........... 57
Table 10: Reasons for Item Deletion ............................................... 60
Table 11: Reliability Results .......................................................... 76
Table 12: Results of Construct Validity Test (Organizational Learning Environment and Team Learning Level) ......................... 79
Table 13: Results of Construct Validity Test (Individual Learning Capacity and Innovation Performance) ........................................ 80
Table 14: Correlation among the Measurement Items ** ∆ (Organizational Learning Environment) ......................................................... 82
Table 15: Correlation among the Measurement Items (Team Learning Capacity) ............................................................................. 83
Table 16: Correlation among the Measurement Items (Individual Learning Capacity) ........................................................................ 84
Table 17: Correlation among the Measurement Items (Innovation Performance) ............................................................................. 85
Table 18: Correlation among the Variables ** (All levels) ....................... 86
Table 19: Correlation among the Variables ** (All Levels against Innovation Performance) .......................................................... 86
Table 20: Correlation among the Variables and Measurement Items ** (Organizational Learning Environment) ...................................... 88
Table 21: Correlation among the Variables and Measurement Items ** (Team Learning Capacity) .......................................................... 89
Table 22: Correlation among the Variables and Measurement Items*  
(Individual Learning Capacity) .............................................................. 90

Table 23: Correlation among the variables and measurement items**  
(Innovation Performance) ...................................................................... 91

Table 24: Characteristics of Respondents .............................................. 93

Table 25: Test of Homogeneity of Variance for ANOVA (Gender) .......... 95

Table 26: Test of Homogeneity of Variance for ANOVA (Age, Working Experience) .................................................................................. 96

Table 27: Test of Homogeneity of Variance for ANOVA (Business Type, Work Nature) ........................................................................... 97

Table 28: Effect of Gender on Observed Variables (T-Test) ................. 98

Table 29: Effect of Age, Working Experience on Observed Variables  
(ANOVA) .................................................................................................. 99

Table 30: Types of Goodness-of-Fit Criteria ......................................... 106

Table 31: SEM Test Results for the Hypothesis .................................... 107

Table 32: The Hypothesis Testing Results ............................................. 108

Table 33: Timeline of the Case Study .................................................... 115

Table 34: Average Scores and Ranking from NPD-X Team Assessment .. 120

Table 35: Benchmarks Table with NPD-X Team ................................... 123

Table 36: Comparison between NPD-X Team and Top Management ...... 127

Table 37: Benchmarks Table with NPD-X Team and Top Management ..... 129
List of Figures

Figure 1 : Centrality of team level in project-based organizational learning
(Murray and Moses, 2005, p. 1196) .......................................................... 46
Figure 2 : Fast Team Learning Model (Lynn et al., 2003) .......................... 47
Figure 3 : Conceptual Model .................................................................... 48
Figure 4 : Research Methodology ............................................................... 51
Figure 5 : SEM Basic Measurement Model .................................................. 67
Figure 6 : Tested Conceptual Model ............................................................. 102
Figure 7 : Measurement Model of the SEM Test Model ............................... 104
Figure 8 : Structure Models of the SEM Test Model ................................. 105
Figure 9 : Re-specified SEM Tested Model ................................................ 109
Figure 10 : NPD-X Team against the Benchmarks ........................................ 124
Figure 11 : NPD-X Team (Hexagon) against Top Management (Triangle) .... 128
Figure 12 : NPD-X Team and Top Management against the Benchmark ..... 130