



Universiteit  
Leiden  
The Netherlands

## External knowledge absorption in Chinese SMEs

Pi, L.

### Citation

Pi, L. (2021, June 30). *External knowledge absorption in Chinese SMEs*. SIKS Dissertation Series. Retrieved from <https://hdl.handle.net/1887/3192733>

Version: Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/3192733>

**Note:** To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <https://hdl.handle.net/1887/3192733> holds various files of this Leiden University dissertation.

**Author:** Pi, L.

**Title:** External knowledge absorption in Chinese SMEs

**Issue Date:** 2021-06-30

# External Knowledge Absorption in Chinese SMEs

Lei Pi



# External Knowledge Absorption in Chinese SMEs

Proefschrift

ter verkrijging van

de graad van doctor aan de Universiteit Leiden,

op gezag van rector magnificus prof.dr.ir. H. Bijl,

volgens besluit van het college voor promoties

te verdedigen op woensdag 30 juni 2021

klokke 10:00 uur

door

Lei Pi

geboren te Henan, China

in1983

**Promotor:**

Prof. dr. H.J. van den Herik	Leiden University
Prof. dr. K. Paetzold	Universität der Bundeswehr München

**Copromotor:**

Dr. R. J. Ortt	Delft University of Technology
----------------	--------------------------------

**Promotiecommissie:**

Prof. dr. S. Jong Kon Chin	Leiden University
Prof. dr. E. Bakker	Leiden University
Dr. X. Li	Leiden University
Prof. dr.-ing. G. H. Baltes	University of Applied Sciences Konstanz
Prof. dr. K. Sailer	Munich University of Applied Science
Dr. C.R.M. Weber	Munich University of Applied Science

The research reported in this thesis has been completed at the Leiden Centre of Data Science (LCDS) hosted at the Mathematical Institute (MI), previously hosted at Leiden Institute of Advanced Computer Science (LIACS) at the Faculty of Science, Leiden University, the Netherlands.

The research reported has been performed partially at the Center for Technology and Innovation Management (CeTIM) and the Institute for Technical Product Development (ITPE) at Universität der Bundeswehr München, Germany.

The research reported in this thesis has been funded by the Initial Training Networks (ITN) as part of the Marie Curie program. The research is part of the larger project: A Networked and IT-enabled Firm's Perspective on Crisis, project number: FP7-PEOPLE-2012-ITN.



SIKS Dissertation Series No. 2021-12

The research reported in this thesis has been carried out under the auspices of SIKS, the Dutch Research School for Information and Knowledge Systems.

ISBN 978-3-00-068668-9

© 2021 Lei Pi

*All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means (electronically, mechanically, photocopying, recording or otherwise) without the written permission of both the copyright owner and the author of the book.*

*To My Mother*



## Preface

This study is inspired by the entrepreneurial stories of many friends and their experiences in managing their enterprises. In the past decades, the world economy has been strongly driven by technological innovation and entrepreneurship. The vital force behind the technology push comes from the almost uncountable number of small and medium-sized enterprises (SMEs). Riding the waves of technological innovation and entrepreneurship, many ambitious individuals try to launch and establish their own business. Many of my friends and former classmates in college and graduate school have become entrepreneurs. They founded their business in different sectors. Their enterprises are mostly small and lack many relevant resources. By talking to them and listening to their stories, I felt that most of them are aware that they need resources beyond the boundaries of their own enterprises. These friends are the primary source of my inspiration. By viewing *knowledge* as the most critical resource, I decided to investigate how SMEs absorb external knowledge. In my Ph.D. study, I was privileged to investigate the knowledge-absorbing processes in SMEs, the challenges in these processes, and how effective the knowledge assimilation mechanisms are.

The results of the investigation are in the thesis. Without any anticipation of the outcome, it is safe to state that External Knowledge Absorption is a fascinating topic for the Leiden University, for the Netherlands, and China, and indeed for all businessmen in the world.



## Table of Contents

<b>Preface .....</b>	<b>vii</b>
<b>Table of Contents .....</b>	<b>ix</b>
<b>List of Abbreviations.....</b>	<b>xii</b>
<b>List of Definitions .....</b>	<b>xiii</b>
<b>List of Figures .....</b>	<b>xiv</b>
<b>List of Tables.....</b>	<b>xv</b>
<b>1 Innovation and External Knowledge Absorption .....</b>	<b>1</b>
1.1 Research Backgrounds.....	1
1.1.1 Knowledge and Competitive Advantages .....	2
1.1.2 Knowledge Management across Organizational Boundaries.....	4
1.1.3 Absorptive Capacity .....	6
1.1.4 SMEs in China .....	8
1.1.5 Absorptive Capacity and SMEs .....	10
1.2 Problem Statement.....	11
1.3 Research Questions.....	13
1.4 Research Methodology .....	14
1.5 Structure of the Dissertation .....	15
<b>2 Absorptive Capacity Literature Review .....</b>	<b>17</b>
2.1 Underpinning the AC Studies .....	17
2.1.1 Resource-based View .....	18
2.1.2 Knowledge-based View .....	19
2.1.3 Organizational Learning.....	21
2.1.4 Dynamic Capabilities .....	22
2.1.5 Embedding AC in other Theories.....	23
2.2 AC Literature .....	24
2.2.1 Conceptualization of AC.....	25
2.2.2 Consequences of AC .....	29
2.2.3 Sources of AC .....	32
2.2.4 Measurement of AC .....	36
2.2.5 AC Studies on SMEs.....	39
2.3 Chapter Conclusion.....	41
<b>3 External Knowledge Absorption in SMEs.....</b>	<b>43</b>
3.1 External Knowledge-Absorbing Processes.....	43
3.2 Partitioning Research Question 1 .....	44
3.3 Research Design .....	45
3.3.1 Research Method.....	46
3.3.2 Data Collection.....	47
3.3.3 Data Analysis .....	49
3.4 Findings and Discussions .....	51

3.4.1 External Knowledge Recognition Criteria .....	51
3.4.2 External Knowledge Assimilation Mechanisms .....	54
3.4.3 External Knowledge Utilization Purposes.....	59
3.5 Chapter Conclusion.....	63
<b>4 Challenges in Absorbing External Knowledge .....</b>	<b>67</b>
4.1 Our Search for Challenges of AC .....	67
4.2 Research Design.....	69
4.3 Challenges in the AC Processes.....	70
4.3.1 Internal Challenges .....	70
4.3.2 External Challenges.....	75
4.4 Chapter Conclusion.....	77
<b>5 Effects of Different External Knowledge Assimilation Mechanisms.....</b>	<b>79</b>
5.1 AC and Firm Performance .....	79
5.2 Propositions.....	81
5.2.1 Consulting Personal Networks .....	81
5.2.2 Purchasing Products or Services .....	82
5.2.3 Referring to Free Sources .....	83
5.2.4 Recruiting New Talents .....	84
5.2.5 Collaborating with Value-chain Partners .....	85
5.3 Research Methodology .....	87
5.3.1 Questionnaire Design and Data Collection .....	87
5.3.2 Measures.....	88
5.3.3 Descriptive Statistics of Measured Variables.....	91
5.3.4 Data Analysis.....	94
5.4 Findings and Discussions.....	97
5.4.1 Effects of External Knowledge Assimilation Mechanisms.....	97
5.4.2 Referring to Free Sources and Recruiting New Talents .....	99
5.5 Chapter Conclusion.....	102
<b>6 Conclusion and Discussions .....</b>	<b>105</b>
6.1 Answers to the Research Questions .....	105
6.1.1 External Knowledge Absorption in SMEs .....	105
6.1.2 Challenges in Absorbing External Knowledge .....	107
6.1.3 Effects of Different External Knowledge Assimilation Mechanisms .....	107
6.2 Answers to the Problem Statement .....	108
6.3 Contributions.....	110
6.3.1 Theoretical Contributions .....	110
6.3.2 Managerial Implications.....	112
6.4 Limitations .....	113
6.4.1 Methodological Limitations .....	114
6.4.2 Sample and Data Collection Limitations.....	115
6.5 Avenues for Future Research.....	117

<b>References .....</b>	<b>119</b>
<b>Appendices .....</b>	<b>141</b>
<b>Acknowledgment .....</b>	<b>155</b>
<b>Summary .....</b>	<b>157</b>
<b>Samenvatting .....</b>	<b>161</b>
<b>Curriculum Vitae .....</b>	<b>167</b>
<b>Publications.....</b>	<b>169</b>
<b>SIKS Dissertation Series .....</b>	<b>171</b>

## **List of Abbreviations**

The list below contains all abbreviations used in the Ph.D. thesis together with a brief explanation. Standard lexical abbreviations, such as “e.g.” and “etc.”, are not listed. Abbreviations used only in tables or figures are explained in the corresponding table or figure.

AC	Absorptive Capacity
AI	Artificial Intelligence
CEO	Chief Executive Officer
CPA	Competing Product Analysis
CTO	Chief Technology Officer
D-W	Durbin-Watson
EKA	External Knowledge Assimilation
EKR	External Knowledge Recognition
EKU	External Knowledge Utilization
EU	European Union
HRM	Human Resource Management
ICT	Information and Communications Technology
IoT	Internet of Things
IT	Information Technology
KM	Knowledge Management
M&A	Mergers and Acquisitions
NFBS	Non-financial Business Sector
NIH	Not-Invented-Here
NiTiM	Network of IT and Innovation Management
OECD	Organization for Economic Co-operation and Development
PS	Problem Statement
RQ	Research Question
SMEs	Small and Medium-sized Enterprises
SPSS	Statistical Package for Social Science
VIF	Variance Inflation Factor

## List of Definitions

Definition 1.1: Knowledge .....	2
Definition 1.2: Knowledge Management .....	3
Definition 1.3: Dynamic Capabilities.....	4
Definition 1.4: Information Technology Infrastructure .....	5
Definition 1.5: Small and Medium-sized Enterprises .....	6
Definition 1.6: Absorptive Capacity .....	6
Definition 1.7: External Knowledge Recognition.....	7
Definition 1.8: External Knowledge Assimilation.....	7
Definition 1.9: External Knowledge Utilization .....	8
Definition 2.1: Knowledge Spillover .....	25
Definition 2.2: Organizational Routines .....	33
Definition 3.1: External Knowledge Recognition Criteria.....	51
Definition 3.2: External Knowledge Assimilation Mechanisms.....	54
Definition 3.3: External Knowledge Utilization Purposes.....	60
Definition 4.1: Challenges in the AC Processes .....	68
Definition 4.2: Social Capital.....	72
Definition 4.3: Business Reputation.....	73
Definition 4.4: The Not-Invented-Here Syndrome .....	75

## List of Figures

Figure 2.1: Theoretical Underpinnings of AC.....	24
Figure 2.2: Relations between In-house R&D, AC, and External Knowledge .....	26
Figure 3.1 Partitioning Research Question 1 .....	45
Figure 3.2 Interrelated and Iterative Relationship between AC Processes .....	65
Figure 5.1: Hypothesis between EKA Mechanisms and Performance.....	87
Figure 5.2: Normal Probability Plot (Finance Performance) .....	95
Figure 5.3: Scatterplot of the Regression Residual (Finance Performance) .....	95
Figure 5.4: Normal Probability Plot (Growth Performance).....	96
Figure 5.5: Scatterplot of the Regression Residual (Growth Performance).....	96



## List of Tables

Table 1.1: SMEs in China’s Economy .....	9
Table 1.2: Trends of Technology-based SMEs in China .....	9
Table 2.1: Important AC Conceptualizations .....	30
Table 2.2: Organizational Factors that Influence AC .....	34
Table 2.3: Environmental Factors of AC .....	35
Table 2.4: Different Measurement of AC .....	39
Table 3.1: Interview Structure .....	47
Table 3.2: Profile of the Interviewees .....	49
Table 3.3: Summary of the Chapter Findings .....	64
Table 4.1: AC Challenges in Multinational Corporates .....	68
Table 4.2: Summary of the Chapter Findings .....	77
Table 5.1: Questionnaire Screening Process .....	88
Table 5.2: Description of the Samples .....	91
Table 5.3: Descriptive Statistics of the Samples .....	92
Table 5.4: Correlations (Spearman) between Measured Variables .....	93
Table 5.5: Partial Correlations between Dependent and Independent Variables .....	93
Table 5.6: Summary of the Two Regressions Models .....	96
Table 5.7: Results of Regressions Analyses .....	97
Table 5.8: Summary of the Chapter Findings .....	102

