HOW SMALL AND MEDIUM SIZED ENTERPRISES (SMEs) CAN INFLUENCE THE SUCCESSFULNESS OF A PARTNERSHIP WITH A LARGE COMPANY (LCO) IN THE TECHNOLOGY INNOVATION SECTOR

by

JILL LYNDA SAWERS

Submitted in partial fulfillment of the requirements for the degree

Philosophiae Doctor (Technology Management)

in the

Faculty of Engineering, Built Environment and Information Technology
University of Pretoria

Pretoria

2006

Summary

HOW SMALL AND MEDIUM SIZED ENTERPRISES (SMEs)

CAN INFLUENCE THE SUCCESSFULNESS OF A PARTNERSHIP WITH A

LARGE COMPANY (LCO)

IN THE TECHNOLOGY INNOVATION SECTOR

by

Jill Lynda Sawers

Supervisor: Professor M.W. Pretorius

Co-supervisor: Professor L.A.G. Oerlemans (also Department of Organization

Studies, Tilburg University, The Netherlands)

Department: Department of Engineering and Technology Management

UNIVERSITY OF PRETORIA

Degree: PhD

Small and medium sized enterprises (SMEs) are being seen by governments, increasingly, as important engines of economic growth. They are viewed as sources of innovation and employment creation.

Technology innovative SME's commercialization strategy often includes forming a partnership with a large company (LCO). This is because what the SME lacks in terms of market links, marketing and distribution channels, the LCO can often provide. LCOs, on the other hand, need to be innovative in order to survive in a dynamic and ever changing business environment. LCOs are therefore open to new ideas, being in the form of knowledge and capabilities.

The reality is, however, that many partnerships fail. For an SME whose growth is dependant on a partnership with an LCO, understanding how it can influence the partnership such that it will result in success is critically important. This research sets out to gain a better understanding of this topic.

Research Problem

Technology innovative businesses operate in the knowledge economy where the one sure source of competitive advantage is knowledge (Takeuchi and Nonaka, 2004). However, knowledge is a high risk commodity and can be easily appropriated by an opportunistic company. A major risk in collaboration is that the partners can gain access to the knowledge and skills of the company (Littler et al, 1995) – this is termed knowledge spillover. Where this is unintentional, it can result in the company exposing its knowledge and skills being made very vulnerable. Furthermore, the high rate of partnership failure is attributed to a lack of cooperation and the opportunistic behaviour of partners (Das et al, 1998).

It is important, therefore, for SMEs wishing to partner with an LCO, to understand both what attracts the LCO to partner with them in the first instance, as well as what safeguards need to be in place to protect themselves against possible opportunistic behaviour by the LCO.

Methodology

A sample of 43 technology innovative SMEs was interviewed by means of a structured questionnaire. The frequencies of the variables were analysed and compared with findings in the literature. In order to improve the variation of the dichotomous responses, the independent variables were compounded into the following variables: competencies, ability capabilities, awareness capabilities, formal safeguards and informal safeguards. The relationship between the number/level of competencies and capabilities and partnership success was determined, as well as the influence of formal and/or informal safeguards on this relationship. Backward conditional logistic regression was performed on the compounded variables in order to determine which model best fitted the data, in other words which predictors most affected partnership success. To better understand the negative relationship between ability capabilities and perceived partnership success, as well as the positive relationship between awareness capabilities and perceived partnership success, cross tabulations were performed on all the individual items to determine the Phi Square. An explanation was provided for those items that proved to be statistically significant.

Because of the small sample used for this quantitative study and in order to verify the major findings, four case studies were conducted on SMEs that had participated in the original survey. The findings of the survey were then compared with the findings of the case studies.

Main findings

The main findings from the survey were the following:

- 1. SMEs' abilities rather than their competencies, appeared to influence the success of the partnership
- the more ability capabilities an SME had, the lower the perceived success of the partnership. This was influenced by where the SME had developed its own IP; and where the SME had segmented is potential market in accordance with Moore's (1999) market segmentation strategy for hi-tech products
- a positive relationship between awareness capability and partnership success was influenced by the SME having an understanding of the LCO's SWOT, but this same relationship was negatively affected by the LCO preferring to enter into a JV with another LCO when sourcing technology
- 4. the relationships listed in items 2 and 3 above were influenced by safeguards, namely:
- 4.1 the greater the number of safeguards (formal and informal) that were put in place, the more positive will be the relationship between increasing numbers of awareness capabilities and the perceived success of the partnership
- 4.2 the greater the number of safeguards (formal and informal) that were put in place, the less negative will be the relationship between increasing numbers of ability capabilities, and the perceived success of the partnership
- 4.3 formal safeguards were more effective at moderating the relationship between capabilities and partnership success than informal safeguards

The main findings from the case studies were as follows:

- 1. having ability capabilities, awareness capabilities and competencies was associated with high levels of partnership success (not in support of the survey findings)
- 2. above average levels of capabilities/competencies were associated with low levels of partnership success (in support of the survey findings)

- 3. there is a positive relationship between the level of safeguards and the association between capabilities/competencies and partnership success (in support of survey findings)
- both formal and informal safeguards are important in ensuring a positive association between capabilities/competencies and partnership success (not in support of survey findings).

In conclusion, the findings from the case studies did indeed validate some of the findings of the survey, namely, in the absence of safeguards, above average levels of capabilities/competencies are associated with low levels of partnership success; and there is a positive relationship between the level of safeguards and the association between capabilities/competencies and partnership success.

Keywords

SME; successful partnership; inter-organizational relationships; technology innovative; competencies; capabilities; safeguards; moderator variables; small-large company partnership.

Acknowledgements

Many individuals contributed substantially to this research report. From the University of Pretoria, Professors Tinus Pretorius and Leon Oerlemans (also Professor at Tilburg University in The Netherlands) provided invaluable guidance and research assistance throughout the research, statistical analysis and report writing process. Their continual challenging of the research proposed and executed, as well as their guidance with respect to the multidisciplinary research fields, associated literature and research findings, was of exceptional value.

The experts, Mr Coen Bester, Dr Anthon Botha, Dr Rudi van der Walt and Prof Rex van Olst, contributed in assessing the transcripts of the case studies. The companies that participated in this study made available their time, and especially those companies that also participated in the case studies, shared their experience in this area.

Additional assistance provided by University of Pretoria (UP) staff include: Christine Mallo, Hettie Groenewald, Eleine Roets, Elna Theron and Marie Theron of UP's Library and Information Services in literature procurement; Anthea van Zyl for assistance with questionnaire layout and soliciting responses; Juanita Schulz for tirelessly tracking down articles; staff members at UP's Department of Statistics, including Elana Mauer, Paul van Staden, and especially Jacqui Somerville; as well as Marlene Mulder and Mariette Stirk for ensuring access to my supervisors as and when necessary!

Dr Rudi van der Walt of North West University was instrumental in seeding the research idea, continually challenging the early assumptions made, and serving as an ad hoc "sounding board". Mariette Smit provided accurate secretarial support in the final phase of the report, and Dr Neville Comins permitted a flexible work environment such that the research could continue on a part-time basis. My immediate colleagues are also thanked in this regard for their understanding of the pressures and time constraints associated with conducting this research on a part-time basis.

Then there are many family members and friends – too many to numerate, whose moral support and encouragement is greatly appreciated. Two individuals are worth specific mention for their ongoing support and assistance, specifically pertaining to the checking of data: Charmaine Moolman and Mari Rothmann.

I am also grateful to the University of Pretoria who afforded me a bursary for this PhD, as well as to The Innovation Hub for financial assistance in completing this degree.

Table of Contents

Summary		
Acknowledgements		
Table of Contents		
List of		viii xii
	Figures and Illustrations	xiii
LIST OF	rigures and illustrations	XIII
Chapte	er 1: Introduction	1
1.1	Problem statement	1
1.2		5
	Doing business in uncertain environments	
1.3	The need for countries to innovate	8
1.4	Technological innovation in context: knowledge management in the knowledge	10
	economy and inter-organizational collaboration	
1.4.1	The knowledge economy	10
1.4.2	Reasons for networks and inter-organizational relationships	12
1.5	Forms of partnerships between LCOs and SMEs	20
1.6	Partnership failure	23
1.7	An illustrative representation of an SME-LCO partnership	28
1.8	Summarized problem statement and research goals	32
1.0	Summanzed problem statement and research goals	32
Chante	er 2: Theoretical framework and conceptual model	34
2.1	Partnerships betweem SMEs and LCOs and their complementary roles in the	35
۷.۱	cycle of technology innovation	33
011		25
2.1.1	Theoretical support for partnership formation	35
2.1.1.1		35
2.1.1.2	•	38
2.1.1.3		39
2.1.2	The innovation opportunities SMMEs present to LCOs	44
2.1.3	Constraints faced by SMEs when partnering, and synergistic opportunities offed	48
	by LCOs tp SMEs in partnership	
2.2	Types of innovation and the management thereof	50
2.2.1	Nurturing and managing disruptive innovation	54
2.2.2	The innovation environment	5 6
2.2.3		57
	Introducing a technology innovation to the market	
2.2.4	Innovation partnerships in South Africa	61
2.3	Definition of capabilities and competencies	62
2.3.1	Capabilities	62
2.3.2	Competencies	65
2.3.3	Relatinship between capabilities and compentencies	67
2.3.4	SME capabilities that may attract an LCO	73
2.3.4.1	Ability capability: Developing and patenting intellectual property	74
2.3.4.2		76
2.3.4.3	, , , , , , , , , , , , , , , , , , , ,	77
2.3.4.4	Ability capability: To understand the LCO's innovation need (radical or	78
2.0.7.7	incremental), and the associated innovative environment	70
2.3.4.5	Ability capability: Market segmentation strategy for innovative technologies	79
2.3.4.6	Awareness capability: Awareness of complementarity with LCO's core	79
0047	business and SWOT	0.4
2.3.4.7	Awareness capability: Understanding of the internal politics of the LCO	81
2.3.4.8	Awareness capability: Being aware of the opportunities that the SME	81
	presents to the LCO	
2.3.4.9	Awareness capability: Understanding the organization type from which LCOs	83
	source technologies	
2.3.4.10	Awareness capability: Preferred technology partnership form of LCO	84

2.3.5	SME competencies that may attract an LCO	85	
2.3.5.1			
2.3.5.2			
2.3.5.3			
2.3.6	Relationship between competencies and capabilities and a successful partnership		
2.4	Characteristics of knowledge in a company	88	
2.4.1	Knowledge spillover and appropriation	92	
2.5	Control systems	95	
2.5.1	Hierarchical systems (alliances and joint ventures) as formal control mechanisms	100	
2.5.2	Trust and social embeddedness as informal control mechanisms, based on social exchange theory	106	
2.6	Safeguards moderating the relationship between competencies and capabilities,	113	
2.0	sateguards moderating the relationship between competencies and capabilities, and partnership success		
2.6.1	The Moderator Conceptual Model	116	
2.6.2	Research hypotheses and associated subhypotheses	118	
2.6.3	Description of formal and informal safeguards	120	
2.6.3.1	Formal safeguard: Partnership between the LCO and SME formalized	121	
2.6.3.2	Formal safeguard: Use of quantitative measures for determining partnership	121	
	success		
2.6.3.3	Formal safeguard: LCO has a technology strategy	121	
2.6.3.4	Formal safeguard: Expansionist opportunities SME presents to LCO	122	
2.6.3.5	Formal safeguard: Means by which LCO gathered information on SME	122	
2.6.3.6	Formal safeguard: Documented process for monitoring quality control, delivery and support of products	123	
2.6.3.7	Formal safeguard: Substantial equity stake in SME held by another entity	123	
2.6.3.8	Informal safeguard: Trust the LCO	123	
2.6.3.9	Informal safeguard: Trust the EGO	124	
2.6.3.10		127	
2.6.3.1		127	
2.6.3.12	5 1	128	
2.6.3.13		128	
2.6.3.14		129	
2.6.3.15		130	
2.0.0.10	informal safeguard. Recognition as being an important player in the cluster	100	
Chapte	er 3: Research Design and Methodology	136	
3.1	Measurement and key variables	136	
3.2	Sample design	142	
3.2.1	Original research design	142	
3.2.2	Revised research design	144	
3.3	Data collection	146 147	
3.4			
3.5	Data analysis		
3.6	Verification of the survey findings by means of case studies	151	
	, , , , , , , , , , , , , , , , , , , ,		

Chapter 4: Results of the survey 152		
4.1	Description of the responding population	152
4.2	Perception of successful partnership (dependent variable)	155
4.3	Capabilities, competencies and safeguards (independent variables)	156
4.3.1	Ability capability variable (X1 first independent variable)	156
4.3.1.1	Frequency of ability capability	156
4.3.1.2		159
4.3.2	Awareness capability variable (X2, second independent variable)	160
4.3.2.1	Frequency of awareness capability	160
4.3.2.2	Distribution of awareness capability	164
4.4	Competencies variable (X3, third independent variable)	166
4.5	Moderator variables – Number of safeguards in the LCO-SME relationship	167
4.5.1	Number of formal safeguards in the LCO-SME relationship (Z1, first moderator	167
	variable)	
4.5.1.1	Frequency of formal safeguards	167
4.5.1.2		170
4.5.2	Number of informal safeguards in the LCO-SME relationship (Z2, second	170
4.5.2	moderator variable	17 1
4 5 0 4		171
4.5.2.1	Frequencies of informal safeguards	171
4.5.2.2		175
4.5.3	Total number of safeguards in the LCO-SME relationship (Z3, third moderator	176
	variable)	
4.6	Exploring the hypotheses: Logistic regression models	178
4.6.1	Determining the relationship between levels of competencies and capabilities and	179
	partnership success (Model 1)	
4.6.2	Determining the relationship between competencies and capabilities and	183
	partnership success when total safeguards moderate the relationship (Model 2)	
4.6.3	Determining the relationship between competencies and capabilities and	181
	partnership success when informal safeguards moderate the relationship (Model	
	3)	
4.6.4	Determining the relationship between the number of competencies and	192
	capabilities and partnership success when formal safeguards moderate the	. • =
	relationship (Model 4)	
4.6.5	Understanding the relationship between capabilities and partnership success by	197
4.0.0	means of cross tabulations	137
	Thound of droop tubulations	
Chapte	er 5: Case studies	201
5.1	Reason for case study approach	201
5.2	Methodology	203
-		
5.3	Case studies	203
5.3.1	SME1	203
5.3.2	SME2	206
5.3.3	SME3	209
5.3.4	SME4	210
5.4	Analyzing the results	213
5.4.1	Capabilities and compentencies and partnership success	213
5.4.1.1	SME1	214
5.4.1.2	SME2	215
5.4.1.3	SME3	216
5.4.1.4	SME4	217
5.4.1.5	Conclusions on the relationship between capabilities and competencies and	219
	partnership success	
5.4.2	Effect of safeguards on the relationship between capabilities and competencies,	220
	and partnership success	
Chapte	er 6: Conclusion and Recommendations	226
6.1	Main findings from the survey	226
6.2	Relationship between survey findings and the literature	230
6.3	Unexpected findings from the survey	232

University of Pretoria etd – Sawers, J L (2007)

6.4	Comparison of survey findings with case study findings		236
6.5		e of the findings and recommendations	238
6.6	Shortcomi	ngs and possible sources of error	240
Bibliography			244
Appen	dix 1	Questionnaire: Tactics for small or medium sized enterprises (SMEs) in the technology innovative sector, that will constrain opportunistic behaviour by large companies	276
Appen	dix 2	Transcripts from the case study interviews	290
Appen	dix 3	Experts' analysis of case studies	302

List of Tables		
Table 1:	Reasons for partnership failure between an SME and an LCO	28
Table 2:	Summary of motives for inter-organizational relationships/strategic alliances	43
Table 3:	Examples of definitions of capabilities and competencies according to various	69
	authors	
Table 4:	Dekker's formal and informal control mechanisms in inter-organizational	114
	relationships	
Table 5:	Questions used to capture the variables to be analysed	139
Table 6:	Definition of an SME as per the South African National Small Business Act of	144
	1996 for the manufacturing sector	
Table 7:	Sources of SMEs surveyed	145
Table 8:	Source of respondents	153
Table 9:	Geographic distribution of respondents	153
Table 10:	Number of full-time employees during 2003	154
Table 11:	Annual turnover of firm as at 31 March 2003	154
Table 12:	Gross asset value of firm	154
Table 13:	SMEs indicating that they perceived the partnership to be successful	155
Table 14: Table 15:	Frequency of responses: ability capability variables	156 159
Table 15.	Distribution of ability capability variable	161
Table 10.	Frequency of responses: awareness capability variables Distribution of awareness capability variable	164
Table 17:	Frequency of responses: competency variables	166
Table 19:	Distribution of competencies variable	166
Table 20:	Frequency of responses: formal safeguard variables	168
Table 21:	Number of formal safeguards in the LCO-SME relationship	170
Table 22:	Frequency of responses: informal safeguard variables	172
Table 23:	Number of informal safeguards	175
Table 24:	Total number of safeguards (formal and informal)	177
Table 25:	Backward conditional logistic regression analyses with partnership success	179
	as the dependent variable and factors influencing partnership success as the	
	independent variables (significance in parentheses)	
Table 26:	Variables not in the equation (Model 1)	181
Table 27:	Variables not in the equation (Model 2)	184
Table 28:	Variables not in the equation (Model 3)	189
Table 29:	Variables not in the equation (Model 4)	194
Table 30:	Phi values for cross tabulations of items that were significant with perceived	198
Table 04	partnership success	04.4
Table 31:	Experts' ratings on the characteristics of the SMEs	214
Table 32:	Capabilities and competencies of SMEs interviewed	219
Table 33:	Level of capabilities, competencies and safeguards, and perceived	223
Table 34:	partnership success for sample companies Comparison of survey and case study findings	236
I abic 34.	Companson of survey and case study illulitys	230

List of Fig	ures and Illustrations	
Figure 1:	Imbalance between an SME and an LCO	31
Figure 2:	Restoring the balance between an SME and an LCO to facilitate a successful	32
rigaro 2.	partnership	02
Figure 3:	Hierachy from knowledge to core compenties (adapted framework of	72
i igui e 5.	Romanowska, 2002:2)	12
Eiguro 4:	,	00
Figure 4:	Relationship between competencies and capabilities and perceived	88
F:	successful partnership	0.4
Figure 5:	Relationship between competencies and capabilities and perceived	94
	successful partnership	
Figure 6:	Theoretical model demonstrating how safeguards moderate the relationship	118
	between competencies and capabilities and successful partnership with an	
	LCO	
Figure 7:	The "onion diagram" manifestations of culture at different levels of depth	126
	(Hofstede, 1991:9)	
Figure 8:	Expanded illustrative model for maintaining the balance for a successful	135
	SME-LCO partnership	
Figure 9:	Distribution of ability capability variable	160
Figure 10:	Distribution of ability capability variable	165
Figure 11:	Distribution of competencies variable	167
Figure 12:	Distribution of formal safeguards	171
Figure 13:	Distribution of informal safeguards	176
Figure 14:	Distribution of total safeguards	178
Figure 15:	Model 1: The relationship between ability capabilities and perceived	183
i igaro ro.	successful partnership – a fair fit	100
Figure 16:	Model 2: The relationship between the number of awareness capabilities and	186
riguic io.	perceived successful partnership when total safeguards moderate the	100
	relationship – a fair fit	
Figure 17:	Model 2: The relationship between the number of ability capabilities and	187
rigule 17.	perceived successful partnership when total safeguards moderate the	107
Figure 18:	relationship – a fair fit	191
rigule 10.	Model 3: The relationship between the level of awareness capability and	191
	perceived successful partnership when informal safeguards moderate he	
Figure 10:	relationship – a fair fit	101
Figure 19:	Model 3: The relationship between the number of ability capability and	191
	perceived successful partnership when informal safeguards moderate the	
F: 00-	relationship – a fair fit	405
Figure 20:	Model 4: The relationship between the leel of awareness capabilities and	195
	perceived successful partnership when formal safeguards moderate the	
	relationship – a good fit	
Figure 21:	Model 4: The relationship between the number of ability capabilities and	196
	perceived successful partnership when formal safeguards moderate the	
	relationship – a good fit	191
Figure 22:	Negative relationship between Ability capability: SME had developed IP, and	198
	perceived successful partnership	
Figure 23:	Negative relationship between Ability capability: SME had segmented its	199
	potential market into early innovators, early adopters, early majority, late	
	majority and laggards, and perceived successful partnership	200
Figure 24:	Positive relationship between awareness capability, understanding of LCO's	
	SWOT, and perceived successful partnership	
Figure 25:	Negative relationship between awareness capability partnering LCO's	200
-	preferred technology sourcing strategy is to enter into a JV with another LCO,	
	and perceived successful partnership	