

**Managing cooperation  
control problems in  
inter-organisational  
research and development  
exchanges**

**Nicole C. Sutton**

**Doctor of Philosophy**

**2015**

Accounting Discipline Group

UTS Business School

University of Technology, Sydney

## **Certificate of original authorship**

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Signature of Student:

Date:

## Acknowledgements

I would like to thank the individuals and organisations who participated in this study and allowed me to undertake this work. This project would not have been possible without the support of the Cotton Research and Development Corporation, who funded the broader project that this thesis emerged from. In particular, I would like to thank Bruce Pyke for his support of the project and introduction to the case organisations. Special thanks also go to my fellow project team members David Brown, Paul Brown, Paul Thambar, Hannah Pham, Kai Jin, Bruce Sutton, Priska Lowe, Khalil Saroufim, Stephen Soco, Dianne Hiles, Suzie Nguyen and Anthony Krithinaki.

I would like to acknowledge the institutional support I have received from the Accounting Discipline Group at UTS. I am particularly indebted to Zoltan Matolcsy for giving me an opportunity to start the PhD, and Peter Wells for continuing to show faith in my ability to deliver it. Special thanks go to the administrative staff, especially the indefatigable Judith Evans, for helping me navigate all the bureaucracy. I also really appreciate the help of Shona Bates in editing my work.

Although this has been a longer PhD journey than I first anticipated, I have been extremely fortunate to have received an experience akin to an academic apprenticeship. During this time I have been the lucky beneficiary of advice from numerous peers and colleagues, especially from members of the Management Accounting Research Collaborative group, the Centre for Management & Organisation Studies and the Accounting Discipline Group.

This would not have been an apprenticeship without the supervision provided by my panel. I would like to thank Professor Ian Palmer for his support early in my doctoral journey, especially for drawing my attention to the issue of research grants. I greatly appreciate the guidance of Professor Stewart Clegg who taught me the significance of launching off the shoulders of theoretical giants and the value of doing pragmatic yet exemplary scholarly work. I am grateful to Dr David Bedford who helped me in finishing the thesis and whose keen eye and understanding of the literature guided me towards what I wanted to say and how I wanted to say it.

I would like to express my sincere gratitude to my principal supervisor, Professor David Brown, for his unwavering mentorship throughout the entire PhD journey. For my first assignment David asked me to write about ‘What is a PhD?’ I answered that “a PhD can be something which you do, something which you experience, something which you survive, something which you produce or something which you get”. Under his guidance, I think my PhD has been *all* of those things! I will always be most grateful for the academic freedom to read, to think, to write, to make choices, to make mistakes, to learn, to develop and finally, to get it right.

This thesis would likely not exist if not for my parents, Bruce and Rosemary, who are responsible for my interest in scientists and research in the first place. Thank you, not only for teaching me about scientists, but also for advice about becoming one. And thank you to my siblings, Max and Michelle, for your encouragement and tolerance of many conversations about university life and work!

Finally, and most importantly, I would like to thank Ava. My warrior against self-doubt, thank you for understanding what doing this thesis meant to me, for always believing that I could finish it and for reassuring me that it didn’t matter if I didn’t.

# Contents

Certificate of original authorship .....	i
Acknowledgements .....	ii
List of tables .....	xi
List of figures .....	xi
List of abbreviations.....	xiii
Abstract .....	xiv
Chapter 1: Introduction .....	1
1.1. Research objective.....	1
1.2. Motivation .....	4
1.2.1. Conceiving of cooperation problems .....	6
1.2.2. Conceiving of control solutions .....	7
1.3. This study's empirical approach.....	9
1.4. Theoretical contributions.....	10
1.4.1. Cooperation control problems.....	10
1.4.2. Hybrid and embedded MCS control solutions .....	11
1.4.3. The relation between control problems and solutions.....	13
1.5. Thesis structure.....	14
Chapter 2: Framing the cooperation control problem of inter-organisational R&D exchanges .....	16
2.1. Introduction .....	16
2.2. Shifting R&D outside the organisation .....	16
2.2.1. Differences between internal and external R&D contracting .....	17
2.2.2. Evidence of cooperation problems in inter-organisational R&D.....	19

2.3.	Understanding the foundations of cooperation control problems .....	24
2.3.1.	Behavioural assumptions .....	25
2.3.2.	Transactional characteristics .....	27
2.3.3.	Summary .....	31
2.4.	The emergence of cooperation control problems in inter-organisational R&D exchanges .....	31
2.4.1.	The negotiation of mutually-satisfying project contracts.....	33
2.4.2.	Making project investment decisions.....	36
2.4.3.	Ensuring compliance with project contracts .....	37
2.4.4.	Summary of cooperation control problems.....	38
2.5.	Chapter summary.....	39
Chapter 3: Control solutions to cooperation problems in inter-organisational R&D .....		40
3.1.	Introduction .....	40
3.2.	Management control of inter-organisational arrangements.....	40
3.2.1.	Choice of governance structure.....	43
3.2.2.	Choice of management control systems.....	44
3.2.1.	Summary .....	45
3.3.	Hybrid governance structures.....	45
3.3.1.	Limitations of hybrid conceptions in management control research .....	45
3.3.2.	Characterising hybrids .....	48
3.3.3.	The structural dimensions of hybrid structures.....	50
3.3.4.	Describing variation in hybrid form.....	53
3.3.5.	Hybrid structures in inter-organisational R&D.....	56
3.3.6.	Summary .....	62
3.4.	Management control systems within hybrid arrangements .....	63

3.4.1.	Planning mechanisms.....	64
3.4.2.	Monitoring and reporting systems .....	67
3.4.3.	Incentives .....	68
3.4.4.	Social-based mechanisms .....	69
3.4.5.	Summary .....	72
3.5.	Chapter summary.....	72
Chapter 4:	Interdependencies between control solutions and problems .....	74
4.1.	Introduction .....	74
4.2.	Conceptualising the relation between hybrid structure and MCS .....	74
4.2.1.	Treating hybrids as context for control .....	74
4.2.2.	Alternative approaches to modelling the hybrid-MCS relation .....	76
4.2.3.	Summary .....	87
4.3.	Relating control solutions and problems in inter-organisational R&D exchanges	88
4.4.	Chapter summary.....	92
Chapter 5:	Research method .....	93
5.1.	Introduction .....	93
5.2.	Methodology .....	93
5.3.	Research strategy.....	97
5.3.1.	Abductive approach to theory development .....	98
5.3.2.	Qualitative case study method .....	100
5.3.3.	Multiple-case design .....	102
5.3.4.	Case selection.....	103
5.4.	Data collection and analysis procedures.....	106
5.4.1.	Data collection considerations .....	109
5.4.2.	Data analysis considerations .....	117

5.5. Chapter summary.....	127
Chapter 6: The Cotton Research and Development Corporation (CRDC).....	129
6.1. Introduction .....	129
6.2. Background and overview .....	129
6.2.1. CRDC funding streams .....	130
6.2.2. The relation to funders .....	132
6.3. Long-term strategic R&D investment planning .....	132
6.3.1. The design of long-term strategic plans .....	133
6.3.2. Selection of the Board of Directors.....	138
6.3.3. Consultation processes.....	140
6.4. Annual operational planning and investment decisions .....	144
6.4.1. Project development.....	146
6.4.2. Project evaluation.....	150
6.4.3. Project selection and investment decisions.....	154
6.4.4. Alternative project development and selection processes.....	159
6.5. Management, monitoring and reporting of R&D activities.....	161
6.5.1. Project-level monitoring and management .....	161
6.5.2. Monitoring and reporting on R&D investment at the portfolio level .....	164
6.6. Chapter Summary .....	164
Chapter 7: The Cotton Cooperative Research Centre (Cotton CRC) .....	166
7.1. Introduction .....	166
7.2. Background and overview .....	166
7.2.1. The CRC Program.....	167
7.2.2. The three Cotton CRCs.....	167
7.2.3. CRC funding and partner organisations.....	169

7.2.4.	The Cotton CRC R&D provider network .....	172
7.3.	The set-up of the CRC arrangements .....	173
7.3.1.	Formalising of the broad scope of each CRC entity .....	173
7.3.2.	Granting discretion to central CRC entity.....	179
7.4.	Operational planning and investment decisions.....	183
7.4.1.	Standardised project-setup procedures.....	184
7.4.2.	Relational mechanisms .....	189
7.5.	Management, monitoring and reporting of R&D activities.....	192
7.5.1.	Project-level monitoring and management .....	193
7.5.2.	Centre-level monitoring and reporting.....	201
7.6.	Chapter Summary.....	206
Chapter 8:	Cross-case comparisons .....	208
8.1.	Introduction .....	208
8.2.	Reflecting on the nature of the two hybrid arrangements .....	208
8.2.1.	Comparing the operating context.....	208
8.2.2.	Comparing the hybrid structures.....	209
8.2.3.	Comparing the embedded MCS.....	215
8.3.	Archetypal patterns.....	225
8.3.1.	Consistent cross-case patterns in variation in structural characteristics and MCS	229
8.3.2.	Internally congruent combinations of control solutions.....	231
8.4.	Chapter Summary.....	235
Chapter 9:	Managing cooperation problems in inter-organisational R&D exchanges .....	237
9.1.	Introduction .....	237
9.2.	Addressing cooperation control problems.....	237

9.2.1.	Negotiating mutually satisfying project contracts.....	240
9.2.2.	Selecting projects for investment under conditions of uncertainty.....	246
9.2.3.	Ensuring ex post compliance with R&D exchange expectations.....	249
9.3.	Misalignment patterns .....	252
9.3.1.	Intensity of project-level MCS for different control problems .....	253
9.3.2.	Instances of transactional misalignment .....	256
9.4.	Chapter summary.....	257
Chapter 10:	Implications.....	259
10.1.	Introduction.....	259
10.2.	Relating control solutions .....	259
10.2.1.	The varying control capacities of alternative hybrid forms.....	261
10.2.2.	Complementary management control.....	263
10.2.3.	Compensatory management control .....	265
10.2.4.	Reconciling the archetype and misalignment approaches.....	267
10.3.	Relating control problems and control solutions .....	269
10.3.1.	Conceptualising the control problem/control solution dynamic .....	270
10.3.2.	Managing cooperation control problems in inter-organisational R&D....	275
10.3.3.	Accepting residual loss: understanding the bounds of efficient alignment 279	
10.4.	Chapter summary .....	284
Chapter 11:	Conclusion.....	286
11.1.	Introduction.....	286
11.2.	Thesis summary .....	286
11.2.1.	Cooperation control problems .....	288
11.2.2.	Hybrid and embedded MCS control solutions .....	291

11.2.3. The relation between control problems and solutions.....	295
11.3. Study limitations.....	298
11.4. Concluding remarks.....	299
References.....	301
Appendix.....	316
Appendix A Inter-organisational management control research .....	316

## List of tables

Table 1: Summary of cooperation control problems in R&D exchanges .....	39
Table 2: Sequences of research activities.....	107
Table 3: List of interviews .....	110
Table 4: Number of interviews by organisation.....	111
Table 5: List of site visits and field trips.....	114
Table 6: List of archival documentation collected.....	116
Table 7: Coding cycles and techniques.....	118
Table 8: The strategic objectives and program structure in the CRDC long-term plans ...	134
Table 9: The three Cotton CRCs.....	168
Table 10: Contributions by the core partners of the three Cotton CRCs .....	170
Table 11: Contributions from affiliates of the Third CRC.....	171
Table 12: The strategic objectives and program structure of the three Cotton CRCs.....	176
Table 13: Accountability structure of the Cotton CRC.....	202
Table 14: Summary of hybrid features of two cases.....	210
Table 15: Summary of MCS embedded within the hybrid arrangements.....	216
Table 16: Relative intensity of MCS use .....	254
Table 17: Inter-organisational management control research.....	316

## List of figures

Figure 1: Preliminary conceptual framework .....	89
Figure 2: Variability in rainfall, cotton production and CRDC revenue.....	131
Figure 3: CRDC R&D projects by program type .....	136
Figure 4: CRDC R&D expenditure (\$) by program type.....	136
Figure 5: CRDC two-stage proposal process .....	145
Figure 6: Example of call for PRPs.....	146
Figure 7: Project reporting requirements .....	162
Figure 8: Number of open projects in the Cotton CRC, by broad program category .....	175
Figure 9: The management structure of the first Cotton CRC (1993–1999) .....	179

Figure 10: The management structure of the second Cotton CRC (1999–2005)..... 180

Figure 11: The management structure of the third Cotton CRC (2005–2012) ..... 180

Figure 12: Project management at CRC..... 184

Figure 13: Structure of relations in the CRDC..... 214

Figure 14: Structure of relation in the Cotton CRC ..... 215

Figure 15: Patterns of relations between hybrid structure characteristics and MCS ..... 227

Figure 16: Cooperation control problems and control solutions in the CRDC..... 238

Figure 17: Cooperation control problems and control solutions in the Cotton CRC..... 239

Figure 18: Conceptualising the dynamic between control problems and solutions in inter-organisational settings..... 276

## List of abbreviations

ABARES	Australian Bureau of Agricultural & Resource Economics & Sciences
ACGRA	Australian Cotton Growers Association
ACRI	Australian Cotton Research Institute
BMP	Best Practices Management (program)
CA	Cotton Australia
CEO	Chief Executive Officer
CMT	Company management team
COO	Chief Operating Officer
Cotton CRC	Cotton Cooperative Research Centre
CRDC	Cotton Research and Development Corporation
CSD	Cotton Seed Distributors
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Department of Agriculture, Forestry and Fisheries
DIISR	The Department of Innovation, Industry, Science and Research
FRP	Full research proposal
KPIs	Key performance indicators
M&E	Monitoring and evaluation (program)
MCS	Management control systems
NSWDPI	New South Wales Department of Primary Industries
OECD	Organisation for Economic Co-operation and Development
PIERD Act	Primary Industries and Energy Research and Development Act 1989
PRP	Preliminary research proposal
QDAFF	Queensland Department of Agriculture, Fisheries and Forestry
R&D	Research and development
RAG	Red Amber Green (report)
RDC	Rural Development Corporation
TCE	Transaction cost economics

## Abstract

Most scholarly knowledge about the management control of research and development (R&D) is premised on a vertical integration model of R&D management; however, in practice, R&D is increasingly being externally contracted through inter-organisational arrangements. Within this context, the aim of this thesis is to examine how cooperation control problems, which arise in inter-organisational R&D exchanges, are addressed by alternative hybrid structures and embedded management control systems (MCS)? To explore this question I investigate two inter-organisational R&D arrangements – a flexible subcontracting arrangement and a limited life equity alliance – within the Australian cotton industry.

First, I use theory from transaction cost economics (TCE) to demonstrate the relevance of cooperation control problems in inter-organisational R&D exchanges. Furthermore, by decomposing the cooperation category I show how the risk of different forms of opportunism gives rise to three types of cooperation control problems at successive contractual phases. These are: costly (*ex ante*) negotiation of mutually agreeable projects contracts; suboptimal investment decisions based on misrepresented information (at the point of contract); and the difficulty in monitoring and enforcing (*ex post*) contract compliance.

Second, I explain how cooperation control problems are addressed by inter-dependent combinations of hybrid structure and embedded MCS. This demonstrates that hybrid governance is not simply the generic inter-organisational context where control occurs; instead, alternative hybrid structures – characterised by varying degrees of formalisation, centralisation and relational governance – have different ‘control solving capacities’. In addition, each hybrid structure’s unique control capacity influences the design and operation of embedded MCS. This is because some MCS – particularly more structure-wide mechanisms – are used to complement the strengths of each hybrid structure; whereas other MCS – typically project-level mechanisms – are used to compensate for deficiencies of each hybrid structure in relation to certain control problems or transactions.

Finally, I explore how control problems and control solutions relate. Based on my empirical results, I propose that each successive control solution choice is determined by a ‘residual control problem potential’, which is shaped by the adequacy of previous control solution choices. In addition, I predict when the relation between control problems and solutions will not hold. I propose that managers will trade-off transaction-level misalignment to avoid portfolio-level negative effects in terms of cost efficiency, internal congruence and perceived equity.