

11091

Incentives to Innovations in Road and Rail Maintenance and Operations

TORBJÖRN STENBECK



KTH Infrastructure

Licentiate Thesis
Stockholm, Sweden 2004

1	Introduction	5
1.1	Definition of Terms	5
1.2	Background.....	6
1.3	Purpose and Research Questions	6
1.4	Delimitation	7
1.5	Method.....	8
2	Innovations – Theory and Practice	11
2.1	Various Ways to Classify Innovations.....	11
2.2	An Organizational Innovation	13
2.3	A Technical Innovation	13
2.4	Radical or Just Incremental Technical Innovations?	15
2.5	Innovation System Theory.....	17
2.6	The Swedish Innovation System.....	18
2.7	Sectoral and Industry-Specific Zooming	19
2.8	Government’s Incentives to the Principals	21
3	Vägverket – Swedish Road Administration.....	23
3.1	Organization of Technical Development.....	23
3.2	Market and Contractor Networks	28
3.3	Procurement Process.....	32
3.4	Tender Evaluation Model	33
3.5	Documentation Systems	34
3.6	Research and Development Program.....	36
4	Banverket – Swedish Railroad Administration	39
4.1	Organization of Technical Development.....	40
4.2	Market and Contractor Networks	41
4.3	Procurement Process.....	42
4.4	Tender Evaluation Model	43
4.5	Documentation Systems	44
4.6	Research and Development Program.....	46
5	International Experiences in Perspective.....	47
5.1	Brief History of Performance Contracts	47
5.2	Organization of Technical Development – French Roads.....	49
5.3	Organization of Technical Development - French Railways.....	54
6	Theories of Technical Change.....	69
6.1	Schumpeter’s Entrepreneur.....	69

6.2	The Role of Demand	71
6.3	The Interaction between Science and Innovations	72
6.4	The Natural Rate of Technical Development.....	73
6.5	No Incentives in Spillover Theory	81
7	Technology Procurement Strategies.....	83
7.2	Soft Parameters	90
7.3	Multicriteria Analysis.....	91
7.4	Common Denominator	91
7.5	Act of Public Procurement	93
8	Empirical Studies and Findings.....	95
8.1	Interviews	95
8.2	Experiments (Vägverket)	104
8.3	Survey (Banverket)	110
8.4	Participatory Observation (Banverket).....	110
9	Conclusions and Proposals	113
9.1	Answer to the Practical Question	113
9.2	Answer to the Scientific Questions	116
9.3	Practical Ideas and Proposals	117
10	Swedish Summary / Svensk sammanfattning	121
10.1	Bakgrund och syfte.....	121
10.2	Innovationssystem kompletterat med incitament	122
10.3	Vägverkets organisation för teknikutveckling	122
10.4	Banverkets organisation för teknikutveckling.....	123
10.5	Svenska underentreprenörer, franska vägerfarenheter	124
10.6	Franska järnvägens innovationssystem	125
10.7	Teorier kring teknisk förändring	126
10.8	Empiri.....	126
10.9	Slutsats Vägverket.....	130
10.10	Slutsats Banverket	131
10.11	Slutsats för vetenskapen	132
10.12	Slutord	133
10.13	Bilagor	134
11	References	141
11.1	Interviews	141
11.2	Publications	143

Abstract

Worried voices in the Swedish road maintenance and operations industry claim that innovations and technical development has ceased in the last decades. One hypothesis is that it is an effect of the public tendering reform introduced in 1992.

Since 2001, the Swedish railroad industry has also introduced public tendering and awarded contracts to private contractors.

This study examines the validity of these claims by analyzing the incentives to innovation in the past and at present. The analysis is concluded by proposals how the innovative climate can be improved between the road and rail administrations and their contractors.

Acknowledgements

Thanks to funding by the Development Fund of the Swedish Construction Industry and the Swedish road and rail administrations, Vägverket and Banverket, this study on incentives to innovations was initiated in March 2003. The Development Fund of the Swedish Construction Industry has approximately 3,000 affiliated companies. Its aim is to develop the building process in order to create commercial conditions for contractors to take advantage of research and stimulate development (SBUF 2004b).

The project has been coordinated by CDU, Centre for research and education in operation and maintenance. Supervisors at KTH, the Royal Institute of Technology in Stockholm, have been Folke Snickars, professor and co-supervisors Johan Silfwerbrand, professor and Fredrick Lekarp, PhD.

I am also grateful to the reference group consisting of the supervisors and representatives of the financiers that assembled three times a year to follow and manage the project. Birgitta Törne and Kjell Eriksson have represented Banverket, Hardy Wikström, Hans Kvarnlöf and Sven-Erik Hallberg have represented Vägverket, Håkan Carlevi from NCC has represented the private contractors and Hans Cedermark has represented CDU.

In addition to the financiers and the reference group, interviewees in the reference list, unlisted interviewees and colleagues at KTH have contributed greatly and amicably to the study. It has been a pleasure to find so many with an altruistic and genuine interest for technical development. The older generation has expressed concern for the younger generation and the younger generation has expressed admiration of their older colleagues. The study could not have been possible to pursue as deeply into reality, and the findings would not have been possible to present as openly, without the sincere wish to find the reasons for lack of innovations that has been encountered almost everywhere.