Knowledge and Innovation

A comparative study of the USA, the UK, and Japan

Helen Brown

Routledge Studies in Innovation, Organization and Technology

Knowledge and Innovation

A comparative study of the USA, the UK, and Japan

Helen Brown

Routledge
Taylor & Francis Group
LONDON AND NEW YORK

First published 2008
by Routledge
2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN

Simultaneously published in the USA and Canada
by Routledge
270 Madison Ave, New York, NY 10016

Routledge is an imprint of the Taylor & Francis Group, an informa business

Transferred to Digital Printing 2008

Typeset in Times by Wearset Ltd, Boldon, Tyne and Wear

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

Library of Congress Cataloging in Publication Data
A catalog record for this book has been requested

ISBN10: 0-415-41663-9 (hbk)
ISBN10: 0-203-93935-2 (ebk)

ISBN13: 978-0-415-41663-4 (hbk)
ISBN13: 978-0-203-93935-2 (ebk)

New insights into processes of innovation will require a focus on social practice and the dynamic constellations of communities where knowledge lives and circulates. Such a difficult task demands the integration of multiple perspectives. So here is a book that combines several theoretical traditions as well as case studies in different cultures to investigate public policy and cross-organizational innovation as integral part of complex social learning systems.

Etienne Wenger

This book is to be welcomed because it tackles two important needs in knowledge transfer. One is a priority to place discussions about knowledge transfer into an appropriate theoretical framework; the other is a greater understanding of the social context of public–private transactions or collaborations.

Sir Brian Fender
President of the Institute of Knowledge Transfer

Knowledge and Innovation

Although governments across the world are implementing policies to transform the economic base towards high-value products and services, these policies often fail to achieve their intended outcome because the process of knowledge transfer is not very well understood. In this book, Helen Brown presents three case studies from the USA, the UK, and Japan arguing that partnership between public and private sector organizations can take many forms, some of which are very complicated. Vignettes from her case studies explore key attributes of partnerships that are effective in different contexts. Brown argues that 'partnership' should not be prescribed as a panacea for the delivery of complex policy in education, health, and economic regeneration. Instead, policy makers need to adopt a much more subtle and sophisticated concept of multi-agency partnership that acknowledges the time and effort needed to build trust and new shared practices.

Brown takes issue with weak theories of change endemic in some policy, as well as the tacit assumption that knowledge and 'technology transfer' is a logistical problem, that can be resolved by unlocking the flow of knowledge from universities to industry. Instead, the author subscribes to a sociocultural theoretical approach that emphasizes the process of knowledge creation and the significance of consequent changes in the dynamics of human relations. Seen in this light, Brown conceptualizes innovation as collaboration between diverse organizations and individuals, the result of which is organizational learning.

This book will be of great interest to students and researchers interested in policy studies, business and management, and education, as well as policy makers engaged with communities of practice theory.

Helen Brown is the Executive Director of the West Midlands Higher Education Association and a Director of the newly formed Institute of Knowledge Transfer.

RIOT!

Routledge studies in innovation, organization and technology

1 **Innovation in the U.S. Service Sector**
Michael P. Gallaher, Albert N. Link and Jeffrey E. Petrusa

2 **Information and Communications Technologies in Society**
E-living in a digital Europe
Edited by Ben Anderson, Malcolm Brynin and Yoel Raban

3 **The Innovative Bureaucracy**
Bureaucracy in an age of fluidity
Alexander Styhre

4 **Innovations and Institutions**
An institutional perspective on the innovative efforts of banks and insurance companies
Patrick Vermeulen and Jorg Raab

5 **Knowledge and Innovation in Business and Industry**
The importance of using others
Edited by Håkan Håkansson and Alexandra Waluszewski

6 **Knowledge and Innovation**
A comparative study of the USA, the UK, and Japan
Helen Brown

Foreword

Bridget Somekh

This book engages with some of the most important issues of our day. In a globalized world, regional industries that have provided a stable way of life for several generations can find their economic viability undermined by competition from overseas, and the pattern is repeating all over the world. As the warning signs become clear, governments see it as their business to develop policies for economic renewal and regeneration to avoid disaster for whole populations, but the success of such initiatives is often ephemeral. This book began with Helen Brown's involvement with the community of universities in the West Midlands, instrumental in the high-technology corridors initiative set up by the British Government, and after closure of the Rover car manufacturing company in the West Midlands was narrowly avoided in 1999. Plunged into the day-to-day business of working with universities that had forged new partnerships with local small and medium enterprises (SMEs), she found herself at the heart of a storm of hopes, passions, and resistance. 'Knowledge transfer' was the government's big idea to divert the technological expertise of university academics into the development of new industries and to lead local businesses in developing new products and diversifying their markets in preparation for surviving the next crisis. Yet, the expense and effort of change often seemed an insurmountable barrier, and partnership between the universities and SMEs often involved overcoming cultural barriers between those who saw the world through very different eyes. The Rover Crisis was a precursor of a swathe of government initiatives to promote 'knowledge transfer' which in 2007 is defined by the Institute of Knowledge Transfer as 'The systems and processes by which knowledge, including technology, know-how, expertise and skills are transferred from one party to another, leading to innovative, profitable or economic and social improvements.' In 2005, when I had the privilege of examining the doctoral thesis on which this book is based, Rover had just plunged into another crisis and the end of the car industry in the West Midlands was in sight. Newspapers were full of the good news that strategies for diversifying the industrial base put in place in 1999 made this much less of a crisis than it might otherwise have been. The positive impact of universities as a catalyst for innovation fuelled a greater reliance on 'knowledge transfer' policies.

> The nations that can thrive in a highly competitive global economy will be those that can compete on high technology and intellectual strength – attracting the highest-skilled people and the companies which have the potential to innovate and to turn innovation into commercial opportunity. These are the sources of the new prosperity.
>
> (Introduction to the Science and Innovation Investment Framework 2004–2014)

> We need to do much better at turning knowledge into enterprise and we want universities to see this as their co-mission.
>
> [Gordon Brown, Chancellor of the Exchequer (launch of CMI)]

Helen's meticulous analysis of the development of partnership in the high-technology corridors over the previous five years told a more complex and less euphoric story and made compelling reading. The lens provided by sociocultural theories, particularly *expansive learning theory* and the conceptualization of these willing and unwilling partnerships as different kinds of *communities of practice*, provided fascinating insights into the processes of change. Now, in this book, she has extended and developed this knowledge of the relationship between strategic change policies and (hoped for) socioeconomic renewal, turning her attention to government initiatives in the mature textiles industry and the emerging photonics industry in Japan, and the dot-com companies and sustainable energy innovation in the US. It makes a fascinating study.

This timely book can perhaps be seen as itself a model of the integration of academic and business cultures, since it combines scholarship with powerful, practical insights. The concepts and technical language of expansive learning theory are used (and carefully explained) to bring a rigorous analysis to the apparent confusions of human perceptions and interactions. Knowledge is built up through illustrative vignettes developed from interviews, compared across the different national contexts. Then in Chapter 10, those of us who are concerned with managing change in our own work places are given a rich compendium of good ideas about how change can be facilitated. This is a book which can help governments and managers – in universities and industry – learn how to build partnerships and how to support and sustain change in ways that enrich communities that would otherwise have been broken socially and economically.

Acknowledgements

Thanks are due to all the people who were willing to be interviewed and contribute information, opinions, and insights to this book. In particular, some comments in this study about the role of key actors and agencies in the UK case studies are intended to illuminate the difficulties involved in enacting a complex and ambitious policy. The overwhelming impression was of people doing their very best to work together in challenging contexts to achieve, within a very short time, a huge change.

I am indebted to my critical friends Professor Bridget Somekh, Professor Murray Saunders, Professor Harry Daniels, and Professor Frank Blackler for their comments and advice on the final draft of this book. However, any shortcomings are my own responsibility.

It was a delight to encounter the work of Nuno Corporation, and the insights of Chief Executive Reiko Sudo and Designer Keiji Otani have been invaluable. I must also thank Professor Takaishi and Ms Yoko Ashizawa for their help in translating and interpreting interview transcripts associated with case studies in Japan.

I am also grateful to Vice-Consul, Rachel Lawley of UKTI, for helping me to make contact with key people and agencies in Silicon Valley in the US. In particular, David Aslin and Michael deAngelis were very generous with their time.

The support and bemused encouragement from my family Ed, Emma, and Sarah has spurred me on. Finally, thanks are due to my colleague and friend Sandra Stackhouse for her invaluable support and patience throughout the long gestation of this book.

Contents

Figures

Tables

1 Introduction and overview

1.1 The international policy context

Governments across the world are implementing policies to transform the economic base towards high-value products and services. Innovation policy has been inspired by the success of Silicon Valley based on its proximity to an excellent source of research, principally at Stanford University, and the clustering of high-technology companies in the region. Nevertheless, policies often fail to achieve their intended outcomes because the process of knowledge transfer is very complex and not well understood by policy makers. The outcomes of policy are unpredictable and the implementation of innovation processes involves cultural change in organizations, and it is difficult to manipulate this by policy.

Knowledge economy policy is informed by a weak theory of change. We struggle to grasp how it can be done more effectively and how barriers can be overcome. However, there is a gap between the goals and the implementation of 'technology transfer' policies.

Partnership between private and public sector organizations is presented as a panacea for the delivery of complex policy in education, health, and economic regeneration. Case studies in the UK, the USA, and Japan illustrate the importance of local context in the creation of partnership between diverse organizations to deliver the 'knowledge transfer' or 'innovation'.

Expansive learning theory (ELT) is commonly used in educational settings and only recently has it been adopted in studies of innovation in complex organizations. It is valuable in studies of technology transfer projects because it offers a way of analysing the impact of human dynamics on the process of innovation. It frames the relationships between individual and organizational perspectives through a focus on the use of mediating artefacts and the rules and divisions of labour that shape collaborative outcomes.

Despite the diverse cultural and environmental contexts, both international and regional 'knowledge economy' policies make the assumption that universities can act as a catalyst for change. In a sense, my work focuses on context and brings the analysis full circle with my case study of the financial structures in Silicon Valley and the role of venture capitalists in commercialization. Despite

the extensive copying of the Silicon Valley model, the case study investigates some critical success factors that may have been overlooked by those seeking to emulate the success of a unique region.

The case studies illustrate how different types of organizational partnerships affect their capacity for innovation. Organizational partnerships evolve differently in response to unique sets of environmental and cultural contexts. Concepts of partnership are extremely varied, and in different countries, people attach their own specific meaning to the word. It is widely eulogized as an excellent way to bring together the public and private sector to deliver complex policies. Nevertheless, partnerships can vary in complexity. The range and number of partners, the depth of commitment, and the quality of communications affect their sustainability and effectiveness.

The case studies explore the impact of underpinning concepts of knowledge on the way in which a partnership comes to understand knowledge creation, transfer and innovation. Knowledge can be conceptualized as a commodity or as a social process, and these lie at opposite ends of a spectrum of an array of views, which drive policy and practice.

Innovation is often described as three stages: research, development, and innovation. Sometimes the word innovation is used to refer to the culmination of all three stages, from knowledge creation to diffusion of innovation into new technological process services or products.

1.2 My aim and rationale

Policy borrowing is a global phenomenon and remains relatively unquestioned. These contrasting international case studies of innovation focus on 'practices' that are effective in specific contexts. Organizations are composed of people who act and interact and can describe their practices. Regardless of the status or expertise of the respondent, their descriptions of events and practices are informed by prior assumptions, cultural practices, and discourses that 'shape their perspective on reality' (Ball, 1994; Beach, 2003; Lincoln and Guba, 2000; Miles and Huberman, 1994; Ozga, 1999; Silverman, 2001; Yin, 2003).

Practices and policy can form a virtuous circle but only if the evaluation of practice creates evidence to inform the development of more successful ways of doing things.[1] In other words, the true value of evaluation lies in the opportunities to *learn* during the implementation process and to adjust the trajectory of policy accordingly. The case studies are analysed to try to answer five research questions:

1 Why is it that some approaches seem to have evolved in a particular geographic and social context?
2 What can be learnt from such exemplars and what if anything can be transplanted or adopted in a different context?
3 What are the benefits and limitations of using ELT to analyse the development of multi-agency learning?

4 How can boundary objects and mediators facilitate innovation?
5 What insights from ELT and from the analysis of collaboration in these international case studies can be applied to similar policy initiatives?[2]

In the past ten years, my interest and professional involvement in regional policy development has grown. For much of the last century, the West Midlands region of England was the heart of UK manufacturing industry and car production. During the past twenty years, increasing global competition had a massive impact on the competitiveness of UK manufacturing companies. I was fascinated by the way in which a regional innovation policy evolved in response to the crisis at the Rover Car Manufacturing plant in 1999.

I took the opportunity to study the 'high-technology corridor' (HTC) policy as an example of an attempt to enhance the impact of higher education institutions on the economic regeneration of an English region. The policy describes a mechanism for universities to contribute to the so-called 'knowledge economy'. From the perspective of universities, this belongs to a type of activity known as the 'third mission',[3] described variously as 'knowledge transfer' or 'technology transfer'. HTCs are geographically pre-determined sites of interaction between sources of research and commercial exploitation that aim to drive a sub-regional knowledge economy as described in the West Midlands Regional Innovation Strategy.

My experience led me to question theories of policy development, which describe a smooth and rational process. I wanted to see if national innovation policies were implemented more easily elsewhere. Two US case studies illustrate the development of partnerships between academia and commerce to drive innovation. The first of these explores partnerships founded to commercialize sustainable energy technologies. The second revisits the 'Silicon Valley phenomenon'. Silicon Valley is an exemplar of research-led innovation, but the name also conjures a powerful metaphor for successful economic regeneration driven by an alliance between universities and high-technology companies. My case study concentrates on the environment in which innovation can flourish in terms of financial services and attitudes in Silicon Valley.

Two Japanese case studies describe innovation practices in a mature industry sector and in an emergent sector. The first explores long-standing partnerships between an innovative design company and various small- and medium-sized manufacturers (SMMs). The Japanese textile industry has an international reputation for the creation of new materials, products, and processes. My second case study describes the Government and regional innovation policies that support collaborations between universities and a cluster of photonics companies.

ELT has gained currency in postmodern studies of organizations. It has been used as a framework to understand how agencies connect in an organic way, and in some cases, research has focused on innovation within large complex organizations. Unlike predominant theories of innovation, which underestimate the extent to which the process of 'knowledge transfer' relies upon the quality of relationships between people, it offers a heuristic framework in which this is

of central importance. My case studies describe opportunities for expansive learning by individuals and organizations working in partnership in terms of variation in communication, trust, and clarity of purpose.

My work builds on several well-referenced and recent studies that have used ELT (a variation of activity theory) to inform their understanding of innovation and organizational change in which previously disparate work teams have devised ways of collaborating (Blackler, 1995, 2000; Blackler *et al.*, 1999, 2000; Engeström, 1999, 2000, 2001, 2004; Engeström *et al.*, 1999; Kerosuo and Engeström, 2003; Ludvigsen *et al.*, 2003; Toiviainen, 2003).

Although the theoretical concepts are developed in the context of a study of innovation, the research methods and analysis may be of interest to researchers and professionals in the fields of education, social work, management, and healthcare. To enable a wide range of readers to dip into particular chapters of this book, there is some reiteration of key theoretical points.

1.3 The structure of this book

This book addresses a significant gap in theory. Currently, 'expansive learning' is conceptualized as collaboration, but this does not adequately describe learning between communities where agency and power vary. However, these case studies reveal the impact of power as a structural constraint to multi-agency learning.

Chapter 1 introduces the cases and situates them in their local and national policy context. It discusses the international policy context for the 'knowledge economy' and the assumptions made in global and local policy.

Chapter 2 outlines the theoretical landscape of innovation and discuses policy implementation by partnerships. There is a tacit assumption that knowledge and 'technology transfer' is a logistical problem, to be resolved by unblocking the flow of knowledge from universities to industry. By contrast, sociocultural theory emphasizes the process of knowledge creation and the significance of consequent changes in the dynamics of human relationships. Following this line of argument leads towards a conception of innovation as collaboration and organizational learning.

Chapter 3 outlines my research design and methodology, linking this to the heuristic framework of ELT. My case study approach recognizes that policy is not necessarily implemented as a linear process and innovators may not even describe what they do as 'knowledge transfer'.[4]

Chapter 4 draws on the empirical data to reconstruct various 'subject perspectives' in relation to changing conceptions of the 'object of activity'. Variations in perspectives show how key individuals and networks of 'partner' organizations are influenced by various competing 'objects of activity' that emerge during the policy implementation process.

In Chapter 5, I discuss the capacity of boundary objects to act as bridges between experts from different 'communities of practice'. In such instances, this leads to the horizontal expansion of the 'object of activity'. I present the data as