CONTRIBUTIONS TO MANAGEMENT SCIENCE

Mika Tuunanen · Josef Windsperger
Gérard Cliquet · George Hendrikse
Editors

New Developments in the Theory of Networks
Franchising, Alliances and Cooperatives

Physica-Verlag
A Springer Company
Editors
Adjudet Prof./Docent, Dr. Mika Tuunanen
University of Jyväskylä
Jyväskylä University School of Business
and Economics
PO Box 35
FI-40014 University of Jyväskylä
Finland
mika.tuunanen@uku.fi

Prof. Dr. Gérard Cliquet
University of Rennes 1
Institute of Management (IAE)
11 rue Jean Macé
35708 Rennes, Cedex 7
France
gerard.cliquet@univ-rennes1.fr

Prof. Dr. Josef Windsperger
University of Vienna
Center of Business Studies
Brünner Straße 72
1210 Vienna
Austria
josef.windsperger@univie.ac.at

Prof. Dr. George Hendrikse
Erasmus University Rotterdam
Rotterdam School of Management
Burg. Oudlaan 50, Office T08-56
3062 PA Rotterdam
The Netherlands
ghendrikse@rsm.nl

Funding from the Austrian Federal Ministry of Science and Research in Vienna is gratefully acknowledged.

DOI 10.1007/978-3-7908-2615-9
Springer Heidelberg Dordrecht London New York

© Springer-Verlag Berlin Heidelberg 2011
This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilm or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.
The use of general descriptive names, registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Cover design: SPI Publisher Services

Printed on acid-free paper

Physica-Verlag is a brand of Springer-Verlag Berlin Heidelberg
Springer-Verlag is a part of Springer Science+Business Media (www.springer.com)
Contents

New Developments in the Theory of Networks: Introduction .................... 1
Josef Windsperger and Mika Tuunanen

Part A Franchising

Contract Design and Decision Rights

Determinants of Contractual Completeness in Franchising .................... 13
George Hendriks and Josef Windsperger

Delegation and Autonomy in Franchising ........................................... 31
Begoña López-Fernández and Susana López-Bayón

Allocation of Decision Rights in International Franchise Firms:
The Case of Master and Direct Franchising ....................................... 45
Nada Mumdžiev

Incentives and Ownership Strategy

Incentives and Control in Company-Owned Versus Franchised
Outlets: An Empirical Study at the Chain Level ................................ 59
Didier Chabaud, Arnaud Lavit d’Hautefort, and Stéphane Saussier

Plural Form and Franchisor Performance: Early Empirical
Findings from Europe ................................................................. 75
Frédéric Perdreau, Anne-Laure Le Nadant, and Gérard Cliquet
<table>
<thead>
<tr>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy, Competition and Internationalization of Franchise Firms</td>
<td></td>
</tr>
<tr>
<td>Inner Strength Against Competitive Forces: Successful Site</td>
<td>93</td>
</tr>
<tr>
<td>Selection for Franchise Network Expansion</td>
<td></td>
</tr>
<tr>
<td>Thomas Ehrmann and Brinja Meiseberg</td>
<td></td>
</tr>
<tr>
<td>Market Saturation or Market Concentration: Evidence</td>
<td>117</td>
</tr>
<tr>
<td>on Competition Among U.S. Limited Service Franchise Brands</td>
<td></td>
</tr>
<tr>
<td>Robert E. Stassen and Marko Grünhagen</td>
<td></td>
</tr>
<tr>
<td>A Model of Optimal International Market Expansion:</td>
<td>135</td>
</tr>
<tr>
<td>The Case of US Hotel Chains Expansion into China</td>
<td></td>
</tr>
<tr>
<td>E. Hachemi Aliouche and Udo Schleintrich</td>
<td></td>
</tr>
<tr>
<td>Entrepreneurship and Franchising</td>
<td>155</td>
</tr>
<tr>
<td>Is the Theory of Entrepreneurship Applicable to Franchising?</td>
<td></td>
</tr>
<tr>
<td>Jenni Torikka</td>
<td></td>
</tr>
<tr>
<td>Franchising and Regulation</td>
<td>179</td>
</tr>
<tr>
<td>Regulating the Franchise Relationship: Franchisor Opportunism,</td>
<td></td>
</tr>
<tr>
<td>Commercial Morality and Good Faith</td>
<td></td>
</tr>
<tr>
<td>Andrew Terry and Cary Di Lernia</td>
<td></td>
</tr>
<tr>
<td>Effect of New Regulation on Franchising Performance:</td>
<td>195</td>
</tr>
<tr>
<td>An Exploratory Study in Spain</td>
<td></td>
</tr>
<tr>
<td>Victoria Bordonaba-Juste, Laura Lucia-Palacios, and Yolanda Polo-Redondo</td>
<td></td>
</tr>
<tr>
<td>Part B       Alliances</td>
<td></td>
</tr>
<tr>
<td>Value Creation in Network Relationships</td>
<td></td>
</tr>
<tr>
<td>The Efficacy of Relational Governance and Value-Creating</td>
<td>211</td>
</tr>
<tr>
<td>Relational Investments in Revenue Enhancement</td>
<td></td>
</tr>
<tr>
<td>in Supplier–Buyer Relationships</td>
<td></td>
</tr>
<tr>
<td>Muhammad Zafar Yaqub and Rudolf Vetschera</td>
<td></td>
</tr>
<tr>
<td>Networked Resource Access and Networked Growth: A Double</td>
<td>239</td>
</tr>
<tr>
<td>Network Hypothesis on the Innovative Entrepreneurial Firm</td>
<td></td>
</tr>
<tr>
<td>Anna Grandori and Eugenia Cacciatori</td>
<td></td>
</tr>
<tr>
<td>Organization of Innovation</td>
<td></td>
</tr>
<tr>
<td>A Network Approach of Joint R&amp;D Projects</td>
<td></td>
</tr>
<tr>
<td>Nieves Arranz and J. Cx</td>
<td></td>
</tr>
<tr>
<td>Strong Ties, Weak Tie</td>
<td></td>
</tr>
<tr>
<td>The Case of Danish      an</td>
<td></td>
</tr>
<tr>
<td>Susanne Gretzinger and</td>
<td></td>
</tr>
<tr>
<td>Knowledge Management</td>
<td></td>
</tr>
<tr>
<td>Organization of Knowledge</td>
<td></td>
</tr>
<tr>
<td>Marijana Srečković and</td>
<td></td>
</tr>
<tr>
<td>Influence of Network and Knowledge Transfer</td>
<td></td>
</tr>
<tr>
<td>Ana Aleksić Mirić</td>
<td></td>
</tr>
<tr>
<td>Part C      Cooperatives</td>
<td></td>
</tr>
<tr>
<td>Behavioral Logics and</td>
<td></td>
</tr>
<tr>
<td>Gemeinschaft and Ges</td>
<td></td>
</tr>
<tr>
<td>Jerker Nilsson and Geot</td>
<td></td>
</tr>
<tr>
<td>The Role of Social Capital of Community-Based</td>
<td></td>
</tr>
<tr>
<td>Richard Lang and Dietrich</td>
<td></td>
</tr>
</tbody>
</table>
Contents

Organization of Innovation through Alliances

A Network Approach to the Structure and Organization of Joint R&D Projects ............................................. 259
Nieves Arranz and J. Carlos Fdez. de Arroyabe

Strong Ties, Weak Ties and the Management of Innovation: The Case of Danish and German SMEs ................................. 277
Susanne Gretzinger, Holger Hinz, and Wenzel Matiaske

Knowledge Management in Networks

Organization of Knowledge Transfer in Clusters: A Knowledge-Based View ..................................................... 299
Marijana Srećković and Josef Windsperger

Influence of Network Maturity on Organisational Learning and Knowledge Transfer in Strategic Alliances ............................ 317
Ana Aleksić Mirić

Part C Cooperatives

Behavioral Logics and Governance of Cooperatives

Gemeinschaft and Gesellschaft in Cooperatives ........................................ 339
Jerker Nilsson and George Hendrikse

The Role of Social Capital in the Development of Community-Based Co-operatives ............................................. 353
Richard Lang and Dietmar Roessler
Organization of Knowledge Transfer in Clusters: A Knowledge-Based View

Marijana Srećković and Josef Windsperger

Abstract In this paper, we develop a knowledge-based view on the organization of knowledge transfer in clusters. Starting from the information richness theory, we argue that tacitness of the partners’ knowledge determines the information richness of the knowledge transfer mechanisms in clusters. We examine the following hypotheses: (a) If the cluster partners’ knowledge is characterized by a low degree of tacitness, knowledge transfer mechanisms with a lower degree of information richness (e.g., email, intranet, documents, newsgroups) are used; (b) if the cluster partners’ knowledge is characterized by a high degree of tacitness, knowledge transfer mechanisms with a higher degree of information richness (e.g., seminars, workshops, formal meetings) are used. We test these hypotheses by using data from the Green Building Cluster of Lower Austria. Using complexity, teachability and codifiability as measures for tacitness of the cluster partners’ knowledge, the empirical results from Green Building Cluster in Austria partly support these hypotheses. Our results indicate that an increase in teachable knowledge results in the use of more knowledge transfer mechanisms with a lower degree of information richness, and an increase in complex, but articulable knowledge results in the use of more knowledge transfer mechanisms with a higher degree of information richness. In addition, we show that trust positively influences the use of all modes of knowledge transfer.

1 Introduction

Clusters are networks of firms in related industries within a given region (Porter 1998, 2000; Malmberg and Maskell 2002). The success of clustering depends on the complementarity of resources and capabilities of the cluster firms (Araujo et al. 2003; Windsperger 2006). Thus, firms will gain competitive advantage when the knowledge transfer is efficiently organized between the cluster partners (Maskell...
and Malmberg 1999; Calantone et al. 2002). In previous years, a large number of researchers in organization theory and management have examined knowledge transfer within and across organizational boundaries using the information (media) richness theory and the knowledge-based view of a firm. The first attempt was to answer the question of how to reduce ambiguity in order to facilitate the transfer of information, using the information richness theory (Daft and Lengel 1986; Russ et al. 1990; Dennis and Kinney 1998; Sheer and Chen 2004). The knowledge-based view of the firm (Barney 1991; Kogut and Zander 1992, 1993; Nonaka et al. 1996; Conner and Prahalad 1996; Grant 1996; Nickerson and Zenger 2004) argues that gaining competitive advantage by setting up networks requires effective mechanisms to facilitate interorganizational transfer of tacit and explicit knowledge (Zander and Kogut 1995; Inkpen 1996; Häkanson 2005).

In this paper, we develop a knowledge-based view on the choice of the knowledge transfer mechanism in clusters that integrates results from the information richness theory. We argue that the information richness theory offers a criteria (‘information richness’) to differentiate knowledge transfer mechanisms according to their information processing (or knowledge transfer) capacity. In clusters, knowledge transfer mechanisms with a relatively higher degree of information richness include seminars, workshops, conference meetings, visits and video conferences. Knowledge transfer mechanisms with a relatively lower degree of information richness include written documents, fax, email, intranet and other electronic media. According to the knowledge-based theory, tacitness of partner knowledge determines the degree of information richness of the knowledge transfer mechanisms. The thesis of our paper is: The higher the degree of tacitness of the partners’ knowledge, the more knowledge transfer mechanisms with a higher degree of information richness should be used to facilitate an efficient knowledge transfer between the cluster partners.

The paper is organized as follows: Section 2 reviews the relevant literature related to knowledge transfer in networks. In Section 3, we develop the knowledge-based view of knowledge transfer mechanisms and derive testable hypotheses. Finally, in Section 4 we test these hypotheses using data from the Green Building Cluster of Lower Austria.

2 Literature Review

Research on information and knowledge transfer in organizations started with the information richness theory in the 1980s (Daft and Macintosh 1981; Daft and Lengel 1984, 1986; Trevino et al. 1987; Daft et al. 1987; Russ et al. 1990; Sheer and Chen 2004). Recent studies extend this view to new electronic communication media (Lim and Benbasat 2000; Buchel and Raub 2001; Sexton et al. 2003; Vickery et al. 2004). According to this view, effective information and knowledge transfer requires a fit between task ambiguity/equivocality and ‘richness’ of the communication media. ‘Information richness (IR)’ consists of four attributes of the communication mechanism: feedback capacity, language variety, and a mechanism’s (media) capacity to handle ambiguity with a relatively higher degree of mechanisms (meetings, train while communication media such as manuals, reports, dat

Since the 1990s, many re the firm have examined the pr transfer (Kogut and Zander 1999a, b; Argote 1999; Albi Bresnen et al. 2003; Nonaka Szulanski and Jensen 2006; and Wittmann 2009). Starting they investigated knowledge the knowledge-based view of knowledge transfer. How relationship between knowl Inkpen (1996), Inkpen and E. They go further by anth learn, and knowledge transfer. They do not develop a more a knowledge types and knowl although a large number of economics and management knowledge transfer between

To sum up, the existing l offer a theoretical framew mechanisms in inter-organi; and test hypotheses about th Starting from this gap, the o view on the choice of kn contribution to the literatur information richness theory cluster relationships. Further Building Cluster of Lower influencing the choice of kn

3 The Design of Kno

According to the knowled resources and capabilities if the creation and transfer of k
years, a large number of studies has examined knowledge sharing and learning within firms. The first attempt to facilitate the sharing of knowledge was made by Daft and Lengel (1986) and Zander (1992, 1993; 1995). However, the use of knowledge management systems requires tacit and explicit knowledge to be combined.

The choice of the knowledge management systems offered by firms is influenced by the nature of the knowledge to be managed. In clusters, the degree of information sharing among firms is relatively higher due to the sharing of tacit knowledge and the need for a common language. The tacitness of knowledge is influenced by the degree of tacitness of the knowledge transfer mechanisms. The knowledge transfer mechanisms used in clusters are often more efficient than those used in firms. The relevant literature suggests that the development of knowledge management systems is based on a combination of tacit and explicit knowledge. However, the development of knowledge management systems is often hindered by the lack of a clear understanding of the relationship between knowledge transfer mechanisms and knowledge creation processes.

Since the 1990s, many researchers have examined the knowledge-based view of the firm (Polanyi 1962). They have investigated knowledge transfer in organizations and networks. According to the knowledge-based view of the firm, tacitness varies positively with the difficulty of knowledge transfer. However, most of this literature does not investigate the relationship between knowledge attributes and knowledge transfer mechanisms. In terms of the relationship between knowledge attributes and knowledge transfer mechanisms, the knowledge transfer mechanisms used in multinational corporations are often more efficient than those used in firms. Furthermore, although a large number of cluster studies have been published in organization economics and management in the last decade, the problem of the organization of knowledge transfer between cluster partners remains largely unexplored.

To sum up, the existing literature has the following deficits: Firstly, it does not offer a theoretical framework for the explanation of the knowledge transfer mechanisms in inter-organizational relations, and secondly, it does not develop and test hypotheses about the design of knowledge transfer mechanisms in clusters. Starting from this gap, the objective of our paper is to develop a knowledge-based view on the choice of knowledge transfer mechanisms in clusters. Our main contribution to the literature is to combine the knowledge-based view with the information richness theory to explain the organization of knowledge transfer in cluster relationships. Furthermore, our study utilizes primary data from the Green Building Cluster of Lower Austria, which enables us to examine the factors influencing the choice of knowledge transfer mechanisms.

3 The Design of Knowledge Transfer Mechanisms in Clusters

According to the knowledge-based theory of the firm, the firm is a bundle of resources and capabilities that consists of a system of organizational routines for the creation and transfer of knowledge (Nonaka 1994; Grant 1996; Antonelli 1999;
This view focuses both on explicit and tacit knowledge that must be created, processed and transferred. Tacit knowledge is the origin of competitive advantage, because it is highly personal, hard to formalize and, therefore, difficult to imitate (Nonaka et al. 1996). Derived from this knowledge-based view, we use the term knowledge transfer mechanisms for organizational routines that enable the transfer of explicit and tacit knowledge (Pedersen et al. 2003; Inkpen 2008; Jasimuddin 2007).

Which factors influence the choice of knowledge transfer mechanisms in networks? According to the knowledge-based view, the characteristic relevant for the determination of efficient knowledge transfer mechanisms is the degree of tacitness of knowledge. If the knowledge is explicit and thus codifiable, knowledge can be efficiently transferred by using knowledge transfer mechanisms with a lower degree of information richness (IR). If the knowledge is tacit and difficult to codify, higher-IR-transfer mechanisms are needed to process and transfer the less codifiable component of knowledge. This is compatible with Teece’s view (Teece 1985, p 229): “Tacit knowledge is extremely difficult to transfer without...teaching, demonstration and participation”. As tacitness of knowledge increases by degree, a larger knowledge transfer capacity and hence more higher-IR-knowledge transfer mechanisms are required for an efficient knowledge transfer. In addition, Berry and Broadbent (1987), Argote (1999) and Almeida and Kogut (1999) argue that high-IR-mechanisms facilitate both the transfer of tacit and explicit knowledge because of the complementarity between tacit and explicit knowledge (Roberts 2000).

To summarize the knowledge-based view on the choice of knowledge transfer mechanisms, we can state the following proposition: The higher (lower) the degree of tacitness of the partner-specific knowledge, the more knowledge transfer mechanisms with a higher (lower) degree of IR are needed to facilitate an efficient knowledge transfer between the partners.

Now we apply this approach to the organization of knowledge transfer in clusters. We start with an example of comparing three knowledge situations and ask the question which knowledge transfer mechanisms should be used (see Fig. 1).

First, we assume that the cluster partner’s knowledge is codified in reports, manuals and databases. With a low tacitness-component, the knowledge can be easily transferred by using lower-IR-mechanisms (for example, postal mailings, fax, intranet, chat, online forum, newsgroups, email) (see FIT I in Fig. 1). Second, we assume that a large part of the partner-specific knowledge is tacit. In this case, most of the partner-specific knowledge and organizational capabilities reside within persons and groups of the cluster firms. With a high tacitness-component, the partner knowledge can be only transferred by using more higher-IR-mechanisms (for example, seminars, workshops, committees, meetings, video conferences) (see FIT II in Fig. 1).

If these alignment conditions are not fulfilled, the following inefficiencies may arise (Russ et al. 1990): (a) MISFIT I: If the partner-specific knowledge is mainly tacit, the knowledge cannot be efficiently transferred by using low-IR-mechanisms. In this case, cluster partners are unable to understand and adequately apply the high tacitness-component of the organizational capabilities (b) MISFIT II: If the partner by using high-IR-mechanisms of codifiable knowledge, it arise due to the high set-up behavioural uncertainty, it increases under personal kn...
d tacit knowledge that must be
gained by those with competitive
mental and, therefore, difficult
knowledge-based view, we use
zational routines that enable the
en et al. 2003; Inkpen 2008;
knowledge transfer mechanisms in
ew, the characteristic relevant
mechanisms is the degree of
and thus codifiable, knowledge
xe transfer mechanisms with a
knowledge is tacit and difficult
ed to process and transfer the
compatible with Teece’s view
ely difficult to transfer with-
As tacitness of knowledge
ner capacity and hence more
r for an efficient knowledge
Argote (1999) and Almeida and
itate both the transfer of tacit
arity between tacit and explic
e choice of knowledge transfer
r: The higher (lower) the degree
the more knowledge transfer
needed to facilitate an efficient
mation of knowledge transfer in
knowledge situations and
ms should be used (see Fig. 1).
knowledge is codified in reports,
ent, the knowledge can be
(e.g., postal mailings,
I) (see FIT I in Fig. 1). Second,
knowledge is tacit. In this case,
tional capabilities reside within
high tacitness-component, the
more higher-IR-mechanisms
ings, video conferences) (see
the following inefficiencies may
IR-specific knowledge is mainly
by using low-IR mechanisms,
d and adequately apply the high

Organization of Knowledge Transfer in Clusters: A Knowledge-Based View

![Diagram](image)

**LOW-IR**: Postal mailings, documents, fax, email, intranet, chat, online forum, newsgroups
**HIGH-IR**: Seminars, workshops, committees, meetings, video conferences

Fig. 1 Relationship between knowledge transfer mechanisms and knowledge attributes

The following inefficiencies may
IR-specific knowledge is mainly
d by using low-IR mechanisms,
d and adequately apply the high
tacitness-component of the other partner’s knowledge, because it is based on
organizational capabilities of employees and groups of the other partner’s firm.
(b) MISFIT II: If the partner knowledge is codifiable, it is not efficiently transferred
by using high-IR mechanisms. Although high-IR-mechanisms facilitate the transfer
of codifiable knowledge, it is not efficient because high knowledge transfer costs
arise due to the high set-up costs of high-IR-mechanisms. In addition, due to
behavioural uncertainty, the risk of information selection and manipulation
increases under personal knowledge transfer mechanisms.

Third, we assume that the partner’s knowledge is partly codifiable and partly
tacit. Further, we assume that the explicit part is codified in manuals, reports, and
databases, while additional partner-specific knowledge resides within managers,
employees and teams at the cluster partner’s firm. Although codified manuals,
reports and databases exist, their utility for the cluster partners is relatively low
because they cannot adequately apply the codified part of the partner-specific
knowledge as this requires specific organizational capabilities. In this case, only
lower-IR-knowledge transfer mechanisms are adopted, the partners are unable
to adequately understand and apply the requisite partner-specific knowledge.
Consequently, since a large part of the knowledge which is transferred to the partners is
characterized by a higher degree of tacitness, low-IR-mechanisms are insufficient
to facilitate the transfer of the requisite knowledge. In this case, both low- and high-
IR-mechanisms are needed to efficiently transfer the partner-specific knowledge.
Seminars, workshops and meetings would facilitate the transfer of the high
tacitness—component of knowledge and thereby also improve the understanding of the more explicit component of the partner knowledge.

As a result, the knowledge-based view on the organization of knowledge transfer in clusters can be summarized by the following hypotheses:

**Hypothesis 1 (H1).** The use of knowledge transfer mechanisms with a higher degree of IR is positively related with the degree of tacitness of partner-specific knowledge.

**Hypothesis 2 (H2).** The use of knowledge transfer mechanisms with a lower degree of IR is negatively related with the degree of tacitness of partner-specific knowledge.

4 Empirical Analysis

4.1 Sample and Data Collection

The empirical setting for testing these hypotheses is the Green Building Cluster of Lower Austria. This cluster is the new materials-independent economic hub for all areas of sustainable construction and living. It was established at the beginning of 2007, through a merger of the Wood Cluster of Lower Austria, founded in 2001, and the Green Building Cluster of Lower Austria, which was founded in 2003. The majority of the 175 partner companies are seated in Lower Austria, whereas a few number in the neighboring provinces and Salzburg. The main areas of focus of the Green Building Cluster of Lower Austria are (see http://www.ecoplus.at/ecoplus/cluster/beuc_en/BEUC_EN_R2.htm):

- Restoration and upgrading of older homes to low-energy home standards
- Living in comfort – healthy interior environments
- New multiple-level structures built to passive energy home standards

The cluster functions as a link between its partner companies and prospective clients (developers, municipalities, etc.) and its aim is to connect the existing national competencies in the area of sustainable building and living. The cluster management team is composed of architects and energy experts as well as professionals from the construction and interior furnishings industries. These experts are professionals involved in cooperative projects, R&D projects, and in general project management. They provide information, support and advice to the partner companies, regardless of the type of building product or construction style. Cluster partners profit from each other and work jointly on innovative and added-value oriented projects. This cross-linking of individual companies in the cluster makes it possible for the consumer to obtain a healthy, comfortable structure and equally suitable interior furnishings at an affordable price. Cluster management supports this networking by offering tailored consultation and qualification packages, initiating and guiding innovative products and international markets.

We started our empirical work on ECOPLUS, a regional government-identified a total of 175 cluster firm several preliminary steps in the process with cluster partners at the Green B St. Poelten, the final version of the email to the general managers of November 2008. General manager, or key informants, as they were called, in the organization of the study. Key informants should occupy no issues being researched (John and et al. 2003), we used H0: significant amount of common metric factor analysis on all item eigenvalues greater than one, we find not a serious problem in our study.

4.2 Measurement

To test the hypotheses, the following knowledge transfer mechanisms, control variables (see Appendix).

4.2.1 Information Richness

Adapted from Daft and Lengel (1986), the following knowledge transfer mechanisms (seminars, workshops, committees, electronic media (emails, intra-office documents, manuals), and numeric formal media with the lo
The Green Building Cluster of Lower Austria, founded in 2001, became an economic hub for all established and new companies and prospective start-ups. The cluster focuses on energy efficient and sustainable living and living. The cluster's main areas of focus are the development of energy efficient and sustainable home standards. Cluster experts work with companies and prospective start-ups to enhance the existing projects and advice to the partner companies. The cluster's innovative and added-value projects in the cluster make it an attractive and equally dynamic cluster. Management supports and qualification packages include the understanding of tacit knowledge and the development of innovative projects and the organization of joint presence on national and international markets.

We started our empirical work by obtaining the list of all network partners from ECOPLUS, a regional governmental institution in Lower Austria. ECOPLUS identified a total of 175 cluster firms in the Green Building Cluster in 2008. After several preliminary steps in the questionnaire development, including interviews with cluster partners at the Green Building Cluster of Lower Austria conference in St. Poelten, the final version of the questionnaire was sent out by postal mail and email to the business managers of the cluster companies in February 2008 and November 2008. General managers were judged to be the most suitable respondents, or key informants, as they are the top decision makers in the company regarding the organization of the knowledge transfer between the partner firms. Key informants should occupy roles that make them knowledgeable about the issues being researched (John and Reve 1982). The questionnaire took approximately 10 min to complete on average. We received 48 completed responses—a response rate of 27.4%. The non-response bias was examined by investigating whether the results obtained from the analysis were driven by differences between the group of respondents and the group of non-respondents. Non-response bias was estimated by comparing early versus late respondents (Armstrong and Overton 1977), where late respondents serve as proxies for non-respondents. No significant differences emerged between the two groups of respondents. In addition, based on Podsakoff et al. (2003), we used Harman’s single-factor test to examine whether a significant amount of common method variance exists in the data. After we conducted factor analysis on all items and extracted more than one factor with eigenvalues greater than one, we felt confident that common method variance is not a serious problem in our study.

4.2 Measurement

To test the hypotheses, the following variables are important: information richness of knowledge transfer mechanisms, degree of tacitness of partner knowledge, and control variables (see Appendix).

4.2.1 Information Richness

Adapted from Daft and Lengel (1984) and Vickery et al. (2004), we differentiate the following knowledge transfer mechanisms in cluster relationships: face-to-face (seminars, workshops, committees, formal and informal meetings); telephone and electronic media (emails, internet, intranet); written personal letters, formal documents and manuals; and numeric formal media (computer output). Face-to-face is the knowledge transfer mechanism with the highest information richness and numeric formal media with the lowest information richness. This hierarchy of
information richness is confirmed by empirical research (D’Ambra et al. 1998). Consistent with the information richness—hierarchy, we differentiate knowledge transfer mechanisms with a relatively higher degree of information richness (seminars and workshops, committees, formal and informal meetings, video conferences) and knowledge transfer mechanisms with a relatively lower degree of information richness (email, intra- and internet, chat discussions, online forum). Therefore, our study conceptualizes information richness in accordance with Daft and Lengel’s approach. Information richness is measured by the extent to which the partner firms use email, documents, chat discussions, online forums, newsgroups, intranet, telephone, seminars, workshops, meetings, conferences and workshops, committees and videoconferences. The general managers were asked to rate the use of these knowledge transfer mechanisms on a seven-point scale. The higher the score, the higher is the company’s use of a certain mechanism. Based on the information richness theory, we construct indicators for lower-IR-mechanisms (LIR) with intranet, chat discussions, online forum, newsgroups, email, internet, fax, formal letters and documents and for higher-IR-mechanisms (HIR) with seminars, workshops, committees, formal and informal meetings and video conferences (see Appendix).

4.2.2 Knowledge Characteristics

According to the knowledge-based view, tacitness of partner-specific knowledge determines the use of knowledge transfer mechanisms. Following Winter’s taxonomy of knowledge (Winter 1987) and Kogut and Zander’s argument (Kogut and Zander 1993; Zander and Kogut 1995), we use the following knowledge attributes to measure the latent construct of tacitness of knowledge: codifiability, teachability and complexity. Codifiability (COD) is the degree to which knowledge can be encoded and written down in manuals. When codifiability is high, the partner knowledge is considered more explicit. Teachability (TEACH) is the extent to which knowledge can be transferred through demonstration and participation. As Winter (1987), Teece (1985) and Håkanson (2007) point out, transfer of tacit knowledge, if possible at all, requires articulation (e.g. through demonstration and participation). Teachability is high when company knowledge can be taught to the cluster partner. However, if company knowledge cannot be taught due to its high degree of tacitness, the cluster partner cannot acquire and apply the requisite knowledge. For this reason, highly-tacit knowledge cannot be used and upgraded in cluster relationships. Kogut and Zander (1993, p 633) define complexity (COMPLEX) “as the number of critical and interacting elements embraced by an entity or activity”. Similarly, Sorenson et al. (2006) define complexity in terms of the level of interdependence inherent in the subcomponents of a piece of knowledge (see Simonin 1999a, b). When the partner knowledge is more complex, it is considered more tacit. Applied to cluster relationships, complexity is high when the application of the partner knowledge requires a large number of heterogeneous, complicated and interdependent tasks, and when cluster partners have to master diverse techniques in order to successfully when the knowledge of the cluster complex, it is considered less tacit.

Adapted from Zander and Kog in codifiability, teachability and conducted a factor analysis to check analysis show that the items loc ability and complexity. Reliability TEACH pass the threshold of 0.7

4.2.3 Control Variables

Trust (TRUST): According to the 1998; Poppo and Zenger 2002; L Mellewigt et al. 2007), trust may isms in two ways: (a) Under the set of formal knowledge transfer me gaes the knowledge transfer haz and reduces the extent of forms 2008). Consequently, cluster con when trust exists between the clans mistrust exists. (b) Under the cor tion barriers and facilitates know ledge transfer mechanisms (Seppä Baytelman 2007; Liao 2009). Up more HR and LIR because trust (nication. TRUST was measured v alpha = 0.93).

SIZE: The number of employee firm size, the more person-based

4.3 Results

Table 1 presents the descriptive sti

<table>
<thead>
<tr>
<th></th>
<th>COD</th>
<th>TEAC</th>
<th>TRUS</th>
<th>COMP</th>
<th>NUM</th>
</tr>
</thead>
</table>

Table 1 Descriptive statistics
Organizational Knowledge Transfer in Clusters: A Knowledge-Based View

techniques in order to successfully apply the partner knowledge. To summarize, when the knowledge of the cluster firms is more codifiable, more teachable and less complex, it is considered less tacit.

Adapted from Zander and Kogut (1995), we use a battery of 14 items to measure codifiability, teachability and complexity of system-specific knowledge. We conducted a factor analysis to check for their dimensionality. The results of the factor analysis show that the items load on three factors referring to codifiability, teachability and complexity. Reliabilities of the final scales for COD, COMPLEX and TEACH pass the threshold of 0.7 (see Appendix).

4.2.3 Control Variables

Trust (TRUST): According to the relational view of governance (Dyer and Singh 1998; Poppo and Zenger 2002; Levin and Cross 2004; Gulati and Nickerson 2008; Mellewigt et al. 2007), trust may influence the use of knowledge transfer mechanisms in two ways: (a) Under the substitutability view, trust is a substitute for the use of formal knowledge transfer mechanisms (Gulati 1995; Yu et al. 2006). It mitigates the knowledge transfer hazards due to lower relational risk (Roberts 2000) and reduces the extent of formal knowledge transfer mechanisms (Lo and Lie 2008). Consequently, cluster companies are likely to use less HIR and more LIR when trust exists between the cluster partners, and use more HIR and less LIR when mistrust exists. (b) Under the complementarity view, trust overcomes communication barriers and facilitates knowledge sharing and increases the use of all knowledge transfer mechanisms (Seppälä et al. 2007; Blomqvist et al. 2005; Bohnet and Baytelman 2007; Liao 2009). Under a high level of trust, cluster partners use both more HIR and LIR because trust creates an incentive for intense and open communication. TRUST was measured with a four-items scale (see Appendix (Cronbach alpha = 0.93)).

SIZE: The number of employees is a proxy for the size of the firm. The larger the firm size, the more person-based HIR and the less information-based LIR are used.

4.3 Results

Table 1 presents the descriptive statistics for the sample in Lower Austria.

<table>
<thead>
<tr>
<th>Descriptive statistics</th>
<th>Mean</th>
<th>Std. deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>COD</td>
<td>1.9333</td>
<td>0.87843</td>
<td>48</td>
</tr>
<tr>
<td>TEACH</td>
<td>2.3500</td>
<td>0.94125</td>
<td>48</td>
</tr>
<tr>
<td>TRUST</td>
<td>3.4375</td>
<td>0.98641</td>
<td>48</td>
</tr>
<tr>
<td>COMPLEX</td>
<td>2.6632</td>
<td>0.92476</td>
<td>48</td>
</tr>
<tr>
<td>NUM_EMPLOYEES</td>
<td>30.21</td>
<td>54.950</td>
<td>48</td>
</tr>
</tbody>
</table>
To test hypotheses 1 and 2, we carry out a regression analysis. We conduct an OLS regression analysis with HIR and LIR as dependent variables, measuring the extent of the use of higher-IR-mechanisms and lower-IR-mechanisms. HIR refers to the use of seminars and workshops, committees, videoconferencing, formal and informal meetings between the cluster partners, and LIR refers to the use of intranet, chat discussions, newsgroups, internet, email, formal letters and documents. The general managers of the cluster companies were asked to rate the use of HIR and LIR on a seven-point scale. By averaging the scale values, we construct HIR- and LIR-indicators. The explanatory variables refer to complexity (COMPLEX), codifiability (COD) and teachability of knowledge (TEACH). Control variables refer to trust (TRUST) and the size of the companies (SIZE). Table 2 presents the correlations of the variables we use in the regression analysis. In addition, the variance inflation factors are well below the rule-of-thumb cut-off of 10 (Netter et al. 1985). In summary, we do not find any collinearity indication.

### 4.3.1 Hypothesis 1: HIR

We estimate the following regression equation:

$$
HIR = \alpha + \beta_1{TEACH} + \beta_2{COMPLEX} + \beta_3{COMPLEX \times TEACH} + \beta_4{COD} + \beta_5{TRUST} + \beta_6{SIZE}.
$$

According to the knowledge-based view, HIR varies positively with complexity (COMPLEX) and negatively with teachability (TEACH) and codifiability (COD). Additionally, we include the interaction term TEACH*COMPLEX as the cluster partners are only able to transfer tacit knowledge if it is at least partly teachable (Winter 1987; Håkanson 2007). Furthermore, under the substitutability view, TRUST is negatively related with HIR, and under the complementarity view, TRUST is positively related with HIR. The larger the firm size, the more person-based HIR-knowledge transfer mechanisms are used. Table 3 reports the results of regression analysis for HIR. The coefficients of COMPLEX*TEACH are positive and significant. This is consistent with our hypothesis that an increase in tacit and articulable knowledge implies the use of more HIR. The coefficient of TRUST is highly significant supporting the knowledge sharing and inversely, the coefficients of teach are not significant.

### 4.3.2 Hypotheses 2: LIR

We estimate the following regression equation:

$$
LIR = \alpha + \beta_1{TEACH} + \beta_2{COD}
$$

We expect that LIR varies positively with TRUST and negatively with SIZE, the more person-based HIR reports the results of the regression analysis.
Table 3 Regression results for HIR

<table>
<thead>
<tr>
<th></th>
<th>HIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1.942*** (0.074)</td>
</tr>
<tr>
<td>COD</td>
<td>-0.063 (0.106)</td>
</tr>
<tr>
<td>TEACH</td>
<td>-0.052 (0.131)</td>
</tr>
<tr>
<td>COMPLEX</td>
<td>0.147 (0.127)</td>
</tr>
<tr>
<td>TRUST</td>
<td>0.310*** (0.066)</td>
</tr>
<tr>
<td>COMPLEX*TEACH</td>
<td>0.374** (0.181)</td>
</tr>
<tr>
<td>SIZE</td>
<td>-0.098 (0.083)</td>
</tr>
<tr>
<td>F</td>
<td>5.438</td>
</tr>
<tr>
<td>Adj.R Square</td>
<td>0.362</td>
</tr>
<tr>
<td>N</td>
<td>48</td>
</tr>
</tbody>
</table>

***p < 0.01; **p < 0.05; *p < 0.1; values in parentheses are standard errors

Table 4 Regression results for LIR

<table>
<thead>
<tr>
<th></th>
<th>LIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1.355*** (0.322)</td>
</tr>
<tr>
<td>COD</td>
<td>-0.017 (0.122)</td>
</tr>
<tr>
<td>TEACH</td>
<td>0.321** (0.119)</td>
</tr>
<tr>
<td>COMPLEX</td>
<td>-0.161 (0.105)</td>
</tr>
<tr>
<td>TRUST</td>
<td>0.170** (0.092)</td>
</tr>
<tr>
<td>SIZE</td>
<td>-0.003 (0.002)</td>
</tr>
<tr>
<td>F</td>
<td>4.276</td>
</tr>
<tr>
<td>Adj.R Square</td>
<td>0.258</td>
</tr>
<tr>
<td>N</td>
<td>48</td>
</tr>
</tbody>
</table>

***p < 0.01; **p < 0.05; *p < 0.1; values in parentheses are standard errors

Organizations of Knowledge Transfer in Clusters: A Knowledge-Based View

X = TEACH + \beta_3 COD

Positively with complexity and codifiability (COD). COMPLEX as the cluster at least partly teachable the substitutability view, complementarity view, in size, the more person-based 3 reports the results of EX*TEACH is positive if an increase in tacit and coefficient of TRUST is highly significant supporting the complementarity view of trust. Trust facilitates knowledge sharing and increases the use of HIR (Seppanen et al. 2007). Conversely, the coefficients of teachability (TEACH), codifiability (COD) and SIZE are not significant.

4.3.2 Hypotheses 2: LIR

We estimate the following regression equation for LIR:

LIR = z + \beta_1 TEACH + \beta_2 COMPLEX + \beta_3 COD + \beta_4 TRUST + \beta_5 SIZE

We expect that LIR varies positively with codifiability (COD) and teachability (TEACH) and negatively with complexity (COMPLEX). In addition, we expect TRUST is positively related with the use of LIR. The larger the size of the firms (SIZE), the more person-based HIR and less information-based LIR are used. Table 4 reports the results of the regression analysis for LIR. The coefficient of teachability
(TEACH) is positive and significant, which indicates that LIR supports the transfer of less tacit partner-specific knowledge. The coefficient of TRUST is slightly significant supporting the complementarity view of trust. Trust facilitates knowledge sharing and increases the use of both HIR and LIR. The coefficients of COMPLEX and COD are not significant. The negative coefficient of SIZE supports the view that the firms use less information-based LIR when the number of employees is large.

5 Discussion

In this paper, we have developed a knowledge-based view on the organization of knowledge transfer in cluster relationships. According to the knowledge-based view, the knowledge transfer between cluster partners is governed by more person-based HIR if the partner-specific knowledge is more tacit, and it is governed by more information-based LIR if the partner-specific knowledge is less tacit. Using complexity, teachability and codifiability as measures for tacitness of the cluster partners’ knowledge, the empirical results from Green Building Cluster in Austria partly support these hypotheses. The results indicate that an increase in teachable knowledge results in the use of more LIR, and an increase in complex, but articulable knowledge results in the use of more HIR. Additionally, based on the relational view of governance, trust influences the organization of knowledge transfer between the cluster partners. Our data supports the complementarity view of trust: More trust facilitates information and knowledge sharing between the partners and hence increase the use of both LIR and HIR.

How does our approach extend the results in the literature? The major contribution of our study is the development of a knowledge-based view on the choice of knowledge transfer mechanisms in clusters. Our study utilizes primary data from the Green Building Cluster of Lower Austria enabling the estimation of factors the theory considers important to affect the organization of the knowledge transfer in clusters.

This study has some limitations: First, due to the small sample size the ability to generalize the results is limited. Further research analyzing data from other clusters with a larger number of cluster firms would help ascertain generalizability of our research results. Second, the measurement of the knowledge of the cluster partners is not without its own limitations. It is a first step to operationalize tacitness of knowledge by different knowledge attributes. Third, we have captured trust as a control variable at a rather general level. Conceptually, trust could take at least two forms (Lazzerini et al. 2008): Knowledge-based or belief-based trust related to the history of inter-organizational experience, and general trust related to the motivational characteristics of the partners. However, we did not differentiate between these two forms.
hat LIR supports the transfer of trust is slightly significant for the view that the firms use.

Appendix

Measures of Variables

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower-IR-knowledge transfer mechanisms (LIR)</td>
<td>To what extent does the cluster company use knowledge transfer mechanisms with a lower degree of IR: (intranet, chat discussions, online forum, newsgroups, email, fax, formal letters, existing documents) (1, no extent; ...7, to a very large extent)</td>
</tr>
<tr>
<td>Higher-IR-knowledge transfer mechanisms (HIR)</td>
<td>To what extent does the cluster company use knowledge transfer mechanisms with a higher degree of IR: (Seminars, workshops, video conferences, committees, informal meetings, formal meetings) (1, no extent; ...7, to a very large extent)</td>
</tr>
<tr>
<td>Complexity (COMPLEX) Coefficient alpha: 0.88</td>
<td>The general manager has to evaluate complexity on a 7 point scale (1, strongly disagree; ...7, strongly agree):</td>
</tr>
<tr>
<td>Teachability (TEACH) Coefficient alpha: 0.92</td>
<td>The general manager has to evaluate teachability on a 7 point scale (1, strongly disagree; ...7, strongly agree):</td>
</tr>
<tr>
<td>Codifiability (COD) Coefficient alpha: 0.80</td>
<td>The general manager has to evaluate codifiability on a 7 point scale (1, strongly disagree; ...7, strongly agree):</td>
</tr>
</tbody>
</table>

(continued)
Organizational Knowledge Transfer

Gertler MS (2003) Tacit knowledge and tacitness of being (there). J Econ
Grant RM (1996) Toward a knowledge
Hong JFL, Nguyen TV (2009) Knowledge
Jasimuddin SM (2007) Exploring knowledge within a high-tech global corporate

References

transfer and inter-firm relationships in innovation: the debate about codification and the mobility of engineers in regional knowledge: the debate about codification. Routledge, London.

Zsiva and transferring knowledge. Kluwer, competitive advantage in firms. Organ


transfer and inter-firm relationships in innovation: the debate about codification and the mobility of engineers in regional knowledge: the debate about codification. Routledge, London.

Zsiva and transferring knowledge. Kluwer, competitive advantage in firms. Organ


Transfer and inter-firm relationships in innovation: the debate about codification and the mobility of engineers in regional knowledge: the debate about codification. Routledge, London.

Zsiva and transferring knowledge. Kluwer, competitive advantage in firms. Organ


Transfer and inter-firm relationships in innovation: the debate about codification and the mobility of engineers in regional knowledge: the debate about codification. Routledge, London.

Zsiva and transferring knowledge. Kluwer, competitive advantage in firms. Organ


Transfer and inter-firm relationships in innovation: the debate about codification and the mobility of engineers in regional knowledge: the debate about codification. Routledge, London.

Zsiva and transferring knowledge. Kluwer, competitive advantage in firms. Organ


Organization of Knowledge Transfer
Trevino LK, Lengel RK, Daft RL (organizations. Commun Res 14)
Vickery SK, Droge C, Stank TP. Git of media richness in a business Manag Sci 50(8):1106–1119
Organization of Knowledge Transfer in Clusters: A Knowledge-Based View


