ON THE IMPACT OF INFORMATION ASYMMETRY ON EVALUATION AND RISK OF CLUSTER PERFORMANCE

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Abstract

This article aims to determine and analyse the main approaches of evaluation of cluster or group performance under information asymmetry within cluster. It is assumed that one of the most relevant causes of information asymmetry inside the business clusters are the different interests of its stakeholders and their willingness to dominate. This paper contributes to the further analysis, development and generalisation of evaluation approach of cluster performance and of the impact of information asymmetry on the activities of business clusters.

Purpose – is to investigate the impact of information asymmetry on the evaluation on performance of business clusters and the methods and approaches of evaluation of performance with regard to information asymmetry.

Design/methodology/approach – general overview of research papers presenting concepts and methodologies of evaluation of performance with regard to information asymmetry.

Findings – information asymmetry has a significant impact on the performance of business clusters, and can be the decisive factor in the viability of a cluster. The members of cluster can be seem as subjects willing to dominate in cluster and to gain a relatively more portion of profit of clusters, some conflicts of interests can appear. However, there is no universal approach for evaluation of the impact of information asymmetry on cluster or group efficiency. This paper aims to highlight the main types of information asymmetry and respective approaches of evaluation analysed by the researchers.

Socialinės technologijos/Social Technologies
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ISSN 2029-7564 (online)
https://www.mruni.eu/lt/mokslo_darbai/st/apie_leidini/
https://www.mruni.eu/en/mokslo_darbai/st/apie_leidini/index.php

Research limitations/implications – *the complexity and nature of information that can be used in the process of creation of innovation. The strong assumptions on information asymmetry from one side and the lack of advanced investigation focussed on the evaluation of business clusters performance efficiency under information asymmetry from other side are the most relevant limitations of research. Therefore the conclusions are focussed only on the conceptual level and analysis of possible further steps in creation of respective methods or models.*

Practical implications – *information asymmetry has a significant impact on the activities and performance of business clusters, and can be the decisive factor for a viability of a cluster and creation of innovations. This study will contribute to the further development and generalisation of evaluation approach of cluster performance and of the impact of information asymmetry on the activities of business clusters.*

Originality/Value – *This case in terms of business cluster performance and creation of innovations is not exhaustively analysed by other researchers. This paper is one of the first attempts to describe and make an assessment of the evaluation of clusters with financial contagion in the Baltic States. The findings of this article should ground the further steps of the creation of evaluation of performance efficiency under information asymmetry.*

Keywords: *information asymmetry, risk, trust, evaluation.*

Research type: *literature review.*

Introduction

Without intense competition with other entities and the classical and well-known uncertainty associated with uncertainty of any business sector about the future and the uncertainties related to the development of innovation, the risk structure of business clusters consists of other important business components: moral hazard, closely related to the different competencies of members of the cluster and information asymmetry. The some main types of information asymmetry in the business cluster can be determined: between the cluster members (concerning the mutual trust), between the cluster companies and end-consumer and between the cluster and external financing entities.

It is recognized that trust is a key factor underlying the cooperation of business entities. The impact of trust on the creation of innovation process, cooperation between the different business sectors or technology transfer process remains decisive. In general context of business, risk and opportunism are closely related to uncertainty, information asymmetry and the need of trust. Information (especially knowledge) sharing helps to mutual understanding and cooperation among cooperating business cluster members, which is the important step to build up trust. On the other side, accurate information helps more precisely estimate the trustworthiness of partners, avoid blackmail in negotiation, and reduce some transaction and production costs, therefore it means the negative impact on the creation of innovations in this case.

Literature showed that trust and transaction costs are inter-related and are one of the most relevant costs for creating commercial innovations. One of the main barriers that innovative companies face are the transaction costs of entering markets, the lack of suitable networks of partnership and the presence of information asymmetries across supply chains. Cluster policies would contribute to mitigate these weaknesses. Cluster company managers have rated the exchange of information on market (62%), best practices (57%) and information on technologies (55%) very high on the list of benefits of cooperation within a cluster (The Gallup Organisation, 2006). It means that clusters indeed value in terms of technology and knowledge transfer and foster collaborative relationships between suppliers and clients (Barsoumian et al., 2011).

On the other hand, some researchers proved that trust facilitates transactions among organizations by reducing transaction costs, such as information searching, negotiation, monitoring and enforcing transactions. In addition, other researchers found that the perception of partners' trustworthiness depends on the amount and accuracy of information, the degree of cooperation and the other factors that are associated with transaction costs. Still other researchers focused on certain types of transactions and analysed how transaction costs and trust interact. In addition, it is important to observe that in financial markets higher trust means the less cost of borrowing.

Information asymmetry is closely linked to moral hazard. Moral hazard is a problem related to post-contractual opportunism in the presence of unobservable asymmetric information. Since information asymmetry more or less happens in every transaction, for the sake of trust organizations are more likely to cooperate with long-term partners with whom information is more reliable and available. Moral hazard evaluation is complicated and it is hard to treat it quantitatively due to the number of reasons. As a moral risk, information asymmetry in usual cases is the scientific research is merely a starting point and not the main object is analysed. But only in the separate cases it can be evaluated by applying the quantitative methods and. Information asymmetry, moral hazard impact on the business impact of cluster activities also related to trust. Preferably all of these values should be measured quantitatively and treated as a measure of mutual trust.

Impact of information asymmetry namely on business clusters, developing and implementing innovation activities is not yet sufficiently investigated. In this article, information asymmetry means that all cluster members dispose by the different structure and content of the information necessary for the cluster and innovation. This feature of information asymmetry namely can be treated as an additional source of risk of cluster activities. Most likely the information asymmetry in business clusters occurs at sharing know-how of each cluster member, contributing towards the creation of innovations, knowledge about it (your contribution), more than any other cluster members. Innovation development strategy with respect to the risk management should be such as to protect the cluster and the innovation creation from cluster members indispensability and commercial information leakage. However, in practice it is difficult to implement such provisions particularly to only the trust of the signing of contracts is not enough (it depends on the mentality), and these factors

determine not only the clusters' attractiveness to potential investors, attracting new partners, capital and other resources concentration, but also clusters (as well as their resources) the fragmentation.

The modelling of cluster or any other business entity performance is based on assumptions. On the other hand, information asymmetry usually is considered as the assumptions of quantitative modelling which limits the possible solutions (estimates) and the selections of methods. Another source of information asymmetry and failure is other assumptions of modelling which essentially depend on the competencies data used. Also, the problem of information asymmetry in business cluster is important because the creation of innovations and maintaining the competitiveness and viability of business based substantially on the expectations is unclear and not very transparent. On the other hand, it is important to emphasize that it is possible that the same information and its asymmetry can lead to different solutions of different managers.

1. Impact of information asymmetry on the performance of business cluster

Asymmetry of information can be treated as an incomplete and unequal information available to each member of business cluster. Information asymmetry and the lack of trust in business cluster is determined by the different members of specialization, different levels of competence and different relevance of contributions of individual cluster members to creation of innovations: in the ideal case, each member of the cluster should possess the relatively same advantage over the other cluster partners, but this problem can be solved by mutual trust. In addition, it is necessary to draw attention that in most cases the information asymmetry is treated as parameter with changing structure of content and quantity of information which is processed in a still different competencies), i.e., depending on the time and defined as stochastic process: development of innovations based by knowledge, which over time has added even more recent knowledge or experience.

Key risks of business cluster creating innovations are as follows: incorrect choice of the research object because of information asymmetry, insufficiency of statistical information, absence of efficient tools for cluster and their prototypes' identification (for more details, see Babkin et al., 2013). Other sources of risk are non-understanding of the real situation and non-understanding of its default threshold - as well as a permanent risk may examine business cluster. On the other hand, cluster breakdown does not mean that all cluster members lose: winners of this situation are basically on their initiative those who do not share with other by adequate level of information and basically initiates the degradation of the cluster. This means that ideas do not necessarily remain unimplemented: it is possible that obtained and not disseminated knowledge to other members of cluster become the precondition of new (not necessarily innovative) business or business cluster. In addition, the information asymmetry between companies and their customers is the key mechanism of the development of cluster. In this case companies initially provide low quality products in anonymous transactions until their production capacity allows paying for direct

marketing. The engine of growths is learning by doing mechanism (for more details, see Kozyrev). The same approach can be applied to business clusters.

Aim to dominate in the cluster and to strengthen the influence to other cluster members and the increase in profits can lead to a variety of differences or even conflicts between cluster members and threaten the viability of a cluster. All this means that intense competition within clusters not only promotes improvement factor of its members, but is also a source of destructive processes. All those directly or indirectly affect the performance of the whole cluster. It is also important to emphasize that other negotiations with external financiers cluster members are not affected by information asymmetries and the agreement on the relevance of contributions of cluster participants to innovation.

In other cases, if the opportunity of contributions of different relevance was not defined in partnership agreement, a threat of mutual friction appears that prevention at the best case will require the time required for negotiations, and in other cases – the change of cluster members and therefore stalling their activities. In the case of technology transfer cultural differences between researcher and business can lead to information asymmetry. The moral hazard associated with the organization's internal culture also leads to information asymmetry. Due to hidden information, cluster member, not knowing all the conditions to spare its full potential, and only for this reason would not provide the innovation process everything we could. As well as information asymmetry leads to moral hazard associated with person's moral character, common business culture and an individual member of the cluster – the organization's internal culture. Unused options: hidden information case, one member of the cluster, not knowing all the conditions to spare their full potential, and for this reason alone to deny the innovation process everything we could.

2. Information asymmetry and technology transfer

Debackere and Veugelers (2005) show that the asymmetry of information between the business and academic sectors is a serious barrier to knowledge and technology transfer. Information asymmetry occurs due to lack of communication and mutual understanding, which leads to fact that it is difficult to assess ex ante the quality of emerging science and technology excellence, and, on the other hand, it is difficult to the scientists to determine commercial viability of invention. The most important function of technology transfer centres, is to minimize the impact of information asymmetry and lack of communication between research and business sectors. Usually they operate as subsidiaries of research institutions and technology parks and aim to develop favourable conditions for knowledge and technology transfer and to promote scientific and business cooperation and mutual understanding and to facilitate and simplify the formal knowledge and technology transfer processes needed to help assess technology commercialization opportunities etc. In addition, these institutions also provide administrative support to scientific knowledge and technology transfer process managed by legal and financial issues; mediate through knowledge and technology transfer agreements between a researcher, research institutions and corporates (Debackere, Veugelers, 2005).

3. Information asymmetry and external financing

Activities of business clusters are more closely embedded in the network because its location closeness promotes the exchange of information and the dissemination of knowledge. This brings advantages to business innovation capability and competence. On the other hand, it is unclear if this further brings benefits to the financing and what are the implications during the process of financing are unclear (Wang, 2015). In the usual case information asymmetry must be tolerated by the external investors. This is crucial point because the external financing in usual cases is the necessary condition for creation of innovations and business cluster activity from the one hand side. On the other hand, information asymmetry is necessary to ensure the confidence of the continuity of project. From the perspective of investor, it can look as a huge source of uncertainty and risk and it is the subject for negotiations, the available information for each agent is various in financial markets. First at all, there is a huge information asymmetry between the managers of company (and cluster too) and existing and possible investors. In addition, it is important to emphasize that the managers have prior information on whether the firm will default and the timing of the default. On the other hand, market investors do have different information (for more details, see Hillairet, Jiao).

Research concerning financing in business clusters show that the relationship plays an important role in financing and the government rule, which generally focus on the relationship between banks and enterprises or enterprises with other financial institutions (e.g., venture capital institutions) and informal financial institutions (such as money lender). On the other hand, few studies distinguish the different network characteristics except for the bank-enterprise relationship and the impact to corporate financing. In different environments, especially in the new markets, in which various systems are still not perfect and the social capital embedded in the cluster network will affect the decision-making of banks and venture capital investors (Wang, 2015).

By the sole use of incomplete information investors are not able to precisely assess the nearness of the assets to the default threshold, therefore the default becomes a totally unpredictable event, and in separate cases these situations can be threaten as too risky to invest following the principle of conservatism. This also can imply that credit spreads are generally non-zero, even for short maturities. Non-vanishing short-term spreads can be seen namely as „transparency spreads" (for more details, see Yu, 2002).

In the special case, R&D setting, the problem of information asymmetry refers to the fact that an inventor or entrepreneur frequently has better information about the nature of the contemplated innovation project and the likelihood of its success than potential investors. Therefore the marketplace for financing the development of innovative ideas is similar to the situations like the "lemons" market modelled by Akerlof (for more details, see Akerlof, 1970; Hall, 2009). In the special version of the "lemons" model, the market for R&D projects may disappear if the problem of information asymmetry is too great. Reducing asymmetry of information via fuller

disclosure is of limited effectiveness due to the ease of imitation of inventive ideas. Therefore companies are reluctant to reveal their innovative ideas to the marketplace. The fact that there could be a substantial cost to revealing information to their competitors reduces the quality of the signal they can make about a potential project (Anton and Yao, 1998). Thus the implications of information asymmetry together with the costliness of mitigating the problem is what companies or business clusters and inventors will face a higher cost of external than internal capital for R&D due to the "lemons" premium (for more details, see Hall, 2009; Schwarz et al.).

In special case, when the innovations can be supported financially by government institutions, it is difficult for the public institutions to select the most valuable individual inventors to develop and to protect themselves from the allocation of unsuccessful projects due to the information asymmetry problems. This threat is particularly high in the allocation of funding for early-stage research projects whose outcome usually is unclear. Interesting and potentially successful projects and setting their assessment is not only a responsibility but also an expensive process (Svensson, 2007), since it requires competent staff, specialized knowledge and time, which is not always possible in a public institution. In addition, the inventors of individual projects are mostly small-scale and may be less well prepared and quickly fail over large-scale research institution projects (for more details, see Svensson, 2007).

4. Effectiveness of information asymmetry

Despite the approach to the asymmetry as one of the most important sources of business risk and objective business operating condition or even the restriction of activities its positive qualities can be seen. Contrary to received knowledge and experimentation, it appears that perceived asymmetry is the more productive condition for negotiation, whereas perceptions of equality actually interfere with efficient processes and satisfying results. Asymmetrical negotiations in the cases studied often went more smoothly than their symmetrical counterparts and produced more mutually satisfactory outcomes.

Negotiation efficiency inside business clusters can be understood as relation between the efforts of exchange of information (input) and the output of the negotiation ("doing the things right"). Hence, an efficient negotiation requires economical activities for information seeking and signalling. Such an assortment should occur against the background of a cost benefit analysis. Thereby, the costs of activities for the exchange of information are compared with the benefit that the gain of such information induces. According to the above mentioned definitions of a 'good' negotiation, achieving an effective negotiation involves negotiation satisfaction. The impact of information asymmetry of information and uncertainty and negotiation to the satisfaction can be structured as summarized in figure (for more details, see Schwarz et al.).

Figure. **Information asymmetry and its impact on effectiveness, efficiency, and satisfaction**
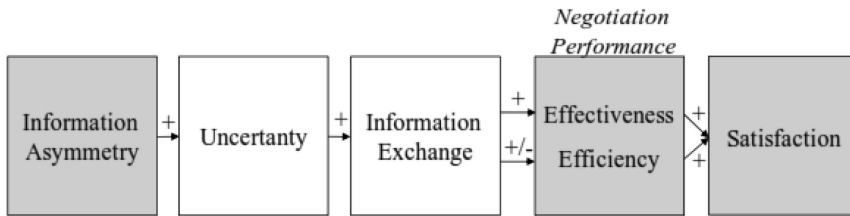
Source: Schwarz, S., Voeth, M., Herbst, U. Information Asymmetry in Buyer-Seller Negotiations and its Impact on Effectiveness, Efficiency and Satisfaction. Competitive Paper, Main session.

On the other hand, the absence of information asymmetry does not mean that the problems related to information disappear. For example, it is known from the game theory that information symmetry can produce deadlock because the behaviours associated with the particular power status produce impasse rather than an effective process to satisfying results (for more details, see Zartman, 1997). High-power symmetry allows each party to hold the other in check; and so it makes them primarily concerned with maintaining their status locking in their side of the symmetry rather than reaching an agreement. On the other hand, low-power symmetry brings together two parties that act in the reverse way-symmetrically to produce the same result. They deadlock since they do not have the power to make the other move, and this makes them primarily concerned with defending whatever little status they have unlocking in their side of the symmetry rather than reaching an agreement. Therefore, the information symmetry tends to produce and reinforce hostility and prolong negotiations in conflict situations. As a result, it calls for a mediator, a role that is possible among low-power parties but much less so between high-power opponents (for more details, see Zartman, 1997).

5. Overview of approaches of evaluation performance under incomplete and asymmetric information

Assumptions. In the general case, the impact of information asymmetry can vary strongly due to the very different structure of information. Usually it is assumed that the business performance of cluster is based on creation of innovation and other common activity, from which all the cluster members expect to earn profits or other benefits. Another assumption is that the business cluster members have agreed on a different scale of their contributions to the development of innovation in their negotiations before setting up the cluster. It is also assumed that each cluster member has information concerning its role in cluster more than other members about their contribution to cluster activities and less information than the other members about each of their contribution to innovation. In addition, the nature of information and its asymmetry can be different.

In credit risk models, information asymmetry plays as one of the most important assumptions and limitations of modelling. Hillaiert and Jiao studied the impact of

asymmetric information in a general credit model, where the default is triggered when a fundamental diffusion process of the firm passes below a random threshold. Inspired by some recent technical default events during the financial crisis, we consider the role of the firm's managers who choose the level of the default threshold and have complete information (for more details, see Hillairet and Jiao).

Knowledge spillover approach. The meaningful approach to model business cluster performance should be the treatment of information asymmetry as knowledge spillovers that are positive and negative. Following Zuluaga, the empirical evidence confirms the existence of knowledge spillovers within regions, though the evidence on inter-regional knowledge spillovers is scarce and mixed (for more details, see Greunz, 2003, Ponds, Oort and Koen Frenken, 2010). Positive effects of knowledge spillovers have been found within and between regions (Moreno et al., 2005). Other researchers found evidence of positive knowledge spillovers among neighbouring US metropolitan statistical areas (for more details, see, for example, Anselin et al., 1997). In addition, several researchers suggested possible negative effects of knowledge spillovers. The effect of negative knowledge spillovers between companies is asymmetrical (for more details, see, for example, Jovanovic and MacDonald 1994, Eeckhout and Jovanovic 2002) and might generate negative effects (Eeckhout and Jovanovic, 2002). In addition, it is possible to apply the model of Holod and Reed (2009) who found that spillovers within the home country may adversely affect growth in the presence of substantial knowledge flows from the foreign country. Based on this idea it is possible to apply the same model to the performance of business cluster under assumptions that „countries" in this case could be treated as members of business cluster. It provides a test that supports the view that innovative performance of companies in one region is negatively affected when they neighbour with highly innovative regions (Zuluaga). This idea also could be reformulated in the terms of business cluster.

Following Kozyrev, the production capacity of business cluster under information asymmetry can be modelled by applying the following formula:

$$x_{t+1} = \begin{cases} \begin{cases} (1 + \delta(X_t/x_t)^\alpha)x_t \\ x_t \end{cases} \\ \bar{x} \end{cases} \tag{1}$$

if operates in period t or otherwise correspondingly and $\bar{x} < \infty$, where X denotes the production capacity of industrial leader, α means the intensity of externalities, δ is the rate of production growth. In addition, it is assumed that the technological externalities decay over the economics distance. In this case the Bellman equation is formulated for the optimal behaviour of the value function of a company under learning spillovers:

$$V(\pi, x, X) = \max\{\pi + \beta V(\pi, x, X'), W(\pi, x, X)\}, \tag{2}$$

$$W(\pi, x, X) = \begin{cases} (\theta - c)lx + \beta W(\pi, x', X'), & x < m \\ (\theta - c)hx - \gamma + \beta Z(\pi, x', X'), & x \geq m \end{cases}, \tag{3}$$

where $X' = \min\{\bar{x}, (1+\delta)X\}$, $x' = \min\{\bar{x}, (1+\delta(X/x)^{\alpha})x\}$, $m = \gamma(\theta-c)^{-1}(h-l)^{-1}$
and $Z(\pi, x, X) = \{(\theta-c)hx - \gamma + \beta Z(\pi, x', X')\}$;   (4)

where β is discount factor, γ is fixed transaction cost for the period, is the θ is the parameter of consumer static utility function, c is the unit production cost.

Production capacity is weakly growing due to learning by doing, so company starts from $x \geq m$ in high quality case. This value is represented by Bellman equation for Z (for more details, see Harmon, Leemon III). For start with $x < m$ – low quality case, company switches to high quality production through direct marketing once production reaches m by learning by doing. This value is represented by Bellman equation for W.

Networking approach. Social networks help to solve the problems of information asymmetry, because it creates the conditions for knowledge about existing technologies and market diffusion (Collier, 2002), and continuous learning, which is very important in a changing technological environment (Lundvall et al., 2002) but it is not sufficient. Networks creating social capital help to create a collective knowledge and common norms and values, which increases the likelihood of coordinated collective action and reduce the so-called free rider problem (Collier, 2002). Transacting involves a dynamic process made up of three temporally distinct phases: negotiation, transaction, and administration. If a network goes through these phases successfully then the trust within the partners emerges (for more details, see Ring 2007).

The paper of Rothenberg considers the systemic relevance of individual player in the performance of team, i.e. the effect of private pre-decision information on teams, because team production creates more complex performance measurement issues than individual production is considered. In addition, results suggest that the design of an information system has incentive effects that differ depending on the type of the performance measurement system and whether the information is also monitored by the principal (for more details, see Rothenberg, 2010).

Conclusions

Aim to dominate in the cluster and to strengthen the influence to other cluster members and the increase in profits can lead to a variety of differences or even conflicts between cluster members and threaten the viability of a cluster. All this means that intense competition within clusters not only promotes improvement factor of its members, but is also a source of destructive processes. All those directly or indirectly affect the performance of the whole cluster. It is also important to emphasize that other negotiations with external financiers cluster members are not affected by information asymmetries and the agreement on the relevance of contributions of cluster participants to innovation. The structure of information asymmetry can be very different and it is related to the commercial secrets. However it is important emphasize that information asymmetry also has a positive impact on the business companies.

Information asymmetry means that the additional assumptions in modelling should be provided in modelling. The modelling of business cluster performance

should be executed as the generalisation of other approaches like Bellman formula approach. On the other hand, the roke of information asymmetry depends on the approach of the modelling of cluster performance.

References

Akerlof, G.A. (1970). The Market for 'Lemons': Quality, Uncertainty, and the Market Mechanism. Quarterly Journal of Economics, (84), pp. 488-500.

Anselin, L., Varga, A., Acs, Z (1997). Local Geographic Spillovers Between University Research and High Technology Innovations. Journal of Urban Economics, 42, p. 422–448.

Anton, J.J., Yao, D.A. (1998). The Sale of Intellectual Property: Strategic Disclosure, Property Rights, and Incomplete Contracts. Working paper, The Wharton School, University of Pennsylvania, USA.

Arnold, M.C., Gillenkirch, R.M. Uncertainty and Information Asymmetry in Budget Negotiations.

Babkin, A.V., Kudryavtseva, T.J., Utkina, S.A. (2013) Identification and Analysis of Industrial Cluster Structure. World Applied Sciences Journal 28(10), p. 1408-1413.

Barsoumian, S., Severin, A., van der Spek, T. (2011). Eco-Innovation and National Cluster Policies in Europe. A Qualitative Review.

Bolton, G., Greiner, B., Ockenfels, A. (2012). Engineering Trust. Reciprocity in the Production of Reputation Information.

Collier P. (2002). Social Capital and Poverty: a Microeconomic Perspective, in Role of Social Capital in Development: An Empirical Assessment. Edited by Christiaan Grootaert and Thierry van Bastelaer. New York: Cambridge University Press, p. 19–41.

Couchman, P.K., Fulop, L., Batchelor, L. (2002) Managing the Risks of R&D Collaboration in the Australian Cooperative Research Centre Program. Proceedings of the 16th Annual ANZAM Conference.

Debackere K., Veugelers R. (2005). The Role of Academic Technology Transfer Organizations in Improving Industry Science Links, in Research Policy, Vol. 34, p. 321–342.

Eeckhout, and Jovanovic, B. (2002). Knowledge Spillovers and Inequality. American Economic Review, 92(5), p. 1290–1307.

The Gallup Organisation. (2006). "2006 Innobarometer on Cluster's Role in Facilitating Innovation in Europe." European Commission - Innobarometer.

Greunz, L. (2003). Geographically and Technologically Mediated Knowledge Spillovers between European Regions. The Annals of Regional Science, 37(4), p. 657-680.

Jovanovic, B., and MacDonald, G. (1994). Competitive Diffusion. Journal of Political Economic, 102, p. 24–52.

Hall, B.H. (2009) The Financing of Innovative Firms. EIB papers.

Harmon, M.E., Leemon, III C.B. Spurious Solutions to the Bellman Equation.

Hillairet, C., Jiao, Y. Credit Risk with Asymmetric Information on the Default Threshold.

Holod, D., Reed, R. (2009). Regional External Economies and Economic Growth under Asymmetry. Southern Economic Journal, Southern Economic Association, 75(4), p. 1123-1140.

Kalkanci, B., Chen, K.-Y., Erhun, F. (2011). Contract Complexity and Performance Under Asymmetric Demand Information: An Experimental Evaluation. Management Science, 57(4), p. 689–704.

Kozyrev, O. Regional Clusters as the Form of the Territorial Organization of Economy.

Lundvall B.-A., Johnson B., Andersen E. S., Dalum B. (2002). National Systems of Production, Innovation and Competence Building, in Research Policy, 31(2), p. 213–231.

Moreno, R., Paci. R., Usai, S. (2005). Spatial

Spillovers and Innovation Activity in European Regions. Environment and Planning, 37, p. 1793-1812.

Nestle, V., Täube, F.A., Heidenreich, S. (2013). An Affair to Remember – the Role of Trust and Information Asymmetry for Open Innovation in Cluster Initiatives. 35th DRUID Celebration Conference 2013, Barcelona, Spain, June 17-19.

Ortner, J., Chassang, S. (2014). Making Collusion Hard: Asymmetric Information as a Counter-Corruption Measure.

Ponds, F.K, van Oort, F.G. (2010). The Citation Impact of Research Collaboration in Science-Based Industries: A Spatial-Institutional Analysis. Papers in Regional Science, 89(2), p. 351-271.

Ring, P.S. (1997). Process Facilitating Reliance on Trust in Inter-Organizational Networks. In The Formation of Inter-organizational Networks. Mark Ebers. Oxford University Press.

Rothenberg, N.R. (2010). Optimal Information Asymmetry and Team Performance Measurement.

Schwarz, S., Voeth, M., Herbst, U. Information Asymmetry in Buyer-Seller Negotiations and its Impact on Effectiveness, Efficiency and Satisfaction. Competitive Paper, Main session.

Svensson R. (2007). Commercialization of Patents and External Financing During the R&D Phase, in Research Policy, 36(7), p. 1052–1069.

Wang, L. (2015). An Empirical Study on the Impact of Guanxi and Trust on External Financing Efficiency in Clusters. Scientific research Publishing.

Yu, F. (2002). Accounting Transparency and the Term Structure of Credit Spreads. Working Paper, University of California at Irvine.

Zartman, W. (1997). The Structuralist Dilemma in Negotiation. Research Group in International Security.

Zuluaga, J.C. The Influence of Regional Knowledge Spillovers on the Innovative Performance of Firms. A Multilevel Approach. Universidad de los Andes.