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The Impact of Openness on Value Co-Creation in Production Networks

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Abstract

The increasing number and economic importance of production networks is one sign of the on-going paradigm shift from industrial production to value co-creation. This transformation can be described by using the notions of a value creation taxonomy, which is introduced in this paper and gives a structured overview of relevant aspects of the underlying conversion from top down to bottom up economics. In order to gain a deeper understanding of this transformation process, the specific design, characteristics and challenges of those networks will be investigated with regard to their time-dependence using a life cycle model.

The present study contributes to a fundamental understanding of the importance of openness as a key success factor of value co-creation in production networks. It gives a systematic characterization of what is meant by “openness” concerning the value creation system, the value creation process and the value creation artifact. Furthermore, an adjusted life cycle model is presented, which may support both, assessment and configuration of openness within those networks by deriving adequate and phase-specific measures.

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1. Introduction

1.1. Bibliometric analysis

To give a first hint on the relevance of the topic, the authors performed a bibliometric analysis of scientific publications in the “Web of Science”-database (Thomson's ISI Web of Knowledge). Referring to the considered categories¹, 663.068 articles have been recorded with an average annual growth rate of 11 % between the years 1997-2013. This rate is used to standardize the following analysis of the specific topics of openness and networks. In the next step, all publications addressing openness or networks in some way were counted based on various search term combinations².

5.285 entries were addressing “production networks” and “clusters”, 15.895 articles were containing the word “open” within the topic and 250 articles comprised both “open” and “network”-terms.

The number of annually published articles in the database grows continuously. A trend in a specific subject can only be derived when it is normalized compared to the general development. For this, all values were standardized to the respective value in 1994, which was set at 100%. Only the deviations of the development of the specific-subject matter compared to the general record development is considered in the following.

After the standardization with the overall growth an increasing use of the term “open” (194%), “network” and “cluster” (341%) within scientific publications can be observed (see Figure 1). The clearest trend can be stated regarding the development of contributions that address “openness” and “networks” and “clusters”. Here the authors found an increase up to 879% within the observation period. Despite reasonable criticism of the bibliometric method and the incompleteness of the database, these figures lead to the conclusion that these issues attracted disproportionately high attention by researchers in recent years³.

¹ “operations research management”, “economics”, “management”, “engineering manufacturing”, “business”

² “regional cluster”, “business cluster”, “industrial cluster”, “industry cluster”, “production network”

³ In comparison, other terms record a downward trend (eg “Six Sigma” with peak in 2009).

1.2. Openness

The increasing importance of the abstract concept of “openness” can be observed in particular in the areas of innovation, R&D and technology management. The open innovation approach [1] has notably promoted this development. The scientific discussion on open innovation focuses on the effects of openness to innovation capability. Openness in terms of open innovation can be examined with respect to different levels of analysis (individual, enterprise, area etc.) [2]. Mostly, however, the enterprise-level becomes the object of analysis and in general the permeability of the corporate boundary is concerned in terms of knowledge, resources and personnel [3]. Laursen and Salter examine openness as related to the number and use of external resources [4]. Another perspective for viewing the permeability of organizational boundaries as a manifestation of openness is the inter-organizational knowledge management [5]. Lichtenthaler describes inbound and outbound transfer of knowledge [3] and the need for a dynamic management of knowledge in inter-organizational systems, without necessarily internalizing it [6].

In terms of the value creation taxonomy proposed in this paper, openness is considered not only by one of the many possible perspectives; but the concept of openness is comprehensively developed. Openness is not only used as one criterion or a single factor of innovation, knowledge management, or human psychology, it encompasses a predominant conceptual framework for identification, description, analysis and configuration of structures, processes and actor relationships in value creation systems.

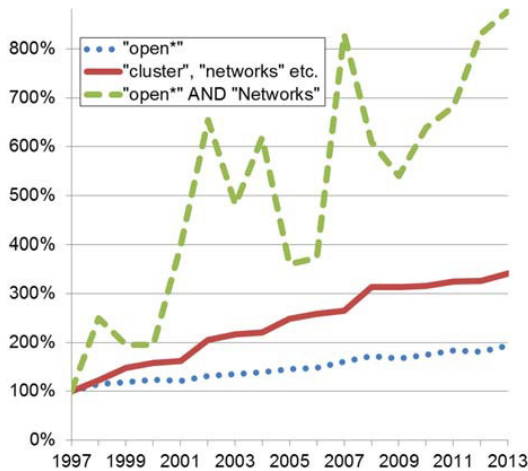


Figure 1: Bibliometric analysis in terms of openness and networks

1.3. Networks

The aim of cooperation with other companies within value co-creation systems such as production networks or clusters is the realization of larger overall revenue by realizing collective efficiency gains, synergies, coordination and emergent effects [7] that may also improve individual performance and competitive position [8]. Cooperation in networks and clusters is based on viable structures and principles that first have to be established, maintained and later also may have to be adjusted [9].

A number of scientific papers have discussed the effective design and management of production networks and network

practices [10,11,12] as well as specific elements of openness such as changeability [13] and complexity [14]. A fundamental and comprehensive examination of openness from a general point of view of production networks does not occur. However, it is essential for the maintenance of the viability of a network. To provide a better understanding of the development of openness along the life cycle of networks, this contribution presents an advanced life cycle model. In the following chapter, a taxonomy is introduced which opens up the current changes in the value creation.

2. Transformation of Value creation

The basis for the following analysis is a value creation taxonomy, which includes the structures, processes and the object of value creation. These three central elements are subject to lasting changes, the cause of which can in turn be found in technological change. Key criteria are further developments and spread of information and communication technologies (I&C technologies) as well as production technology (see Figure 2).

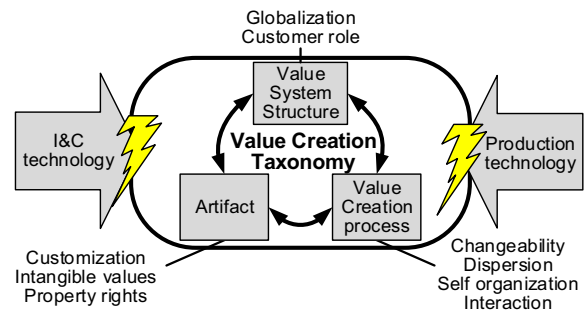


Figure 2: Value creation taxonomy

The transformation of value creation structures can firstly be attributed to globalization [15,16,17]. The spread of I&C technologies and the accompanying fall in transaction costs means that the benefits of widely dislocated value creation activities are increasing, which is followed by permanently changing relations between the worldwide operating actors. However, as the pressure of competition increases, this is also accompanied by a potential expansion of sales opportunities. Secondly, an increase in the importance of the customer’s role can be detected. Since knowledge work is gaining importance as part of value creation processes, customer’s power over the producer is rising due to a better access to I&C technology and networks. Therefore the value creation and production cannot longer be seen within the boundaries of a company. It is no longer possible to achieve a clear demarcation between the domains of customers and producers (‘prosumer’) and accordingly the role of traditional companies is changing.

The transformation of the value creation processes stems directly from the influence of the value creation structure. The need for individualized products and globalization thus calls for changeable production systems and processes. In addition, the number of actors involved in the value creation process is increasing. Coordination of these actors takes place less through hierarchical organizations: With the decreasing importance of conditions of time and space, the value creation processes are increasingly based on interaction, collaboration and self-organization [18] of the worldwide distributed actors

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