Available online at www.sciencedirect.com

ScienceDirect

Procedia CIRP 16 (2014) 38 – 43

www.elsevier.com/locate/procedia

Product Services Systems and Value Creation. Proceedings of the 6th CIRP Conference on Industrial Product-Service Systems

Knowledge Management in Value Creation Networks: Establishing a New Business Model through the Role of a Knowledge-Intermediary

Krenz, P.[a]*; Basmer, S. [a]; Buxbaum-Conradi, S. [a]; Redlich, T. [a]; Wulfsberg, J.-P. [a]

[a]*Helmut-Schmidt-Universität, Holstenhofweg 85, 22043 Hamburg, Germany*

* Tel: +49 40 6541 2490; fax: 40 6541 2839. *E-mail address:* pascal.krenz@hsu-hh.de

Abstract

The spatial distribution and growing granularity of value chains within manufacturing networks increase the complexity of inter-organizational value creation processes and pose new challenges for their coordination and a common innovation development. “Knowledge” is the essential resource to cope with this complexity. However, in an inter-organizational context conflicts between knowledge management objectives and general management objectives can arise, which have to be compensated. The presented article describes the role of a knowledge intermediary, which represents a support function within value creation networks. The intermediary supports value creation structures, processes and the artifact, which ensure an appropriate symbiosis between knowledge management objectives and general management objectives.

Keywords: Knowledge Management; Co-operation Networks; Value Co-Creation; Innovation and Value Creation; Distributed Manufacturing

1. Introduction

The success and competitive ability of value creation networks depend on the ‘productive knowledge’ that is available during the inter-organizational value creation processes [1,2]. Productive knowledge refers to the cognitive ability of transferring knowledge into actions (or using knowledge appropriately in a specific context) [3]. The single actors within a network have only a limited capacity to accumulate productive knowledge due to the complexity and diversity of knowledge stocks [4]. Thus, the single actor (or enterprise) focuses on his core competencies and outsources secondary and tertiary business processes [5]. Knowledge, which has been created in the company over years and decades, is distributed to autonomous partners and becomes intransparent and often not directly accessible. This results in a spatial distribution of knowledge carriers and value creation processes [6].

The increasing granularity of value chains does not only result in a growing intransparency, it also reflects the increasing complexity of the product development process. This complexity poses new challenges for the design and coordination of inter-organizational value chains [7,8].

Knowledge Management (KM) sets the preconditions for the solution of complex problems evolving in the context of the (re-)integration of distributed, single operations into efficient inter-organizational business processes within the network [9]. The common potential of the actors can be best exploited through a (re-)aggregation of the spatially distributed knowledge resp. the relevant experts [10,11].

2. Knowledge Management within the regional aeronautical cluster Hamburg Aviation

The actors of the aeronautical cluster in Hamburg (Hamburg Aviation) are currently facing that exact challenges. The exceptional density of factors of production within the cluster offers great potentials for collaborative problem-solving and innovation. Although cluster initiatives are established to actually meet the growing complexity of inter-organizational value creation, the inter-organizational cooperation activities are assessed as insufficient by many of the aeronautical clusters’ actors. Even though the potentials of an efficient management of the common resource ‘knowledge’ [12] are recognized, there seems to be a lack of ability to put them into practice.

Selection and peer-review under responsibility of the International Scientific Committee of “The 6th CIRP Conference on Industrial Product-Service Systems” in the person of the Conference Chair Professor Hoda ElMaraghy”

doi:10.1016/j.procir.2014.01.006

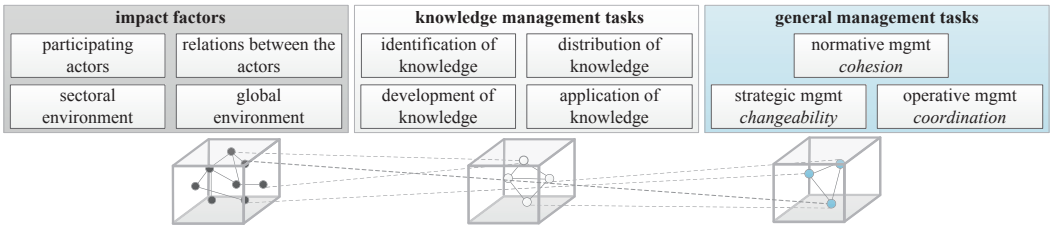

Fig. 1 Schematic illustration of the interdependencies between different areas of influence, KM tasks and GM tasks

Within the framework of a BMBF (Federal Ministry of Education and Research) sponsored research project a Knowledge Management Systems (KMS) has been developed for the aeronautical cluster in Hamburg. Correspondingly, the developed KMS supports the cooperation of the clusters' actors by enabling them to manage the common resource 'knowledge' efficiently following the overall aim of optimizing the harmonization of value chains as well as fostering collaborative innovation in the cluster.

The regional cluster initiative Hamburg Aviation (HA) consists of the core companies AIRBUS and LUFTHANSA Technik, Hamburg Airport, several associations, research institutes and universities, as well as 300 small and medium-sized enterprises (SMEs), which are linked both vertically and horizontally with one another.

Grasping and mastering the complexity of the various and constantly changing forms of cooperation within a value creation network (i.e. HA) cannot be achieved through a constructivist approach, which aims at a rather static system. Instead of order, determinism, deduction and stasis, the analytical framework has to focus on indeterminism, sense-making and the openness towards change [13]. That also means that the solution is not necessarily linked to a series of mathematical conditions, but rather to patterns of emergence, which provoke further changes.

„Theory in turn becomes not the discovery of theorems of undying generality, but the deep understanding of mechanisms that create these patterns and propagations of change." [14]

3. Requirements for inter-organizational KM

Based on the exposed premises, a systemic analysis for a deeper analytical understanding of the interdependencies between the single elements of the system *Hamburg Aviation* is required [15]. This analysis serves as a fundament for the subsequent deriving procedure of the KMS. In a first step, the effects of context-specific impact factors (e.g. level of trust, power asymmetries along the value chain) on the realization of the KM tasks as well as the realization of the general management tasks (GM tasks) in the course of cooperation are detected (see figure 1). Major tasks of the KMS are composed of the identification, distribution, development and application of knowledge [16]. The organization and regulation of the system (GM tasks) can be divided into the domains of operational management (coordination of the value creation processes), strategic management (securing the changeability) and normative management (ensuring cohesion) [17,18].

Within interdisciplinary workshops a qualitative model has been developed based on a method by NEUMANN/ GRIMM that describes the interdependencies between context-specific impacts on the realization of the KM as well as the GM tasks in detail [19]. The development of the model is based on a qualitative interview study, which has been carried out with experts of the different sectors of the aeronautical cluster [20,21].

The qualitative model allows us to identify key impacts on the realization of KM and GM tasks [22]. Moreover conflicting factors can be extracted that have an opposing impact (i.e. positive impact on KM tasks; negative impact on objectives of the GM tasks). Figure 2 shows an extract of the key impacts on 'knowledge development' and the 'ensuring of cohesion' as an objective of the normative management as well as the identified conflicting factors "autonomy" and "heterogeneity".

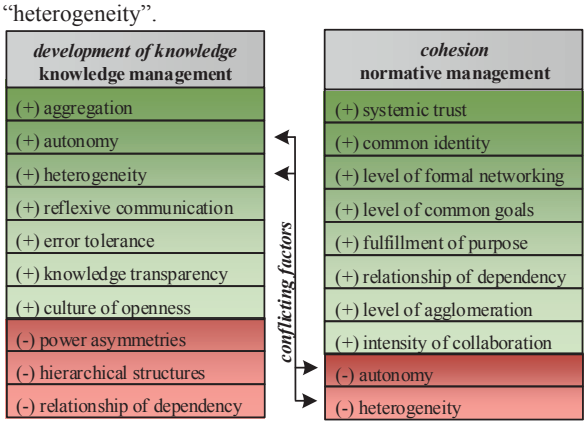

Fig. 2: Conflicting factors between 'development of knowledge' and 'cohesion'

Based on a comprehensive analysis of the key impacts within these two fields (KM and GM tasks) three central conflicts have been identified between KM and GM tasks. Though an entire resolution of these conflicts is never possible and also not aspirated, it is necessary to establish an appropriate, context-specific compensation (see figure 3). Accordingly, three major requirements for the knowledge management were derived:

(1) Compensation between cognitive proximity and distance: Cognitive distance (resp. proximity) refers to the degree of similarity of mental models, i.e. their structure and content. A high degree of autonomy and heterogeneity usually comes along with a certain cognitive distance between the actors and is the fundament for high problem solving skills of

cooperating actors that are not blocked through group thinking and conformity. However, these exact factors have a strong negative impact on the cohesion of the system (resp. sub-system), whereas cognitive proximity facilitates an efficient communication and the establishment of a common identity in the long run [23].

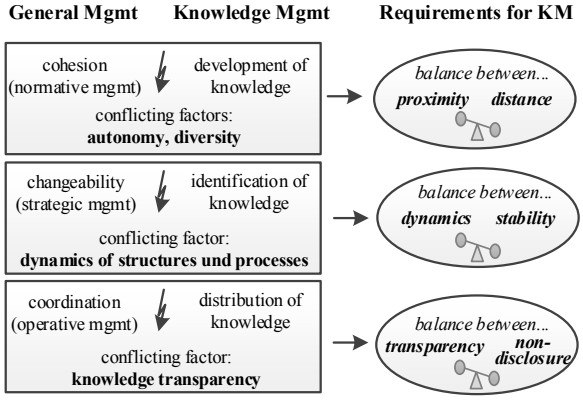

Fig. 3 The three major conflicts of objectives and the need for their compensation

First requirement: During the cooperation a dynamic compensation between cognitive distance and proximity has to be assured, which fosters the innovation potential and prevents conformity and group thinking without affecting the cohesion of the whole cooperation system.

(2) Compensation between dynamics and stability: Dynamic structures and processes within the value creation system (VCS) are the basis for its changeability and the precondition for the adaptation to changing environments (market conditions, political framework). However, this strongly affects the process of knowledge identification. Stable structures and well-established processes as well as generally accepted standards facilitate the identification of knowledge significantly.

Second requirement: Consequently, there is a need for compensating constant long-term structures as well as dynamic system features in a way that the identification of knowledge can be realized without affecting the dynamic of the whole system.

(3) Compensation between knowledge transparency and non-disclosure: The availability of internal expert knowledge and knowledge of internal operations is crucial to the coordination of value creating activities and the emergence of synergies. However, a high level of transparency increases the risk of inadvertent knowledge drain (or industrial espionage), which in turn strongly affects the willingness to share knowledge – an essential precondition for the distribution of knowledge within the system.

Third requirement: There is a need to regulate the availability of knowledge (transparency) in a way that the necessary willingness to share can be raised and competitive knowledge can be protected (i.e. loss risks can be minimized).

During our empirical research we found these conflicts of objectives in different areas and on different levels of the value creation system. A very heterogeneous, interdisciplinary task force composed of actors having a high cognitive distance (due to different professional, institutional and cultural backgrounds) may serve the problem solving performance of the team (i.e. changeability, ability to innovate), but also highly complicates their communication and coordination (i.e. viability). The emergence of synergies as well as an efficient coordination demands for a certain amount of knowledge transparency and the willingness to share knowledge, which in turn strongly contradicts to the single actor's need to protect intellectual property. These problems on the micro-level of the task force are also reflected on the macro-level of the whole value creation network (i.e. the cluster).

Consequently, there is a constant need for the compensation between cognitive proximity and distance, dynamics and stability, transparency and non-disclosure in order to assure the viability of the value creation system on its different levels and in its different stages. KM should thus regulate the knowledge flows in a way that ensures the cohesion, changeability and cordination of the VCN. Therefore, the design of the value creation artifact, its system structure and the related processes as well as their interdependencies have to be taken into account. KM is often misunderstood as another add-on in management activities, but it cannot be considered isolated from general management activities. There is still a lack of management models for an appropriate symbiosis of the KM and GM objectives especially in an inter-organizational context. In the following section, the hitherto missing super-ordinated knowledge function in inter-organizational value creation systems is presented.

4. Operational principles of a knowledge function in value creation systems

The basic task of the knowledge function is to achieve an accurate compensation between the conflicts of objectives in order to realize the tasks of KM and GM successfully (see previous section). In this sense, the knowledge function performs a contribution to the regulation of value creation systems and is conducive to its goal-oriented design. In the following section the regulating mechanism of the knowledge function is explained in three steps (figure 4). Using a qualitative approach it is worthy to note that system variables are fuzzy in nature and not quantifiable, we therefore focus on the peculiarity of a system variable (i.e. a high vs. a low level of heterogeneity).

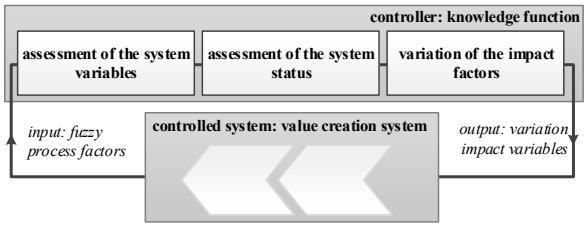

Fig. 4: Schematic figure of the steps of regulation

(1) *Assessment and transformation of the system variables:* Within the first step of regulation the qualitative system

variables (fuzzy system input) are assessed with regard to their peculiarity and transformed into a standardized linguistic description (i.e. high – medium – low). Corresponding to figure 1 these are: (a) the relevant impact factors (e.g. power asymmetries alongside the value chain, common basis of trust), (b) the level of realization of the tasks of KM as well as (c) the tasks of GM (cohesion, changeability, coordination). After assessing the peculiarities of the system variables, a further evaluation is carried out that focusses on the current stage (actual context) in which the system is located (initiation, constitution, operation, transition) since each stage demands for different degrees of cognitive distance, systems dynamic and transparency.

(2) *Assessment of the system status:* In order to fulfill the system's purpose it is inevitable to ensure the viability of the system. According to Stafford Beer [24] a system will be viable, if appropriate degrees of cohesion, changeability as well as coordination skills are highly developed. Thus, as part of the second step of regulation the peculiarity of these necessary system characteristics is assessed with regard to the current system stage: *Is the peculiarity of the system characteristics (cohesion, changeability and coordination) suitable to the particular development stage of the value creation system and is an appropriate compensation achieved between tasks of KM and GM?* Whereas in step 1 of the regulation only not related data (single variables) were assessed, step 2 is based on a holistic perspective that takes the interdependencies of the different elements into account.

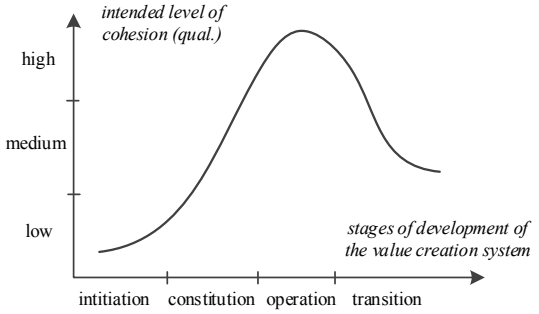

Fig. 5: Development of a suitable level of cohesion with regard to different stages of development

Figure 5 shows for example the demand for cohesion according to the particular stage of development. During the early stages of the system development (*initiation and constitution*) a higher cognitive distance between the actors should be aspired which is usually correlating with a low level of cohesion. The intention is to unlock the hidden innovation potential of the actors by an appropriate configuration of heterogeneous and specialized partners and to develop the common value creation structures, processes and artifacts within a controversial and open process. In contrast, the *stage of operation* is characterized by the actual realization of the common artifact. The definition of the task is already known, the necessary operational processes are defined and an efficient processing of subtasks is needed. Because of the complexity of the task standardized processes and common structures are established to coordinate the single tasks of the common value creation. If the cognitive proximity of the actors increases in this stage, the level of cohesion is simultaneously rising. Nevertheless, if the surrounding environmental conditions change, common structures and processes or the artifact itself need to be adapted so the distance between the actors needs to be raised again leading to a medium level of cohesion in the *stage of transition*.

On the basis of the information on the peculiarity of the systems' cohesion, changeability and coordination performance and the current development stage of the system, the assessment of the system state is now possible. For example: a high level of cohesion within the stage of transition would block the process of transformation of the system. Accordingly, there is a need for compensation between cognitive proximity and distance in order to induce a higher distance between the actors through the variation of the conflict-causing variables (impact variables).

(3) *Variation of the impact variables:* During this step of regulation, the knowledge function needs to modify those impact variables that cause the imbalances between KM and GM objectives with regard to the specific stage of the value creation system. Those impact variables have been identified already in the qualitative interdependency model developed within this research project (see section 2). Table 1 shows an extract of the identified variables. They are categorized based on the following spheres: value creation system, artifact and process. By varying the peculiarities of these impact variables, the structure, process and artifact can be modified in order to achieve the compensation appropriate to a specific context.

	proximity and distance	**dynamics and stability**	**transparency and non-disclosure**
structure	cooperation structure	cooperation structure	communication culture
	inter-organizational coordination	inter-organizational coordination	formal network
	regional agglomeration of the actors	adaptability	informal network
process	width and depth of cooperation activities	level of dependency	depth of cooperation activities
	power asymmetries, level of dependency	culture of error tolerance	conflict culture
	common objectives	technological changeability	trust
artifact	granularity of the common task	modularity	granularity
	scope of service		property rights structure

Tab.1: Impact variables to compensate the three conflicts of objectives

5. Realization of the knowledge function in value creation networks (VCNs) by the role of a knowledge intermediary

The knowledge function is a systemic approach to explain a necessary super-ordinated mechanism within a value creation system that establishes an adequate symbiosis of the objectives of the tasks of KM and GM. In the following, the role of the knowledge intermediary is presented, whose central task is to implement the knowledge function within the organizational structure of the value creation network. In other words the knowledge intermediary is the institutional realization of the knowledge function within a value creation network. The intermediary analyzes the network continuously (regulation: 1. Step), assesses the cooperation according to the compensation of conflicting factors (regulation: 2. step) and finally develops concrete courses of action to realize the

necessary variation of the relevant impact variables (regulation: 3. Step). In doing so, the intermediary supports to design the value creation structure, process and artifact of the network in a goal-oriented way (compensation between an efficient regulation of the resource 'knowledge' and securing the viability of the network).

If the overall aim of inter-organizational KM is to increase the realized added value of the whole system (thereby also implying a satisfaction of individual needs), a broad participation of the different knowledge carriers needs to be assured [25,26]. This implies that the knowledge intermediary has to fulfill two fundamental attributes for a successful realization of the knowledge function:

Taking a holistic perspective (on the VCN): A holistic perspective takes the needs of the various actors of the value chain into account and enables the compensation of the three conflicts of objectives between the KM and the GM tasks that may occur on very different levels of the VCN.

Neutral and objective realization of the knowledge function: The intermediary needs to realize the knowledge function objectively and independent from particular interests of the actors. Courses of action have to be developed on the basis of an objective assessment of the respective context.

However, these characteristics lead to special requirements regarding the realization of the role inside the network. The primary value-adding activities consist of product development, manufacturing and marketing. Actors involved in a VCN are usually experts for a single section of the value chain and they focus their efforts on optimizing their part of the value creation process in order to enforce their competitiveness. They are guided by particular interests within a limited point of view. In other words, they lack an objective, holistic point of view [27,28]. However, the knowledge intermediary needs to take a neutral, holistic perspective to fulfill the requirements for an inter-organizational KM within the network. Consequently, the realization of the knowledge function through the role of an intermediary needs to be realized by actors that are not part of the primary value creating processes. Otherwise the acceptance would be low due to an insufficient neutrality of the actors (e.g. fear of opportunistic behavior) or a low quality of the courses of action on account of an insufficient holistic perspective. These specific attributes, which the knowledge intermediary is required to fulfill within value creation networks, open up the field for new business models.

The business model [29] of the knowledge intermediary is based on enabling the actors of the primary value-adding processes to realize the requirements of inter-organizational KM within the frame of their cooperation, while effectively compensating the conflicts of objectives. They collect information affecting the realization of the KM tasks in the network. Furthermore, they analyze the arrangement of balances in the system and check to what extent adjustments have to be made. Finally, the identified adjustments are realized through a collaborative development of courses of action that aim at a variation of the conflicting factors.

As a matter of fact, the intermediary and the derived business model should not be understood as an institution that develops the KMS for the network in a top-down manner. Nor does it mean that the intermediary is represented through one single actor in the network. This role needs to be implemented on different levels of cooperation inside the value creation network and all segments of the value chain. A variety of intermediaries is needed, which fulfill the role for single segments in the network and develop a holistic view.

6. Implementing the role of a knowledge intermediary in *Hamburg Aviation*

The presented research results have been realized in the aeronautical cluster Hamburg Aviation by implementing the role of a knowledge intermediary at the Centre of Applied Aeronautical Research (ZAL GmbH). The ZAL offers a platform for scientific-technological cooperation in Hamburg. It is a company consisting of a heterogeneous number of shareholders (i.e. core companies, public sector, universities). We were so far able to institutionalize the inter-organizational task force (TF) 'Aerospace Production' which aims at orienting the regional research activities stronger to the needs of the local industry and identifying and exploiting synergies.

initiation → constitution → operation

high **cognitive distance** between the cooperating actors → high **cognitive proximity** between the cooperating actors

structure	**cooperation structure**	
	formless aggregation of autonomous actors (common demand)	establish an open community structure, cooperation contract
	inter-organizational coordination	
	avoidance of top-down coordination by a neutral instance instead of a focal actor	designation of project leaders, coordination by a neutral instance
	agglomeration of the actors	
	local aggregation through meetings, decentralized operations based on a virtual collaboration system	shortening of meeting periods, participation of the operational level by means of an IT-system
process	**width of cooperation activities**	
	meetings as open fora	reduction of the amount of partners according to the required number for the implementation of defined tasks
	common aims and expectation, common identity	
	definition of strategic objectives, name of the group, guiding principle	differentiated milestones related to the tasks, common public image
	power asymmetry	
	democratic principles (participation), coordination by a neutral actor (ZAL)	
	level of dependency	
	facilitate access to common knowledge ressources by means of a virtual cooperation platform	
artifact	**granularity**	
	differentiated portfolio of themes	concentration on extracts of the portfolio of themes
	scope of service	
	development of portfolios of themes as interdisciplinary R&D (consideration of aspects of technology, processes and systems)	

Tab. 2: Phase-dependent courses of action to balance proximity and distance of the cooperating actors within the task force 'Aerospace Production'

As a *neutral* actor the ZAL realizes its role as an intermediary in so far that it supports the TF passing the stages of idea management, business model architecture, and project management. Table 2 shows an extract of the courses of action, which have been implemented by the ZAL in its role as intermediary. For example, the table can display that the autonomous actors have been aggregated within the structure of an open community in the earlier stages of the cooperation (impact factor: cooperation structure). A hierarchical coordination of the inter-organizational cooperation has not been waived during the meetings. Rather, an accompanying moderation by the ZAL as a neutral instance was utilized (impact factor: inter-organizational coordination). After the stage of the idea generation a

common business model has been defined and realized within concrete single projects. In this course, the cooperation has been institutionalized, cooperation contracts were signed and the project leaders were chosen within each subproject (impact factor: cooperation structure / inter-organizational coordination). This example shows the goal-oriented design of the value creation structure of the ZAL in cooperation with the participating actors of the cluster to achieve a context-oriented compensation between cognitive proximity and distance of the actors. In this way, the common potential to develop knowledge in the stage of idea generation could be fully exploited and furthermore, the viability of the cooperation was ensured during the stage of operation.

7 Conclusion and Outlook

Knowledge Management has to be considered against the backdrop of changing paradigms of value creation - from the traditional firm in the industrial era to mass collaboration in a globalized networked world - focusing on its integrative function. As we have pointed out in the previous sections, KM in value creation networks needs to regulate the knowledge flows in a way that ensures the viability as well as the adaptability/ changeability of the VCN. Therefore, the design of the value creation artifact, its system structure and the related processes as well as their interdependencies have to be taken into account. Following such an integrative systemic approach, one has to analyze the interweaving of GM and KM objectives.

Existing theories and models according KM are not recognizing the presented holistic view and the embedding of KM inside the overall network management. In contrast to other understandings of the role of a broker respective intermediary the understanding of the presented knowledge intermediary differs. In contrast to a knowledge broker the central task of a knowledge intermediary is not to support the realization of the knowledge tasks. He does not transfer knowledge between the different actors of the network or identifies the knowledge resources within the network. Instead the intermediary designs value creation structures, processes and the artifact in cooperation with the network actors. The relevant objective is to ensure a symbiosis between tasks of the knowledge management and tasks of the general management. Concluding, knowledge management represents not only an add-on in management activities in a network, but rather it is grounded in the value creation structures, processes and the artifact. This holistic perspective ensures its embedding in the overall network management.

References

[1] Hidalgo C, Hausmann R. The building blocks of economic complexity. Proc. Natl. Acad. Sci. June 30, 2009;106/26:10570–10575.
[2] Ammar-Khodja S, Bernard A. An Overview on Knowledge Management. In: Bernard A, Tichkiewitch S, editors. Methods and Tools for Effective Knowledge Life-Cycle-Management. Berlin: Springer; 2008. p. 3-21.
[3] Bullinger HJ, Ilg R. Living and working in a networked world: ten trends. In: The practical real-time enterprise. Facts and Perspectives. Berlin: Springer; 2005. p. 497-507.
[4] Schuh G, Gottschalk S. Production engineering for selforganizing complex systems. Prod Eng Res Dev 2008;2:431–435.
[5] Prahalad CK, Hamel G. The core competence of the corporation. IEEE Engineering Management Review 1992;20/3:5-14.
[6] Picot A, Reichwald R, Wigand R. Information, Organization and Management. Berlin/Heidelberg: Springer; 2008.
[7] Schuh G, Arnoscht J, Völker, M. Product Design Leverage on the Changeability of Production Systems. Procedia CIRP 2012;3:305–310.
[8] Redlich T, Wulfsberg JP, Bruhns FL. Open production: scientific foundation for co-creative product realization. Prod Eng Res Devel 2011;5/2:127-139.
[9] Wiendahl HP et al. Changeable Manufacturing. Classification – Design – Operation. Annals of the CIRP 2007;56/2:783-809.
[10] ElMaraghy HA, ElMaraghy WH. Variety, Complexity and Value Creation. In: Zaeh MF, editor. Enabling Manufacturing Competitiveness and Economic Sustainability. Heidelberg: Springer; 2014, p. 1-7.
[11] Hausmann R, Hidalgo CA et al. The Atlas of Economic Complexity. Puritan Press; 2011.
[12] Weyrich C. Knowledge-based companies – objectives and requirements. In: Kuhlin B, Thielmann H, editors. The practical real-time enterprise. Facts and Perspectives. Berlin: Springer; 2005. p. 481-496.
[13] Malik F. Management. The essence of the Craft. Frankfurt: Campus-Verlag; 2010.
[14] Arthur WB. Complexity Economics. A Different Framework for Economic Thought. SFI WORKING PAPER, 2013-04-012.
[15] Vester F. The Art of Interconnected Thinking. Ideas and Tools for a New Approach to Tackling Complexity. München: Malik Management; 2007.
[16] Probst G, Raub St, Romhardt K, Managing Knowledge. Chichester: Wiley, 1999.
[17] Rüegg-Stürm J. The new St. Gallen Management Model. Houndmills: Palgrave Macmillan; 2005.
[18] Beer St. Decision and Control. London: Wiley; 1966.
[19] Neumann K. KNOW WHY. Systems Thinking and Modeling. Norderstedt: Books on Demand; 2012.
[20] Further details: Krenz P, Basmer S-V, Buxbaum-Conradi S, Wulfsberg JP. Hamburg Model of Knowledge Management. In: Zaeh MF, editor. Enabling Manufacturing Competitiveness and Economic Sustainability. Heidelberg: Springer; 2014. p. 389-394.
[21] Strauss A, Corbin JM. Basics of Qualitative Research, Thousand Oaks, California: Sage Publications; 2008.
[22] Gausemeier J, Fink A, Schlake O. Scenario Management. An Approach to deliver Future Potential. Technological Forecasting and Social Change 1998;59/2:111–130.
[23] Noteboom et al. Optimal cognitive distance and absorptive capacity. Research Policy 2007;36:1016 – 1034.
[24] Beer St. The Heart Of Enterprise. Chichester: Wiley; 1979.
[25] Redlich T, Wulfsberg JP. Wertschöpfung in der Bottom-up-Ökonomie. Berlin, Heidelberg: Springer; 2011.
[engl. title: Value Creation in bottom-up economics]
[26] Caves RE, Porter ME. From Entry Barriers to Mobility Barriers. In: Wood JC, Wood MC, editors. Michael Porter. Critical Evaluations in Business and Management. London, New York: Routledge; 2010. p. 30-47.
[27] Porter, M. The Structure within Industries and Companies` Performance. In: Wood JC, Wood MC, editors. Michael Porter. Critical Evaluations in Business and Management. London, New York: Routledge; 2010, p. 78-97.
[28] Lyons AC, Mondragon AEC, Piller F, Poler R. Customer-Driven Supply Chains. From Glass Pipelines to Open Innovation Networks. London: Springer; 2011.
[29] Osterwalder A. The business model ontology. Lausanne: Universität; 2004.