Personal competences and social structure: information management in business networks

J. Aderhold[1] & M. Meyer[2]
[1]*Innovation Research and Sustainable Resource Management,*
[2]*Chair for Organizational Behaviour,*
Faculty of Economics and Business Administration,
Chemnitz University of Technology, Germany

Abstract

We developed a procedure for exploring and describing the insufficiently investigated relationship between role expectations in the network, subjective motives, experiences and identifications, which might be employed during the iterative process of network construction. This procedure is derived from the interplay between network development, role structures, defining competence profiles and the integrated bundling in network-based value creation processes. Due to the dynamics and complexity, this unit of analysis requires (1) an intensive focus upon the notion of person-related competency and its importance in the dynamic context of networks, and (2) a method for describing and presenting subjective network constructions in as up-to-date a way as possible. We especially want to explore the mutual perception of actors within the framework of a soft factor controlling. We can gather data on context-specific personal constructs by the grid technique. Based upon the applied methods, it is possible to provide information about the relevant structures within networks, which can be used for Personal selection and competency development.
Keywords: competence, virtual business networks, information management, grid-technique, polyhedral analysis.

1 Introduction

Technological progress and the dissemination of new technologies, e.g., concerning information, communication or media, create new business opportunities especially for small and medium enterprises (SME) because of

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their high flexibility and their close relation to costumers [1, 2, 3]. But at the same time, this implies increasing competition [4]. The participation in networks appears to be a valuable instrument to manage both dynamics [5]. But particularly the establishment of networks – or the entry into existing ones – represents a major challenge to SME. The constitution of networks is contingent upon various conditions and involves far-reaching consequences for the single partner, the network itself and the network environment [6, 7]. However, small and the smallest enterprises cannot participate in this development – or not entirely – because of their structure and the limited resources. Consequently, present and future research has to be focused on organizational designs appropriate to enforce SME network building [8]. Above all, appropriate design principles, which allow for the maintaining of such complex and dynamic forms of cooperation, are missing.

The following proposition of a competence cells network approach reflects current tendencies in management and economic science based on the core competence concept by Prahalad and Hamel [9]. The main ideas were developed and combined with an IT-based planning and optimisation scheme. The management model that was created as a result is a modification of the concept of Extended Value Chain Management (EVCM). It enables production networks to select and focus their competences according to specific orders quickly. Furthermore, it offers various possibilities to optimize the selection process. Besides the exact representation of all flows of information and material at any time, personal and social factors, as well as economic, logistic and technical parameters, can be integrated and analysed. Especially for social factors we suggest the repertory grid method as a principal research tool. The data acquired is then used for polyhedral analysis, which will be described in detail in the end. The following insights are derived from current research within the collaboration research centre “non-hierarchical production networks”, Chemnitz University of Technology.

2 The concept of linked competence cells

The concept of competence cells refers to the core competence approach of Prahalad and Hamel [9]. It relies on the assumption that economic success is due to unique, identifiable competences. These key competences represent the fertile ground of any company to create present or future products and services. Therefore they may be used directly or transformed by appropriate management measures. In general, core competences consist of technological abilities necessary to realize value creation. On the one hand, single components or aspects of those competencies are derived according to the production processes within the value chain. They can be categorized, for example, from a technical, economic, informational or activity-related point of view.

On the other hand, a given production profile can be decomposed into its components and subsequently transformed into competence cells. In this context, we emphasize that personal and social factors can’t be overestimated with regard to their contribution to the frictionlessness of the production process. We assume

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that competence cells are defined as the smallest indivisible, economically mostly independent, specialized units that temporarily link up to other competence cells to accomplish complex tasks. Companies may provide resources by forming autonomous competence cells, which act as elementary units in value creating cooperative processes. Such competence networks enforce flexibility and temporariness, since they enable individual value chains supported by a large variety of competence cell portfolios as it is appropriate to either a given problem, a specific order or a product, for example.

The new non-hierarchical competence cell network approach faces the challenge of assuming core competences (see figure 1). It assumes that, within a given region, there are competence units, formed by a multitude of experiences, which can be interpreted as competence cells (see http://www.tu-chemnitz.de/sfb457/en/). Or from a managerial point of view: The region is scanned for potential network partners and competences are integrated through bringing them into the form of competence cells by specific management measures.

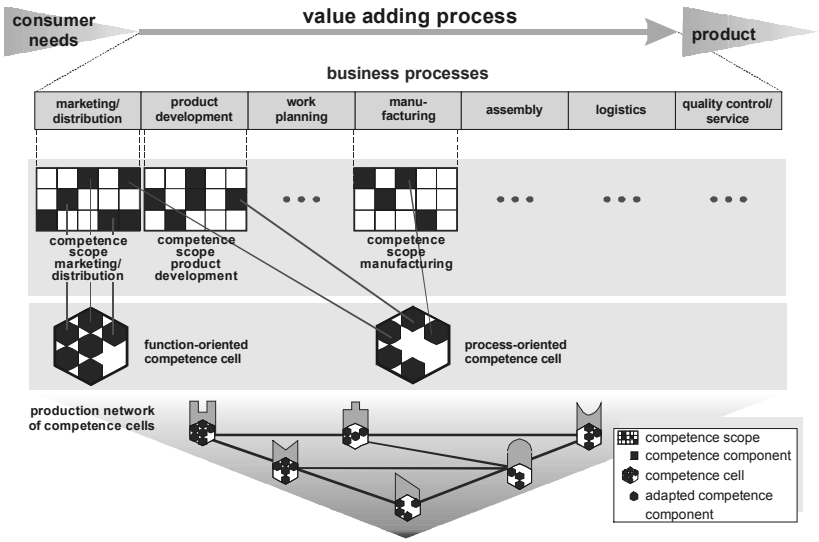

Figure 1: Relation of value adding process and types of competence cells.

This regional network potential serves to enable differently-orientated competence networks. To facilitate this project-like cooperation, it is necessary to implement a minimal amount of institutional infrastructure, such as a uniform information platform, common terms of trade, quality standards, etc. On this basis, temporary production networks can be built according to customer inquiries. The linkage may be orientated to problem solving, the specific order, production or processes. Competence cells are the basic bricks of a non-hierarchical production network. Once again, we emphasize that it is not the

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given entrepreneurial division that is cooperating, but only those competencies, which are selected for the production chain.

The challenge consists of creating dynamic, temporary network structures to satisfy the variety of costumer needs. The couplings originate to solve concrete problems of costumers and therefore dissolve after their accomplishment. It is assumed that the interdependencies between the single cooperation partners are homogeneous. The coordination arises by supply and demand instantaneously. This means that task-specific coordination and decision-making competences are distributed among the concerned network actors. This network design implies changes to the established system of labour division, to the dimensioning of competence cells and their linkage, to the temporal and special structure of production, to the size and equipment of production places. The introduction of mobile competence cells offering specific production possibilities may even be conceived. An overall integrating method is necessary to build and maintain non-hierarchical networks between competence cells. Incompatible information systems prevent value creation from being effective by causing high administration and coordination costs. Instruments to represent all flows of information and material exactly at any time, which would ensure appropriate reaction in case of disturbances or later-introduced customer demands, are missing. Consequently, it is necessary to centralize the planning for products and processes to ensure the continuity of informational and material flows between the single SME. Therefore, we adopt the Extended Value Chain Management (EVCM) as a central management system [10]. Combined with the repertory grid technique and the polyhedral analysis, this system allows IT-based case specific selection and overall optimisation of the workflow in competence cells networks.

3 Network competency

Inter-firm co-operations based on business networks need a suitable infrastructure. We assume that one characteristic attribute of the infrastructure in business networks is developing and cultivating informal relationships. Wenger and Snyder [11, pp. 56f] describe this "cultivation task" as a management paradox. Networks are mainly informal and self-organizing. They can be “cultivated” by special means. We can use horticulture as an analogy – plants grow best if their characteristics are respected. We need an infrastructure supporting the networks to “grow” and “take care” of them [12]. In business economics, the instrument “controlling” is used for analysing, interpreting and evaluating firm data. We would like to use this instrument for psychological purposes within a procedural framework, which will be developed in this article. Viable firms need heuristic strategies to control their targets depending on autonomous actor relationships. Therefore, business networks shall be provided the opportunities to present role expectations towards the whole system at any time. From our point of view, a controlling instrument for soft factors seems to be obligatory in order to meet the challenges derived from the above-presented arguments. We search a function-oriented social, respective relational competency that requires a different focus on the above-presented dimension


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depending upon the network configuration. Generally, we can understand the construct "competency" as a system of inner-psychic preconditions that reflects itself in the quality of visible action and regulates it. The notion of personal competency emphasizes the procedural quality of the inner-psychic activity. The "personal competency" represents an essential trait of the personality.

4 The role construct repertory: gaining the data

We have developed a procedure for exploring and describing the insufficiently investigated relationship between role expectations in the network, subjective motives, experiences and identifications that might be employed during the iterative process of network construction. This procedure is derived from the interplay between network development, role structures, defining competency profiles and the integrated bundling in network-based value creation processes. In particular, the dynamics and complexity of this unit of analysis requires: (1) an intensive focus on the notion of person-related competency and its importance in the dynamic context of networks, (2) and a method for describing and presenting subjective network constructions in as up-to-date a way as possible. We especially want to explore the mutual perception of actors within the framework of the soft factor controlling. Our second aim is to provide the system with the mutual assessment of the partners regarding reliability, competency, trust, etc.

Here, we present a method which has the advantages of a clinical interview on one hand and which provides data similar to data attained from a standardized interview on the other hand. The method is called "Role Construct Repertory Grid" [13]. This method allows insight into the construct system of an individual. This method is closely linked with the theory of social constructs. Up to now, the Grid method has been applied and published in very different variations [14, 15, 16].

The different methodological variants are based on a common concept. The interviewed people are asked to formulate differences between objects of their experience (elements), which are entered into a data matrix (grid) in the form of short descriptions (constructs). Finally, the interviewed people assess the elements using a given scale. A grid provides numeric data that are especially useful for comparing individuals. The data firstly describe a qualitative relationship of patterns about a person's point of view. To determine a quantitative relationship, the raw data must compute with a special kind of mathematical algorithm, such as the polyhedral analysis [17, 18]. The interviewed people directly associate patterns, which are not set in advance. Therefore, we get idiosyncratic data. The interviewed person formulates relationships, describes them ideally in his own words in a very spontaneous way. The only given structure in the grid consists of the elements. They should not only be representative but they should also be notional abstractions from reality – they stem from the environment of the interviewed persons as well as from the topic of the investigation. People, situations stemming from the network context form notional structures. The researchers ask the interviewees to

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formulate their subjective assessments about the given elements within a standardized research design. Then they form dimensions (construct/contrast poles) such as co-operative versus obstinate. Among the most relevant constructs, we distinguish between core constructs defining the self and core role constructs defining the relationships between the individual and other people. If an investigation is carried out within the network context, elements presenting the "self" are excluded. In a second step, the interviewees assess the elements whose dimensions are individually formed (scaling).

Self	Self (Other)	Ideal Self	NW Coordinator	NW Culture	Direct Partner	NW Culture (Future)	NW Partner (Now)	NW Partner (Future)	NW Participant (Now)	NW Participant (Future)	Person of Confidence	Enemy	Regular customer	desire customer	Competition network		
4	4	3	4	3	5	3	2	3	3	3	5	5	4	4	4	egoistically	participating
4	4	5	5	4	2	5	3	2	2	2	4	1	4	4	2	Qualification in subranges	Qualification in Multimedia
5	4	5	5	5	2	5	4	5	4	5	5	2	3	5	5	mental limits	open minded
4	3	5	5	4	3	4	4	5	4	5	5	2	5	5	5	indifferently	mental relationship
5	5	4	3	4	2	5	4	4	4	4	5	1	3	5	2	uncontrolled wisdom	Experience
3	3	3	4	5	2	4	4	4	3	4	5	1	3	4	2	are lazy	concentrate on the substantial
3	4	5	5	4	3	5	3	5	4	5	4	2	4	4	4	not sizably	to have Personality
4	4	5	5	4	3	5	3	4	4	4	5	3	4	5	5	pure Business	Creativity

Figure 2: Filled grid matrix

We assume a scale ranging from 1 to 6 – if the right pole is given a 6, this means that this pole is fully right. The same is true for the left pole (see figure 2). Finally, we receive a matrix produced by the repertory-grid-method. In a second step, all elements are assessed with regard to dimensions individually formed by the interviewee (scaling). Finally, the researchers receive a completed matrix; the personal elements can be presented as assessment spaces by means of the matrix's cell values. In the cluster analysis to be carried out, the assessed elements and constructs are compared based on their similarity. The construct pole "obstinate" contrasts the construct pole "co-operative". In the following argumentation, we do not deal with the dimensions because the argumentation would become too complex. At the end of the process, the data in the cells of the matrix can be computed and entered into a database. For example, the elements 'I ideal', 'network coordinator' and 'network culture of tomorrow' are assessed as similar elements of the person asked. Due to clarity, further interpretations based on the connection measures are not discussed here.

5 Results

An examined network has approximately 40 free cooperation partners (among others, freelancers) of different key competencies, e.g., writers, graphic artists,

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developers, etc., that are involved in the product development in various online projects at the same time. In addition to standardized interviews with some selected cooperation partners, we have carried out Repertory Grid interviews with particularly relevant people. The Repertory Grids were aimed at elaborating on differences and similarities between the subjective perceptions of the partners involved. Based on selected elements, which, among others, resulted from contact conversations and from interviews carried out before, constructs were extracted by means of the triad method (see above) and a main component analysis was calculated. Based on an existing data matrix consisting of elements, the charges of the variables were represented as points in the factor space by means of a factor analysis. The resulting space of points can be understood as a 'cognitive similarity room', bringing together elements and constructs that can thus be observed in their mutual interaction. The following main components analyses give an idea about the world of constructs/elements of a central person in the network. In the figure, it is recognizable that due to the position of the constructs, four dimensions are spread out. These dimensions are a first interpretation of the bi-plots, the common graphic representation of the elements and constructs (figure 3). They indicate the axes of the construct world of the person asked. Each axis symbolizes the semantic space of the constructions.

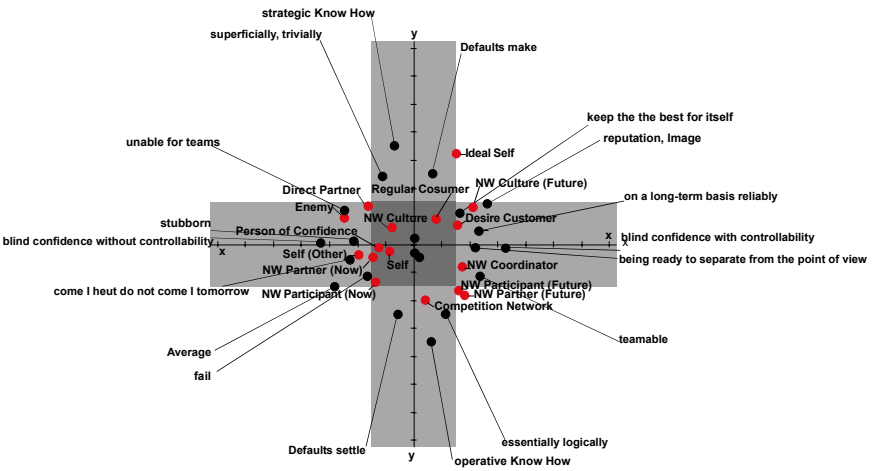

Figure 3: Illustration of the Repertory Grid result, main components analysis in the form of a bi-plot.

All constructs are more or less on one of the above-mentioned poles and show how far, i.e., with which descriptions, the associated elements are connected. Let us examine an example by means of this figure. Two dimensions (x/y-axis) are clearly presented. The dimensions can be characterized in several ways. One of these we can label with the term 'cooperation' ranges from 'team able' to 'not

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team able'. All elements on this axis can be connected. The relative position of the elements indicates the subjective assessment of the person asked.

For example, the element 'enemy' as well as the element 'direct partner' are on this axis near the construct 'not team able'. The 'network coordinator' and 'partner target' or 'participant (future)' are rather near the construct 'team able'. If their positions on a second dimension, called 'trust' (blind confidence without possibility of control to blind confidence with possibility of control) are compared, it becomes obvious that here the (in reality nonexistent) element 'network coordinator' is included considerably more clearly than the elements 'enemy' or 'direct partner'. Confidence in the direct partner without possibility of control therefore seems to trigger a direct association with 'not team able'.

As has already been emphasized, actors in networks are exposed to permanent uncertainties. These uncertainties are frequently covered up, often with serious consequences. A look at the evaluated Repertory Grids can show contradictory identity features. For example, the sense of community competes with the simultaneous wish to 'keep the best for itself', and thus generates identity. Confidence expectations are formulated in the same way: network participants shall be 'ready to separate from the point of view'. The other cooperation partners, however, cannot identify themselves clearly with the aims and wishes of the questioned business partners. Moreover, it can be noticed that the people asked wish for a different network culture than that existing at present. What all partners agree on is the network culture in the future. The culture should have a 'reputation, image', 'social competency' and 'sense of community', and should 'act consequent' and, 'have an overview'. However, the guide-supported expert interviews show that it is inconsistent with the existing 'culture'. Due to this premise of a latent discontent, the people involved try to keep themselves and their close environment openly and easily comprehensible, partly without considering the existing network reality.

In an inter-firm network, it is hardly possible to hire additional managers permanently in order to complete abilities needed; the development of competency gains a special importance. People acting within the network have these abilities. However, not only measures like external trainings can be the focus, but also measures to design internal structures and career development. Within networks, managers have more room for acting than in hierarchically organized firms. The related possibilities for active, self-defined action can lead to competence acquisition in the working situation if the context is formed in the right way. In order to motivate people, aspects of career development gain crucial importance because networks have a temporary and very flexible character and, thus, produce a high degree of uncertainty for the people acting in the network.
The competency to work within a network can be seen in the same way as the work in a group or team. Thus, the acquisition of competency is a development process that depends on many factors. This process leads to new requirements not only for the managers co-operating in the network but also for the employees and the management board of the participating firms. In addition, practicable supporting systems for management decisions, which allow an analysis of complex personnel structures in network, are needed.

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6 Conclusions

Due to the challenge to adapt to highly flexible markets, temporary, inter-organizational co-operation is of increasing importance. However, even the inner-organizational coordination between different departments tends to be inefficient or incomplete [19]. In general, the probability of failure of inter-firm co-operative arrangements is extremely high [20]. Therefore, managers as well as theorists are searching for tools and methods to create an effective co-operative design to support such complex processes. We introduced a general model to manage temporal production chains, which we have linked with a special routine to face the particularities of the partner selection within a non-hierarchical network. This routine consists of the repertory grid method to assure individual adaption to the existing points of view, which we connected in a second step with polyhedral analysis to estimate the homogeneity of selected sets of partners, which combines advantages of group psychological methods with mathematical analyses. For a further integration to the competence cell network approach, it is necessary to quantify the individual "view of the world" like a "cognitive map" [21] described by elements and pairs of constructs. The above mentioned grid-matrix serves as starting point and database. The initial idea of our approach consists of a demanded equality of elements and pairs of constructs, although they originate from person-specific interviews. As a result, we obtain a new matrix in which each representative pair of constructs only occurs once. Finally, the matrices of all competence cells are identical structures.

The actual involvement of the described attributes in network activities depends on the structure of the created distribution of the elements and constructs within the network. For example, unique attributes or competences of a certain partner won't be of interest if this partner remains isolated due to external reasons. Since the social constellations within the network change with regard to specific tasks, these conclusions drawn from repertory grid and polyhedral analysis may also vary. The polyhedral analysis takes into consideration the particularities of competence cell networks more appropriately than the usually-applied graph-based methods of empirical social research because a group/social constructional approach is used to shape relations of attributes of objects. The polyhedral analysis explores the relation or the degree of relatedness, so-called simplexes, and provides measurement values such as length of chains, connectivity or eccentricity. An appropriate identification of these simplexes allows the application of polyhedral analysis methods. This research method serves as a mathematical framework to derive further structural statements. It explores the relation between individuals and the overall network with regard to individual competencies.

Our research for an appropriate method led us to the Repertory Grid Method by Kelly [see 13] and the Polyhedral Analysis by Atkin and Casti [17]. A combination of these ideas serves to inquire into personal and socio-structural criteria (holes, connectivity and eccentricity) not only in a qualitative manner, but also to transform them so that the collected data can be inserted in the EVCM. The grid contributes images of present relational constellations, and the

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polyhedral analysis furnishes the algorithms to estimate social compatibility. Finally, the optimisation of value chain partnerships based on soft facts can be realized. It is furthermore possible to provide information for the partner selection and optimisation of relational structures within the network.

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