COLLABORATIVE KNOWLEDGE NETWORKS

– Reflections from a performance measurement, complexity and knowledge perspective

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This paper outlines the relationship between complexity thinking and performance measurement in the context of dynamic organizational structures. The authors thereby especially reflect on collaborative knowledge networks as being one specific type of alliance.

A definition and purposes for doing performance measurement are outlined as well as requirements for a performance measurement system which leads into a need for action to further develop performance measurement theory to suit the context of networked organizations.

The paper will show that the specific context of collaborative knowledge networks delivers challenges for the existing body of knowledge in the performance measurement domain.

1. INTRODUCTION

For many years performance frameworks have been used by companies to improve their performance. It goes back to the beginning of the 20th century when DuPont started to use a pyramid of financial ratios, which linked a wide range of financial ratios to return on investment. (Kennerley and Neely, 2000)

Recognizing the need for additional non-financial measures, companies started to implement sets of non-financial measures (Kaplan and Norton, 1996a). Keegan et al. (1989) proposed a performance matrix based on balanced measures, Lynch and Cross (1995) were the first who considered internal and external performance measures and Fitzgerald et al. (1991) realized the concept of causality. Following, the CARDS approach developed a concept of linking measures and metrics through cause-and-effect relationships (HGO Tech, 1994). Finally Kaplan and Norton (1996a) proposed their famous Balanced Scorecard, providing a multi-dimensional

corporate measurement system. North et al. (1998) began to think about measurement from a knowledge oriented perspective, whereas Kerssens-van Drongelen (1999) put special emphasis on R&D. A quite new measurement model which has to be mentioned finally is the Performance Prism by Kennerley and Neely (2000) which adopts a stakeholder centric view of performance measurement.

All those approaches have in common that their application has mainly been investigated within traditional, organizational structures. Recently new concepts like knowledge management, collaborative knowledge networks, complexity theory, have moved onto the research agenda, therefore the emerging question is how those new paradigms, concepts and theories interact with the subject of performance measurement.

In the last years, knowledge management has moved up the business agenda of enterprises throughout Europe. Most of the companies, institutions and authorities deal more or less explicitly with that issue. Knowledge management is recognized as being a major driver for company performance.

At the beginning of the 90s, when the knowledge management movement started with works from Sveiby, Davenport, Prussak, Edvinsson, the focus of knowledge management was very much on identifying, acquiring, sharing, distributing and developing knowledge within the physical boundaries of a company. Very often heavy weight IT infrastructures were built to support those knowledge related activities.

Over the last years an interesting shift of paradigms could be observed: Driven by the evolvement of new organizational forms, like networks, communities or partnerships the focus shifted from a more IT centered perspective to a more human centered perspective on KM: People like Wenger with their community thinking postulated that the process of sharing knowledge needs to be driven by human beings working voluntarily in a community which shares common interests and thoughts. Thus according to Wenger communities can be described as self-organized and self-directed groups of people, informally bound together by a common mission and passion for a joint enterprise. Collaborative knowledge networks (CKNs) link communities together providing a technical and social infrastructure for collaboration and knowledge management (Deloitte, 2002).

Very often these networks are set up virtually over different locations relying thereby on internet applications giving their communities a home.

Recently, communities and collaborative networks started to become a recognized and valuable new type of organizational form. Latest literature (Deloitte, 2002) states that companies which provide such type of environments gain significant benefits in the areas of knowledge transfer, response times and innovation.

The following sections outline some of the basic premises and working principles of performance measurement in the context of such networks leading into a list of challenges for performance measurement in the context of new organizational forms relying on the example of collaborative knowledge networks.

2. PERFORMANCE MEASUREMENT, BUSINESS DEVELOPMENT AND COMPLEXITY THINKING – Framing the context

Recent literature proposes the following definition for performance measurement (Roth, 2002):

Performance management is defined as the

- methods,
- processes,
- structures

and behavioral patterns an organization uses to improve performance.

Performance management may be used during

- strategic and operative (tactical) planning,
- execution (or implementation),
- communication stages activity.

As part of the communication activity, performance measurement is the process that gathers and records the effectiveness and efficiency of the execution (action) and planning stages.

Performance Management (PM) and measurement is proposed to be a powerful enabling tool for developing a company's business. Certainly performance measurement can be applied to various application fields, such as product development, manufacturing, sales etc. However traditionally performance measurement starts in most cases at a corporate level supporting thereby the improvement of a company's performance. By pinpointing to the biggest improvement potentials PM contributes to a sustainable business development. Quite some time ago people have recognized that developing the business has many facets which go far beyond the one-dimensional development of the business by looking only at financial figures. The section above has shown that most of the existing performance measurement frameworks (Roth (2002) discusses some of the most popular approaches in greater detail) try to cover a broad and holistic range of perspectives to ensure that the business is developed in a sound and sustainable way.

The pressure to more rapidly adapt the business is driven by the increasing amount of what Davis and Meyer called "Blur" (Davis and Meyer, 1999). They coined the term "blur" to describe the combined effect of Speed, Connectivity and Intangibles on the business world. Speed is how fast change occurs within the business environment. Connectivity is how networked businesses are becoming to one another to complete a value chain that offers a product or service to the market. Intangibles are the ratio of non-physical to physical assets in the final offer to a consumer. The greater the amount of blur in an economy, the greater the frequency and speed with which companies must adapt to it.

Today all three are increasing tremendously. Thus managers are being forced into an almost constant state of adaptation. It is not surprising that business leaders and management consultants and theorists are looking beyond traditional metaphors (business as machine, business as information processor) to gain a better understanding of how to respond to this new environment. Lewin (1998) explained the reason for this exploration: *"Traditionally, business people think about their worlds in a very mechanistic, linear way that is characterized by simple cause and*

effect and is predictable. Most of the world isn't like that. Complexity theory looks at these systems in ways that are organic, nonlinear and holistic."

Latest literature on complexity thinking proposes that „the idea that businesses operate as efficient, functioning, co-ordinated machines is outdated. Instead, authors such as Wheatley (1992) contend that information, and the flows and the knowledge content of enterprises and their networks will be fundamental to their ability to compete in new markets“ and that „the old science of business development based on planning and projection is redundant“.

If we take a step back and have a look at the purposes of performance measurement, i.e. why we are doing performance measurement (see the following table) it can be seen that the purposes are proposed to remain valid for any type of organizational structure:

Table 1: Taxonomy of performance measurement purposes
(based on Kerssens-van Drongelen, 1999)

No.	Purpose
1a	Provision of insight into deviations from objectives / environmental factors to support diagnosis by managers as to whether / which steering actions to apply
1b	Provision of insight into deviations from objectives / environmental factors to support diagnosis by subordinates on whether / which steering actions to apply
2	Fuelling learning (for improvement of the predictive model)
3	Alignment and communication of objectives through the organization
4	Justification of existence, decisions and performance
5	Motivation of people through feedback
5a	Support performance-based rewards

However it is clear that especially purpose 1a and 1b are planning-centered. The question therefore is whether activities like „planning“ or „projection“ based on measurement are truly redundant in the case of new organizational forms such as collaborative knowledge networks, or whether it is a research challenge to find ways, processes and methodologies to do planning, projection, measurement which suits the needs of today's new organizational structures.

Thus it may be more the question how these purposes can be transformed into concrete requirements for PMS design principles for the specific context of virtual organizations and collaborative knowledge networks. Roth (2002) offers a taxonomy of requirement clusters for a PMS from a knowledge reuse and invention perspective thereby looking especially at the product development context in corporate business:

Table 2: Taxonomy of requirements for a PMS from
a knowledge reuse and invention perspective

No	Requirement	Relevant requirements
1	Standardization	- Standardized aggregation principles for knowledge asset related measures. - Standardized perspectives for reuse and invention measurement, reuse and invention indicator templates

		and a process for building and implementing the PMS functions.
2	Data processing mechanism	• Operative improvement tool for knowledge reuse and invention, enabled through software. • Knowledge identification, storage and sharing support. • Idea generation and evaluation support.
3	Transparency	• Process Navigation functionalities. • Clear and simple aggregation rules for asset related measures. • Transparent and clear build and implementation methodology. • Clear and simple indicators.
4	Participation	• Participative set-up of the build and implementation methodology, asset-related measure collection and reporting and operative improvement tools for reuse and invention (Definition of role concepts for reuse and invention). • Alignment of performance measurement system to communities of practice.
5	Alignment	• Alignment to process goals from a reuse and invention perspective. • Provision of strategic reuse and invention oriented measures.
6	Comprehensiveness	• Reuse and invention issues have to be covered in a holistic way (people, process and technology consideration). • Sound balance between reuse and invention. • Support of operative and strategic reuse and invention improvement. • Consideration of the whole process (systems thinking). • Comprehensive set of measures for reuse and invention. • Integration in day-to-day working environments supporting operative reuse and invention activities. • Multi dimensional reflection of the process. • Superior systems performance in terms of efficiency (simple and clear processes, enabling technologies, integrated solutions).
7	Effectiveness	• Integration into existing reuse repositories, creativity and community tools. • Provide a process for identifying the company specific reuse and invention assets and for identifying the right reuse and invention measures for the right context.
8	Operability	• Reflection and support of the reuse and invention process. • Integration of a performance measurement framework

		into a day-to-day reuse and invention management tool. • Intuitive procedures and tools. • User-friendly enabling technology.

It can be seen that the above list assumes a clear organizational structure, defined processes, clear infrastructures and a clear mission, vision and strategy of the company. Roth proposes that the more this context is given for virtual organizations and networks the more the above requirements are valid for this context. In other words the biggest need for action is seen in the context of highly volatile, dynamic networks. This need for action can be formulated in a list of challenges for performance measurement within the CKN context.

3. PERFORMANCE MEASUREMENT – the 10 challenges in multi-enterprise/network knowledge based organizations

The whole state of the art presented in the earlier sections refers to more traditional organizational forms with traditional processes, strategy planning processes etc. However, in a network context, where are the boundaries of measurement? How detailed can one measure without affecting the networks creativity? The complexity of relations in a network and the sheer existence of a variety of contributors in a network makes measurement more difficult as there are more “objects” that have to be measured. The first challenge is therefore to analyze in detail the role of and required design principles for performance measurement in the context of collaborative knowledge networks.

The earlier sections have shown that PM needs a sound organizational implementation base within companies. Various roles for measuring performance have to be defined to ensure sound measurement, acting and planning. Due to the dynamic set-up of collaborative knowledge networks there may be the question how it can be ensured that the performance measurement activity is put on a solid fundament. Beyond performance measurement is not a core activity in the value creation process of a company. Therefore within CKNs there may come up the very pragmatic question under whose payroll the PM activity will run. Challenge two is therefore to ensure that there are roles for doing performance measurement which are sustainable, robust and solid.

Kemp and von Wendel de Joode (2002) have written an interesting article where they elaborate on the strategy finding task in the context of the LINUX community. Generally people distinguish between emergent, resource-based or top-down, market-based strategy definition. Due to the high volatility of the system the authors propose that communities should rely on emergent, dynamic and implicit strategy definition. However this implicit strategy finding forms a great challenge for performance measurement. Performance measurement is a process (see definition above) based on a corporate strategy key where success factors and performance drivers are identified which are in return aligned with performance measures. Recent approaches to PM take very explicitly also the bottom-up perspective into account. However to give the measurement activity a chance a certain stability and sustainability of the system is seen as necessary otherwise the measurement results never refer to the true business drivers of the company, due to the past oriented

nature of any measurement activity. Challenge three is therefore to discover which levels of stability encourage long-term improvement through performance measurement while maintaining the network adaptability.

In many cases people are not interested in the absolute value of the measurement result (or often there can't even be defined absolute measures), instead they are much more interested in the evolution over time of a certain measure. The longer the time period of the measuring the more accurate predictions for the future can be. Challenge four is therefore to ensure that measures can be collected over a sustained period of time.

The purposes for performance measurement above have shown that performance measurement is more than just doing measurement to see where the company is. Performance measurement is a key communication instrument therefore the development of performance measures and roles should be done in a participative way. Challenge five is how in a dynamic, de-centralized environment performance measures, roles and measurement processes can be defined in collaborative way.

Today there exists a very rich set of performance measures for various application contexts. However due to the fact that performance originates from financial control the measurement of soft, intangible assets is quite new (Roth, 2002). Measurement of soft issues, innovation and KM activity has just started to become a recognized subject. Therefore there is still a high need for action to develop meaningful knowledge related measures for non-traditional organizational forms – Challenge six.

Recent approaches to performance measurement (Roth, 2002) have recognized that not only the top-down, but also the bottom-up process-oriented dimension has to taken into account when designing performance measurement functions. This means that business processes, organizational structures and technology devices have to be analyzed and the critical performance relevant assets identified. In traditional structures business process modeling tools can be deployed to describe those structures. With regard to highly dynamic structures we have the challenge that there are so far very few describing mechanisms for those volatile scenarios which makes it very difficult to identify the performance relevant assets – Challenge seven.

Each partner in a network or alliance may have its own business processes and reporting structures. Each partner may have different aims and objective as well. The challenge is therefore how to design and use a network performance measurement system which suits the different requirements and aims of different, individual stakeholders – Challenge eight (McKinsey, 2002).

Assessing added value is a challenge as well, because of interdependencies between networks and their members' parent organization and because of different 'value' objectives that different members bring. As multiple partners contribute to a network's success, where do you actually measure? What are the appropriate ways to assess added value for different network types, and how to separate performance coming from the network, the member and the members' parent organization is challenge nine (McKinsey, 2002).

A further challenge is the peripheral position of network alliances, which are often „stuck in the middle“, i.e. often there is no senior management support which is crucial for solid performance measurement. Only if there is top management

support and interest it is ensured that activity follows the measurement results (McKinsey, 2002).

4. CONCLUSION

The present paper shows that there is a high need for action to bring together the domains of performance measurement and complexity thinking within the context of knowledge based organizations. It has been shown that the general purposes and requirements for performance measurement are still valid in those contexts, but are subject of being further developed to meet the challenges set in this paper.

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5. LITERATURE

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