

DYNAMIC PERFORMANCE MANAGEMENT IN BUSINESS NETWORKS ENVIRONMENT

Roberto da Piedade Francisco, Américo Azevedo
Faculdade de Engenharia da Universidade do Porto and Inesc Porto
roberto.piedade@fe.up.pt, ala@fe.up.pt

This paper underlines the necessity of developing a framework supported by methodologies and concepts that makes it possible to provide instances of the network's global performance management system in collaborative networks, and to simultaneously lead to the necessary alignment of all participants. We propose a way to identify and suggest the requirements to develop a framework that can support a dynamic Performance Management System efficiently through a conceptual schema that enables the implementation of natural manner.

1. INTRODUCTION

A dynamic transformation in the business environment increased the collaboration among different and geographically distributed entities that effectively combine the most suitable set of skills and resources temporarily in order to achieve a common goal, generating the so-called collaborative networks (Chituc & Azevedo, 2005). This subject is actually an important trend assumed and recognized by the scientific community and the practitioners because it is co-related with the necessity to improve the competitiveness.

To reach competitiveness, world-excellence, and agility in severe conditions that markets impose that becomes so interesting to act in collaborative networks (CN). This implies obeying some requirements like common strategies and goals, level of mutual trust, interoperable process and infrastructures and policies for business practices in collaborative networks. The integration and agility of a CN is possible if these challenging base conditions are achieved (Camarinha-Matos, Afsarmanesh & Ollus, 2005).

To manage this new model, the inter-organizational performance must be treated with more intensity. A performance management system (PMS) can help organizations to improve performance, but the CNs are dependent on the individual knowledge of its participants (Evans, Roth & Sturm, 2004). Defining, setting up and implementing an effective PMS for a dynamic CN are challenges to be reached in order to contribute to the support of the CN decision-makers. After this charter, this paper presents some issues about collaborative networks and their performance

aspects, about performance management, alignment and PMSs. Then, it treats the requirements towards a dynamic performance management and proposes a framework model to guide a PMS implementation presenting technological support issues and, finally, it presents the conclusions.

2. BUSINESS NETWORKS

2.1 Collaborative Networks

The collaborative business environment can be seen as an interaction between enterprises that want to cooperate in order to reach common goals. To easily adapt itself to the dynamics of the market, the temporary networks seem to better adapt to typically short duration of business opportunities while long-term organizations are worried with investments on common infrastructures and practices and with the trust building process (Camarinha-Matos, Afsarmanesh & Ollus, 2005).

Many topologies of CN are proposed and researched. Some are chosen by types of enterprises, others by the interaction mechanisms adopted and the rest of them by other criteria. To find a classification for the dynamic markets, the choice of time related aspects would be the most suitable. Afsarmanesh, Marik & Camarinha-Matos (2004) considered three different CN types: 1) long-term partnership of SMEs with one dominant partner, 2) dynamic project-based partnership without a dominant partner, and 3) temporary partnerships intended by one organization to explore short-term market opportunities.

A dynamic CN is supposed to have an intensive care because their performance is running in a short period. Its life-cycles shorter and shorter and it is fundamental to understand which parameters or indicators must be used in a PMS and if they will be useful and bring back solutions that will allow us to deal with strategies and respective operations performance. The life-cycle can be presented in the following phases:

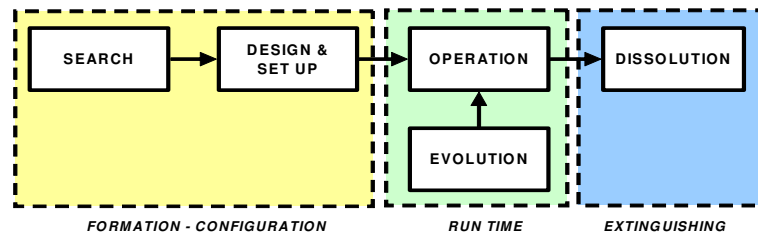


Figure 1 – Life-cycle of a collaborative network's main phases

In order to verify if a dynamic CN is effective, it is necessary to find mature management skills seen in experience in strategy formulation. If this is found, there will be adjusted and effective PMS to manage the performance and solve problems or inclusively reconfigure the CN. The absence of meaningful goals and the use of wrong measures can lead organizations in the wrong direction.

2.2 Collaborative Network Performance

Indeed, the emerging models of business collaboration, namely the ones in the context of business networking, require adequate technologies and supporting infrastructures, proper management tools and performance measurement solutions that can guarantee technological, strategic and business goal alignment among business partners in a collaborative networked business environment.

Then, it is extremely important that the CN develops a structured form to design their PMS. It is a prudence way to reach proper management tools and performance measurement solutions with adequate technologies and supporting infrastructures.

Busi & Bititci (2006) presents some questions that can be used to point important considerations such as: 1) Which performance measures should be collaboratively selected? 2) How multiple individual measures can be aggregated to give an overall picture of the collaborative enterprise performance? 3) How can a company that belongs in more than one collaborative enterprise have one single measurement system? 4) How can conflicting measures and objectives be managed in a collaborative enterprise?

Those are very pertinent questions to build a PMS in order to obtain a consistent system but also more specific questions can be asked:

- What CN topology must exist?
- What framework is the most appropriate to be used?
- How to make it possible to reach the alignment?
- How to manage problems, solutions and to make reconfiguration with the PMS outputs data?

At least those questions must guide the design of the PMS and they can be treated during design of the network itself as well. A repository contains data on the past performance of all participants in CN which is an adjusted way to know their potentials and competencies. It will also help answer that question above in order to support the Search and Design & Set Up phases.

3. PERFORMANCE MANAGEMENT AND ALIGNMENT

3.1 Performance Measurement and Management

According to Busi & Bititci (2006), the “integrated performance management in collaborative enterprises is the process of using inter-organizational systems to collaboratively measure performance of collaborative enterprise processes and use the measurement to enable decision-makers to proactively and strategically manage the collaborative enterprise itself”. These authors referred that five “actors” can be identified: (1) the collaborative enterprise; (2) the collaborative operational processes; (3) the collaborative process of measuring and managing performance; (4) the inter-organizational systems; and (5) the decision makers. Those concerns have brought a change from the measurement view to a management view in order to necessarily obtain information through indicators that make support configure, re-configure or dissolve the collaborative network. According to Evans, Roth & Sturm (2004) today, a performance measurement system is a subset of a PMS.

A PMS can continuously show if the investments are amortizing (effectivity), if the external and internal processes are obtaining expected results (effectiveness) and also if the operational activities are functioning within controlled and defined parameters (efficiency). When measuring the real-time performance we can encounter the static and dynamic indicators that must be searched and defined because some (static) are mentioned to regular operations and other (dynamic) to actions that solve problems.

Kaplan and Norton (1992) stand out the need for measurement saying that: "if the companies wish to survive and to prosper in the age of the information, they must use systems of management and measurement of performance derived from its strategies and capabilities".

Many performance management models can be encountered and applied to practitioners and after this adapted to each application such as Balanced Scorecard System (Kaplan & Norton, 1992), Performance Prism model (Neely, Adams & Kenerly, 2002), GPM-SME (Alba et al, 2004), PMS-EVE (Saiz, Rodríguez & Bas, 2005), SCOR (Cabral et al., 2005) and also the business excellence models that combine results, for instance the individual organizational performance related to a specific market or territory. The Malcom Baldrige Price (MBA) in USA, and Deming Price in Japan, and EFQM Excellence Award in Europe are good examples. Every model consists in congregating some concepts to build a framework that can aim for specific purposes and support the decision-makers. However it is essential that the chosen one enables a consistent integration.

But it can also be a chance to review the functionality of the organizational structure. Trivial organizations can choose between two basic forms of structure for its management: functional or procedural. In a procedural structure, a horizontal vision of the organization is applied. This enables the adoption of process oriented management, it focuses on the value aggregation chain and also on the concept of internal customer-supplier, clearly identifying the used resources and permanently searching the external customer satisfaction (Varvakis et al., 1998). It can be pondered that this approach contributes to the alignment of the CN partners.

Francisco & Machado (2005) alerts to the effect caused by changes seen in the organization when it implements new strategies, structures and technologies which may induce internal resistances. It is also necessary to have change management knowledge.

3.2 Strategic Alignment

A framework must be developed to address the need for performance measurement and management, applied mainly on Operation and Evolution phases. Maybe it is more important to reach alignment among participants of a CN than to define the framework.

According to Kaplan & Norton (1992) the balanced scorecard approach intends to make sure it is possible to align individual, organizational and inter-departmental initiatives to identify new process or tools meant to meet the clients' demands and stakeholders' objectives. The main principle is to integrate the goals with strategies and thus reach a better definition of the process, their performance and their relationship with the internal and external clients. It encourages a state of synergy.

The term 'synergy' is the point to be considered. The "synergy is the interaction of two or more agents or forces so that their combined effect is greater than the sum of their individual effects, or also a cooperative interaction among groups, especially among the acquired subsidiaries or merged parts of a corporation, that creates an enhanced combined effect" (dictionary.com). It is the perceived vision.

To Saiz, Rodríguez & Bas (2005) the cooperative interaction maximizes the combined capacities to reach the strategic objectives through integrated solutions to provide efficiency and effectiveness in the operations meant to take care of customers needs. The integration between scorecards makes it possible to manage the collaborative service units and the decentralized business units as a unique entity (Kaplan & Norton, 2001). It means to build an interactive performance management system that can be a tool capable of turning strategies into actions if alignment exists on all relevant and critical activities (Chituc & Azevedo, 2005). The alignment brings sustainable gains allowed in an effective interaction.

Furthermore, a CN needs have their inter-organizational processes duly defined, established and kept. Divergences in the objectives can also occur as well as some gaps, more or less expressive, in terms of competencies on organizational and technological management among partners. This implies a management system on top dependents of the vocation and abilities of the CN in its business environment. However, the difficulty of developing a collaborative culture and appropriate performance measures has been identified as an obstacle to the successful implementation of collaborative PMS overall in a dynamic environment (Busi & Bititci, 2006).

A dynamic performance management intends to build an interactive and aligned structure to quickly and consistently support based-performance decisions in networks existing for a specific life-cycle mainly on these ones in which the time for reconfiguration is short and limited and where there is neither time to test and optimize collaboration between participants, nor to improve processes by trial-and-error procedures (Graser et al., 2005). Let us not forget that the "actors" cited by Busi & Bititci (2006) must be based on the aligned structures perfectly explored in Operation, Evolution and Dissolution phases of the life-cycle.

3.3 Technological Support

The growth of CN is happening also because many improvements on information and communication technologies (ICT) which is a contribution to the continuous application of new approaches, solutions and conceptual schemas.

Furthermore, the aim is to address the different requirements of technological supports systems that can support a dynamic performance management system tailored for business networking environment. In this context, one of main objectives is to search technological supports applications and explore features that give priority to PMS and its respective framework during the Design & Set Up phase of CN implementation project. Thus, some questions must be answered, such as: what kind of technological support can be used?

There are some interesting management models that can contribute to manage the CN through management technologies that brings new dedicated approaches to improve the operations performance, promote agility and stimulate the use of many available tools that enable the increase the competencies.

4. TOWARDS A DYNAMIC PERFORMANCE MANAGEMENT

We propose a way to identify and suggest the requirements to develop a framework that can efficiently support a dynamic PMS through a conceptual schema that enables the implementation of a natural manner.

The framework is based on two main layers: data and information layer and functionality layer. The first layer comprises several services related to data acquiring and repository management. The second layer comprises three main performance functionalities: network performance management to support mainly the Design & Start-up phase, real-time performance measurement and management on Operation and Evolution phases, and performance analysis to know and understand the performance and knowledge reached during the life-cycle (figure 2).

The view of a performance repository of partners on CN intends to provide trustworthy information about trust, reliability, competency (skill level), experience and know-how. A time gain can be reached in the Search phase as well as in the Design phase.

To appropriately manage the CN Operation phase, there is a set of indicators in a specific chosen PMS framework through static and dynamic indicators that enables the improvement of time factor (agility), operations performance and provides sustainability to continuous improvement and change management. It has also an implication on Evolution phase.

An explanatory case study research can be used to find such interesting approaches based on a scientific method. It is convenient to look at the real environment and understand the issues that can be important to measure and manage the systems and explore them.

Finally, a performance analysis must be carried out in order to understand if the CN has reached its goals and to obtain a memory about their performance allowing a state of learning and proper knowledge of itself. It is mandatory on Dissolution phase.

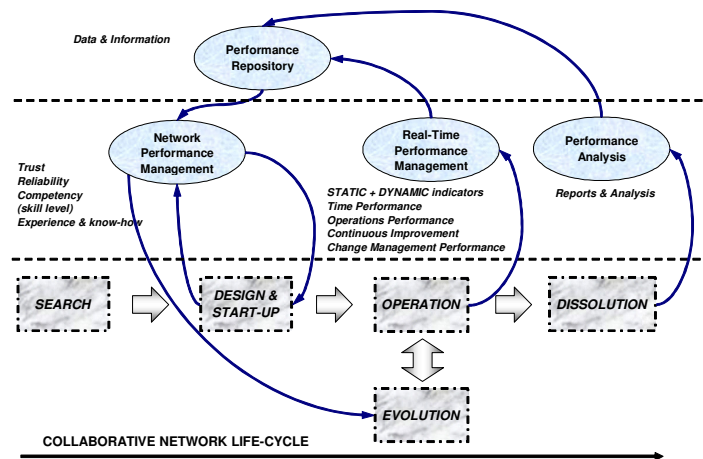


Figure 2 – Performance Management Framework

Specifically on the PMS framework some concerns must be viewed (figure 3). The main functionality is the interaction among the CN partners from their own local performance management system (LPMS) as well as the interaction among each one of them and the global network performance management system (GNPMS).

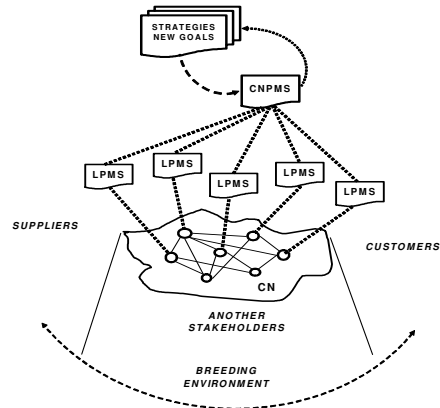


Figure 3 – Towards to a dynamic performance management

First, a LPMS in every significant partner must be found or developed, and the partner should use an adequate framework and consider the alignment of that local system with the strategies and common global goals.

Another important requirement is the ICT interoperability process and their infrastructures. Also the computer programs and languages must be integrated or adapted to obtain consistent data.

The action of a broker for the NC management has an important role to play in the integration and alignment. On the other hand its inexistence in mature CN with effective PMS can be replaced by the individual enterprise competencies.

4.1 Methodology Proposal

Based on Biti & Bititci (2006) research approach and on explanatory research made by authors through surveys in real conditions, a methodology to implement a PMS in a collaborative network is proposed. It has six steps:

1. Data Collecting.
2. PMS Framework Definition.
3. Technological Support.
4. Indicators Selection.
5. Sensitization and Start Up.
6. PMS Monitoring.

It needs to be further explained and developed to be applied on real situations. Now, it is still being used only as basis of a research on performance management in collaborative networks.

5. CONCLUSIONS

This paper presents some suppositions within a research project of the authors that intend to evidence the importance of management of the organizational performance as a contribution to collaborative networks (CN) projects. It also intends to suggest a framework model that makes it possible to support the CN decision-makers, and to simultaneously lead to the necessary alignment of all participants. It still intends to present a simple methodology to implement a performance management system (PMS) consider interactive mechanisms and respective technological supports.

A dynamic performance management intends to build an interactive and aligned structure to support based-performance decisions in a quick and consistent manner. In fact, to manage a dynamic performance in a CN, it is appropriate to use some kind of methodology to implement (and maintain) a PMS framework that can contribute to support the CN success.

Acknowledgements. The authors would like to thank the INESC-Porto support.

6. REFERENCES

1. Afsarmanesh H, Marik V, Camarinha-Matos LM. "Challenges of Collaborative Networks in Europe". In *A Research Agenda for Emerging Business Models*. Norwel: Kluwer, 2004.
2. Alba M, Diez L, Olmos E, Rodríguez R. "Global Performance Management for Small and Medium-Sized Enterprises (GMP_SME)". In *Collaborative Networks and their Breeding Environments*. New York: Springer, 2005.
3. Busi M, Bititci US. "Collaborative Performance Management: Present Gaps and Future Research". In *International Journal of Productivity and Performance Management* 2006; Vol. 55 No. 1: 7-25.
4. Cabral R, Doumeings G, Li M-S, Popplewell K. "Supply-Chain Operations Reference-Model: SCOR version 7 Overview". In *Enterprise Interoperability Research Roadmap, V2.0*. Information Society Technology, 2005.
5. Camarinha-Matos LM, Afsarmanesh H, Ollus M. "Ecolead: a Holistic Approach to Creation and Management of Dynamic Virtual Organizations". In *Collaborative Networks and their Breeding Environments*. New York: Springer, 2005.
6. Chituc CM, Azevedo AL. "Multi-Perspective Challenges on Collaborative Networks Business Environment". In *Collaborative Networks and their Breeding Environments*. New York: Springer, 2005.
7. Dictionary.com. <http://dictionary.reference.com/>
8. Evans S, Roth N & Sturm F. "Performance Measurement and Added Value of Networks". In *A Research Agenda for Emerging Business Models*. Norwel: Kluwer, 2004.
9. Francisco RP, Machado RL. "Mudança eficaz: usando metodologias para auxiliar a liderança na implementação de novas visões ou estratégias". In *Anais do XXV ENEGEP - Encontro Nacional de Engenharia e Produção*. Porto Alegre: XXV Enegep, 2005.
10. Graser F, Jansson K, Eschenbächer J, Westphal I, Negretto U. "Towards Performance Measurement in Virtual Organizations – Potentials, Needs, and Research Challenges". In *Collaborative Networks and their Breeding Environments*. New York: Springer, 2005.
11. Kaplan RS, Norton DP. *Organização Orientada para a Estratégia: como as empresas que adotam o balanced scorecard prosperam no novo ambiente de negócios*. 2. ed. Rio de Janeiro: Campus, 2001.
12. Kaplan RS, Norton DP. *The Balanced Scorecard – Measures that Drive Performance*. In *Harvard Business Review*, January-February, p. 71-79, 1992.
13. Neely A, Adams C, Kenerly M. *The Performance Prism: the Scorecard for Measuring and Managing Business Success*. London: Prentice Hall/Pearson Education, 2002.
14. Saiz JJA, Rodríguez RR, Bas AO. "A Performance Measurement System for Virtual and Extended Enterprises". In *Collaborative Networks and their Breeding Environments*. New York: Springer, 2005.
15. Varvakis, GJ et al. *Gerenciamento de processos*. Florianópolis: PPGEP-UFSC, 1998.