

# An Approach to Performance Management in Collaborative Networks Based on Stakeholders' Key Success Factors

Pedro Ferreira, Pedro Cunha, Luís Carneiro, André Sá

► **To cite this version:**

Pedro Ferreira, Pedro Cunha, Luís Carneiro, André Sá. An Approach to Performance Management in Collaborative Networks Based on Stakeholders' Key Success Factors. Luis M. Camarinha-Matos; Alexandra Pereira-Klen; Hamideh Afsarmanesh. 12th Working Conference on Virtual Enterprises (PROVE), Oct 2011, São Paulo, Brazil. Springer, IFIP Advances in Information and Communication Technology, AICT-362, pp.140-147, 2011, Adaptation and Value Creating Collaborative Networks. <10.1007/978-3-642-23330-2\_16>. <hal-01569968>

**HAL Id: hal-01569968**

**<https://hal.inria.fr/hal-01569968>**

Submitted on 28 Jul 2017

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



# An Approach to Performance Management in Collaborative Networks Based on Stakeholders' Key Success Factors

Pedro S. Ferreira<sup>1</sup>, Pedro F. Cunha<sup>1,2</sup>, Luís Carneiro<sup>3</sup>, André Sá<sup>3</sup>

<sup>1</sup> CENI – Centro de Integração e Inovação de Processos, Portugal  
{psf, pcunha}@ceni.pt

<sup>2</sup> EST/IPS – Escola Superior Tecnologia / Inst.Politécnico Setúbal, Portugal

<sup>3</sup> INESC Porto  
{luis.carneiro, andre.sa}@inescporto.pt

**Abstract.** Performance management in collaborative networks requires approaches suitable to deal with a larger domain than in traditional organisations, including new processes, new stakeholders and a less clear border between internal and external. The proposed approach addresses objectives and strategies setting, performance measurement and evaluation, monitoring, learning and improvement. It relies on the identification of key stakeholders and on their key success factors which provide the external perspective driving the performance evaluation and improvement. The work starts from the consideration of different natures and life times of Business Communities and Virtual Organisations, analyses the stakeholders' relations and emphasises the clear identification of value creation for stakeholders as an essential component to align organisations.

**Keywords:** Performance management, collaborative networks, virtual organisations, framework for performance management.

## 1 Introduction

As new forms of organisation emerge and develop to cope with the new challenges, companies lack the support to fully understand them, their implications and their benefits and to make the path towards them. That path is mostly a continuous process of adjustment concerning trust, sharing, collaboration, agility and competency.

Through collaborative networks (CN), participating organisations aim at delivering higher value and higher performance to their stakeholders and at sustaining competitive advantage, by sharing knowledge and resources. Performance management, essential to the success of collaborative networks, requires approaches suitable to the type and objectives of this type of networks. The change of previous organisational models, e.g. companies with sharp boundaries, formal relationships with other companies and a focus on internal efficiency and effectiveness, to networks has a profound impact upon performance management practices [1]. Though the single organisation performance management concepts and recommendations have been applied to networks and are to great extent valid, the new challenges require

dealing with a larger domain, including new processes, new stakeholders and a less clear concept of internal and external to virtual and real organisations. Other specific issues of networks to deal with are the duration of their life and their virtual nature.

The concepts of virtual organization (VO) and virtual organization breeding environment (VBE) [2] were used by the Net-Challenge project [3]. A Business Community (BC), according to the Net-Challenge project, is similar to a VBE, mainly composed of SME in the same industry, usually in a geographic proximity, that may be open or closed, depending on the restrictions to membership.

Performance management is very important also in CN to assure the delivery of value to its stakeholders and to strive to beat the competition. Moreover, performance management should contribute to trust development in CN, which is a fundamental enabler of collaboration, by delivering objective information on performance of CN and of their members. In this context, several contributions can be found for performance measurement considering it a way to demonstrate the benefits of participating in CN and to promote the acceptance of these organisational forms [4] and aiming at achieving equity among partners [5].

In the CN, performance management calls for suitable approaches and processes to identify critical factors and indicators, to formulate actions to take advantage of opportunities or overcome weaknesses and improve the system's performance as it defined by the stakeholders [6]. Performance management covers objectives, strategies, performance measurement and evaluation, monitoring, learning and improvement [7]. The following activities are part of a performance management process:

1. Definition of objectives and strategy formulation;
2. Definition of what to measure and targets setting;
3. Setup of a measurement system;
4. Measurement and analysis of performance;
5. Decision and carrying out of actions in order to achieve the targets.

Activity 1 of the previous list is concerned with what the organisation wants to be good at and what strategy it chooses to get there. The activities 2 to 4, which are part of the performance measurement process, receive inputs from the first one and deliver outputs to the last one. In the current context, performance measurement is about collecting data about the past so that a projection into the future can be done and improvement actions can be decided.

Performance management is tightly integrated with process design. Processes are designed and tuned for specific objectives, related to the organisation's strategy. A challenge is the alignment of processes and organisations and the development of suitable performance indicators that provide objective and explicit representation of performance and benefits within a collaborative network. Approaches like the Supply Chain Operations Reference (SCOR) model developed by Supply Chain Council that proposes performance indicators for supply chains are not oriented towards collaborative processes throughout the supply network [8], cannot cope with the dynamics of CN and cannot measure performance on soft factors related to the collaboration [9].

In the following sections of this paper the Net-Challenge approach to performance management based on stakeholders' key success factors is presented. This approach is

part of the framework for performance management developed in the Net-Challenge project.

## 2 CN's Stakeholders and their Key Success Factors

Performance cannot be objectively defined and it can only have a clear definition within each specific context [10]. In fact, the definition of performance lacks knowing to whom is performance delivered [7]. The base principle in this approach is that performance is determined by the stakeholders.

A key stakeholder is an entity with an interest in the organisation's activity or in its outcomes, which has the power to influence them considerably. Knowing who the key stakeholders are and what they are expecting from the organisation is the starting point to fulfil their expectations. The key stakeholders of the BC are BC Member, VO, Customer and Society. The VO's key stakeholders are Broker, Partner, Customer, BC and Society. Fig. 2 represents the stakeholders and their relations.

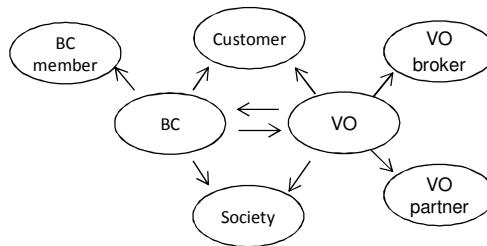


Fig. 1. BC's and VO's stakeholders.

It is considered that the broker is the organisation holding the business opportunity and that it represents the customer at the same time it is a partner in the VO. However, taken into consideration the importance of having the VO oriented to the creation of value and to the customer, and with the purpose to emphasise its KSF and to keep the specific role of the broker clear, the customer is considered a VO's stakeholder.

The Business Community is a VO's stakeholder since it only fulfils its potential and its mission through the VO. The VO is a BC's stakeholder by definition, since the BC must provide the conditions for the formation and success of VO. The society is a key stakeholder of both BC and VO but with different perspectives related with their different time horizons and purposes.

Stakeholders are the ones who ultimately evaluate the performance of an organisation. So, it is fundamental to know what are the attributes they value most (in the product, service, job or whatever kind of deliverable) and that they expect the organisation and its competitors can provide them i.e., the success factors. The key success factors (KSF) are the most important success factors for the key stakeholders, the ones the organisation will concentrate on. The difficulty about determining the KSF lies in identifying the few things that will drive the organisation's strategy and its success [11].

The distinction of success factors (stakeholder centred) from factors internal to the organisation (organisation or process centred), which are the factors that drive or affect the success factors and that will be called performance factors, is important. The key success factors have to be known by asking the stakeholders. The way an organisation satisfies the KSF will determine its competitive advantage and for that reason they are in the base of a strategy formulation.

There is no consensus concerning this terminology. The concept of KSF is used with this name [8] and is also named key strategic factor [12]. A related concept in the SCOR model is the value proposition statement which identifies the KSF for types of customer in segmented markets [13]. Many authors do not distinguish the external and internal perspectives, using the names critical success factor [14] and key performance factor [11], among others.

The benefit concept is central in the approach to performance measurement of ECOLEAD project [4], since it is the driver of the collaborative network (CN) behaviour. The goal in a CN is the maximization of a benefit which is an attribute of its specific value system.

Since the KSF are related with competitiveness, it should be noted that competition and the possibility to choose alternatives exist both in BC and in VO and the choice will be determined by the performance on the KSF. As an example, an organisation may decide to participate or not in a BC and may be or not allowed to participate.

### 3 Performance Management in Collaborative Networks

The proposed approach to performance management aims at guaranteeing the alignment and achievement of strategic and operational business objectives in the Virtual Organisation and in its supporting Business Community environments. It relies on establishing a strategy based on key success factors (KSF) and on identifying and cascading them internally in alignment with the strategy. Fig. 2 depicts the Net-Challenge performance management framework.

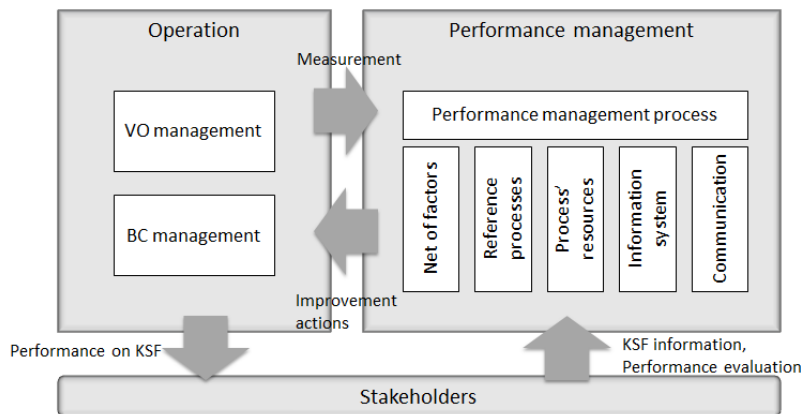
The main components of the Net-Challenge framework for performance management are:

- a stakeholder's perspective of value which defines what performance is (external environment);
- the interlinked factors in the CN which can be acted upon in order to change performance (internal environment);
- the reference performance management processes aiming at making the strategy succeed;
- the information system;
- the process' resources;
- the communication processes (internal and with stakeholders).

Performance can be acted upon in the two environments, which means in two time horizons. In the VO, depending on its lifetime and in the BC, where members develop their capabilities, sharing knowledge whenever possible and try to know each other. In the BC, a management process can improve the instruments related to membership and those made available to VO to support their formation and operation, such as the

standard processes, templates and specific ICT tools. Also a BC management process for strategy revision ponders the actual performance and the environment changes and adjusts strategy if necessary.

Two reference processes for performance management in the BC and in the VO are part of the Net-Challenge framework, which interface with the reference collaboration processes as briefly explained. In order to expedite the processes, particularly in VO, some resources are provided – scenario templates which characterise typical business scenarios and propose sets of KSF and lists of success factors, the corresponding KPI and the definitions.



**Fig. 2.** Components and interactions in the Net-Challenge framework for performance management.

The information system collects data from VO partners and BC members for KPI, conveys evaluation of performance and feeds a central repository of information (BC member and VO profiles). Aggregated and disaggregated data allows analysing performance of VO, VO partners and of the whole BC. This system supports search of partners based on claimed capabilities, qualified processes and actual performance.

Internal and external communication of performance is essential to mobilise organisations to improvement, to convey the BC strategy and to reward the members.

In order to speed up and guide organisations in the analysis process and in the identification of KSF and also to clarify the concepts of the performance management framework, the framework contains examples of KSF to BC's and VO's stakeholders which are presented in Table 1 and Table 2, respectively. To find the KSF the key question is “what are most important requirements that the stakeholder wants from the organisation (and from other competing organisations) that will determine his evaluation or ultimately that will make him decide for one organisation?”. Since it is important that a clear and common understanding of the meaning of each KSF exists, a KSF glossary is a required process resource.

The BC's KSF to the VO consider both the formation of the VO and its operation. During the formation, the VO does not exist formally but the KSF demanded are specific and distinct from those asked by a member to the BC.

The KSF listed are potential KSF and only some of them will apply in each scenario. It should also be noted that the BC also wants some of the VO's KSF to customer, meaning that those KSF are related with its mission statement and main goals (such as supporting the supply of complex, high added value products for demanding customers). By analysing the performance of all VO formed, the BC can determine its own success.

**Table 1.** List of some examples of BC's KSF to its stakeholders

Stakeholder	KSF	
BC member	<ul style="list-style-type: none"> <li>• Business opportunities</li> <li>• Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>• Reputation in the market</li> <li>• Economies of scale and scope</li> </ul>
Virtual Organisation	<ul style="list-style-type: none"> <li>• Preparedness of members</li> <li>• Information about members</li> <li>• Capacity</li> </ul>	<ul style="list-style-type: none"> <li>• Supporting instruments</li> <li>• Complementary capabilities</li> </ul>
Customer	<ul style="list-style-type: none"> <li>• Suppliers development</li> </ul>	<ul style="list-style-type: none"> <li>• Suppliers selection effort</li> </ul>
Society	<ul style="list-style-type: none"> <li>• Social responsibility</li> </ul>	<ul style="list-style-type: none"> <li>• Ethical behaviour</li> </ul>

**Table 2.** List of some examples of VO's KSF to its stakeholders

Stakeholder	KSF		
Partner (not broker)	<ul style="list-style-type: none"> <li>• Sales</li> <li>• Margin</li> </ul>	<ul style="list-style-type: none"> <li>• Payment terms</li> <li>• Capacity utilisation</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge</li> <li>• Reputation in the BC and in the market</li> </ul>
Broker	<ul style="list-style-type: none"> <li>• Cost and risk sharing</li> <li>• Responsiveness</li> <li>• Expertise</li> </ul>	<ul style="list-style-type: none"> <li>• KSF for Partner (not Broker)</li> </ul>	<ul style="list-style-type: none"> <li>• KSF for Customer (when the Broker represents the Customer)</li> </ul>
Customer	<ul style="list-style-type: none"> <li>• Price</li> <li>• Quality of the product</li> <li>• Innovative solutions / differentiation</li> </ul>	<ul style="list-style-type: none"> <li>• Location of partners</li> <li>• Technical support</li> <li>• Delivery time reliability</li> <li>• Delivery time</li> </ul>	<ul style="list-style-type: none"> <li>• Technical features</li> <li>• Confidentiality</li> <li>• Turnkey solutions</li> <li>• Customer service</li> <li>• Product mix</li> </ul>
BC	<ul style="list-style-type: none"> <li>• VO Sales</li> <li>• Margin</li> <li>• Turnkey solutions</li> </ul>	<ul style="list-style-type: none"> <li>• Delivery time</li> <li>• Quality of products</li> <li>• Technical features</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge</li> <li>• BC rules compliance</li> <li>• Reputation in the market</li> </ul>
Society	<ul style="list-style-type: none"> <li>• Ethical behaviour</li> </ul>	<ul style="list-style-type: none"> <li>• Tax compliance</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental compliance</li> </ul>

The identification of the most important factors that affect the key success factors – the key performance factors (KPF) – enables to act on the processes and measure them in alignment with the strategy. The process of identification and definition of KSF and KPF contribute to create a common language in the Business Community.

Key performance indicators (KPI) allow monitoring the performance of the organisations on the selected key factors (success and performance factors). However a performance factor may require more than one performance indicator to be fully measured. KPI are the (few) selected ones to measure the overall performance of a

system or organisation. Some KPI are proposed with the main objective to speed up the analysis during formation of BC and VO.

Although quantitative indicators were preferred, for some factors only qualitative indicators could be found. Some are measured periodically others are measured once, which is the case of qualitative measures obtained at the VO's dissolution phase in a review of performance.

## 4 Validation

The Net-Challenge framework for performance management will be tested in a pilot application led by one industrial partner, in the textile and garment sector. In this sector, supply chains are hierarchical; many companies are very small and have a very informal approach to performance management. It will be mostly focused on the validation of the process resources (KSF, KPF, KPI and business scenarios) and of the sub-processes to negotiate them and setup the performance management processes.

Interviews with key people in the participating organisations will enable an initial validation and adjustment and to determine the needs and requirements for training and assistance. Information will be acquired through inquiries about the initial conditions and the effectiveness of process execution. It will also be examined the contribution of the performance management processes to the alignment of strategies and to customer orientation. Both the validation and the specific requirements will enrich the framework.

## 5 Conclusions

The identification of CN's key stakeholders, of their relations and roles and the identification of their key success factors enables a comprehensive approach to performance management, from strategy setting to improvement decisions and monitoring. The paper focuses the identification and definition of key success factors, i.e., of value creation for stakeholders as an essential component for the analysis and control of performance factors and thus to support the collaboration processes in CN.

As argued in this paper, performance measurement and particularly the selection of KPI require the existence of the sound base provided by the analysis of KSF or otherwise may be arbitrary and generate confusion, resources waste and lack of confidence on CN potential. The practical approach and the KSF presented can guide CN to develop their performance management systems in a logic way, contribute to fill the gaps found in this area and may stimulate organisations to get involved in CN.

**Acknowledgments** The authors would like to acknowledge the co-funding of the European Commission within NMP priority of the Seventh RTD Framework Programme (2007-13) for the Net Challenge project (Innovative Networks of SMEs for Complex Products Manufacturing), Ref. CP-FP 229287-2. The authors also acknowledge the valuable collaboration provided by the project team during the research work.



## References

1. Folan, P., Browne, J.: A review of performance measurement: Towards performance management. *Computers in Industry* 56, 663--680 (2005)
2. Camarinha-Matos, L. M., Afsarmanesh, H.: Elements of a base VE infrastructure. *Computers in Industry* 51(2), 139--163 (2003)
3. Carneiro, L., Almeida, R., Azevedo, A., Kankaanpaa, T., Shamsuzzoha, A.: An Innovative Framework Supporting SME Networks for Complex Product Manufacturing. In: Camarinha-Matos, L., Boucher, X., Afsarmanesh, H. (eds.) *IFIP Advances in Information and Communication Technology*, vol. 336, pp. 204-211. Springer Boston (2010)
4. Camarinha-Matos, L. M., Abreu, A.: Performance indicators for collaborative networks based on collaboration benefits. *Production Planning & Control* 18(7), 592--609 (2007)
5. Alfaro, J., Rodriguez, R., Ortiz, A.: A performance measurement system for virtual and extended enterprises. In Camarinha-Matos, L. M., ed.: *Proceedings of the Sixth IFIP Working Conference on Virtual Enterprises*, vol. 186, pp. 285--292., New York (2005)
6. Cunha, P. F., Ferreira, P. S., Macedo, P.: Performance evaluation within cooperate networked production enterprises. *International Journal of Computer Integrated Manufacturing* 21(2), 174--179 (2008)
7. Otley, D.: Performance management: a framework for management control systems research. *Management Accounting Research* 10, 363--382 (1999)
8. La Forme, F.-A. G., Genoulaz, V., Campagne, J.-P.: A framework to analyse collaborative performance. *Computers in Industry* 58, 687--697 (2007)
9. Camarinha-Matos, L. M., Afsarmanesh, H.: Related work on reference modeling for collaborative networks. In: Camarinha-Matos, L. M., Afsarmanesh, H. (eds.) *Collaborative networks: reference modeling*, pp. 15--28. Springer Science (2008)
10. Lebas, M. J.: Performance measurement and performance management. *International Journal of Production Economics* 58, 23--35 (1995)
11. Kaydos, W. J.: *Operational performance measurement: increasing total productivity*. St. Lucile Press, Boca Raton (1999)
12. Kenny, G.: *Strategic Planning and Performance Management: Develop and Measure a Winning Strategy*. Elsevier/Butterworth-Heinemann, London (2005)
13. Bolstorff, P., Rosenbaum, R.: *Supply chain excellence: a handbook for dramatic improvement using the SCOR model*. American Management Association (2003)
14. Kaplan, R. S., Norton, D. P.: *The Balanced Scorecard*. Harvard Business School Press, Boston (1996)
15. Gunasekaran, A., Patel, C., McGaughey, R. E.: A framework for supply chain performance measurement. *Int. J. Production Economics* 87, 333--347 (2004)