

AN INTEGRATED FRAMEWORK FOR COLLABORATIVE ENTERPRISE PERFORMANCE MANAGEMENTⁱ

MARCO BUSI, C.E.O. **carisma r.c.t.** Ltd., Dingwall, Scotland m.busi@carismarct.com

In the 1950s and 1960s companies focussed on production cost minimisation and mass production. In the 1980s demand for high flexibility, high quality and low costs led organisations to design highly functionalised organisational structures where vertically aligned operations prevailed. During the 1990s then, Japanese success stories led to major changes in terms of organisational structure; expressions such as lean- and agile-manufacturing and JIT production became commonplaces. Organisations became flatter and the emphasis shifted from functions to processes with horizontally aligned operations.

Today, market and production globalisation and the network- and knowledge-based economy are triggering continuous changes in the way companies are organised and the way they do business. After four decades of focusing on optimisation of internal operations, companies have realised that they have to invest in integrating their internal operations with those of suppliers and customers. The XXI century is clearly going to be about the collaborative enterprise, i.e. a set of organisations that work together exchanging information, sharing activities and resources and complementing one another's capacity for mutual benefit and a common purpose.

In manufacturing, logistics accounts for an ever increasing percentage of the final product cost, ranging from 6% to 15% of the total turnover. Decision makers have finally realised that improving logistics and Supply Chain Management (SCM) performance represents an important leverage of competitiveness.

Both management and research emphasis today has hence shifted onto:

- Managing flows of information, goods and knowledge within a network of companies
- Managing extended processes within and beyond the single company's four-walls
- Managing the collaborative enterprise performance, not only measuring it
- Creating and managing multidisciplinary teams
- Deploying integrated ICT across organisations
- Creating and sharing knowledge

This research tackles in particular the first three bullets in the above list. It takes as a starting point the acknowledgement that over the past few years practitioners and academics alike have been noticing an increasing level of collaboration among companies not supported by the development of proper management processes and methods.

In particular, in the area of business performance measurement, a holistic approach to manage performance from a collaborative enterprise perspective is still missing. The aim of this research is to fill the existing gaps concerning the dynamics, mechanisms and infrastructure needed for integrated performance management in collaborative enterprises.

To improve understanding of how collaborative enterprises should measure and manage performance, this research answers two important questions:

- What has to be measured?
- How shall it be measured?

After preliminarily investigating the research problem both in literature and in industry at Raufoss Chassis Technology ASA, the research suggests a process model for the collaborative enterprise. This researcher was mainly interested in the construction of a general collaborative enterprise process model, understanding which processes were to be

considered and how their performance could be measured. It was concluded that in collaborative enterprises, management and support processes are *vertically* extended, i.e. these are carried out at both the single-node and the collaborative enterprise level. Information related to management and support processes flows from the single-nodes upward to the collaborative enterprise level. Operate processes, on the other hand, are *horizontally* extended, i.e. these are carried out at each single node level and extended to the others nodes in the chain. Information related to operate processes flows from the very first supplier to the very last customer and vice-versa.

Based on this view, performance management in collaborative enterprises should monitor the flow of information related to management and support processes between the collaborative enterprise management team and the single units; and the flows of goods and information related to operate processes among the single units being part of the collaborative enterprise. Also, it should provide useful information at three different levels of analysis and decision making: strategic, tactical, and operational.

Collaborative enterprise performance management is hence defined in this dissertation as the process of using inter-organisational systems (IOSs) to collaboratively measuring performance of collaborative enterprise processes and using these measurements to enable decision-makers to proactively and strategically manage the collaborative enterprise itself.

However, the decision of what to measure or how to interpret the performance measures is neither an easy nor a straightforward task. Lack of understanding of which are the key success factors, or what is the best measure to adopt would most probably lead to wrong decisions being made. Whilst much has been documented concerning guidelines and rules for the choosing of performance measures, there is no recognised methodology in place that allows an organisation to select performance measures in a step-wise, logical fashion. Existing performance measurement frameworks can only go so far. The absence of a formalised set of performance measurement selection guidelines may have much to do with this. The diverging and often contradictory needs of firms in different business environments are not amenable to the creation of a performance measurement selection tool. Performance measurement selection guidelines are also complicated by the fact that the most relevant measures for a company to adopt change over time.

The study of literature clearly pointed out the lack of appropriate performance management theories, models and tools. The research hence took up the challenge of developing a comprehensive framework to support managers:

- Measuring and managing performance
- Managing through performance
- Building the performance measurement system
- Clarifying performance measurement boundaries
- Specifying performance measurement dimensions or views

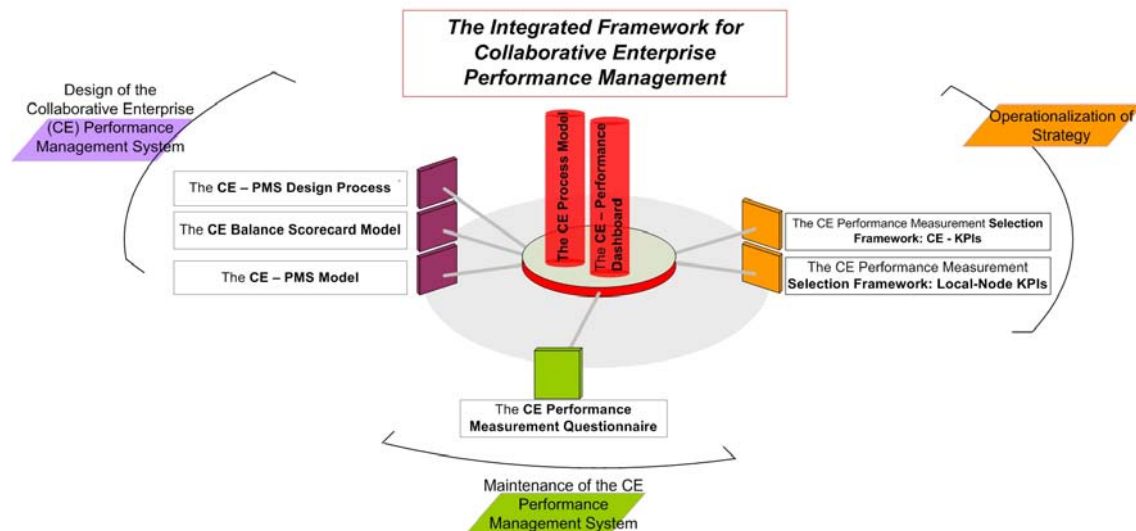
The framework presented includes:

- A collaborative enterprise balanced scorecard model: for structuring and selecting performance indicators at the single units in the collaborative enterprise
- A collaborative enterprise wide PMS model: which illustrates the two levels structure of the measurement systems and the link between the separate measurement systems
- A customizable list of single node indicators: for the selection of local-nodes performance measures
- A customizable list of collaborative enterprise performance indicators: for the selection of collaborative enterprise performance measures
- A collaborative enterprise performance measurement system design process
- Two collaborative enterprise performance measurement selection frameworks:

- ▶ Local node KPIs selection framework
- ▶ CE KPIs selection framework
- A set of collaborative enterprise self-assessment checklists: for periodic review and update of the measurement system.

Last, this research contributes to improve:

- Understanding of the collaborative enterprise structure and dynamics and the extended processes and operations
- Understanding of collaborative enterprise performance measurement and management
- Understanding of collaborative technologies requirements
- Understanding of partners' collaboration and the requirements it poses
- Understanding of the use of performance measurement and its support to SCM
- Visibility of the operations and ability to monitor processes along the network



The Integrated Framework For Collaborative Enterprise Performance Management

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Note about the author:

Marco Busi is the C.E.O. and Head of Research at carisma rct ltd. He has a PhD in Collaborative Enterprise Performance Management and an MSc in Industrial Engineering. He has worked in various research and development projects as well as consultancy within areas such as supply chain management, global outsourcing, operations management and customer service. He has published extensively and is the editor-in-chief of Strategic Outsourcing, an International Journal. He can be contacted by email on m.busi@carismarct.com

ⁱ Adapted from the author's PhD dissertation for a 3-years research carried out at the Norwegian University of Science and Technology, Department of Production and Quality Engineering, Trondheim, Norway