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### Activity-based quality management

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# Summary

The NEN-EN-ISO 9000 (the Dutch version of ISO 9000), which describes the basic principles of quality management systems and specifies the relevant terminology, breaks down quality management into quality *planning*, quality *control*, quality *assurance* and quality *improvement*. Quality planning focuses on determining the quality objectives and the required processes and tools. Quality control is aimed at complying with quality requirements, while quality assurance is about creating confidence that these requirements are being complied with. Quality improvement is defined as enhancing the ability to comply with the quality requirements. Until recently, the emphasis was on quality planning, control and assurance. Quality improvement has, so far, received far less attention. This is probably as a result of the problems many organisations experienced in achieving improvements due to the fact that quality management systems in practice are often independent from the management and control of primary processes. It therefore seems a good idea to review the possibilities of a link to other management systems. In this context, the relationship between quality improvement and *Activity-Based Costing* (ABC) has been highlighted in various publications, with the usual conclusion that the ABC method could contribute towards the design and implementation of quality improvements (e.g. Ittner, 1999, pp. 492-500; Kaplan and Cooper, 1998, pp. 47-56; Rummmler and Brache, 1995, p. 116, and Shields and McEwen, 1996, p. 18). These publications argue that the systematic character of ABC fits the quality management methods well. The main criticism levelled at the cost-differentiation methods is that they do not fit in properly with a systematic approach of the operations of organisations and, in addition, that they produce inaccurate cost information.

The review is based on the following formulation:

*In which way can existing concepts of quality management and Activity-Based Costing be synthesised<sup>17</sup> so that it leads to new insights with respect to quality improvement techniques for organisations?*

<sup>17</sup> Literal meaning: linked to each other

The following five questions were derived from this formulation:

- 1 What are the basic principles underpinning quality management and *Activity-Based Costing* and how have these two concepts developed up to now?
- 2 What are the arguments for reviewing a synthesis of quality management and *Activity-Based Costing* and what are the specific characteristics of this synthesis?
- 3 Which relationships between quality management and *Activity-Based Costing* lead to new insights into quality improvement?
- 4 How can quality management and *Activity-Based Costing* be synthesised in a conceptual model?
- 5 What are the practical experiences with new quality improvement techniques that are based on a synthesis of quality management and *Activity-Based Costing*?

### Question 1

Two literature studies were carried out in order to answer question 1.

These are described in section 2 (Quality management) and section 3 (*Activity-Based Costing*).

After discussing a number of definitions from the literature, quality was defined as the extent to which the characteristics of a product or service correspond with the wishes of the relevant stakeholders. In quality management, it is standard practice to make a distinction between planning, control, assurance and improvement. The development phases of quality management, the concept *Total Quality Management (TQM)* and the relationship between quality management and process management were then examined. The final paragraph of section 2 is devoted to the subject 'quality costs'. This notion is defined as the sum of the prevention costs, the assessment costs and internal and external failure costs. In practice, measuring these quality costs appears to cause problems, partly because of definition problems.

The basic principles of quality management are summarised as follows:

- quality management is focused on the players/doers in and around an organisation;
- quality management is process oriented and requires long-term thinking;
- quality management involves planning, controlling, assuring and improving quality;
- quality management comprises both physical and mental implementation of improvements.

In the third section, *Activity-Based Costing (ABC)* is defined as a method, which attributes costs to products (or other cost units, such as services or clients) on the basis of a causal link between products and the activities

required for these products. The method originated in the 80s as a reaction to a global attribution of the indirect costs by means of a surcharge on the direct costs. ABC starts with an analysis of the activities of an organisation. These activities are subsequently grouped in *cost pools* on the basis of a fixed ratio of the costs that these activities generate, regardless of the extent to which they are consumed. Furthermore, a *cost driver* (a factor determining the cost level) is established for each *pool*. After that, the costs per *cost pool* are gathered and the total per *pool* is attributed to the products on the basis of consumption of activities. Finally, the costs for each of the products are added up, resulting in the cost price of the products.

The section on ABC then focuses on the identification of the activities. In addition, the issue of ABC as instrument for decisions is discussed. Finally, a comparison is made with the production-centre method (PCM), and a number of practical applications of ABC are discussed.

The basic principles of ABC are summarised as follows:

- ABC primarily focuses on the proper differentiation of indirect costs;
- ABC generates insight into the volume and the causal links of the indirect costs;
- ABC highlights the activities of an organisation;
- ABC uses the *cost drivers* as an important instrument for attributing costs;
- ABC is basically an indication instrument.

### Question 2

To answer question 2, seven semi-structured interviews were conducted with experts of both management systems. These interviews are elaborated in section 4. Six arguments for a synthesis of quality management and ABC were raised:

- cost management is, by definition, part of quality management;
- ABC can support organisation diagnoses, quality management and process improvements;
- actions based on insight into the relationship between cost and quality strengthens competitive ability;
- ABC supports efficiency goals, quality management and effectiveness goals;
- a synthesis could contribute to the establishment of proper performance indicators;
- a synthesis can provide support in pro/con arguments between quality and costs.

During the interviews, attention was also focused on the possible pitfalls of a synthesis of quality management and ABC. For example, a synthesis would always result in adaptations of the two separate management systems, creating the danger of 'compromises' on crucial points. Another frequently mentioned pitfall touches on the same issue. This refers to the risk

of insufficient depth of a synthesised model, because the purposes served by the independent systems differ so much that there can be no question of synergy anymore.

Finally, the specific characteristics of a synthesis were examined:

- the *cost drivers* are the link between the activities (quality management) and costs (ABC);
- the processes and their activities form the core of the analysis;
- a synthesis should be based upon the objectives of both management systems;
- sufficient attention should be devoted to those parts of the organisational units on which the synthesis focuses and to the links between them;
- a synthesis should be examined in more detail in a field study.

### Question 3

Question 3 is described in section 5. In this section, quality management and *Activity-Based Costing* are studied in more detail and compared to each other in order to obtain building blocks for a synthesis. The synthesis was subsequently discussed during three meetings with representatives from Scania, a discreet-assembly organisation. The answer to this question is concluded with the elaboration of the first version of a conceptual model, in which the relationship between quality management and *Activity-Based Costing* is discussed in the context of this study.

The results of a synthesis of quality management and ABC were then investigated on the basis of the management control process. Possible results included objectified choices for quality improvement, accurate information gathering, improved efficiency of the 'correct' activities and improved measuring and information systems.

A choice was then made for organisations that use discreet assembly as an area of research, because the principles of quality management and ABC are the most applicable in this environment. These organisations usually have a clear structure, which can simplify the research process.

Attention was subsequently focused on *Activity-Based Management* (ABM), with the final conclusion that ABM is primarily based on financial information and aimed at strategic and operational decisions to improve efficiency and/or the profit position. A synthesis will additionally emphasise the interests of internal and external players of organisations and, as such, is aimed at both quality management and cost management.

Then, quality management was compared to ABC on a number of important points and the discussions with the representatives from Scania were elaborated. This resulted in the following basic principles for the first version of a conceptual model (in which quality management and ABC are synthesised; see diagram 5.8):

- The cost drivers must be explicitly present in the conceptual model.
- The processes and activities and the interfaces between these should form the starting point for the conceptual model.
- A description of the objectives of the observed processes should form the basis of the concept.
- The costs of the different processes and activities should be taken into account during the construction/reconstruction of standards or objectives.
- A systematic involvement of staff in the implementation of the different steps of the conceptual model should be stimulated.
- A synergetic relationship between quality management and ABC should be set up in the conceptual model to obtain insight into all facets of the activities and the associated means of control and costs.
- A link between *cost drivers* and performance indicators in the conceptual model is essential in order to properly analyse the costs of changes introduced or to be introduced.
- The conceptual model should be recurrent; only then will it be possible to utilise the economic and other effects of the incremental improvements to learn from the past.
- It is recommended to use the conceptual model to provide insight into the effects of interruptions, deliberately or otherwise, of the observed processes.
- The Deming cycle should be followed emphatically in the conceptual model.

#### Question 4

The Delphi study is elaborated in section 6. In addition, an introductory case study was carried out in order to answer this question, thus adding a practical component in so doing. The results of this case study are described in section 7. To further focus the synthesis, the first version of the conceptual model was used as basis for the Delphi study. The results of the Delphi study led to the second version of the conceptual model (see table 6.3), with the emphasis on the following:

- to highlight the goals more clearly in the choice of the process to be improved;
- to pay more attention to the distinction between the process to be improved, the steps required for the improvement and the improved process;
- to pay more attention to the analysis of the *cost drivers* and *quality drivers*<sup>18</sup>;
- to remove the *quality-pools*<sup>19</sup> because these lead to too many problems and questions;
- to explain the nature and content of the improvement proposal.

<sup>18</sup> The concept '*quality driver*' is defined as a gauge based on an activity analysis to measure the success or failure of variables, which are critical for the realisation of the strategy.

<sup>19</sup> The concept '*quality pool*' is defined as a cluster of improvement activities, which focuses on a specific aspect or attention area and which the management wishes to use for managing and/or which it has to account for.

The second version of the conceptual model is then used in section 7 as basis for an introductory case study. After explaining why the case study is considered the most appropriate method for this study, the organisation in which the introductory case study took place is introduced. The organisation found it necessary to combine quality management and cost information, which is considered difficult in practice. It was emphasised that the financial function required information about the yields of improvement projects, in addition to cost information.

The introductory case study has led to the conclusion that phases 5 to 8, in which the improvement proposal is designed, were worked out more meticulously in the conceptual model than in the organisation in question. This was mainly caused by the emphatic attention to the *cost* and *quality drivers*. It is also concluded that the choice for adequate improvement activities (required to achieve the desired situation) was less explicit in the organisation than propagated by the conceptual model.

A simplified fictitious application of the core of the concept led to the view that unravelling improvement processes into activities can contribute towards a more realistic and practical planning of quality improvements. In addition it was revealed that many improvement objects in the organisation concerned were not related to main processes, but to supporting processes. Finally, it appeared that *cost* and *quality drivers* could provide support in refining improvement proposals.

The steps of the conceptual model are defined as *Activity-Based Quality Management (ABQM)*: a method for improving processes on the basis of an analysis of the underlying activities, whereby cost generators and quality criteria are seen as important managing variables, while their mutual coherence is also taken into account.

### Question 5

Question 5, which deals with practical experiences with new quality improvement techniques based on a synthesis, is dealt with on the basis of two comprehensive case studies. These were carried out at organisations where discreet assembly is applied. In these case studies, the conceptual model was implemented in the form of a project. The case studies are described in sections 8 and 9.

In the first comprehensive case study, the supportive part of the manufacturing and engineering departments was broken down into activities. In the second comprehensive case study, the project group focused on the activities of a specific production department and a number of adjacent supporting processes. There was an ongoing effort to specify and, where possible, quantify the possible effects of the actions with the aid of the cost

and quality drivers. In this way, it was assessed whether quality improvements at activity level would, indeed, lead to more insight. Both case studies were concluded with an evaluation. The table below shows the results of both studies on the basis of a number of statements derived from the conceptual model.

<i>Statement</i>	<i>Result</i>
If strategic objectives are linked to quality management, it offers direction in the selection of the processes to be improved.	- First study: verbally confirmed. - Second study: neither confirmed nor denied.
The unravelling of processes into activities leads to adequate information for baseline measurements.	- First study: confirmed. - Second study: confirmed.
Cost management must form a part of quality improvement.	- First study: confirmed. - Second study: confirmed.
<i>Cost drivers</i> are useful performance indicators for measuring, analysing and improving quality.	- First study: confirmed. - Second study: confirmed.
Insight into the relationship between <i>cost drivers</i> and <i>quality drivers</i> improve the commitment of the relevant people involved.	- First study: insufficiently investigated. - Second study: neither confirmed nor denied.
Disintegration of improvement proposals at activity level improves the planning, realisation and efficiency.	- First study: confirmed. - Second study: insufficiently investigated.
<i>Quality drivers</i> , in combination with <i>cost drivers</i> , are good tools for drawing up management reports and for evaluation.	- First study: verbally confirmed. - Second study: verbally confirmed.
Quality management based on activities enhances the possibilities for ongoing improvement of the management.	- First study: confirmed. - Second study: confirmed.

The issue was approached on the basis of a conceptual model, in which quality improvements are discussed from their origin (mission and vision) to their end (evaluation and initiation of new proposals), and is answered as follows:

Although quality management theories emphasise the significance of the relationship between organisational strategies and quality improvement, in practice, this relationship is only partly dealt with. Organisational strategies are often defined at too high a level of abstraction to serve as support in determining improvement projects. The application of concepts, in which activities form the basis, do not, in principle, lead to the clarification



of the relationship between strategy and improvement projects. However, it cannot be ruled out that ignoring the mutual relationship between quality management and cost-price calculations based on activities can lead to the wrong choice in strategies.

Unravelling processes into activities leads to more effective quality improvements, because the staff in organisations have a good understanding of activities. An activity analysis offers a good framework for initiating, implementing and evaluating improvement projects. This is the result of the fact that specific characteristics can be attributed to activities, whereby these can be measured by cost and quality drivers. On top of that, the effects on other activities of changes in the quality improvement process become clear. This improves the results of quality management.

The distinction of cost and quality drivers as 'value drivers' enhances the possibilities for integrated quality management. Observing the costs and cost generators for the benefit of quality improvements, in addition to the traditional performance indicators, creates broader support for the actual achievement. The distinction confirms the statement that quality management, by definition, must also be based on cost information. Although this was not specifically addressed as such in the case studies, one may assume that progress reports gain additional conviction when they are based on cost and quality drivers.

It is difficult to define the interactions between quality improvements and cost management in quantitative sense. What is more, the question remains how reliable this definition is. This problem is caused by the fact that quality management (and, thus, also quality improvements) is focused on the interests of different parties and that the management system, therefore, is interpreted from different angles. Moreover, the quality of organisations is determined by such a wide range of factors (and their mutual complex relationships) that it can be said that the quantitative pro/con arguments have little practical value.

Breaking down improvement proposals into activities, therefore, improves the chance of success of improvement projects. It offers the quality manager a good framework for organising the projects efficiently and, additionally, offers the possibility for proper planning. Furthermore, it improves the insight into the required hours of labour, whereby quality improvement projects become more real for both the management and the people directly involved.

Altogether, this study has resulted in a better understanding of quality management in general, and quality improvement in particular. It appears that existing TQM concepts are not always applied equally specifically in

practice, which sets question marks at the value and the need of quality management.

*Activity-Based Quality Management (ABQM)* can be described as a method that makes quality improvement projects real, in that it is based on easily understood activities. Moreover, it enhances the possibility to use quantitative information, because more specific criteria can be attributed to activities than to processes. This leads to a better understanding of quality improvement. Furthermore, the case studies revealed that ABQM contributes towards the commitment of staff. This is partly caused by the fact that the identification of activities requires staff involvement in an early stage already. Therefore, ABQM has resulted in new points of departure for quality improvement.