

National Process of Quality Management Education : The Swedish Example

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Abstract

The application of a process view, as complement to the traditional functional division, is often a way to highlight organisational improvement potential. This paper examines the process of providing university level education in quality management, using Sweden as an example. The purpose is to assess the performance of university education as part of the supply chain of providing quality management to a society. This has been done by studying the actual offering compared to a notional benchmark of best performance. Preliminary results indicate that there could be a significant improvement potential in both providing more education of the right type and in the right way. A lot of similar basic courses are given but with varying names, possibly reflecting difficulties in defining the area of quality management and its constituents. An important reason for the detected improvement potential seems to be the lack of ownership of the studied supply chain of providing university level quality education to the Swedish society.

Key Words: Quality Management, Education, Process Management

1. Introduction

Each year in average about fifty thousand students enter university education in Sweden. It should be no wild guess that the work markets of tomorrow will be more and more competitive. Apart from specialist skills it is likely that good generalist skills are needed. Modern organisations in societies with high labour cost, like Sweden, have a need for independent professionals capable of working without too much supervision. Most organisations of tomorrow will be in constant change but still be expected to continuously perform on

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high level. This will require good processes and personnel that can work with many different aspects of quality management.

When looking at the performance of organisations we see no indications that quality issues have become less relevant in recent years. The need for quality management is evident and the flatter the organisation the more flexible and competent the employees need to be. This puts high pressure on the system of education. According to ENQA (2005) European standards and guidelines for internal and external quality assurance and audit in higher education are under development. A European consultative forum for quality assurance in higher education is also being established. The Swedish government has set the goal that 50 percent of the population should receive a university level education and we believe that values, methodologies and tools of quality management should form an integral part of this education. In this paper the need for quality management education in Sweden, as well as the current supply of it, is assessed.

2. Methodology

The methodology used involves the following parts:

- a stakeholder orientated assessment of the current situation using a process model
- quantitative and qualitative assessments of the national quality education output
- an assessment of the volume of the benchmark quality education
- an assessment of some aspects of the technical quality of the education
- a quality maturity assessment of some Swedish universities as an example
- a maturity assessment of the national supply chain of university level quality education

The process model used is based on (Isaksson, 2006) and serves to give an overview of the supply chain, see Figure 1. The university level education in quality management provided by Swedish universities is examined and its volume is assessed based on available data taken from the website www.studera.nu. This web-site is commonly used by Swedish students and should give a reasonable picture of the course offering. Courses including the search word for quality management "kvalitetsteknik" have been chosen.

It is believed that to attain interest in quality education it should be credible, which would mean that universities should take their own medicine. A multiple case study of three universities is carried out to study the quality education and the overall university application of quality management. To do this we have reviewed course plans and the internal use of quality management in the three chosen universities using participant observation, archival analysis, and interviews. The three cases chosen are Gotland University, Luleå University of

Technology and University West. The choice of these universities is partly a practical one. These are the places where the authors work. However, since these universities also provide a wide range of courses in quality management our contention is that there should be no particular bias in the sample. We have tried to reduce the possible bias of assessing our own universities by agreeing on a set of case study questions before starting the work (Yin, 1994). Also, in order to increase reliability the results have been cross examined.

3. Results

Of the entire Swedish supply chain of education we have chosen to look at what we call the supply chain of providing university level education in quality management. To do this we have used a generic process model and generic process measurements. The process chart and the set of measurements together form what we call the process model. We have applied this model at the national level, but it could possibly also be applied at university level or at the quality department level. Only a few of the elements in the model will be highlighted, see Figure 1. Measurements have been divided into drivers, input, output, outcome and resources. At the national level we are mainly interested in process capacity and technical quality. The output parameter person European Credits (ECTS) gives us a figure for the actual process capacity of the studied supply chain. A full year is calculated as 60 ECTS. The technical quality is defined as the content of the quality education. We have looked at the level of education, the topics included, and the level of standardisation and clarity of the courses offered. The analysis presented in Figure 1 as outcome reveals that the principal stakeholders and their needs of the education in quality management include:

- Students in search for an education leading to a job
- Employers looking for employees with adequate competence
- The state wanting to have productive citizens and good tax payers
- Universities needing a good reputation and sufficient incomes to sustain operations.

Elements of interest, apart from the output and outcome indicators, are such as external drivers for quality management education, internal drivers and resources. For the resources the Method part should be of particular interest since this is where there might be a structure for managing the supply chain. To a certain extent the management processes and the Method resource are being looked after by the Swedish National Agency for Higher Education (HSV). We have discussed these issues with some of the Swedish quality professionals like pro-rectors, professors and lecturers. A conclusion is that there is nobody that could be seen as formally responsible of managing the supply chain of quality education in Sweden. The HSV acts as an organ of control to secure the academic quality for the individual universities.

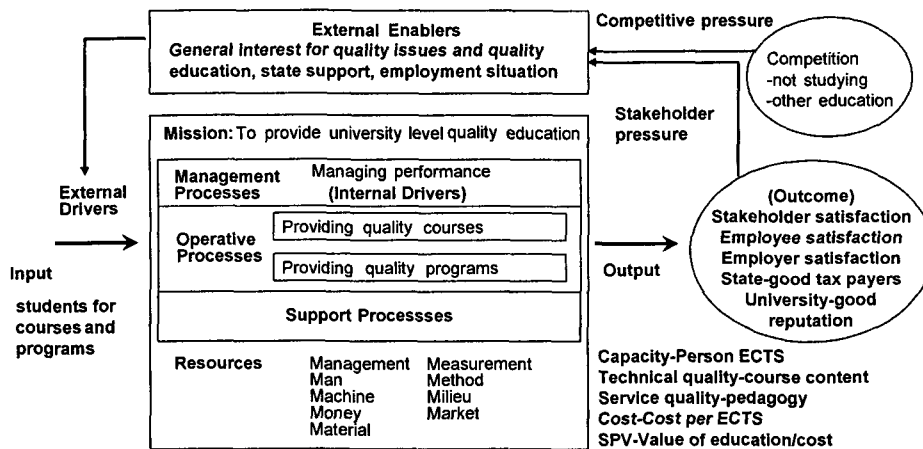


Figure 1. The national quality education process described as a generic process based system model, adapted from (Isaksson, 2006). ECTS = European Credits indicating the magnitude of studies. SPV = Specific Product Value.

They do not particularly look at the content of individual courses offered or at the standardisation of the courses. The academic topic in Swedish for quality technology and management is called “kvalitetsteknik.” This literally means quality technology, which does not describe the content very well. Additionally there is no clear description of what this topic should include. Professor Håkan Wiklund, Mid University, mentions that the chosen topic does not figure as a search word when looking at the official Swedish statistical database for research grants. Professor Bengt Klefsjö, Luleå University of Technology, confirms that there is no formal definition but that the topic should be defined by the user.

A risk of not having an agreed definition is that the different courses provided within the topic will vary. This issue will be further looked into in the case studies. The external drivers seem to be weaker than they were during the heydays of the quality movement, i.e. in the 80s and 90s. Among these drivers are demand for education, demands for research and demand for competence within quality management. We use the word quality management to describe the entire quality area. Quality does not seem to have as much influence on corporate management as it once used to have (Foley, 2005). An important question is if those organisations described as employers in Figure 1 have reached such a level with the Cost of Poor Quality that there is not much need for improvement. Here we define the Cost of Poor Quality based on Juran as the difference between the actual situation and that with perfect products and processes. Our contention is that even if some products, and particularly some goods, certainly have improved, such as cars, computers and cell phones, there still is a considerable Cost of Poor Quality. In this line of argumentation the need for quality is not perceived as being less today than it was a decade ago. This leads us to the conclusion

that seen from a Swedish perspective the need of education in quality management could be as strong today as it was 10-15 years ago. In this case a reason for weaker drivers may be found in what Figure 1 describes as the external enablers. A hypothesis could be that need for quality education is unchanged but that the perception of this need has changed.

Process management is by (Stigendal and Johansson, 2003) described using four points, see below. Similar descriptions of process management have been provided by, for instance, (Melan, 1992).

1. **Identification and mapping of the organisational processes**: In this case the boundaries of the supply chain are still quite vague, do they start with needs for the education or with the manifested interest? Where do they end?
2. **Process analysis and improvement**: There seems to be few or no performance indicators, which make analysis and improvement very hard.
3. **Definition of process ownership**: The qualitative overview of the national supply process for quality education indicates that there is no formal or informal management of it. The topic itself is not well defined, which makes the ownership issue even more difficult.
4. **Establishment and use of measurement system**: Universities are being regularly monitored by authorities on certain quality parameters. It is unclear if there are any measurements on the level of the supply chain.

The survey on the website www.studera.nu gave a total of 117 hits for courses and programs in 15 universities. The total number of universities in Sweden is appearing at the search site is 46. After reducing double entries for the same education being given in different sites and at different speeds the list was reduced to 41 courses and 17 programs. Out of the 17 programs only 3 were clearly focused on quality issues. Many of the others were programs for business administration or engineering with a certain quality component. A quick check of the search engine was carried out by comparing courses in the case study universities with the list and by some checking of universities with known courses in quality management. Some differences were found but generally the reduced list seemed representative enough to enable quantification. The one exception found was the Linköping University where none of the quality courses given appeared in the search. Only when searching the university web-site were the courses found. This indicates some problems with the search engine.

The total educational quality education production of the Swedish universities has been assessed based on the information above to about 20000 ECTS, which would correspond to roughly 300 full time quality students per year. The question is how to find a benchmark for assessing the actual performance.

3.1 National Benchmark Discussion

We assume that all organisations have a need to improve. To get some sort of benchmark for the level needed we have used the Six Sigma Program training requirements as a reference. Swedish organisations have a high rate of professionals, employees that can work independently doing part of the work that was earlier done by supervisors, see Hammer (1996). Our bold assumption is that for each fifth employee a green belt is needed and that for each 100 employees there is a need for a Black Belt. A master Black Belt is needed for each 10 Black Belts. The total Swedish work force is estimated to 4 million people. Assuming an average work time of 40 years the replacement rate is about 100,000 persons per year. This means that each year a total of 20,000 Green Belts, 1000 Black Belts and 100 Master Black Belts should be trained. The educational requirements are translated to ECTS as follows. A green Belt education that involves both theory and practise is set to 2 ECTS, the Black Belt education to 40 ECTS and the Master Black Belt to 180 ECTS.

3.2 Assessment of the Improvement Potential

Based on the stated assumptions the yearly need for education in quality management adds up to 100,000 ECTS which is about 5 times the current supply. However, not only universities are supplying the market with this education, it is also done by consultancy companies and the organisations themselves. Still, the indication is that there seems to be a gap between supply and requirements. It could well be that supply meets the demand, but as discussed earlier it could also be that the demand does not correspond to actual needs. This might indicate that ordinary market mechanisms currently do not seem to be able to solve the indicated problem of lack of quality management competency. For universities there may be a potential in increased quality education, but the most important potential should probably be at the level of students and employers.

The assessment of technical quality at the national supply chain level is based on the division into the different levels (green, black and master black belt). This has been done based on a few assumptions. Results are presented in Table 1.

Table 1. Assessment of demand and supply for different types of quality education. Supply based on search in www.studera.nu.

ECTS	Demand	Supply	Comment
Green Belts	40,000	7,000	Based on quality courses
Black Belts	40,000	5,000	Based on programs with quality
Master Black Belts	20,000	7,000	Based on quality programs

To the supply of Master Black Belts might be added doctoral students within the quality area. The number of PhD examined has not been surveyed but is believed to be in the range of 2~5 persons per year. This would add some 400~900 ECTS to Master Black Belts when using 180 ECTS per person. The results in Table I indicate that the deficit would be equally spread out with the possible exception that the supply of Master Black Belts seems to be closer to target. Only 30 percent of the surveyed universities had hits for quality courses. This could indicate that there is more of a problem at the green belt level.

3.3 Case Studies of Quality Performance

The three case study universities manage 21 out of the 41 identified quality management related courses and 2 out of the 3 dedicated quality programs. This indicates that our sample should be good enough for a first estimate of the general situation in Sweden.

In order to study the technical quality of the studied courses in more detail we have looked at the content of these courses in our three universities based on the publicly posted course plans. We have surveyed 13 syllabuses for courses with various names within the quality area. Results include a total of 49 different key words for describing the content. Courses labelled as basic quality management are described differently due to wording and due to actual difference in content. Courses are described either as A-courses, no previous knowledge in the area, or as B-courses with indicated requirements. However, even this varies and the same course can be A or B depending on whom it is given to within a university. Also, the same type of courses to the same category of students could be labelled A or B depending on which university presents them. As a consequence the presentation to potential students risk being confusing and could lead to reduced interest.

3.4 Use of Quality Management Within the Case Study Universities

The results for the university level assessments are summarised in Table II. Quality issues are often interpreted as the academic quality. This includes the student perceived quality, which could be equated with what we have called service quality in Figure 1. Academic quality also includes parts of what has been described as the technical quality. Requirements set by the controlling governmental body include, apart from measuring the student perceived quality, requirements for performing the education in the right way. This is controlled against issues such as having qualified teachers, enough of teaching hours, and having written course plans. The part which is missing is if the right thing is being done, which might be called the design quality of the education. There is little focus on the usability of the educational content for students and future employers. Feed back from old students and employers is generally scarce.

Table 2. Assessment of university use of quality management.

Questions	Case 1	Case 2	Case 3
Is there a quality policy?	No	No	No
Who is responsible for quality	Divided in course and admin quality	Divided in course and admin quality	Divided in course and admin quality
Has the management any common quality training?	No, but one individual has	Yes, one is Master Black Belt and several have basic training	No, but some individuals have
How is course quality measured?	Student perceived quality only	Student perceived quality only	Student perceived quality only
Level of process orientation	Initial	Initial	Non existing to initial
Are quality tools used by management	Some use	Some use	Limited usage
Overall assessment of quality management maturity	Low but with a positive trend	Low but with a positive trend	Low

By and large the studied universities treat quality management as any other topic and judge it mainly by student interest and economic results. At the time of our investigation competency present within the area of quality management was not to any significant amount used for internal university performance improvement.

3.5 Causes for the Identified Improvement Potential

In Figure 1 resources are described with 9Ms. These are used carrying out a quick analysis of causes for the detected improvement potential. Focus will be on some of the Ms only.

The qualitative analysis point out the following main causes for the existing potential (see also Table 3).

- Management: lack of any management of the studied supply process on a national level. There are no stated objectives and goals
- Method: without objectives there is no strategy and no ownership for the process which has been described
- Measurement: without measurements there can be little improvement
- Market: without market knowledge it is impossible to know if the right products are offered and in the right quantity.

Clearly there are a large number of students examined in Sweden each year with high levels of understanding regarding the subject of quality management. However, our contention is, based on the examination described, that the maturity of the Swedish supply process for

providing university level education in quality management has a substantial potential for improvement when compared to a notional benchmark based on the organisational assessment of needs.

Table 3. Interpretation of the 9Ms as resources for the national supply chain of university based quality education in Sweden, adapted from (Garvare and Isaksson, 2005).

M:s	Criteria
Management	<p><i>Policies, goals and strategies for improving quality education process?</i> At present there is no formal strategic management of the process studied. Responsibility for supervision and matters related to institution of higher education has been delegated to the Swedish National Agency for Higher Education. Some years ago an unofficial forum existed where lecturers within quality education met every second year. We have not found any structure official or unofficial that could be seen to have any process ownership.</p>
Method	<p><i>Structure for carrying out strategies and achieving goals. Management systems for quality education process? Process maturity?</i> There is no well defined strategy or structure for co-operation between different providers of education. Some co-operation exists, but largely on an ad hoc basis.</p>
Man	<p><i>How is relevant competency for the different work tasks assured?</i> The level of educational personnel has not been assessed.</p>
Measurement	<p><i>How are quality education performance measured and results communicated?</i> The Swedish National Agency for Higher Education reviews the operations of all higher education institutions and evaluates all subjects and programmes once every six years. This assessment is divided into four stages: Self-evaluations conducted by the institutions involved, external panel studies of the self-evaluations, site-visits and follow-up after 1~3 years. This measurement is on university level and does not look at how the entire supply chain caters for the national needs.</p>
Machine	<p><i>Describe how the equipment including all premises is made to perform to the required standards.</i> Not studied.</p>
Material	<p><i>Describe how the student material into the educational process is monitored and controlled?</i> Many courses accept all applicants. With close to 50% of the entire population embarking on university studies the variation in learning ability risks of being quite high.</p>
Milieu	<p><i>Describe how the working environment supports the personnel and the equipment used.</i> Not studied.</p>
Market	<p><i>Describe market information and market drivers such as customer base, competition and important stakeholder needs.</i> This has not been studied in any detail but the general picture is that the market knowledge is limited and consists of monitoring of the interest that students show. However, since the students have limited knowledge of what use the education is the student demand does not give a good picture of what the work market demand is.</p>
Money	<p><i>Describe availability of funds for operations and investments.</i> Not analysed.</p>

4. Conclusions

There seems to be a potential for enlarging the Swedish university level education in quality management, but today the manifested demand is absent. This might partly be due to the difficulty of describing what quality management is, and how it can be used to improve organisational performance. The proposed courses within this field are disparate and non-standardised, which makes it difficult for potential students to choose the appropriate courses. There could also be a problem with credibility since the use of quality management, which supposedly should suit any organisation, is not to any significant amount used by the universities themselves. Also, it might be that the courses offered are really not customised to the needs of the end users but perhaps more functionally oriented to specific traditional fields within quality management. It is nobody's fault that there seems to still be an important improvement potential. It is just that on a national level in Sweden there appears to be a design flaw, which has not yet been fully addressed. A reason for this could be that there has been as yet no methodical examination of the supply chain of higher education quality management as a system. Use of a process model, such as the one presented in Figure 1, may help in picturing the entire system. The model may also aid the identification of important cross organisational processes and supply chains as a precondition for improvement.

4.1 Discussion and Proposals for Further Work

The results of our work are only indicative. We have not more than sketchily assessed the potential for additional quality education, which would probably mainly concern universities. Furthermore, we have not studied educational supply chains within other areas than that of quality management. Neither have we discussed the implications of a less competent workforce for Swedish organisations. It is of course very hard to put a precise value on this type of education. The Specific Product Value, see (Isaksson, 2005), mentioned in Figure 1, is to indicate that there might be a need for assessment of what the value for students and employers is in relation to the total cost of the education. The cost of education may be relatively easy to calculate but the value added is probably much more difficult to assess. For students this might be the extent to which they use the acquired knowledge and how this knowledge has helped them get a good job. For employers the value added might be the value created by the former students using their quality knowledge for improved performance. It should be of interest to study the design quality of courses and programs in quality management. To what extent are these courses based on end user needs and to what extent on a sort of production focus, based on the background of the educators? There could be a problem in that quality management has become too much of an academic issue. Quality management should ideally be cross-functional and process orientated, which at times

is difficult to manage in the university world. How many quality courses are today based on Deming's system of profound knowledge with appreciation for a system, knowledge about variation, theory of knowledge and psychology?

We think that further work and research could possibly be carried out as follows:

- Starting with the groups or departments responsible for the quality education and describing them using the process model in Figure 1. An interesting question may be how the quality course offering has been customised.
- With some more internal credibility the internal quality work could be extended to the entire university, again using the process model to identify important processes and measurements. Some suggested questions:
 - How is quality management integrated into other courses?
 - How is quality management used for improving the university performance?
 - How is quality education marketed as a product?
- Co-operation on a voluntary basis between quality educators trying to find an agreement of how to standardise the field with the purpose of increasing the total market
- Possibilities for co-operation with other actors within the national quality education field
- Joint studies of market needs
- Benchmarking of the quality education supply chain with other countries.

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