

SELF-DEVELOPED MODEL FOR EXTERNAL PROGRAMME REVIEW AT CHALMERS UNIVERSITY OF TECHNOLOGY – STAKEHOLDER NEEDS AND PERCEPTIONS

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ABSTRACT

Swedish models for evaluation of Quality in Higher Education (QHE models) have historically been designed by national agencies for higher education (HSV, UK-ämbetet). However, the proposal for the coming national QHE model assigns more responsibility to individual universities to develop their own QHE models. Chalmers University of Technology is developing such a local QHE model. In this paper, we focus on one of its components, namely a framework and process for programme evaluation by external reviewers, the Chalmers Programme Review Framework (Chalmers PRF). The Chalmers PRF aims to provide an external and international perspective from independent academic and industrial experts on the targeted programmes and their operational environment in the context of global best practice. The paper further accounts for the experiences from pilot testing of the evaluation framework on two MScEng (Sw. Civilingenjör) programmes – Electrical Engineering as well as Automation and Mechatronics Engineering. In particular, the relevance and utility as perceived by programme stakeholders – industry, university management, teacher and students are discussed. Even though this external programme evaluation model was developed for an institution in the Swedish context, it may be easily adapted to institutions beyond Sweden for states with engineering accreditation systems, and those without.

KEYWORDS

Education Quality Assurance, Programme Review, Standard 12

INTRODUCTION

Across the world, governments and professional bodies have developed frameworks and standards that address the level and contents of engineering programmes at universities. If a programme meets these standards, it will graduate professionally competent and responsible engineers. Examples include EUR-ACE (2015), Engineers Australia (2008) and ABET (2015).

In Sweden, the models for evaluation of Quality in Higher Education (QHE models) have historically been designed by the government's national agencies for higher education (HSV, UK-ämbetet).

The international frameworks are relatively stable over time. By contrast, the Swedish national models for evaluation of higher education have had different aims and designs for each review cycle. In the 2006 review of engineering programmes (Högskoleverket, 2006), the focus was on processes, pre-conditions (e.g., grade point average of entering students) and throughput. In the framework applied in the 2013 review (Högskoleverket, 2010), the focus was on achieved learning outcomes, as demonstrated in final degree reports.

From 2016, a new Swedish national system for quality assurance of higher education (Regeringskansliet, 2015) will be introduced that gives universities the responsibility to self-develop processes for programme quality assurance. The Swedish Higher Education Authority (UK-ämbetet) will then review these processes rather than the actual programmes. As a baseline, local QHE models should consider the output of the education in the relation to the national goals. However, the new proposal also opens opportunities for universities to develop local QHE models that, in addition to addressing outcomes in relation to national goals, also evaluate the university's standing towards its internally defined goals, for example to validate that the education at the university holds up to high international quality indicators. Chalmers University of Technology is developing such a local QHE model.

Malmqvist et al. (2015) reviewed a number of self-developed QHE models, including those from Massachusetts Institute of Technology (2015), the Technical University of Denmark (DTU, 2014), University of Strathclyde (2015) and Reykjavik University (2011) and found that the self-developed frameworks put the emphasis on improvement and development beyond the thresholds set by accreditation requirements. Evaluations made at the request of the own university have the advantage that they elicit honest and constructive feedback. This may not always be the case during a review made for an accreditation or similar. The reason is that in a third party review, the ambition is to come out well and avoid criticism. Thus, discussions of weaknesses may be suppressed. However, Malmqvist et al. also found that self-developed QHE models (just like national models) can differ substantially with regards to aims, scope and panel composition. Hence, self-developed QHE models must be carefully designed, and their development requires a significant investment in time, resources and money from the university, as well as a number of iterations to make improvements and adjustments based on pilot experience with applying the model.

In this paper, we present and discuss on one such model, namely a process for external programme evaluation, the Chalmers Programme Review Framework (Chalmers PRF). The Chalmers PRF aims to provide an external and international perspective from independent academic and industrial experts on the targeted programmes and their operational environment in the context of global best practice. The Chalmers PRF was developed and piloted on two MScEng (Sw. Civilingenjör) programmes – Electrical Engineering as well as Automation and Mechatronics Engineering during the spring of 2015.

In particular, we focus on the relevance and utility of the Chalmers PRF for its customers, i.e. the stakeholders for Chalmers educational programmes: industry representatives, university management, programme directors, faculty, students, and government. We will compare their views on quality in higher education, and their impression of the Chalmers PRF in itself as well as in comparison with other QHE models that they have experienced.

This study was designed to follow up the pilot test of the Chalmers PRF reported on in Malmqvist et al. (2015). It was carried out as an interview study with relevant stakeholder representatives, i.e., industry, students, university management, programme directors and faculty. Two representatives from each stakeholder category were interviewed, i.e. ten in total. No government representatives were interviewed in the study, due to the future Swedish national system for evaluation of higher education not being finalized at the time of the interviews (March 2016). The interviews comprised circa 20 questions in the categories personal information, views on educational quality, views on the Chalmers PRF and outlook. The interview duration was typically one hour. The interviews were transcribed. Data analysis was conducted by the KJ method and to some extent quantified.

The remainder of the paper is structured as follows: We first account for the Chalmers proposed framework and process. This is followed by a presentation of the results from the stakeholder interviews. The discussion reflects on the fulfillment of the requirements from government and from Chalmers. The last section wraps up the paper by stating conclusions and identifies needs for future work.

CHALMERS PROGRAMME REVIEW FRAMEWORK (CHALMERS PRF)

The design of Chalmers PRF was guided both by compliance requirements derived from governmental frameworks, and “improvement” opportunities suggested in the self-developed frameworks. A review done according to Chalmers PRF must verify that national degree requirements are satisfied, but also guide Chalmers' development towards its own goals and ambitions, including providing world-class education.

Review aims

The primary aim of Chalmers PRF (2015) is to be a key tool in enhancing the competitiveness and quality of Chalmers' programmes. It achieves this aim by providing an external and international perspective of independent industrial and academic experts on the targeted programmes, set in the context of global best practice.

Review framework & parameters

The review considers four perspectives (student, resources, directions, and impact) each with 3-5 criteria. For example, the impact dimension includes criteria related to the value, employability, knowledge transfer and international standing of the programme. Figure 1 shows the structure and components of the framework.

As can be seen in Figure 1, a number of the Chalmers PRF review criteria are also found in accreditation/national evaluation models, including, e.g., learning environments and quality assurance processes. These standard criteria provide the basis of Chalmers PRF, and well positions a Chalmers programme that passes the review to also pass a national evaluation/accreditation.

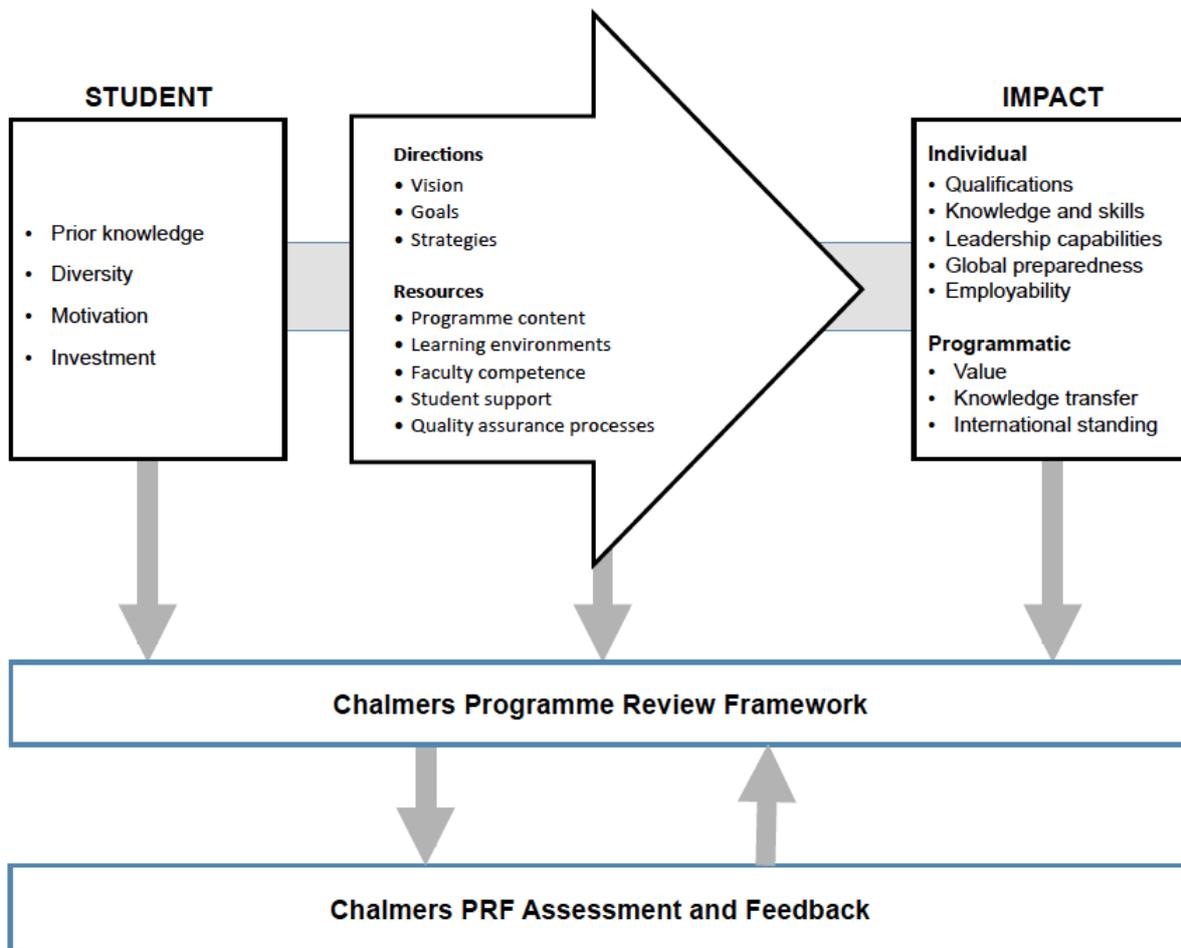


Fig 1. Chalmers Programme Review Framework.

However, a number of criteria have been added to the framework, targeting specific aims for Chalmers' programmes. The Chalmers-specific review criteria include:

- **Leadership.** To what extent the programme prepares to assume leading roles in the development and operation of product, systems and processes?
- **Global preparedness.** How does the programme prepare for a globally mobile career including international employment?
- **Value.** What are the unique selling points/profile of the programmes? What are the perceptions of stakeholders of the unique benefits of the programme graduates?
- **Knowledge transfer.** How do graduates bring new knowledge from academia to industry? How many patents and new companies created by students and recent graduates? What is the role of the programme in the local innovation ecosystem? Do students publish research papers in peer reviewed journals and conferences?
- **International standing.** Are courses found to be of high international standing through international benchmarking or review? Are master theses of high quality in an international perspective?

Review methodology & and process

The methodology and process of the review is similar to that of a standard external review, i.e. planning, self-evaluation, site visit, post-visiting reporting and response, and follow up. However, special attention is given in the planning phase to customize review questions and objectives to Chalmers' current interest and strategies, in order to target the review at relevant issues. Moreover, international participation is sought in the review panel, both regarding academic domain experts and industry experts.

Review deliverables

The review report accounts for the review preparation and process but its main substance is stated in terms of strengths, weaknesses and recommended actions, organized into:

- Commendations. Identified aspects where Chalmers has strengths, particularly with respect to an international reference point.
- Recommendations. Identified issues that Chalmers should address along with recommended actions to resolve the issues.
- Opportunities. Somewhat more generally formulated actions that Chalmers might consider in order to improve its standings and operations.

Pilot testing

Chalmers PRF was tested during 2015 on two MScEng (Sw. Civilingenjör) programmes: Electrical Engineering (E) as well as Automation and Mechatronics Engineering (Z). The commendations and recommendations set comprised 13 commendations, 3 priority recommendations, 16 general recommendations, 8 recommendations common to E and Z, 8 E-specific recommendations, 7 Z-specific recommendations and 5 general opportunities, i.e., 50 recommendations and opportunities in total. The pilot test has demonstrated that the Chalmers PRF provides a rich set of proposals for educational improvement. A more detailed discussion of the results can be found in Malmqvist *et al.* (2015).

STAKEHOLDER NEEDS AND PERSPECTIVES

In this section, we account for the results from the stakeholder interviews. We will present their views on characteristics of quality in higher education, on quality improvement work, the importance of the various stated purposes of the Chalmers PRF and how effective it had been in the pilot test, and the stakeholders views of strengths and weaknesses of the Chalmers PRF in comparison with other quality assurance models that they had experience of, as well as what the stakeholders identified as development needs of the Chalmers PRF.

Stakeholder views on quality

The university respondents bring forward a view of quality as consisting of many aspects: the results of the education, the educational processes, the way that students are met by and supported through their studies, the university quality assurance processes, elements of industry involvement, engaged and highly competent teachers and the attitudes amongst professors to continually develop their courses and teaching approaches were all mentioned. Hence, it would appear that a QHE model should also be multidimensional or holistic.

Alternatively, that it would be realized that any single QHE model might only address parts of the issues, and that a university would need several complementary QHE models.

One industry representative described a quality education as one that combines theory and practice in a synergistic way. On one hand, he argued that deep working knowledge of theory is essential to solve really hard problems, on the other hand that fresh graduates lacking of understanding of practice would tend to bring forward unrealistic ideas and be perceived as naïve. This industry representative further emphasized the importance of preparing for leadership, and of the importance of equipment and infrastructure that supports hands-on learning. The other industry representative argued that a high quality combines mastery of modern engineering tools with social skills (*“technical knowledge is not sufficient”*). It can be noted that both industry interviewees brought forward quality characteristics that are at the core of a CDIO-based programme.

Quality improvement work

The university leadership interviewees described their quality improvement practices in a rather diverse way, although two tendencies could be discerned: one approach that relied on processes and instruments, one on the personal interaction with people: *“I work by walking around and talking to by people”*. These tendencies are mirrored in what features of the Chalmers PRF that the individuals had appreciated. For the instrumentalists, the structured approach is the value, but for the respondents who emphasized dialogue, the personal interaction with the panel members was an essential incentive of the Chalmers PRF, as discussed further.

When asked about barriers to quality improvements in higher education, the university respondents identified the strongest barriers as the status of teaching, especially in a research-intensive university, and as faculty time: there is always competition with other opportunities and responsibility. The students, however, also argued that some teachers are reluctant to change despite criticism. Hence, a typically less articulated challenge for a QHE model is to appear rewarding for involved actors and to create attention for the associated educational development. For the Chalmers PRF, the programme directors identified the dialogue with international experts as particularly rewarding. The industry representatives emphasized the importance of frequent meetings and of steering the university-industry meetings toward dialogue, not only information from the university side.

Stakeholders' assessment of the Chalmers PRF

The respondents were asked to assess Chalmers PRF through a quasi-quantified assessment of the importance of the Chalmers PRF's purpose and the effectiveness of the review to deliver recommendation pertinent to the purpose; and in through open-ended questions on review outcomes and associated development needs.

Ratings of importance and effectiveness

The Chalmers PRF has a number of stated purposes. The interviewees were asked to rate the importance and effectiveness of the pilot set in addressing the purposes. A five-level rating scale was used for both assessments, ranging from < not important at all (1) – very important (5) > and < not at all (1) – very significantly (5) >. The ratings are shown in Table 1, including averages and ranges.

Table 1. Stakeholder ratings of the importance of the purposes of the Chalmers PRF, and of the effectiveness of the process in providing support for each purpose

Purpose	Importance		Effectiveness	
	Avg	Range	Avg	Range
Provide an external and international perspective of independent industrial experts on the targeted programmes	4.3	3-5	3.7	3-5
Provide an external and international perspective of independent academic experts on the targeted programmes	4.1	2-5	4.1	3-5
Secure that national degree requirements are fulfilled	4.1	3-5	2.7	1-2
Guide Chalmers development towards its own ambitions, including education of a higher international standing	4.3	3-5	4.1	3-5
Indicate to what degree Chalmers programmes have a positive impact on society (relevance, employability, knowledge transfer)	4.1	3-4	2.6	1-3
Indicate to what degree the educational programmes are supported by an appropriate institutional environment (leadership, faculty competence, support staff, learning environments etc)	4.3	4-5	4.0	3-5
Indicate to what degree Chalmers internal quality assurance processes are purposeful and effective	4.3	4-5	3.4	1-5

We observe that all purposes are assessed as important (4) or very important (5). The ratings concerning effectiveness were a bit lower, but the generally close to or above the “significant” level (4.0). However, two purposes stand out as less effectively delivered “Secure that national degree requirements are fulfilled”, and “Indicate to what degree Chalmers programmes have a positive impact on society (relevance, employability, knowledge transfer)”. These purposes will be further discussed below.

As general strengths of the Chalmers PRF, the interviewees especially mentioned the value of being exposed to external and international perspectives.

Improvement needs

Many of the respondents pointed out that they had expected more programme-level focus in the review findings. Instead the review findings tended to be directed towards the university level leadership routines, including roles, responsibilities and accountability, quality systems, and how these were implemented. To some extent, the programme directors were disappointed with this balance. They had made a major effort to prepare for the review, and felt that they got less concrete and less numerous recommendations in return. Clearer instructions, compiled overview of available material, and ample time to the review the material were suggested in order to get more of the review at the programme level, alternatively a different introduction to the programme directors of the purpose of the review to set the correct expectations would be useful.

The programme directors further argued for the need to minimize the effort to produce the documentation for the review. The current list of data and documents is rather extensive, and the programme directors felt that only a fraction was accessed by the review panel and visible in the analysis. A clarification of what documentation that would be required and for what specific analysis was requested, along with database systems that could gather data (e.g. number of first-hand applicants) over time and enable trend analysis, comparisons with other programmes etc.

A unique element of the Chalmers PRF is the assessment of impact. This purpose was assessed as very important by the stakeholder but the recommendations in the review less significant. This element must be given more attention in further reviews, starting from elaborating the data to be collected, how it should be analyzed etc.

The low rating of effectiveness for “*Secure that national degree requirements are fulfilled*” along with comments from the interviewees that it may not be obtain to accommodate both a focused, development-oriented dialogue and an extensive, control-oriented examination within the same framework and occasion. In the pilot, development was prioritized (nevertheless, a number of the recommendations were of control and accountability character. The respondents agreed that this should be the priority. However, this also leaves a gap, since the Swedish government, if the current proposal stands, is not going to make programme-level evaluations in the future. Possibly, this may lead to that some Swedish universities opt to apply for accreditation by EUR-ACE or ABET in order to secure that their programmes meet international threshold standards.

Teachers, students and industry representatives generally were less certain about the results of the evaluation, with many “*I cannot assess*” replies concerning effectiveness. It is clear that there needs to be a comprehensive and broad result communication activity as part of the framework, if the results are going to be well known outside of the circle of university management and programme directors.

The interviewed teachers voiced concerns of what they viewed as the top-down perspective of the framework, and of some recommendations that emphasized accountability. They argued that the university should to a higher degree trust its teachers; provide them with autonomy and design programmes starting from the teachers’ actual competence, rather than on a pre-defined list of programme learning outcomes. The question is how to design a programme review framework so that it also is perceived and rewarding and constructive for individual faculty to participate in?

In conclusion, however, the respondents were in agreement that the Chalmers PRF will be a central component in Chalmers education quality system and essential for the future quality improvement at Chalmers.

DISCUSSION

This study was made with input from a limited number of respondents. The pilot test together with this study and that of Malmqvist *et al.* (2015) provided limited grounds for arguing that the findings are transferable to other universities. More test and evaluation is needed.

The pilot test was also limited in some ways. Firstly, the time scale to prepare and conduct the programme reviews was compressed, since they were a pilot conducted on the tail of designing the framework itself. This constrained the ability to conduct a detailed examination of the programme details. Secondly, and most importantly, the review panels only consisted of two individuals: the second and third authors of this paper. With larger review panels, some more specific feedback on programme and course contents and level would likely have been obtained.

CONCLUSIONS

Local models for evaluation of Quality in Higher Education (QHE models) complement national models by enabling a stronger focus on locally relevant issues, by including an international perspective and benchmark, and by being more development-oriented than the national control-oriented models.

Chalmers PRF is such a model. Particular to the Chalmers PRF is the consideration of evaluation criteria regarding: leadership, global preparedness, programme value, knowledge transfer and international standing were added.

The stakeholder interviews reported in this paper suggest that an extensive dialogue between review panel and evaluated programmes is essential to reach the development-oriented ambitions of the framework. The interviews further indicate that it will likely be difficult to use this framework to both guide development and to secure that national degree requirements are met. Hence, it may be proposed that the Chalmers PRF is focused on development, while other QHE frameworks are applied to secure compliance with national criteria.

It is suggested that the Chalmers PRF may be easily adapted to institutions beyond Sweden for states with engineering accreditation systems, and those without.

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Mats Nordlund has a background from executive positions in academia and manufacturing industry in Europe, USA, and Russia. He has also served on several national and international panels in innovation, research and education. In academia, he recently served three years as Vice President of Research Programs at Skoltech in Moscow; previously he launched and managed the System Design and Management (SDM) programme at MIT.

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