

ASSESSING A GRADUATE OPERATIONS MANAGEMENT COURSE USING THE HOUSE OF QUALITY

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Abstract

Students in a graduate operations management course were surveyed to assess their perceptions concerning such issues as the course focus, e.g., service versus manufacturing, qualitative versus quantitative material; the course content, e.g., breadth versus depth of coverage; the topics included; the pedagogical approach, e.g., lecture, cases, simulation. This information was used to develop input to a House of Quality. This House of Quality was analyzed, and the results were the basis for course revisions.

I. INTRODUCTION

Our MBA program is primarily an evening program so a large percentage of our students are full-time employees with significant business experience. Each semester students are asked to complete a brief background questionnaire at the beginning of the course. This information indicates that the students' academic and work experiences are quite diverse. This diversity of backgrounds is one of the motivations for conducting this evaluation.

For some time the four members of our operations management (OM) faculty have been concerned about the graduate OM course we offer. Our concerns included such issues as the course focus, e.g., service versus manufacturing, qualitative versus quantitative material; the course content, e.g., breadth versus depth of coverage; the topics included; the pedagogical approach, e.g., lecture, cases, simulation. Our concerns were based on circumstances such as what we perceived as changes in the expectations of our students, a lack of relevant feedback from the institution's formal teaching evaluation system, availability of new instructional technologies that could impact this course, and, what we suspect is a prime motivator of this questioning, a feeling at the end of a semester that we could have done a better job. Thus we felt that the course should be reviewed and evaluated.

Since the potential modifications to the course could involve a significant investment on the part of the faculty and could have a substantial impact on the students, we felt that the typical unilateral review and modification would not address the concerns that motivated this effort. We decided to use one of the tools that we teach in the areas of product/service design and total quality management, the House of Quality, to help us in this process.

II. COURSE DESCRIPTION

The course is required for all MBA students. The prerequisite is an introductory undergraduate OM course. We cover practically all of the topics included in a typical OM text. Our general approach to the material is what may be described as “managerial”, i.e., the use of quantitatively based models is limited. Thus, exams consist solely of discussion questions. A student has three options for his/her term paper --- a comparison between a classic operations book and a modern operations book, a primary research project, and a secondary research project. Even though several faculty members teach this course, there is a high degree of uniformity in course content and pedagogical approach.

Class size ranges between 18 and 25. The course typically meets once a week for two hours and forty minutes. Relevant chapters from the text are assigned along with two to three articles each week. At the beginning of a semester, students in a section form teams of three or four. Each team is then randomly assigned a class session and is responsible for developing and making a presentation using the assigned articles as a starting point.

III. THE HOUSE OF QUALITY

Essentially the House of Quality is a structured way of converting the needs and expectations of the customer into product/service specifications. The House of Quality is usually embedded in a more comprehensive program --- Quality Function Deployment (QFD). The QFD approach normally consists of four phases (Houses of Quality); the outputs of one house providing inputs to its successor house (see Terninko [1997] or Hauser and Clausing [1988] for a more complete description). In our case, we considered only the first house in this series since many of the issues addressed in subsequent houses are normally beyond the control of the individual faculty member.

In higher education, QFD has been applied in several situations. Ermer [1995] reported on how the University of Wisconsin-Madison’s Engineering Department used QFD to revise its undergraduate curriculum. Pittman [1996] et al described the use of QFD in evaluating Grand Valley State University’s MBA program. Bier and Cornesky [2001] explained how QFD was used to construct an MS curriculum that would meet the requirements of its accrediting agency. QFD was used to improve teaching and student counseling in the school of engineering at West Virginia University [Jaraiedi, 1992]. Lam and Zhao [1998] presented a study on formulating and evaluating university teaching techniques based on analytical hierarchy process (AHP) and QFD. These efforts were at the program level. We are applying a portion of QFD, the House of Quality, at the course level.

Although "house" designs can vary and are flexible, all contain the same basic building materials:

Whats: The qualities or attributes the product or service must contain, as required by the customer. Whats are compared to competitors' qualities and ranked by importance.

Hows: The technical means of satisfying the whats, including the exact specifications (the how-tos) that must be met to achieve them.

Correlation Matrix: An evaluation of the positive and negative relationships between the hows, sometimes called the "roof." Used to determine the best use of internal resources.

Relationship Matrix: An evaluation of the relationships between the whats and the hows. Identifies the best ways to satisfy the customer and generates a numerical ranking used as a guide throughout the development process [Kinni, 1993].

According to Chase, Aquilano and Jacobs [2001], one of the first steps in the development of a House of Quality is to identify the customer requirements (the "whats" or "voice of the customer"). We considered the students enrolled in the course as a primary customer for this course. The voice of this customer base was assessed using a questionnaire given at the end of the course.

The Whats. In one section of the questionnaire, ten possible course components were listed. The student was asked to "indicate the magnitude of the contribution that each component *could* (emphasis added) make to enhance the worth of" the course. An eleven-point Lickert scale was provided for each component. In another section, the students were asked to indicate where the current course stood by reacting to eight statements dealing with the issues presented in the introduction. A seven-position completion scale was provided for each item. The students were asked to respond to seven more statements concerning the value of the various components used in the current course in a third section. Their responses were analyzed, and the following customer requirements were developed:

An emphasis on applications to and examples from the service sector

Emphasis on outside reading assignments

Qualitative approach

Given these items, a House of Quality was started. As seen in Figure 1, these customer requirements form the rows in the room to the left that were extended into the main room.

The Hows. In the next phase, the "hows" or the design requirements for this course were determined. These generally evolve from the "whats" identified above. In this case, we looked for those aspects of the course where decisions can be made at the professor level. Basically these are decisions regarding the structure and content of this course. Initially we identified the following areas:

Presentation method (lecture, cases, simulation, seminar, videos, outside speakers or some combination)

Coverage (number of topic areas)

Sector focus (mix of service and manufacturing)

Approach (qualitative [managerial] or quantitative)

Student participation (amount and type)

Assignments (amount and type)

Grading (components and relative weighting)

These formed the columns of the second story room in Figure 1 that were extended into the main room.

The Relationship Matrix. The next step was to complete the relationship matrix formed in the main room of the house. If there is a relationship between a customer requirement (a row) and a design requirement (a column), the strength of that relationship is estimated. By convention, the strength of the relationship is limited to three levels --- small, medium or strong. Each of these levels is represented by a different symbol placed in the appropriate cell of the relationship matrix. The results are shown in Figure 1.

The Correlation Matrix. The next step was to examine the potential correlation between each pair of “hows” (design requirements). When one design requirement affects or is affected by one or more other design requirements, i.e., they are not independent, the strength and direction of that relationship is noted in this matrix. Correlations are usually limited to four conventional situations --- strong positive, positive, negative, strong negative. By properly orienting the partial matrix, an “attic” is formed on top of the second story room. Our evaluations are shown in Figure 1. This information is important to know when the next phase of this process is carried out.

In the next phase, the relative importance weighting for each customer requirement was determined. We based our weights on the results from the questionnaires, and used a three-point scale. These relative weights were arrived at using the informal approach of group discussion. Once these values were determined, we calculated an importance weighting for the strength relationships for each of the design requirements. The importance weighting is a weighted sum using the strength relationships for a design requirement and the relative importance of each customer requirement. As noted in the caption for Figure 1, we used the conventional weightings for this calculation.

The next (and in our case the final) phase was to determine the specifications of the product (the course). Our resulting House of Quality indicated that there are two primary areas that needed attention --- the proportion of course devoted to the service sector and the proportion of the material assigned outside of the text. One recommendation was to modify the course by increasing the outside readings that deal with service applications and decreasing those that have a manufacturing focus, i.e., alter the balance. Evaluation of the role of the text in the course was also recommended. One alternative was to find a text with more of a focus on service than our current text. Another alternative was to diminish the role of a text by making a basic OM text optional. The amount of outside assignments would be increase to compensate. By judiciously selecting these added assignments, the manufacturing balance could be moved further toward the service end. The text content should be evaluated relative to its focus on service.

IV. CONCLUSIONS

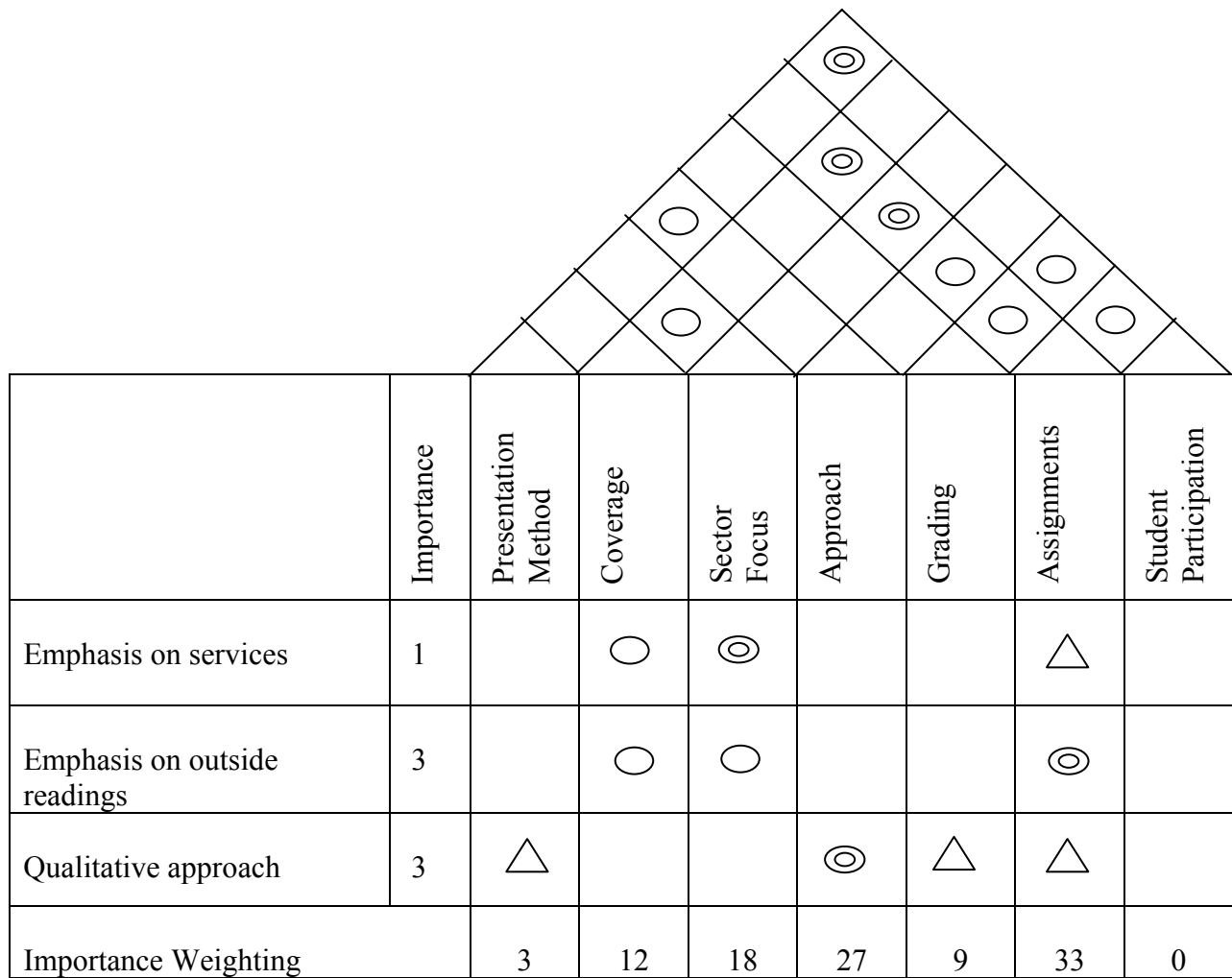
At this point, we have not implemented any changes in the OM course based on this analysis. We hope that in the future some modifications based on the recommendations above can be put into practice. After implementing these changes, feedback will be obtained in a manner similar to what was used in this project to determine if our adjustments have improved the course’s ability to meet the customers’ requirements.

A more general conclusion is that a major benefit of this effort is going through the process itself. We have developed a fact-based foundation upon which this course can be refined. It also serves as a basis of informed discussions about the course with fellow OM faculty as well as non-OM faculty. As we conducted this endeavor, a variety of issues arose. For example, was the “customer” properly identified in this case? In the case of course design, how instrumental should the students be? Are there other constituencies that should be considered, e.g., faculty that teach the courses that have this course as a prerequisite, employers, MBA alumni? How would their respective requirements be assessed? If multiple constituencies were considered, how would their requirements be combined? Was the scope of our inquiry of our selected customer

base wide enough, i.e., were there some important issues that were omitted? Should the feedback process be altered to facilitate the use of some more sophisticated procedure such as AHP in determining relative importance, i.e., are the additional benefits worth the additional cost? Is the House of Quality format needed to obtain similar outcomes? In any case, we found this to be an insightful and constructive process that has yielded sound recommendations. It will be continued in the future.

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Relationships Notation

- ◎ Strong = 9
- Medium = 3
- △ Small = 1

Correlations Notation

- Strong positive ◎
- Positive ○
- Negative ×
- Strong negative ✖

Figure 1: House of Quality