Applying QFD to Design Vocational Training Course for Clothing Merchandisers

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ABSTRACT
The primary purpose of this paper is to present a case on using QFD to design and plan the content of a training course for the entry-level clothing merchandisers of a buying office to perform dimensional check for samples. Instead of using the traditional 4-2-1 or similar symbols to assign weights for assessing the effectiveness of the “HOWs” to achieve the “WHATs” of the matrix of the quality table, AHP will be used to operate this important decision-making step. We hope this case will contribute on illustrating how QFD, incorporated with AHP, could be easily applied to practice quality-oriented course development for vocational education and training.

Keywords: QFD, training, course design, clothing merchandisers

1.0 Introduction
The industry of Hong Kong is developing from production towards product development. It has markedly evolved from OEM (original equipment manufacture) to ODM (original design manufacture), and is seeking its way to transform to OBM (original brand manufacture) (Hong Kong Industrialist, 2005). In regard to this major trend of development, many trading companies of the industry have shifted from offering sales-based merchandising services to purchase-based merchandising services to buyers. On one hand, the China’s accession to the World Trade Organization (WTO) has attracted more and more overseas buyers to set up their buying offices in Hong Kong to facilitate their purchase of merchandise with this “world factory”. On the other hand, in the face of increasing competition of the global market, many sales offices in Hong Kong, which were originally established for receiving orders to feed their production lines in the Mainland and some other developing countries, have expanded their business to provide purchasing services to buyers. This shift, though will take some time to be fully realized, is a critical turn for the development of the industry in Hong Kong.

The shift from sales-based to purchase-based merchandising services will be a great challenge for the vocational education and training institutions. The institutions have a successful record of supplying manpower for production, but they need to develop new education and training services in order to continue their support to the development of the industry in Hong Kong (Lumby, 2000; Ashton, 2002). Both types of merchandising are administrative in nature and the merchandisers execute more or less the same operations. However, the merchandisers’ perspectives and concerns are different because they represent two different parties of trade. They require two different vocational education and training curricula though they look similar. To meet the challenge, the institutions need to practice quality-oriented course development. The course planners are required to understand the job needs of the purchased-based merchandisers before they could design and plan appropriate courses to enhance the vocational knowledge and skills for this new major manpower group of the current industry. This paper is to present a case on using quality function deployment (QFD) to design and plan the content of a training course for the entry-level clothing merchandisers of a buying office to perform dimensional check for samples. We hope this case will contribute on illustrating how QFD could be easily applied to practice quality-oriented course development for vocational education and training.
2.0 QFD and AHP

Akao introduced QFD in 1966, the time the Japanese automobile industry was in the midst of rapid growth. Emphasis was placed on new product development and model changes for meeting the increasing competition of the market (Akao, 1990; Akao & Mazur, 2003). QFD focuses on delivering value by understanding the customer’s wants and needs and then deploying these expectations throughout the development process (Hill, 1994). In short, it is a system that strategically translates customer requirements into the appropriate technical requirements for each stage of product development and production with an aim of outperforming market competition (Sullivan, 1986; Terninko, 1997).

QFD strictly obeys the customer paradigm and firmly adopts problem-solving approach to develop products and services. The problem to be solved by the supplier for its customers is the gap between the ability of its product or service and the actual customers’ needs. QFD advocates listening to customers first. It assists the translation of customers’ requirements all the way back in any business process that the end product or service actually satisfies those demands (King, 1987). The outcome of such design approach to product development produces a win-win situation to both the supplier and customers. Not only development time is shortened and fewer engineering changes, but customer satisfaction is also increased (King, 1989).

QFD skillfully selects and combines the appropriate new QC tools to conceptualize and operate product development. Although each of the new QC tools is useful in and of themselves, the synergistic combination of these tools that created by QFD produces a process whose power is far more than the sum of its parts. To serve as a platform for product development, QFD is ready to accommodate new technologies and techniques for solving customers’ problems. The initial development of QFD has adopted the assignment of 4-2-1 or some other similar symbols to weight the effectiveness of the “HOWs” for achieving the “WHATS” of the matrix of the quality table. It is an easy method and has an advantage of encouraging people to accept and apply QFD. However, in the face of increasing competition of the market and limited available resources, this weighting step becomes critical to successful product development. Analytic hierarchy process (AHP) therefore is introduced to improve this important decision-making step. AHP adopts problem-solving approach for making complex multi-criteria decisions based on variables that do not have exact numerical consequences. It allows for the application of data, experience, insight and intuition in a logical and thorough way. AHP enables decision-makers to derive ratio scale priorities or weights instead of arbitrarily assigning them (Saaty, 1994; Forman & Selly, 2001). In doing so, AHP provides a mathematically valid mechanism to operate QFD. Not only also easy to use, and, but it greatly enhances the powerfulness of QFD for product development.

3.0 Case Study

Sample inspection is one of the major tasks of junior merchandisers. The course that under studied is an in-house training of a buying office. Its aim is to train the entry-level clothing merchandisers to perform dimensional check for samples, which is the technical part of sample inspection. The current content of the course is emphasized on training the trainees the inspection skills and educating them the material and production defects that commonly found on clothing products. Recently, the company has found that some problems with product development should have had avoided if the samples were properly checked. To avoid such problems, the company thus decided to enhance the competency of the junior merchandisers to perform sample inspection.

Junior merchandisers of manufacturing companies should not have much problem with checking sample measurements, as they usually are graduates of technical colleges or vocational education institutions. However, checking sample measurements is something new for those of buying offices. Since many newly recruited junior merchandisers are university freshmen of various disciplines, they therefore do not have abundant knowledge about clothing products and production. Instead of treating it the same as training quality controllers, the course should have a different emphasis and approach in regard to the trainees’ background and their job purpose.
3.1 Methodology

In December 2006, three merchandising managers of the company were invited to attend a brainstorming session. The purpose of the brainstorming session is to understand their performance expectation with the task of dimensional check for samples. Under the facilitation of the author, the merchandising managers were encouraged to exchange opinions and put forward suggestions. Their voices were jotted down onto the affinity diagramming pane of Expert Choice® (software for operating AHP) with the verbatim as original as possible. The jotted down verbatim was then further modified, reworded and grouped. Upon discussion, it was agreed that the primary performance requirement for the task of dimensional check for samples is “measure accurately”. The primary performance requirement is composed of two performance criteria: (1) measure with appropriate techniques, and (2) measure at the right positions. To put them in AHP terms, the primary performance requirement is the goal to be ultimately achieved and the two performance criteria are the objectives that to be fulfilled in order to achieve the goal. Finally, the three merchandising managers were asked to assess the relative importance of the two performance objectives in respect to the primary performance goal. Their responses were entered into the group model of Expert Choice® for calculating the global and local weights. Exhibit-1 displays the structure of the performance expectation, with the goal and its objectives attached with respective weights. This tree is equivalent to the “WHATs” of the demanded quality hierarchy of QFD.

Exhibit-1: Structure of the performance expectation for the task of dimensional check for samples

Upon understanding the performance expectation of the merchandising managers, the next step is to understand the problems the entry-level merchandisers may have when they perform the task. The author thus paid a “gemba” visit to the second lesson of the training course. Besides observed how the trainees learn to check sample measurements, the author also interviewed the trainees for understanding their difficulties with the learning process. The collected voices were analyzed in order to interpret and extract the actual meanings of the trainees. They were then used to generate a list of knowledge and skills for facilitating the trainees to perform the task, which are the alternatives for achieving the performance objectives. This is equivalent to the “HOWs” of the quality element deployment hierarchy of QFD. Exhibit-2 is an example of processing the voices that collected from the trainees.

<table>
<thead>
<tr>
<th>Trainee</th>
<th>Sample Measured</th>
<th>Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Style 10 Men’s woven dress shirt</td>
<td>He is pointing to the width of a sleeve placket of a shirt.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Original Customer Verbatim</th>
<th>Reworded Customer Verbatim</th>
<th>Extracted Meaning</th>
<th>Suggested Knowledge &amp; Skills to be Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>I want to know which component of the sleeve is the sleeve placket.</td>
<td>I need to know the components of a sleeve.</td>
<td>Terminology of sleeve components.</td>
<td>Clothing terminology</td>
</tr>
<tr>
<td>I want to know what “depth” means.</td>
<td>I need to know the meaning of the dimension of depth.</td>
<td>Dimensions</td>
<td>Basic geometry for garments</td>
</tr>
<tr>
<td>I want to know how to measure the depth of the sleeve placket.</td>
<td>I need to know the technique for measuring the depth of the sleeve placket.</td>
<td>Techniques for taking measurements of different dimensions</td>
<td>Measuring techniques</td>
</tr>
</tbody>
</table>

Exhibit-2: An example of processing the voices collected from the trainees

With reference to the processed trainees’ voices, five subject areas were suggested for the course. These five subject areas were put onto a questionnaire (Exhibit-3) for the trainees to make pair wise comparison on the importance for achieving the two performance objectives respectively. To avoid misunderstanding about the scopes of the subject areas, the trainees were provided with definitions. 20 questionnaires were distributed to the trainees on the third lesson of the training course. They were all completed and collected. The responses were put into the group model of the Expert Choice® to synthesize the priorities for the five subject areas. This process is equivalent to the weighting of the...
matrix of the quality table – assessing the effectiveness of the “HOWs” to achieve the “WHATs” of QFD.

Exhibit-3: Part of the questionnaire for pair wise comparison of the five subject areas

3.2 Results and Discussion

Exhibit-4 shows the result of the survey. The top two subject areas are “Measuring techniques” and “Basic measurements”, earning 28.5% and 25.0% respectively. As the trainees need to know what to be measured and how to take the measurements, these two subject areas are naturally expected. However, there is a new insight for the course. “Basic concepts of garment construction”, which is not much emphasized in the current content, turns out to be of third importance (20.3%). Although the terms such as high point shoulder, pleats and darts have been mentioned from time to time on the classes, it seems that the trainees need to have a more comprehensive understanding about the reference points and lines of human figures as well as the mechanisms for creating shapes and fullness in order to firmly grasp the knowledge about clothing measurements.

Exhibit-4: Priorities of the five subject areas for achieving the two performance objectives

Exhibit-5 displays the performance sensitivity graph showing how well each of the subject areas performs with respect to each of the performance objectives. From the graph, we could find that the top three subject areas: “Measuring techniques”, “Basic measurements” and “Basic concepts of garment construction”, all could meet the two performance objectives satisfactorily.

Exhibit-5: Performance sensitivity of the five subject areas in meeting the performance objectives

The order of importance of the subject areas, however, does not directly imply the teaching sequence or the allocation of time for them. In regard to the background of the trainees and the purpose of the task they need to accomplish, the following changes are suggested for the course:
Exhibit-6: Suggested content for the training course

The company will arrange a trial run for the training course with the suggested content. The collected comments from the trial run will be used to make further improvement to the course.

4.0 Conclusion

The study has illustrated how QFD, incorporated with AHP, could be easily applied to practice quality-oriented course development for vocational education and training. The training department reflected that this study has helped them to have a greater understanding about the performance requirements of the merchandising managers as well as the learning needs of the merchandisers. They admitted that this understanding about customers is important for them to design and plan appropriate courses. When the training effectiveness increases, their contributions to the company also increase.

References

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Authors’ Backgrounds

Catherine Y. P. Chan is a PhD student of Institute of Textiles and Clothing at The Hong Kong Polytechnic University. She is conducting her research on course design model for vocational education and training for the clothing industry.

Dr. S. F. Chan teaches span garment production, quality assurance and off-shore investment, and he is currently engaged in research projects of relevant computer capacity planning, ISO 9000 implementation and fabric objective measurement.

Dr. K. Chan has published extensively, topics ranging from textile polymers to geotextiles, knitwear, quality and quality management techniques. He has presented research papers at conferences in Hong Kong, Korea, Japan, USA, UK, China and Egypt.

Dr. W. C. Ip holds a PhD from Leeds University. His research interests include social scaling, financial time series and environmentics. He has also been actively engaged in consultancy work on social and economic issues.