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Designing Services Using Quality Function Deployment

Introduction

Faced with consumer demand for increased standards, service companies recognise the competitive advantages in the provision of superior services. A major challenge for service industries in the 1990s is the design of customer focused services.

Quality Function Deployment (QFD) is a unique quality process. The customer, the focal point of business today, is incorporated at the first stages of design. Although more commonly associated with manufacturing, it is also an important tool for the design of services. This paper promotes a greater understanding of QFD and develops a framework for its use that is applicable to service organisations. The use of QFD by Alitalia, Italy's national airline, to design a new B747 Intercontinental Business class service is assessed. Based on this assessment a series of crucial steps in the QFD process are identified. These steps form the basis of the framework proposed.

Service Quality

It is logical perhaps, to assume that service companies should be able to utilise manufacturing techniques to achieve the same substantial improvements. This however is not the case. Service quality improvement poses a number of challenges. For a service company to simply duplicate a manufacturing technique is fraught with danger. The use of manufacturing techniques in the service sector requires accurate adaptation to a different set of circumstances. Services cannot be defined and measured as precisely as physical products. Services are characterised by a number of important traits, each with distinct implications that make service design especially challenging.

Five distinctive characteristics are suggested: intangibility, heterogeneity, inseparability, interactivity, and directness.

First, services are intangible. The intangible aspects of a service make evaluation and quantification difficult.

Second, services are heterogeneous as consistency of performance is variable. This is especially true of labour-intensive services, where control of the employee/consumer interface can be difficult. However it is at this interface that most customers judge the level of perceived quality.

Third, production and consumption are almost simultaneous, making them inseparable. Service quality is perceived during delivery and the first time performance of a service critically influences a customer's evaluation.

Fourth, there exists a high degree of producer/consumer interaction. The customer is directly involved in the delivery process which in turn affects the perception of quality. As a result it is difficult to determine customer expectations and uncertainty can trans-

The ability to design services that consistently improve the quality of service offered to customers is the key to any successful service quality improvement strategy. A major differentiating factor between service organisations is how well they identify customer requirements and deliver on those requirements. Quality Function Deployment (QFD), although traditionally associated with the design of physical products, is equally applicable to service design. QFD allows the development of a service design that focuses on the specific requirements of the customer. This paper examines the use of QFD by Alitalia in designing a new business class service. The authors present recommendations and a framework for the specific use of QFD by service organisations, that if utilised should secure competitive advantage.

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Table 1.

CUSTOMER REQUIREMENTS	'IDEAL' AIRLINE	ALITALIA	FUTURE SERVICE	QUALITY TARGET LEVELS	SALES POINTS	ABSOLUTE WEIGHTS	SIGNIFICANCE RANKING
	A	B	C	D	E	F	G
13. FRESH INGREDIENTS	4.49	3.63	4.49	1.24	1.5	8.83	1ST
14. CHOICE...ETC	4.12	3.58	4.12	1.15	1.0	4.75	10th

pire. This problem is amplified as standards are often judgmental, based on personal experience, preferences and moods.

Fifth, a service is direct and cannot be inventoried. Perishability demands instantaneous delivery with demand. Demand must be monitored and supply accurately planned.

Given these particular characteristics, few attempts to model quality for the services have been successful. Thus there is a scarcity of service quality approaches.

Achieving outstanding levels of service quality commences, as with physical products, with identifying the features of the service that the customer considers most important. However, service quality initiatives often fail because organisations overlook or wrongly define customer needs. There are three main reasons for this:

1. the belief that customer needs are being fulfilled when in fact they are not

2. the inability to define these needs

3. management's remoteness from the customer/front line interface.

The Use of QFD by Alitalia

This section describes how Alitalia used a modified form of the QFD process to design a new Intercontinental Business Class service.

Phase 1:
Identification of Customer Requirements

The QFD process begins with identifying what it is customers want and expect from the service being provided. This is the most critical stage of the QFD process.

Using the brainstorming technique an experienced cross functional team from Alitalia identified 47 customer requirements. A "needs tree" was then devised that systematically represented the customer requirements. The 47 requirements were classified into three groups: quality of the flight attendants, the quality of the in-flight products offered and the quality of the cabin environment.

Phase 2:
Obtaining Customer Importance Ratings

It is unlikely an organisation can satisfy all customer requirements and it is necessary therefore to understand the importance the customer attributes to each requirement. Customers were asked to rate the importance of the service features (customer requirements) and to compare Alitalia's service with that of their "ideal airline" via a quantitative survey. By asking customers to compare Alitalia to their "idesal airline" it was possible to see if Alitalia's service was meeting or exceeding customer expectations.

The mean ratings for both the "ideal airline" and Alitalia were calculated and plotted graphically as below. (Table 2.)

A table was then drawn up that ranked customer requirements in order of significance. At this stage a cross functi-

onal meeting determined the planned service improvements, quality target levels and those sales points that would greatly improve the image of the service. A section of the table is shown.

The mean ratings for the 'Ideal' airline and Alitalia were entered in Columns (A) and (B) respectively. The mean quality target levels that represented the Alitalia's future service were decided by the cross functional meeting and were listed in column (C). Column (D) contained the actual improvements to service features that Alitalia wanted to achieve. ('1.00 = no improvement). Improvements were calculated by dividing the planned quality target levels by the current service quality levels.

For example:
'Fresh Ingredients' = 4.49/3.63 = 1.24

The most important sales points are those that if improved greatly enhance the overall image of the service. These were given a value of '1.5' in column (E). The significance of each customer requirement was then ascertained by calculating the absolute weight ((A) x (D) x (E)) of each.

For example:
'Fresh Ingredients' =
4.49 x 1.24 x 1.5 = 8.33

Table 2.
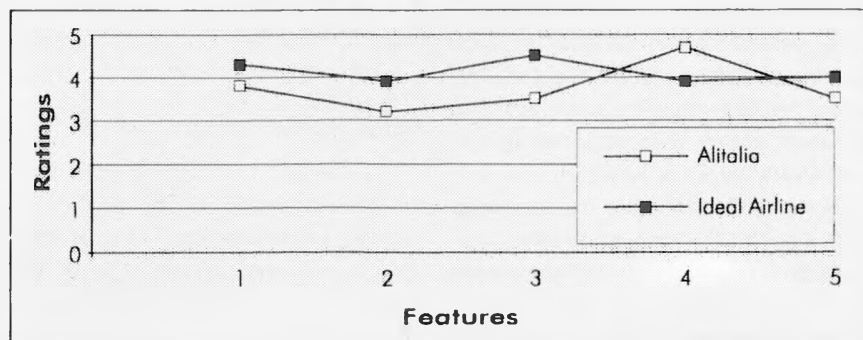
Once all absolute weights had been calculated they were ranked in order of significance.

Phase 3:
Identification of Quality Elements

It is the quality elements that described the service in measurable terms and ensure the acceptability of the final service. Each customer requirement was examined and measurable elements generated for each. A total of 87 quality elements were identified and represented in a 'Quality Elements Tree'. A section of the Quality Elements Tree is shown below. (Table 3.)
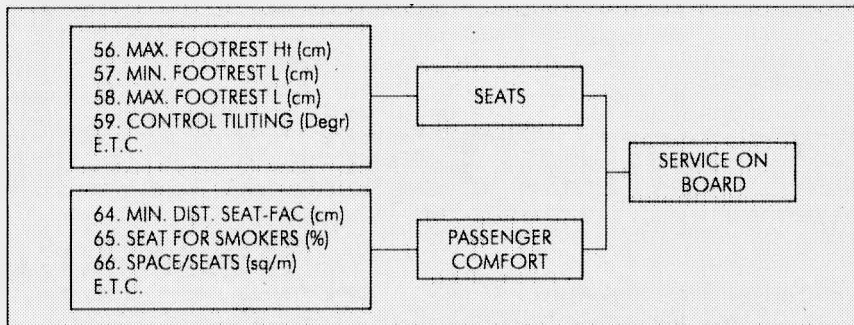
Phase 4:
Construction of a Correlation Matrix

A matrix was constructed to determine if the 47 customer requirements had in fact been accurately described in measurable terms by the 87 quality elements. An intensive cross functional group meeting determined the strengths of the correlations. Correlations were represented in the matrix by numbers, (9 = strong, 3 = average, 1 = weak).

Phase 5:
Feasibility Study

The feasibility study incorporated the design of a 'Quality Elements Significance/Difficulty Table'. First, the significance of the quality elements was established. The correlations that - appeared under each quality element in the Correlation Matrix were multiplied by the absolute weights of the customer requirements and added together.

For example:
Flight Attendants Presence' =
$(9 \times 4.21) + (3 \times 3.86) + (1 \times 4.50) =$
53.97/54

By including the absolute weights of the customer requirements it ensured that the importance ratings and the sales points were reflected in the significance calculations.

Second, the difficulty in improving each quality element was ascertained by considering technical, financial and reliability constraints. A scale of '1-10' was used, where '10' was high diffi-

Table 3.

Table 4.

culty and '1' low difficulty. The overall difficulty for a quality element was calculated by multiplying the scores for each constraint together. This was done for all quality elements.

Both the significance and the difficulty ratings were plotted in a two dimensional matrix. The matrix afforded a cost benefit analysis. A range was used to summarise these ratings.

Significance Range:
I	= 11 - 39
II	= 40 - 68
III	= 69 - 97
IV	= 98 - 126
V	= 127 - 155

Difficulty Range:
E	= 1 - 161
D	= 162 - 322
C	= 323 - 483
B	= 484 - 644
A	= 645 - 805

Phase 6:
Improving the Business Class Service

The financial constraints imposed on the project restricted the number of possible improvements. Together with the survey results and sales points the matrix allowed easy identification of the most important areas of improve-

ment. Main areas of improvement were seat pitch, seat access, seat comfort, seat design, interior design, food and the duty free range.

Four harmonious working groups were responsible for the overall design and delivery of the new service. A new business class service was designed and introduced to all aircraft in June 1993.

Evaluating the new Business Class Service

An evaluation determined the success of the new service in meeting customer requirements and ultimately the success of using QFD in new service design.

Integral to any successful quality management strategy is the need for continuous reassessment. Gaining feedback from both employees and customers allows effective management of the service quality process. A variety of qualitative and quantitative research methods were utilised.

Customer requirements and the importance attributed to them by the customer varies with time. It was important therefore to re-establish those
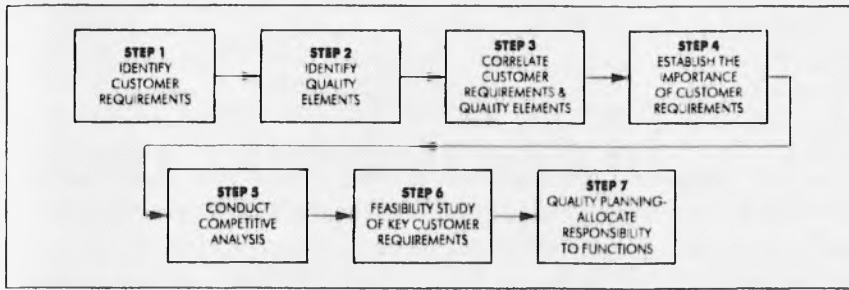
customer requirements identified during the project and the emergence of any new requirements.

Customer and employee focus group meetings coupled with 200 individual customer interviews established 50 customer requirements. Based on this qualitative research a quantitative questionnaire was designed and 3,000 distributed on all intercontinental flights. Using the same scoring as for the survey carried out during the project made comparison easier.

The results from the survey and a employee focus group meeting established the importance of the customer requirements. In addition to asking customers to compare Alitalia with their 'Ideal' airline they were also asked to compare Alitalia with 'Other' airlines.

The mean values obtained for the features of Alitalia's service were compared to those obtained for the 'Ideal' and 'Other' categories. Gap analysis between the old and new service highlighted those features of the new service not meeting customer's 'ideal' expectations and needing further improvement. It was also possible to track changes in customer requirements with time. Comparison with 'Other' airlines provided a feel for how Alitalia's new service perceived.

The conclusion from the evaluation was that the new service had been totally successful and the use of QFD had paved the way for excellent service design.

A Framework for the use of QFD in the Service Sector

The evaluation confirmed the effectiveness of QFD in the design of new services. Based on intensive research into the B747 Intercontinental Busi-

ness Class Project at Alitalia and the subsequent evaluation a framework for the use of QFD in the service sector was developed. A number of specific observations and general recommendations are outlined that should be borne in mind when applying the framework.

Any company contemplating the use of QFD must satisfy a number of prerequisites prior to implementation, if successful service design is to be achieved.

Any service organisation must strive to:

– be market oriented and customer driven

– excite and delight the customer

– eliminate any bureaucracy

– encourage a multidisciplinary approach to projects

– regard everyone downstream as a customer

– plan to eradicate negative quality and promote positive quality.

A series of critical steps collectively form the framework proposed. Adherence to this framework by service companies will lead to successful service design when using QFD.

Step 1 - This is the most important step as it is customer requirements that form the basis of the QFD process. Utilising various research methods, such as surveys, interviews, focus group meetings e.t.c., the requirements of the customer are collated. A detailed breakdown is obtained by amplifying the primary requirements to secondary and tertiary levels. Observations are:

● The customer defines service quality and must be incorporated at this stage. Failure to do so will lead to grave inaccuracies

● Front line staff comprehend customer requirements better than any other employee group. Opportunities to air comments openly via staff meetings, review discussions e.t.c. must be provided

● Customer requirements are dynamic and not constant over time. Continuous monitoring of customers and staff is necessary

● A company's culture must be condusive to service quality initiatives. Bureaucracy must be removed, open feedback' encouraged and management must get to know the customer

● Research methods must provide accurate information. A range of methods must be used. Customer and employee focus group meetings and interviews are a good starting point

● A complaint data base should be established to provide valuable information over time

● A cross functional and externally oriented approach must be encouraged. For it to be successful senior management down must be involved.

Step 2 - Quality elements are essentially design features that must be assured and measured. It is critical that they reflect customer requirements, as they describe the service in mesurable terms. The primary elements must be amplified to secondary and tertiary levels to provide a satisfactory level of detail. It is these elements that are deployed throughout the whole service development process. Observations are:

● Generating mesurable quality elements is a cross functional task. Such an approach ensures all vital control mechanisms are included

● Ambiguity must be avoided. Quality elements a that are not critical will only distract the team from the overall design and must be eliminated.

Step 3 - Customer requirements and quality elements are correlated and a symbol or numbering system used to indicate correlation strengths. If a large proportion of weak correlations exist then the quality elements have not fully addressed customer requirements. In this instance the design is unlikely to fulfill customer expectations and quality ele-

ments must be revised. Only when a high percentage of correlations exist should a company proceed. Observations are:

- The matrix should be produced on one single peice of paper, enabling easy visual examination

- It is critical that the quality elements address the customer requirements in measurable terms

- Everyone involved must comprehend the symbol or numbering system used.

Step 4 - Market research is conducted to ascertain the importance of the customer requirements identified in Step 1. This forms the first part of the market evaluation. The customer requirements are ranked in order by the importance attributed by the customer. This determines those service features that if improved will generate the greatest level of customer satisfaction. Observations are:

- Whatever research method is used to ascertain customer importance ratings, a pilot test must be conducted on the customer first

- If a questionnaire is used, focus group meetings will help to eliminate any flaws its design

Step 5 - This step forms the second part of the market evaluation and leads on from Step 4. It is important to discover exactly how the company satisfies the customer in comparison to its main rivals. The competitive analysis data, whether from media information, questionnaires e.t.c., compares the service the company actually provides. The average ratings given to the features of the company's service are compared to those ratings of other companies. It is at this stage of the process that the absolute strengths and weaknesses of the company's service and that of its competitors are highlighted. Observations are:

- Failure to complete a thorough competitive analysis will produce a very unrealistic market image, based on managements' perceptions of the market alone

- Continous market research is essential if the company is to keep abrest of innovative developments and market trends in general

Step 6 - Customer requirements are examined again. Features that can be improved realistically, given financial, time and technical constraints e.t.c. are highlighted. Those that cannot be improved given the limitations are eliminated.

The amended list of customer requirements is examined a second time. The feasibility, costs involved and rewards gained by improving each remaining customer requirement is considered. A simple scoring system is used, for example a five point scale where five equals easily feasible, low costs and high rewards and vice versa. The scores for each customer requirement are totalled and multiplied by the average importance rating and ranked by highest score, as below. (Table 6).

Incorporating the average customer importance rating ensures the voice of the customer is represented at this stage. Features with the highest scores are those that are most important to the customer and attained easily given the constraints. It is these features that if improved will dramatically improve the service offered and the overall image of the company. Observations are:

- Customer importance ratings and the company's sales points must be reflected in the feasibility study

- A cross functional approach ensures the difficulties and the significance of planned improvements are fully realised

- A matrix similar to the one utilised by Alitalia is beneficial as it effectively summarises the results.

Step 7 - Having completed Steps 1 to 6, quality planning can commence. Results from Step 5 will indicate which features of a company's service lag behind competition and need improving. The results from Step 6 will confirm the feasibility of improving these features and the rewards in doing so. Once this has been established, quality targets are set. Quality targets are integral to the final quality plan and al-

low the company to assess success, performance and further improve the service. Accountability for achieving these targets must be entrusted to those functions that impact most in meeting a ceratin requirement. A comprehensive plan that incorprates amendments to service processes and subsequently Standing Operating Procedures (SOPs) must be produced. Observations are:

- Not all service features can be or need to be improved. Initially it is important to concentrate on improving those features that reap the greatest rewards.

- It is essential all functions are involved at this stage and responsibilities are well documented and understood

- At this stage companies must be prepared to make a number of trade offs when improving certain features.

Conclusion

The company utilising QFD several of times will adopt it's own tailored approach with time. What is essential is that the steps outlined in this paper are thoroughly executed if the final design is to achieve significant success.

Although there exists no widely accepted approach for the use of QFD in the service sector, the framework outlined provides a structure to effectively implement QFD. A number of fundamental requirements have been highlighted that if followed will enhance serice design.

As with all services it must be remembered customer requirements are constantly changing and that there is a need to continually monitor the customer. QFD ensures that customer requirements are confirmed and understood from the outset and that service design is based on these requirements. It is for this reason that QFD provides the service company with the opportunity to generate customer focused services.

Table 6.

FEASIBILITY	COSTS	REWARDS	TOTAL	RANKING
3	1	2	6x4.3=25.8	17
4	4	1	9x3.8=34.2	4
5	3	5	13x4.5=58.5	1