

GEMBA RESEARCH IN THE JAPANESE CELLULAR PHONE MARKET

Eric Ronney (Nokia UK, Marketing Manager)

Peter Olfe (Nokia Japan, Market Research Manager)

Glenn Mazur (Japan Business Consultants, Ltd., University of Michigan, QFD Institute)

1. Contents

1. Contents	2
2. Introduction	3
2.1. HISTORY OF QFD AT NOKIA.....	3
2.2. VOICE OF CUSTOMER RESEARCH.....	4
3. The benefits of GEMBA research	4
3.1. CUSTOMERS DON'T TELL US EVERYTHING	4
3.2. PRODUCTS HAVE NO VALUE IN THEMSELVES	5
3.3. OPTIMIZING THE PRODUCT DEVELOPMENT PROCESS	6
4. Japan GEMBA research project	7
4.1. INTRODUCTION.....	7
4.2. PLANNING THE PROJECT – WHO TO INVOLVE.....	7
4.2.1. <i>Project Objectives – product 'x'</i>	7
4.2.2. <i>Prioritizing the objectives</i>	8
4.2.3. <i>Selecting the Target Customer Segments</i>	9
4.2.4. <i>Selecting the GEMBA</i>	10
4.3. DESIGN THE RESEARCH METHOD – CULTURAL SENSITIVITY	10
DEVELOPMENT OF THE TRAINING GUIDE	11
4.5. THE GEMBA EXPERIENCE SO FAR	12
4.5.1. <i>Extract the customer statements from the visit reports</i>	12
4.5.2. <i>Get the customers to organize the statements into groups (affinity diagram method)</i>	12
4.5.3. <i>Turn the affinity diagram into a hierarchy of Demanded Quality statements (tree structure)</i>	13
4.6. RESULTS SO FAR	14
5. CONCLUSIONS	14
5.1. FUTURE PLANS	15
6. About the authors	15
6.1. ERIC RONNEY	15
6.2. PETER OLFE.....	15
6.3. GLENN MAZUR.....	15
7. References	16



2. Introduction

2.1. History of QFD at Nokia

Quality Function Deployment (QFD) has been used in Japan since 1966 to help companies better understand how their customers define quality, and then assure that the internal operations such as design and manufacturing can actually deliver it. QFD has been widely practised by various divisions of Japanese competitors of ours such as NEC [Akao 1990, Takada 1992, Uchimaru et al 1993] and Panasonic [Akao 1990], and even European [Olsson 1993, Jacobs 1996] and American ones [Bosserman and Stoner 1994, Bohem and Squires 1995, Richardson and Barnard 1996, Stickel and Bosserman 1996].

Nokia has been using QFD since the mid 1990s, learning of it after its successful introduction into the US automobile industry, which began in the mid 1980s. The results of one of our studies were presented at the 1994 North American Symposium on QFD entitled, "Developing A New Generation '14' Colour Set," by S. Salminen of Nokia Home Electronics and Ian Ferguson.

Early adopters of QFD in the US were concentrated in the automobile component suppliers, but soon spread to component suppliers in other industries, especially electronics. Of the 16 papers presented at the world's first Symposium on QFD in 1989,¹ nine were related to automotive suppliers and four were from high-tech companies such as AT&T, Hewlett-Packard, and Texas Instruments. A legacy such early adopters faced was a QFD approach that focused more on component level improvements and product failures. The benefits of this approach included easier implementation and training, but the downside was packing all requirements into a House of Quality too large to manipulate, and a concentration on improving existing designs at the expense of adding new technology, functionality, or lowering costs.

In recent years, the more QFD-proficient of these companies have upgraded to Comprehensive QFD, which includes several tools to better analyse the Voice of the Customer, and more concise deployment matrices that address specific design requirements such as performance, function, technology, capability, as well as the components, manufacturing, and production phases. This study we conducted in Japan began with these new Voice of Customer tools, as a way to augment our market research into the Japanese cellular phone market. The specific methods were based on the work of one of our authors [Mazur 2000].

¹ www.qfdi.org/transact.htm



2.2. Voice of Customer Research

'Traditional' customer research has focussed on the testing of new products or product features that have already been developed to some level. The techniques used have been focus group discussions in the offices of research agencies and telephone surveys. The objective of such research is to measure the attractiveness of the new product/feature as part of the New Product Development Process.

An alternative customer research method focuses on discovering customer needs or problems. This method is called 'going to the GEMBA'² and involves encounters with customers in the environment where they are actually using our products. This method relies more on observation of customer behaviour and direct interviewing of the customers. The outcome of such research is an understanding of customer needs and problems, which can feed into the earliest phases of the product/feature development process.

The benefits of GEMBA research are:

- We can understand the underlying benefits delivered by mobile phone products, which gives the opportunity to optimise the delivery of those benefits in future products.
- Through the use of observation, we can discover customer needs or problems that they might not think to mention in traditional research. These are known as 'latent' needs and give the opportunity to make products that result in above average customer satisfaction.
- We can more precisely focus our innovation and new product development processes to deliver the benefits that customers really value.

This paper first expands on the benefits of GEMBA research for Nokia and then describes a GEMBA research project that was carried out in Japan, and how the research method was designed to take cultural issues into account in order to maximise the effectiveness of the research.

3. The benefits of GEMBA research

3.1. Customers don't tell us everything

To satisfy customers, we must understand that meeting different kinds of requirements is key to achieving customer satisfaction. There are three types of customer requirements to consider, according to Dr. Noriaki Kano [Kano 1984].

² The word GEMBA is a Japanese meaning 'the source (location)'. It is the place where things actually occur; it is raw, untainted information. Its common reference is to the factory floor, but Mazur has broadened its context to the place where customers actually experience the use of our products.



Normal Requirements are typically what we get by just asking customers what they want. These requirements satisfy (or dissatisfy) in proportion to their presence (or absence) in the product or service. Fast delivery would be a good example. The faster (or slower) the delivery, the more they like (or dislike) it.

Expected Requirements are often so basic the customer may fail to mention them - until we fail to perform them. They are basic expectations without which the product or service may cease to be of value; their absence is very dissatisfying. Further, meeting these requirements often goes unnoticed by most customers. For example, if coffee is served hot, customers barely notice it. If it's cold or too hot, dissatisfaction occurs. Expected requirements must be fulfilled.

Exciting Requirements are difficult to discover. They are beyond the customer's expectations. Their absence doesn't dissatisfy; their presence excites. For example, if caviar and champagne were served on a flight from London to Manchester, that would be exciting. If not, customers would hardly complain. These are the things that wow the customers and bring them back. Since customers are not apt to voice these requirements, it is the responsibility of the organization to explore customer problems and opportunities to uncover such unspoken items. These requirements can shift over time, segment, or other external factors.

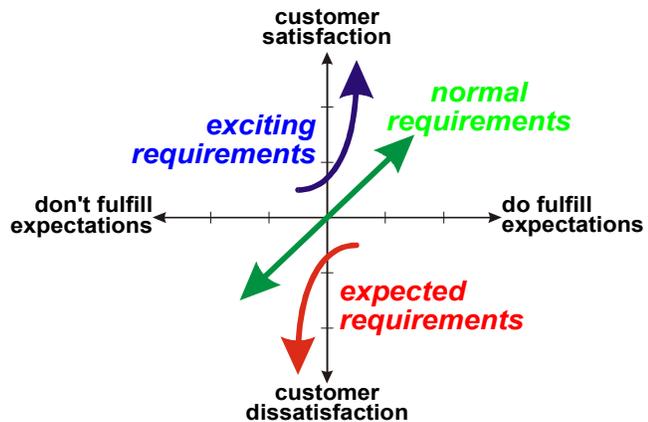


Figure 1. Kano Model

3.2. Products have no value in themselves

It is said that producers make features and customers buy benefits. Products are the 'vehicle' to deliver benefits to customers. Manufacturers like Nokia must assure that the products they create actually deliver the benefits that the customers value most. Thus, we have to address several areas in the product development process.

1. Identify normal, expected, and exciting requirements.
2. Determine which are benefits and which are features, and mine feature requirements for underlying benefits.
3. Have customers tell us which benefits are most important, have them rate our current product and competitive product's ability to satisfy those benefits.
4. Improve weak features to meet those benefits that are important and underperforming.
5. Assure that internal operations related to those features actually deliver.

Areas 1-3 are part of the GEMBA research described in this paper.

3.3. Optimizing the product development process

In a study of phases of product development processes in over 200 companies, Dr. Robert Cooper of McMaster University in Toronto identified 13 phases of product development, how frequently these phases were engaged in, and how well companies performed the tasks associated with the phases [Cooper 1993]. One of the weakest links in the process was that of the detailed market study, which was performed by the subject companies on only 25.4% of their products, and for which they rated the quality of their study at 5.74 on a scale of 10.

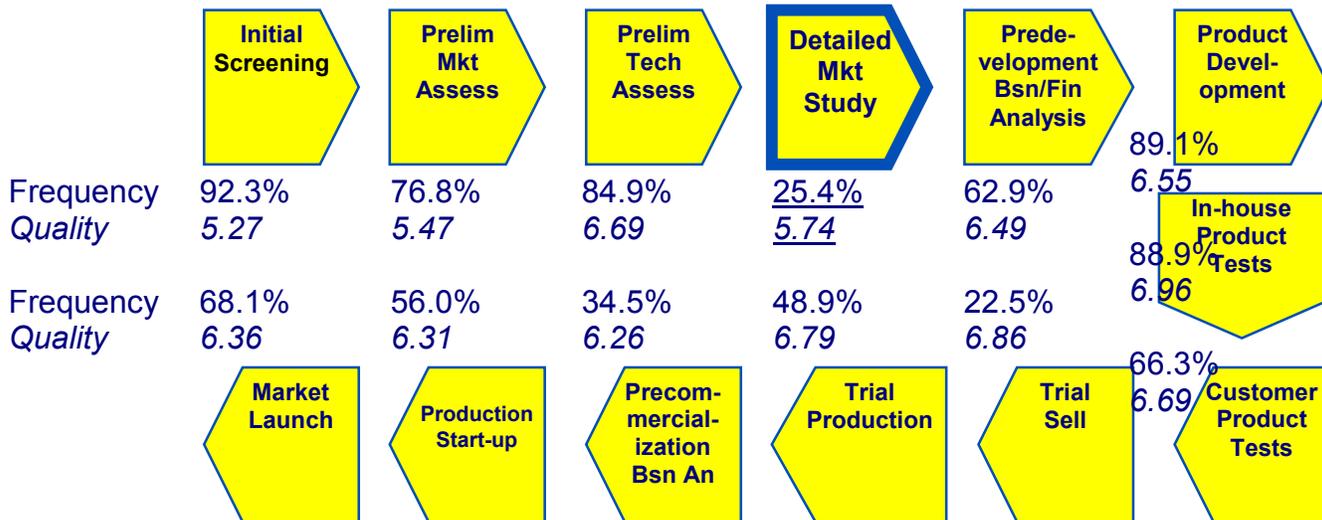


Figure 2. Weakest Link in NDP (adapter from Cooper)

The QFD approach to detailed market study is the GEMBA research [Mazur 1997]. The steps required are specific to each project, but the following activities are commonly addressed.

1. Prioritise and clarify numerical goals of the project.
2. Determine which customers are critical to achieving these goals. Describe customers in terms of modes of use.
3. Design and conduct an observational study of the key customers in the act of using the subject product. Analyse observations and verbatims for latent requirements (exciting, expected, normal).
4. Separate requirements into customer benefits and product features. Make sure to extract any new benefits from required product features. Structure benefits with affinity diagram and hierarchy diagram, to preserve paradigm of customer (not engineers).
5. Deploy to product features using House of Quality or Blitz QFD [Zultner 1997].



4. Japan GEMBA research project

4.1. Introduction

Nokia has been involved in the Japanese cellular phone market since 1994 when its first product for Japan was launched. Nokia has developed a stable market position since then but in terms of market share has not reached anything like its world position. This reflects the intense competition from Japanese manufacturers and the difficulties of understanding the Japanese culture, from the perspective of a western company.

In 1998, Nokia decided to study Comprehensive QFD as a way to improve its product definition process. As part of this it was decided to start a QFD project to focus on the Japanese market. The mission of the project was to use QFD in the definition of a future product, which was code named 'x'. This paper describes the research phase of the QFD process, resulting in the 'voice of the customer' information.

4.2. Planning the Project – who to involve

When planning the project, we clearly wanted to improve our understanding of the end users of our products. Most of the Nokia's product development for the Japanese market takes place in the U.K. The value of U.K. based personnel to visit Japan has long been recognised as a way to develop market and customer understanding. However, few of these 'visitors' had the opportunity to meet 'real' customers. Therefore we decided to include members of the UK R&D team in the project.

Surveys of both (Japanese) employees and corporate customers told us that they thought the company did not understand Japanese customer needs. Therefore it was felt important that local staff (in Tokyo) should be involved in all stages of the project so that we could achieve both a real and perceived improvement of our customer understanding.

So we started by setting up a project team. The team comprised members of the Nokia management team, plus members of the sales, marketing and R&D teams from both the UK and Tokyo. The whole team rarely met together during the project but individuals were involved at various stages of the planning, organised by a core team of a few individuals. An external QFD expert (Mazur) familiar with the Japanese guided us in our work.

Also, implicit in the idea of 'going to the Gemba' was the idea that we would carry out the research ourselves. This has meant that many of those involved in the planning have also conducted some of the research.

4.2.1. Project Objectives – product 'x'

The first step was to define the objectives for the project. We translated this step as 'define the objectives of the product' which clarified the focus of the discussion. The project

team met in Tokyo and brainstormed the objectives. After most of a day's discussion, the team defined 6 objectives, which are summarised as follows:

1. Profit
2. Time to market (launch schedule)
3. Brand (support for the Nokia brand awareness and positioning objectives)
4. Technology re-use
5. Quality (product reliability)
6. Market share

Each of the objectives was defined using the SMART model. This checked that the objectives were:

- Specific
- Measurable
- Achievable
- Realistic
- Time related

This made sure that the objectives were clear and that a common understanding existed in the team.

4.2.2. Prioritizing the objectives

Since not all objectives were equally important to the success of the project, the team then defined priorities for the objectives. This was done using the AHP (Analytic Hierarchy Process) [Saaty 1990] where each objective was compared with each other. After asking ourselves the question "which objective is more important, and why," a consensus about the priorities was reached. This discussion yielded not only an agreement about the priorities but also a common understanding of the reasoning behind the decisions that were made. The graph below shows how the priorities worked out.

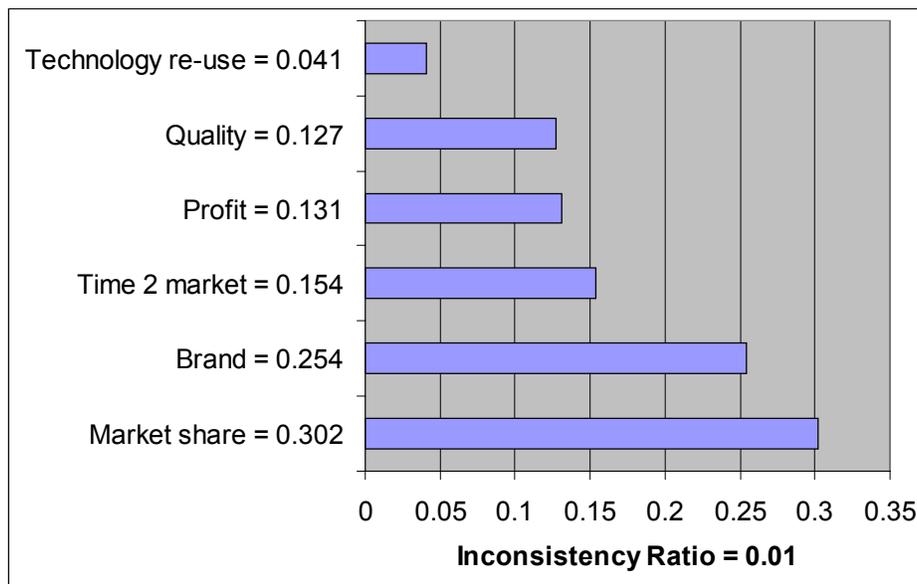


Figure 3. Results of AHP on Project Objectives



4.2.3. Selecting the Target Customer Segments

When choosing which customer GEMBA to research, we could have chosen our direct trade customers or members of the distribution channel; all of who have needs from Nokia's mobile phone products. In fact, our trade customers (the mobile service operators) have a strong influence on the product specification. In the Japanese mobile phone market, the products are dual branded and the operators define that certain features must be included in the phones.

However, we decided to focus on end users, as it was perceived that this is where the biggest improvements in our understanding would come.

Also it has been argued that the end users in any product supply chain are the most important members of that chain because they are the only ones putting money into the system – everyone else is taking money out (profits)!³ Therefore, if the end users are happy then everyone in the chain will benefit.

For the task of choosing the customer segments that would best support the objectives of the project, Nokia had developed a segmentation model of mobile phone users, which it has used in its product planning activities. The segments are drawn according to the differing benefits that customers expect to derive from their mobile phone. These include such things as keeping in contact with family members for reassurance about their safety, and enhancement of work efficiency.

Using a correlation matrix, the customer segments were analysed by asking ourselves the question, "if we target this segment, to what degree can we expect to achieve the objectives?" We asked this question for all the segments and for each objective in turn. (See Table 1) The top four segments were selected that best supported the weighted project objectives from above. The combined weights of the top 4 segments totalled 74%.

Table 1. Project Goals - Customer Segments Matrix

Objectives	Objective weights	CUSTOMER SEGMENTS						
		1	2	3	4	5	6	7
Tech reuse	.041	☼	○	○	☼	▲	☼	▲
Quality	.127	▲	○	☼	○	○	▲	☼
Profit	.131	▲	▲	☼	▲	☼	▲	☼
Time 2 market	.154	☼	○	○	☼	▲	☼	▲
Brand	.254	▲	○	▲	○	○	▲	▲
Market share	.302	▲	○	○	○	☼	▲	☼
Segment weights %		9	8	16	13	21	9	24

☼ = strong (9); ○ = moderate (3); ▲ = weak (1)

³ "The final user of our automobiles is the only person who puts any money in the supply chain. We're all passing his tokens up and down the chain." ... Jeffrey Trimmer, Director of Operations and Strategy for Chrysler's procurement and supply organisation. (*Automotive News*, 9/18/98)



4.2.4. Selecting the GEMBA

An early decision was taken to conduct the research in public places in the Tokyo metropolitan area for the following reasons:

- The Nokia office is located in Tokyo and we wanted to make it as easy as possible for employees to take part in the research.
- 25% of the Japanese population live in the Tokyo area.
- Due to the high population density and high penetration of mobile phones in Japan (currently 41%), it is very easy to find mobile phone users in public in Tokyo.
- The Japanese have a high awareness of the effect of their behaviour on others around them. They avoid making or receiving phone calls in areas where others would be disturbed and prefer public places.
- A nation-wide survey of Japanese cellular phone usage behaviour shows that 70% of usage is either in public areas or on public transportation. These areas we believe are sufficiently similar throughout the country.

i.e. Simple is best!

4.3. Design the Research Method – Cultural Sensitivity

In considering the design of the research method, we planned to carry out both observation and street intercept interviewing of the customers. We realised that we would face some cultural barriers when trying to stop people and encourage them to talk about their mobile phone experiences. The issues that were considered are as follows:

- Thanks to the Aum incident, the Japanese are more conscious than ever about being approached by people on the street. There are also many men who aggressively recruit or flirt with women in 'young' areas such as the Shibuya area of Tokyo.
- People in Japan are naturally reluctant to voice their opinions in public to someone that they do not know. This is particularly true when the person asking them is also Japanese.
- Similarly, most Japanese will refuse to have their photo taken by other Japanese, but less so by foreigners. Foreigners are seen as tourists and so it is ok.
- (Probably not specific to Japan) People are naturally not comfortable with being approached by a group of four or more people. Even three is a bit too many.

For these reasons, we selected the following approach.

- The research teams would comprise two people.
- One male, one female.
- One Japanese, one Gaijin (foreigner).
- The foreigner is assigned to observation and taking photographs of the Gemba scene and customers.
- The Japanese person also observes, conducts interviews and makes notes of what the customers say.



The combination of male/female avoids putting the customer on their guard too much (males or females). The combination of Japanese/Gaijin is unusual and arouses the interest of the customer. We found that customers were more likely to be open and express their opinions with a foreigner present, even though they do so in Japanese! Also the combination is less likely to be mistaken for representatives of a religious group (not very popular in Japan).

4.4. Development of the Training Guide

As mentioned earlier, we decided from the start to 'go to the Gemba' ourselves. This highlighted a need for training in the observation and interviewing techniques that we planned to use because very few of the project team members had a market research background. However, it was felt that the benefits of experiencing the customer contact first hand would outweigh the disadvantages of our lack of experience.

B4 You Go

- ✓ Teams should consist of two people (one foreigner + one Japanese)
 - ✓ Reason (*Explained later*)
- ✓ Teams are recommended to consist of one male and one female
 - ✓ Reason (*Explained later*)
- ✓ Decide where to observe
 - ✓ Decide the main target end user for that day and select a part of town where that target is likely to be found.
 - ✓ Until interviewers begin to feel comfortable with the process, interviews should be conducted on the street. Later, the range of sites can be expanded to include train station platforms, trains themselves, department stores and supermarkets, bars, and restaurants.
- ✓ Items to bring
 - ✓ Digital camera
 - ✓ Interview sheets and pen
 - ✓ Clipboard (to interview while standing)
 - ✓ Business cards (in case subject asks for proof that you are a Nokia employee)

Figure 3. Example of Gemba Training Guide

So the next step was the creation of a Training Guide (Figure 3.) to facilitate the training and to act as a reference for the future. To create a very effective guide we engaged a local market research company to co-develop the guide. This was important for providing tips for first timers on how to approach and interview people on the street. The document is intended to be self-explanatory and to contain all the information needed for anyone in the company to conduct a Gemba visit. The document contains the following information:

1. Introduction – the objectives of the research
2. What the Gemba is all about
3. The basic steps (go to the Gemba, observe, develop questions, interview people, report)
4. The Gemba team (male/female, local/foreign) and why



5. Preparation
6. Guidelines for observation, what to look for
7. Guidelines for interviewing, how to approach people, what to ask (5 whys)
8. Reporting
9. Contacts names and how to arrange a Gemba visit
10. Reporting template

This document is one of the tangible outcomes of the project so far.

4.5. The GEMBA experience so far

We started the Gemba visits in June 1999. The visits have been running at the rate of about two per month in 1999 but have slowed since the beginning of this year. In November 1999 we decided to take stock and to analyse the results of the Gemba visits to date. We used the results of only five visits but this generated over 80 Voice of the Customer statements. These statements have been analysed and turned into a tree structure of Demanded Quality statements with two levels of detail. This is how we did the analysis:

1. Extract the customer statements from the visit reports. (Figure 4)
2. Get the customers to organise the statements into groups (affinity diagram method).
3. Turn the affinity diagram into a hierarchy of Demanded Quality statements (a tree structure).

4.5.1. Extract the customer statements from the visit reports

The visits were analysed in three separate group sessions by members of the project team. At least one of the people who actually visited the Gemba was present in each of the sessions. This proved to be important because in many cases, the visit report failed to explain clearly enough what was going on.

The teams used Voice of the Customer tables and customer flow charts to aid in the process [Mazur 1997, 2000]. It was surprising how many customer statements could be inferred from just a few clues gained from the observations and interviews. After eliminating duplicates, the result was over 80 customer statements.

4.5.2. Get the customers to organize the statements into groups (affinity diagram method)

We decided that we should get our customers to organise the statements for us, even though this proved to be relatively expensive. We wanted to avoid introducing our own view on the structure, which would probably be rather feature or 'solution' oriented. We wanted the customer's view.

Because we were targeting four customer segments, four separate sessions were arranged. We used a research agency to arrange and conduct the sessions. The figure below shows the kind of structure that the customers created.

NOKIA

NO. 001	Date:	1999.6.3 10am-	Location	Hachiko Square, Shibuya, Tokyo
	1pm		

**Observations**

- Many people were waiting to meet their friends and made phone calls and SMS messages to find them from the crowd.
- Mostly young people; few of the High Flyers or Assured, but many Trendsetters
- Young high school students wear phones around their neck (927 ads)
- "Salary-men" smoke while talking, either holding their cigarette in the other hand or talk with it hanging from their mouths
- Many people are carrying bags and other things (suite bag) in their hands while walking and being on the phone
- "Punk" style dressed young guy has similar color (mix colors of yellow and green) shoes and the cellular phone

Figure 4. Example of a Visit Report

Of course, each customer group produced a different structure, although we found that there was a remarkable degree of similarity between the structures.

4.5.3. Turn the affinity diagram into a hierarchy of Demanded Quality statements (tree structure)

The intention of this step was to 'sort out' the hierarchy. We planned to align levels of detail, harmonise the language used in the statements and look for missing statements



in the structure. To this end, four members of the project team got together for a meeting, which was planned to last two days. At the same meeting we planned to design the quantitative research to discover the customer importance rating for the statements.

However, the team first decided to combine the structures produced by the four customer groups. We made the assumption that a single structure could represent the views of all four customer groups. Indeed, we found many similarities between the structures but there were also some differences. We found that this was a difficult process and we spent over half the meeting (more than one day) combining the structures.

Because of this we did not complete our work as planned but had to complete the tasks via e-mail. The result was a 2-level table of Demanded Quality statements with four first level and 18 second level items. (Unfortunately, the information cannot be reproduced here as it is regarded as company confidential)

4.6. Results so Far

'Going to the GEMBA' was planned as a continuous process and the GEMBA visits continue to this day. More and more people in the company are gaining experience and insight from observing and interviewing customers and the GEMBA Training Guide continues to be used as a reference.

Going to the gemba is becoming a popular job for Nokia people!

Also, we have gained knowledge and experience of how to process Voice of the Customer information into a form that can be used to support future product planning and definition in Nokia.

5. CONCLUSIONS

The main learning points from the GEMBA research project are as follows:

1. Our care in taking local situation and cultural issues into account really seems to have paid off. The research implementation has gone more smoothly than we could have hoped for and useful information was obtained immediately.
2. It has proved easy to recruit employees to 'go to the GEMBA'. There seems to be an unmet need for employees to talk to customers. Perhaps this is common sense!
3. It was surprising how much information could be gleaned from a few clues gained by observation and interviews. We also quickly found that we encountered repeat situations and heard the same comments from customers. This infers that a good appreciation of any one particular GEMBA can be gleaned from just a few visits.
4. The analysis of the Voice of the Customer information was more difficult and took longer than we expected. This was despite the facilitation of an expert. We have concluded that QFD cannot be learned effectively from books or lectures. The facilitation of an experienced person is certainly required but there is no substitute



for putting the methodology into action within a real life context. This is learning by doing!

5.1. Future Plans

Visits to the Gemba are continuing in Japan today and the information gathered is being applied to the definition of products for the Japanese market. The team is gradually improving its technique in 'going to the Gemba' and interpreting what we see and hear.

One future direction that we have discussed is to modify the research method to allow more in depth understanding of customer needs. The street intercept method allows only limited 'digging' into the underlying needs. If we can dig more deeply to discover problems or needs that customers don't tend to mention, this would give us the opportunity to excite the customers with new solutions and products.

As before, it will be important to take Japanese cultural issues into account in the design of the research.

6. About the authors

6.1. Eric Ronney

Eric Ronney is currently working as a marketing manager at Nokia Mobile Phones, based at their R&D facility in U.K. He has 14 years experience in the mobile phone industry, about 9 years in technical and R&D roles and the last 5 years in product marketing roles, involving the definition and development of mobile phone products. He graduated from Heriot-Watt University in Edinburgh with a BSc degree in Electronic Engineering and is currently studying with Cambridge Marketing College for a Chartered Institute of Marketing Diploma in Marketing.

Eric may be reached at eric.ronney@nokia.com.

6.2. Peter Olfe

Peter Olfe is Market Research Manager, Nokia Mobile Phones, Japan. Originally from USA, Peter has lived in Japan for 9 years and is fluent in Japanese. He has been with Nokia for over 3 years and before that he worked as a consultant to foreign companies in Japan. Peter graduated from Middlebury College, VT, USA with a BA and obtained a MBA from Columbia Business School, NY, USA.

Peter may be reached at peter.olfe@nokia.com.

6.3. Glenn Mazur

Glenn H. Mazur has been active in QFD since its inception in North America, and has worked extensively with the founders of QFD on their teaching and consulting visits from Japan. He is a leader in the application of QFD to service industries and consumer products, conducts advanced QFD research, and is the Conference Chair for the North American Symposium on Quality Function Deployment held annually in Novi, Michigan. Glenn is the Executive Director of the QFD Institute and International Council for QFD, Adjunct Lecturer on TQM at the University of Michigan College of Engineering, President



of Japan Business Consultants Ltd., and is a member of the American Society for Quality Control (ASQC), and the Japanese Society for Quality Control (JSQC). Glenn can be reached at www.mazur.com.

7. References

- Akao, Yoji ed. 1990. *Quality Function Deployment: Integrating Customer Requirements into Product Design*. [Translated by Glenn Mazur]. Productivity Press. ISBN0-915299-41-0
- ____ Toyomi, Yuritsugu (Matsushita Electric, Electrical Appliance Business Department). "Using the Demanded Quality Deployment Chart."
- ____ Ohoka, Tadayoshi (Matsushita Electronic Components Company). "Quality Function Deployment at the Pre-Production Stage."
- ____ Harada, Akira (Futaba Electronics Division). "Quality Function Deployment and Technology Deployment."
- ____ Togari, Hisashi (NEC IC Microcomputer Systems) "Quality Function Deployment for Software Development."
- Boehm, Carol (Motorola) and Ted Squires. 1995. "QFD for Prediction of Phased-in Customer Benefits," *Transactions of the 7th Symposium on QFD*. QFD Institute, www.qfdi.org. ISBN1-889477-07-9
- Bosserman, Sherry and J. Stoner (Motorola). 1994. "QFD Introduction To Motorola - A Study In Change Management." *Transactions of the 6th Symposium on QFD*. QFD Institute, www.qfdi.org. ISBN1-889477-06-0
- Cooper, Robert. 1993. *Winning at New Products*, 2nd ed. Addison-Wesley, ISBN 0-201-56381-9
- Jacobs, Stephan and Michael Gebhardt (Ericsson Eurolab Deutschland). 1996. "Conflict Management in Design," *Transactions of the 8th Symposium on QFD*. QFD Institute, www.qfdi.org. ISBN1-889477-08-7
- Kano, Noriaki et al. 1984. "Attractive Quality and Must-be Quality" *Hinshitsu*, Vol. 14, No. 2. JUSE.
- Mazur, Glenn. 1997. "Voice of Customer Analysis: A Modern System of front-end QFD Tools" *Proceedings of the 51st Congress of the American Society for Quality*, Orlando FL.
- Mazur, Glenn. 2000. *Comprehensive QFD for Products v 2000*. Japan Business Consultants, www.mazur.com
- Olsson, Anders (Ericsson Radar Electronics). 1993. "Product Development and QFD." Proceedings of the QFD Seminar, Linköping University, Sweden, May 5, 1993.
- Salminen, S (Nokia Home Electronics) and Ian Ferguson. 1994. "Developing A New Generation '14' Colour Set." *Transactions of the 6th Symposium on QFD*. QFD Institute, www.qfdi.org. ISBN1-889477-06-0
- Richardson, Carrie (Motorola) and Bill Barnard. 1996. "Customer Integrated Decision-Making (CIDM)/QFD and the Development of Integrated Circuits Solutions for Multimedia Markets" *Transactions of the 8th Symposium on QFD*. QFD Institute, www.qfdi.org. ISBN1-889477-08-7
- Saaty, Thomas L. 1990. *Decision Making for Leaders: The Analytic Hierarchy Process for Decisions in a Complex World*. Rev. 2nd ed. Pittsburgh: RWS Publications.



- Stickel, Fred and Sherry Bosserman (Motorola). 1996. "Motorola's Six Pack QFD Total Customer Satisfaction Team," *Transactions of the 8th Symposium on QFD*. QFD Institute, www.qfdi.org. ISBN1-889477-08-7
- Takada, Hiroshi. 1992. "The Use of QFD at NEC Kansai." Proceedings of the 1st European Conference on Quality Function Deployment. Milan, Italy, March 25-26, 1992. Galgano & Associati.
- Uchimar, Kiyoshi et al. (NEC IC Microcomputer Systems) 1993. *TQM for Technical Groups: Total Quality Principles for Technical Groups*. Productivity Press. ISBN1-56327-005-6
- Zultner, Richard. 1997. "Project QFD Managing Software Development Projects," *Transactions of the 9th Symposium on QFD*. QFD Institute, www.qfdi.org. ISBN1-889477-09-5