



# QR VIEWS

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## *Dr. Yoji Akao : Pioneer of Quality Function Deployment*



**Dr. Yoji Akao**

Passed away at the age of 88  
on 24 October 2016.

*Founder of Quality Function Deployment (QFD)  
Professor, Graduate School of Yamagata University  
Chairman, International Council for QFD  
Honorary President, Hong Kong QFD Association*

### **Education:**

Graduated from Tokyo Institute of Technology in 1948  
Received Doctorate PhD in 1964

### **Teaching Experience:**

Prof. Yamanashi University, 1974-1981,  
Prof. Tamagawa University, 1981-1995 (Dean from 1991-1994),  
Prof. Asahi University, 1995-2004

### **PUBLICATIONS:**

Prof. Akao is best known for his work of developing Quality Function Deployment methodology that has been widely used all around the world in most sectors of business. He has published many papers and books. Most widely used have been the following:

- Quality Function Deployment – Integrating Customer Requirements into Product Design published in English in 1990; originally published in Japanese in 1988.
- QFD: The Customer Driven Approach to Quality Planning and Deployment.
- HoshinKanri - Policy Deployment for Successful TQM published in English in 1991; originally published in Japanese in 1988.

### **VOLUNTARY ACTIVITIES:**

Member Academician of International Academy for Quality (IAQ) since 1989, President of Japanese Society for Quality Control- 1990-1991, Chairman of 'International Council for QFD', since 1997 Honorary consultant of the 'Association for Quality Function Deployment of China' since 2005.

### **RECOGNITION:**

- "Quality Control Literature Prize" from the Nippon Keizai, Shinbun-Sha, 1960 and 1978.
- "Deming Prize" from Committee of Deming Prize in JUSE, 1978.
- Best on Quality Award from International Academy for Quality (IAQ).

- ASQ' "Distinguished Service Medal" from American Society for Quality (ASQ) in 2001 ,
- "Shainin Medal" from ASQ in 2007.
- "Honorary Member" from ASQ in 2010 and
- "Honorary Member" from International Academy for Quality (IAQ) in 2010

Two distinguished awards have been established in recent years in his honour.

- The [Akao Prize](#)<sup>®</sup> is awarded to individuals around the world who have demonstrated Excellence in their practice and dissemination of QFD for many years.

The [Akao Scholarship for QFD](#) rewards to university students for excellence in their QFD study and research.

## CONTRIBUTION TO ASIA:

He has influenced quality practices in most countries in Asia through his books originally published in Japanese and that were later translated in English and widely used for new product development offering better products to the customers in shorter time cycles and at lower cost. QFD has become a universal

methodology referred to in all Business Excellence Models; TQM approaches; Six Sigma; Design for Six Sigma and Lean etc.

He has also travelled to many countries of the world including Asia to train and consult people in the field of quality management with particular reference to QFD and HoshinKanri which is the precursor to the Balanced Score Card approach.

# Quality Function Deployment

KR Mohan Ananthanarayanan & P.Muthuganapathy

Quality Function Deployment (QFD) is a structured method for listening to the customers and optimizing designs, materials and processes to ensure the customers' expectations are best satisfied. Optimal Thinking® is the core of all activities.

### QFD Benefits

- Shortest Cycle Time
- Best Quality
- Lowest Cost
- Best Customer Satisfaction

### History of QFD

- 1966 -Yogi Akao proposes concept
- 1969 -First magazine article
- 1972 -Concept of deployment is developed
- 1972 -KOBÉ Shipyard using Quality Tables
- 1977 -Toyota uses QFD in their design process
- 1984 -Dr. Clausing (Xerox to Ford) begins advocating QFD
- 1987 -Bob King's book "Better Designs in Half the Time"
- 1988 -Clausing & Hauser QFD article published in Harvard

'Customer is king' is a familiar phrase we often hear. It means that the needs of the customers are well understood in product or service realization organization. Quality Function Deployment (QFD) is a quality tool to understand and achieve better customer satisfaction. It is known in different names like decision matrices, matrix product planning and customer driven engineering. It is the ability of an industry to understand the voice of the customer, his needs and then to translate it into technical specifications and features that will fetch a 'wow' response from the customer. It is applicable for internal customers also in an

organization. Historically in India, when kings built monuments and temples, requirements were more than well understood by the workmen who translated King's voice into everlasting pieces of excellence with utmost commitment and involvement. These pieces delight visitors even today. Customer was literally the king.

The method used in QFD to translate the voice of customer into technical specifications comprises of matrices starting from the house of quality matrix. Figure.1 & 2 gives the house of quality template, its benefits and QFD phases for product development.

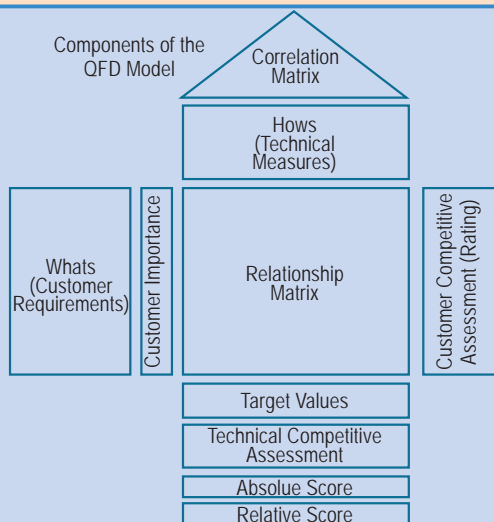


Figure 1: The house of quality template and benefits

### THE HOUSE OF QUALITY PROVIDES

- A requirement planning capability
- A tool for graphic and integrated thinking
- A means to capture and preserve the engineering thought process
- A means to communicate the thought process to the new members of the QFD team
- A means to inform the management regarding inconsistencies between requirements, risks and needs of the customer.

**Key elements of QFD:**

- WHAT———— the output that we seek
- HOW———— that which causes the WHAT to happen.
- RELATIONSHIP————How much each HOW relates to each WHAT
- HOW MUCH ————The measure of HOW.

**Features of QFD:**

QFD is concerned with systematic collection of customers’ likes, dislikes, views, opinions, etc. in either precise or vague forms. Converting these into technical requirements must have to pass through the development of the following:

1. Planning matrix
2. Deployment matrix
3. Process plan and quality control charts
4. Operating instructions

The features of the above documents are briefly discussed in the following section.

QFD is a systematic approach to incorporate the “voice of the customer” into total product cycle involving

- Product planning
- Product Design
- Manufacturing
- Assembly
- Service

**Sample Applications**

- Design of new or existing products
- Design of new or existing services
- Development of design requirements
- Selection of decision alternatives
- Selection of points of manufacturing
- Selection of points of service
- Selection of key suppliers
- Trade studies.



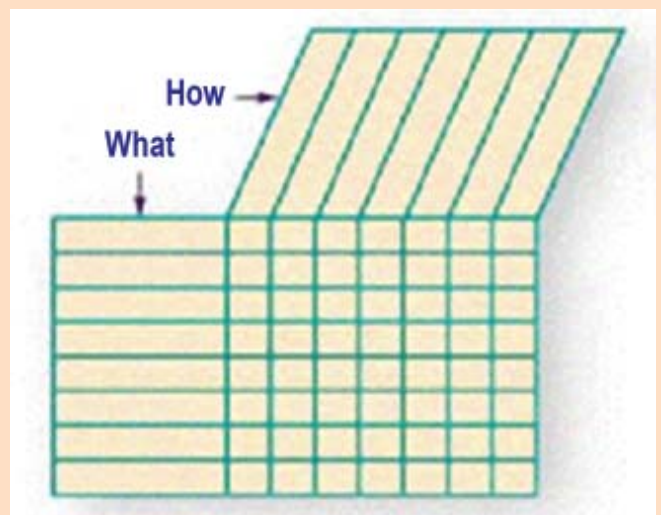
Figure 2 : QFD phases for product deveopment

**Planning matrix**

It translates the voice of the customer into counterpart control characteristics; i.e. it provides a way of turning general customer requirements drawn from market evaluations; comparisons with competition, and marketing plans into specified final product control characteristics.

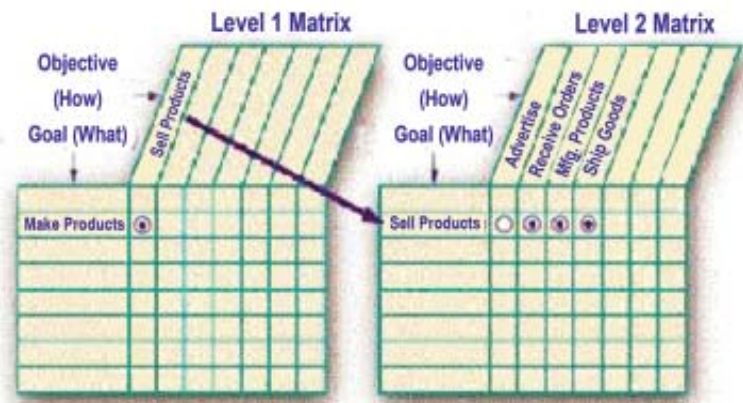
**QFD matrix**

Once this matrix is made and then comes what is known as waterfall relationship of QFD matrices as shown in figure 3.



### Deployment matrix

It translates the output of planning matrix i.e., the final product control characteristics into critical component characteristics. Thus, it moves one step farther back in the design and assembly process.



### REQUIREMENTS MATRIX

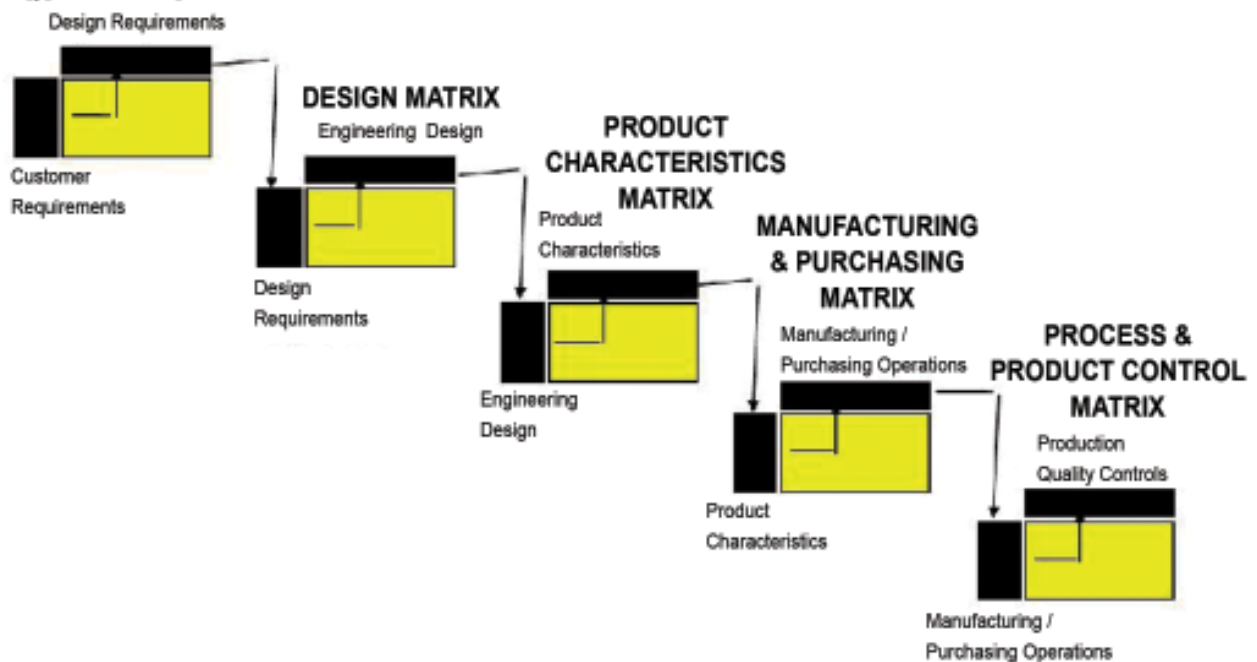


Figure 3: Waterfall relationship of QFD matrices

We see many automobiles introduce new features as an improvement in their new version. Most of them are worked out from the voice of customer. Same feature appears differently in automobiles of different companies as in the case of dash boards, seats and the bumpers which are essentially due to the interaction of basic design of the vehicle and product manufacturing mix.

QFD works well as long as customer knows what he wants and are able to express it proficiently. Here comes the hitch. Many know what they want but are not proficient enough to put it in right words. Requirement for a coconut scrapper is well understood in our kitchen but voice of customer in this regard can be naïve leading to not many safe models in the market.

### Process plan and Quality control charts:

These two documents identify critical product and process parameters, as well as control or checkpoints for each of those parameters.

### Operating Instructions:

These are based on the critical product and process parameters; these instructions identify operations to be performed by plant personnel to assure that important parameters are achieved.

Thus QFD envisages the systematic translation of customers' needs which are expressed in non-technical terms into technical language at different levels and positions.

## Major Steps in Product Improvement Using QFD Approach:

1. Market research- collection of customers' requirements.
  - a) Identifying customer needs
  - b) Identifying the potential market.

The information regarding the product requirements in customer terms comes from a variety of sources:

- i) Market research data
- ii) Dealers input
- iii) Sales department wants

iv) Special customer opinion surveys.

2. This is the most critical part of the process and it is usually the most difficult, because it requires obtaining and expressing what the customer truly wants and not what we think he/she expects.
3. Finalizing the customer requirements.
4. Prioritizing the product design requirements.
5. Establishing critical part/process characteristics.
6. Prediction of potential failures and improvements action.
7. Product evaluation at different stages.

The Systems Assembly Europe Business System QFD is shown in figure 4.

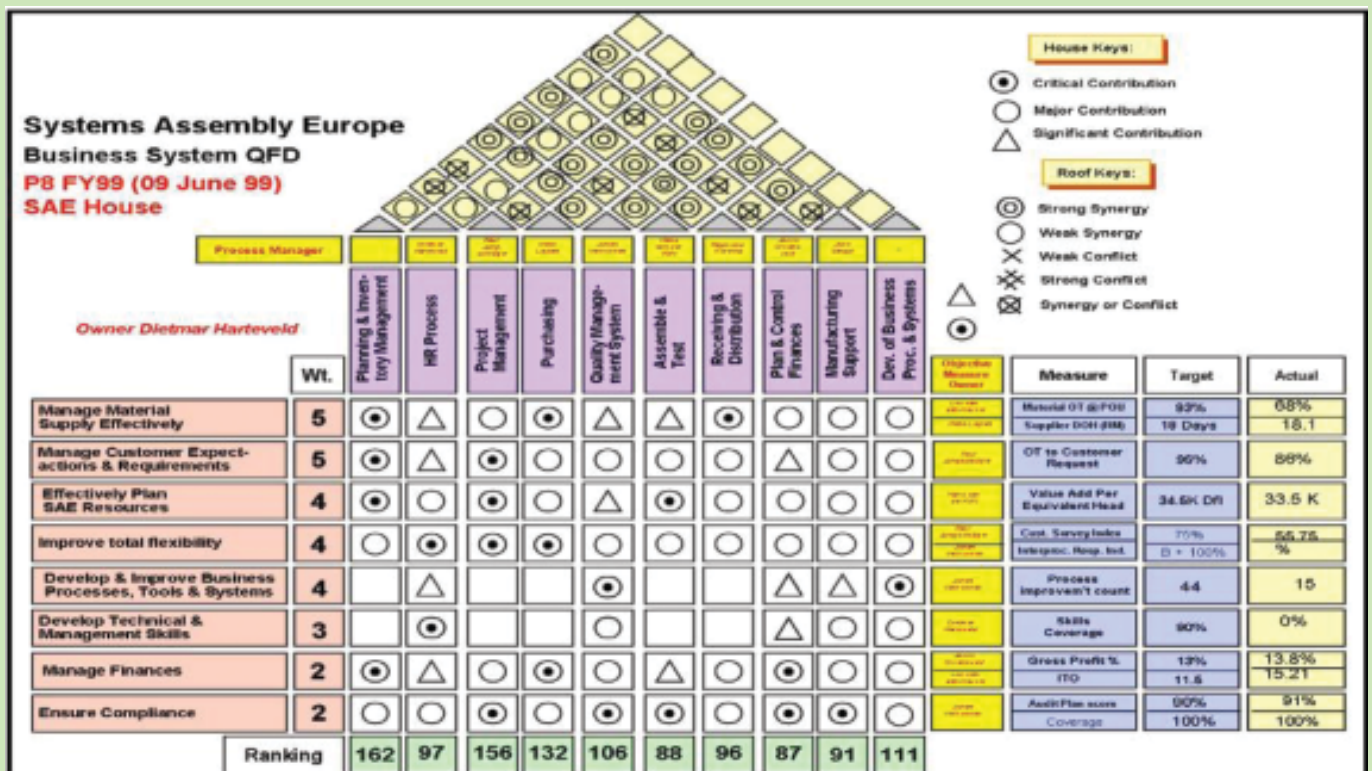


Figure 4: SAE Business System QFD

**Kano model** is the one that helps to understand customer needs better. Dr. Noriaki Kano isolated and identified three levels of customer expectations. They are (i) Expected needs – a must available requirements, fully satisfying the customer at this level simply gets a supplier into the market (ii) Normal needs - These are the qualities, attributes, and characteristics that keep a supplier in the market (iii) Exciting needs - These are features and properties that make a supplier a leader in the market. QFD and Kano model goes together to provide an exciting product with features you may not even recognize as in the case of our mobile phones.

## Conclusion:

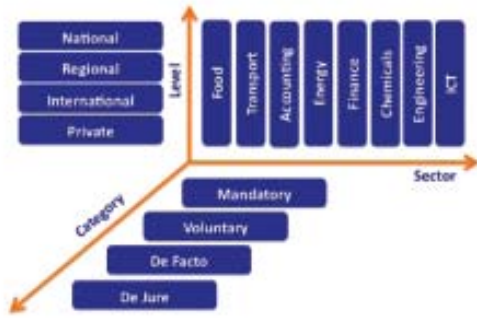
QFD serves, as a best tool for incorporating customer needs in the design of the product for quality improvement and long term survival of the organization.

## NIQR National Convention

NIQR Chennai conducted Fifteenth National Convention on 11 June 2016 and Shri. **Selvaraju**, Former Director DSRQ, received the award on behalf of ISRO for **“Performance for Success”**. NIQR Trivandrum members also had attended the convention and benefited.

## World Standards Day Celebration

### Categorisation of standards



Each year on 14 October, the members of the International Electro technical commission (IEC), International Organisation for Standardisation (ISO) and



International Telecommunication Union (ITU) celebrate World Standards Day, which is a means of paying tribute to the collaborative efforts of the thousands of experts worldwide who develop the voluntary technical agreements that are published as international standards.

**Shri.K.R.Mohan Ananthanarayanan**, Secretary NIQR Trivandrum Branch delivered a lecture on World Standards on 14 October 2016 World Standards Day Celebration at Institution of Engineers Hall, Trivandrum.



**Shri.C.Athi Pagavan**, Vice Chairman, NIQR Trivandrum Branch delivered lecture on World Standards day at Amal Jyothi College of Engineering, Kanjirapally on 5 November 2016.

**Shri. K.R.Mohan Anantha Narayanan**, Secretary NIQR Trivandrum Branch Conducted Quiz program for the students and the winners were awarded with cash prize and mementos. **NIQR Trivandrum Branch cosponsored the Quiz Program.**

## ANNUAL GENERAL BODY MEETING



**Annual General Body Meeting of NIQR Trivandrum Branch was held on 20 October 2016 at Hotel Apollo**

**Dimora.** Shri. C. A. Ignatious, Chairman NIQR Trivandrum Branch delivered a lecture on exponential technologies. Shri. K. Rajagopal was honoured with ponnada for his contribution towards Quality. Shri. K.R. Mohan Ananthanarayanan, Secretary highlighted the activities of Trivandrum Branch, Shri. Sai, Treasurer presented the audited accounts. Shri.C.Athi Pagavan, Vice Chairman, delivered the vote of thanks. The new EC was elected with Shri. C. A. Ignatious, as Chairman.

## Wrap up



**K. R. Mohan Ananthanarayanan**  
Secretary  
NIQR Trivandrum Branch

The term of the present Executive committee (EC) has come to an end and the new EC has taken over on 20 October 2016. We have the same line up that served for a long time with a few new faces. On behalf of the last committee let me express our sincere thanks to all the members for the successful conduct of programmes of the branch. I hope to expect increased participation and contribution in the year to come for the programmes of the branch. NIQR is a professional society which can help improvement of quality in various spheres of life. It can train students, engineers and impart basic awareness among public that will have a long term impact on society at large. With the guidance of our Chairman Shri.C. A. Ignatious we hope we will be able to provide a new approach for spreading the message of quality. I hope members would show more interest in contributing to QR views, attending programme and giving useful suggestion to the Executive Committee. Quality month is being celebrated in the month of November and NIQR joins the world over to spread awareness about quality in all walks of life.