# The Taguchi Method:

## THE SERVICE MANAGER'S PRIMER TO QUALITY

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# GENICHI TAGUCHI

- Born in Japan, 1924
- Electrical Engineer
- Worked during 1950's to improve Japan's post-WWII telephone communication system
- Father of the "Taguchi Method" and "Robust Engineering"

# Don’t run away!

- Not a mathematician?
- You can still successfully apply Taguchi Method concepts to your service business.
- Basic concepts are simple.
- Just keep reading.

# Competitive Edge 101:

- "In the next century, the capability of developing robust technology will be essential to the competitiveness of any manufacturing enterprise." (Tsai) (Taguchi: p xi)

- Substitute "robust services" and "service enterprise." You need this.

# Competitive Edge 102:

- "To compete successfully in the global marketplace, organizations must have the ability to produce a variety of high-quality, low-cost products that fully satisfy customers' needs." (Robust Engineering; p. xiii)

# Quality Defined

- "Any engineered system reaches its 'ideal function' when all of its applied energy (input) is transformed efficiently into creating desired output energy." (Robust p. 6)

- Employee energy = input
- Customer satisfied = output

# Basic Ideas:

- CUSTOMER SATISFACTION
- Design to the highest standards early in the process to eliminate all non-random errors
- Quality Loss = Loss to Society quantified through “Quality Loss Function”
- Variation (+/-) from optimal measure results in a loss.
- For best results, GET HELP.

# Resources Expended on Quality

# Customer Satisfaction

- **Ways to measure service:**

  1. Returning customers
  2. Number of complaints (1:10)
  3. Number of compliments
  4. Employee attitude

# Design

- Equipment – No breakdowns
- Specific jobs defined – Need to know responsibilities
- Policies and Procedures – What do you want, anyway?
- Taguchi Method experiment

# Quality Loss Concept

- Deviation from target results in loss.
  - Lower than target
  - Greater than target
  - Both lose

# Quality Loss Function

- Quantify the Loss
- Warning:

  Next slide contains math formulas

- But give it a try!

# Quality Loss Function II

$$L(y) = k(y-m)^2$$

$L(y)$ = Loss

$k$ = constant = $\frac{\text{cost to correct}}{\text{tolerance}^2}$

$y$ = reported value

$m$ = mean value (average)

(Taguchi On Robust Technology p. 22)

# Example:

- Company C received an average of 10 complaints per month last year. In November they received 15 complaints (y). Management sets an acceptable level at 2 (tolerance).
- It costs the company $50 directly per complaint to correct the problems. They determined the cost in lost sales to be $100.
- Total cost per complaint: $150

# Example continued:

$k = \$150/2^2 = \$37.50$

$L(y) = 37.50\ (15-10)^2$

$= 37.50\ (5)^2$

$= 37.50\ (25)$

= $937.50 is loss for the month of November

# MATH DONE!

# Taguchi Experiment – Steps According to Dr. Foster:

(OM Review p. 38-44)

- Managers' job:
  - Identify the Problems
  - Brainstorm
  - Contribute to experiment design
- Facilitator's job:
  - Design experiment
  - Run experiment
  - Analyze results
  - Confirm experiment

# Step 1: Problem Identification

- What do managers and/or employees see that need improvement?

# Step 2: Brainstorming

- Identify critical variables in the service that affect quality.
- Open and honest discourse with all people involved.
- Decide which factors are controllable and which are not.

# Step 3: Experiment Design

- Using results from brainstorming session, facilitator will design an experiment.
- Management must understand this part, and needs to fully support the resources needed for it.

# Step 4: Experiment

- Use of ANOVA requires managers understand its use.
- Facilitator, although in charge of the experiment, must assure management's understanding of the process.

# Step 5: Analysis

- Factors closest to target specification identified.
- Means to reduce controllable variation produced.

# Step 6: Confirm Experiment

- Set up new system using data from experiment.
- Test and validate results.

# Conclusion:

- Best improvement is early in the process.
- Use expert consulting help for full experiment and implementation.
- Successfully used in airlines, insurance, hotels and restaurants.
- Quality is a major feature that sets a service apart from the rest.

# Citations:


- Foster, S. Thomas Jr. Ph. D.: "Designing and Initiating A Taguchi Experiment in a Services Setting" *OM Review – Refereed: Volume 9, No. 3.*

- Taguchi, Genichi: *Taguchi on Robust Technology Development: Bringing Quality Engineering Upstream;* Asme Press, New York, 1993

- Taguchi, Chowdhury, Taguchi*: Robust Engineering: Learn how to boost quality while reducing costs and time to market;* McGraw-Hill, New York, 2000

# Recommended Reading:

- In addition to cited works:
  - Visit American Supply Institute (ASI) website at www.amsup.com