

## Generator of Customer Focus and Profiles Through Probability Sampling Surveys

Burton T. Oñate<sup>1</sup>

### ABSTRACT

Many countries of the world allocate a high percentage of their quality award points to customer profiles (needs, requirements, evaluations and satisfactions). Also, in Total Quality Management (TQM) Humanware dimension, customer focus and profiles are given more importance and therefore higher weights. The scientific technique of probability sampling surveys is applied to both external and internal customers of an enterprise to measure the different characteristics or categories of this customer criterion in TQM. The sampling design was coined by the author as "optimum allocation with equal take" which emphasized: (1) the generation of estimators with quality in terms of highest precision (low standard errors), minimum non-sampling errors, consistency in concepts and definitions, relevance (objectives), and user-friendliness; (2) delivery just-in-time; and, (3) least cost. The estimators of this design will generate optimum measurements of the needs and requirements of customers and their satisfaction.

**Keywords:** customers' profiles, optimum allocation with equal take, internal and external users frames.

### 1. Introduction

"TQM Towards the 21st Century" was the theme of the International Conference on Quality held in Yokohama, Japan in October 1996. TQM principles, techniques, philosophies and criteria were enumerated and discussed. TQM includes these dimensions: (1) Humanware (HuW): (a) Leadership and Management; (b) Human Resource Development and Management (Total Quality Care Management); (c) Customer Focus, Satisfaction and Expectation; (2) Hardware (HaW): (d) Quality Process and Product Control Management; (e) Quality of Operational Results; (f) Continuous Quality and Productivity Improvements and Self Assessment; and (3) Software (SW): (g) Strategic Quality Planning (and Management); and (h) Documentation, Information and Analysis. Other criteria such as the (i) Environment, (j) Impacts on Society and others have also been mentioned. The sources of these criteria are: the US National M. Baldrige Quality Awards (Hart and Bogan; 1992, George, 1992), European Quality Awards, Deming (Prize), the Philippine Quality Awards (PQA), ISO 9,000 and 14,000 certification series and other frameworks (Feigenbaum, 1996). TQM is applied to all sectors of Industry and Business services, say, establishments in the Philippine Standard Industrial Classification and has invaded government operations such as health care management, education, finance, housing/construction and many others (Gore, 1993; Hutchens, 1996). TQM in statistical operations is not easily available in the global literature (Oñate, 1998, 1997). As an establishment, a statistical agency in the Philippine Statistical System will be involved in the production of data (the product/service) with the desired quality, at least cost and delivered for each sub-sector of the economy, agriculture, industry and services including demographic and socioeconomic profiles on the needs and satisfaction of its customers (public and private sectors, academe, workforce and others). One of the primary sub-goals of TQM is making delighted customers (Haller, 1996) which is allocated 250 points in the PQA. The total is 1000 and the elements in the PQA are patterned after the US Malcolm Baldrige Quality Awards. Note that in TQM elements (2e) Quality of Operational Results and (2f) Continuous Quality and Productivity Improvements (Endres,

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<sup>1</sup> Member, Philippine Society for Quality (PSQ) and Asia-Pacific Quality Organization (APQO); Chairperson, Board of Trustees, Oarland, Inc.

1997) and Self-Assessments are given 250 points while (lc) Customer Focus is allocated 300 points in the US Baldrige Quality Awards. Each country may have different categories and points allocation. The Australian Quality Awards (AQA) have assigned: Leadership (130), Policy and Planning (120), Information and Analysis (130), Human Resources (200), Customer Focus (240) and Quality of Processes, Product and Service (180) or a total of 1000. AQA allocates also the highest point of 240 for Consumer Focus. In 1999, different allocation of points has been recommended for PQA and the USQA. Customer focus and profiles are important items in TQM.

## **2. Customer Satisfaction and Retention: Employees and Suppliers Profiles**

A customer is any individual, group or establishment who may be impacted or affected by the product, process or services. There are external and internal customers where the external customers are those affected by the product, process or service but not members of the establishment while the internal customers are those affected by the product, process or service, but are members of the establishment that provides the product, process and/or service (Juran, 1992 as cited by Endres, 1997). These concepts may be expanded depending on functions to include customer designs in jeans, shoes, packaging, travel, tools, cards, publishing, printing and others.

- 2.1 Quality in products and services is important to maintain and improve competitiveness in the global markets. It means greater market shares and profitability. There are significant potentials which exist in all establishments, national and foreign, for improvements in productivity and quality (Swift, Ross and Omachonu, 1998). But many establishments or firms do not perceive quality as a vehicle for greater business performance. Attaining quality superiority through TQM produces or generates the following benefits: (1) Greater customer loyalty; (2) Market share improvements; (3) Higher stock prices; (4) Reduced service calls; (5) Higher prices; and, (6) Higher productivity. Feigenbaum (1990, 1991) estimated that TQM could mean a 7 percent increase in USA's Gross National Product. Getting quality result is not a short-term endeavor. Implementing TQM requires hands-on, continuous management leadership.
- 2.2 As the global business environment becomes more and more turbulent TQM seems more and more indispensable. New issues or challenges such as organizational ethics, strategy development processes, restructuring and improvement, developing "learning organizations", and others can most effectively be tackled and confronted within the context of a TQM philosophy, criteria and principles. Lindsay and Petrick (1997) suggest that an establishment take the "TQM journey" before trying to go beyond TQM. Organizational Development includes strategic input and continued development of strategic planning system to increase customer satisfaction and retention. No book or publication can tell an establishment how to achieve total quality: only the customers and stakeholders can tell one when one has it or not. But outstanding quality, delivery, service and cost generate satisfied customers who reward the establishment with continued patronage (customer for life) and free word-of-mouth advertising (F. Voehl, Series Editor, Preface, in Lindsay and Petrick, 1997, op. cit.)

### 2.3 Customer Satisfaction and Retention

- a. **Measurement System on Customer Satisfaction** includes: 1) development of key indicators that generates customer satisfaction; and 2) collecting data regarding the perceptions of quality received by customers through surveys, product/service follow-ups, complaints, and turnover of customers and employees inputs. Indicators could be two folds; physical product (reliability, aesthetics, adaptability); and, nature of service/outcome, timeliness, satisfaction, dependability, reputation of establishment, friendliness and courtesy. Individuals, groups, departments in any organization are able to achieve quality and productivity if these employees or officers are very sensitive to the needs, concerns and priorities of both external and internal customers. Thus, customer satisfaction has a three pronged subsystem: the quality process; the employees under Total Quality Care Management (TQCM); and, the customer expectation.
- b. **Customer Retention and Service Quality.** Customer defection is a recognized problem and customer retention is a challenge and opportunity in both manufacturing (physical products) and service firms. Service industries are becoming an important component of any economy in terms of the workforce, and quality and value of the services. The quality of services is declining (Swift, et. al, 1998, op cit). Many services are intangible and the interaction or link between employees (internal customers) and the end users (external customers) is critical. In fact, this interaction (face-to-face or one-on-one context) influences satisfaction more than the actual physical product or service obtained. There is a proven relationship between customer retention and profit. There is a "lifetime retention" value. Some examples are: (1) Taco Bell estimates that the lifetime value of a retained customer is about US\$11,000; (2) Automotive dealership calculates that the lifetime value of a retained customer is US \$300,000 in sales; and, (3) a credit card company reported that a 5 percent improvement in customer defections increases its average customer value by 125 percent.
- c. **Drivers of Customer Retention and Profit** are employees satisfaction and employees retention. Internal customer conflict will arise between the people, the activities, and the functions within the establishment that are the customers of other people, activities or functions. Manufacturing is the customer of design and other departments/divisions are customers of data processing. Conflict may arise between the needs and requirements of the internal and external customers and a balance must be made to meet these differences and the processes must be designed to meet these differences in needs and requirements.
- d. **Buyer (the Establishment) - Supplier Relationships** must be perfect and lifelong so that no rework or inspection is necessary. Both buyers and suppliers will have long-term commitments to TQM (ISO 9000 and 14000). Suppliers should be involved in the early stage of research, development and design for continuous cost, quality and productivity improvements and both should agree on the best-in-class products and processes. Other guidelines and criteria may be forwarded depending on the specific enterprise (manufacturing or service). Many establishments believe that high ratings on employees (internal) satisfaction and retention will result in high ratings on customer (external) satisfaction and retention.

### 3. Instruments to Measure External Customers (End-users) and Internal Customers (Employees) Satisfaction.

These instruments will include Customers Sampling Frames, Manual on Concepts and Definitions, Probability Sampling Designs and Estimation Procedures, Questionnaire Design, Specifications, Schedule of Activities, Workforce and a Tentative Budget for External and Internal (Employee) Customers. For illustrative purposes in this section, very tentative and preliminary data are applied in the sub-sector of consumer code.

#### 3.1 Customers Sampling Frames

There will be two frames which will be considered, namely: (1) external or clients; and (2) internal or employees frames, both of which are developed and constructed within the immediate control of the establishment or company. A suppliers frame will also be made available but only the instruments for the external clients are detailed.

##### Initial Frame: Requirements of New Clients

Application for new clients (subscribers) requires information which could serve as initial indicators and these data will include, among others, the following: full name, sex, citizenship, date of birth, home address, years in residence, zip code, home telephone, employer/business name, title, business telephone, business address, years working, zip code, fax and e-mail, employment, monthly income range, home ownership, subscriber of type of product or service, marital status, spouse name and address, and others.

These initial data could be used as indicators for the frame on stratification based on location (geo-code), types of account (private, government, households, others), income levels, and others. Later on, the billings or accounts will show expenditures, types of service, geo-codes and others which may be used as correlation variables for ratio and regression estimators to improve the reliability and precision of relevant estimates for internal (employees) and external customers (end-users). These documentation will enable the given establishment or corporation partial and/or full control of the construction and development of the initial and future target and frame universes for the probability sampling designs for the generation of customer focus and profiles.

#### 3.2 Some Concepts and Definitions

The Standard Concepts and Definitions seek to specify in precise terms terminologies, scope, time coverage, universes, and measurement variables of this study. Special attention is required in the determination of the sampling universes:

- **Target universe** - this pertains to the concept or framework of units under which the ideal/true target parameters are to be determined; and corresponds to the conceptualization stage of the survey. In this study, the target universe consists of the units comprising the totality of subscribers (N).
- **Frame universe** - this pertains to the list of recorded units (e.g. subscribers as of a given time period). Multiple frames may arise as a result of logical grouping of units having

similar or near similar characteristics (i.e. stratification of subscriber base into Individual, Corporate, Government, and Others). Ideally, the Frame universe must coincide with the Target universe.

- **Survey universe** - this is the collection of units that would have been identified and surveyed under the survey scheme specified in this study. The Survey universe must coincide with the Frame universe. However, in practice, the Survey universe may deviate from the Frame universe as a result of undercoverage, wrong coverage, non-response and missing units.
- **Inference universe** - is the conceptual universe of units for which data would have become available at the tabulation stage after the survey and processing stages under a specified selection scheme, if selected, and after adjustments and imputations, if any. The Inference parameters may differ from the Target parameters because of undercoverage, overcoverage, wrong coverage, missing units, noncontact, non-response, response error, inappropriate weights, imputations and adjustment errors (Oñate, 1995). These concepts are shown in Chart 1. The following definitions/classifications are used:

## 1. Clients By Type of Account

### 1.1 Individual

**Individual Account** : subscription and accountability is limited to individual or person

- a. Individual Account (Regular) : does not require any special handling of an Account Officer or Account Executives
- b. Individual Account (VIP) : requires very special handling of an Account Officer or Account Executives VIP can either mean Very Important or Very Influential Person

### 1.2 Corporate

**Corporate Account** : subscription and accountability is under the name of a corporation. All corporate accounts require very special handling because of the totality of business they bring to our company.

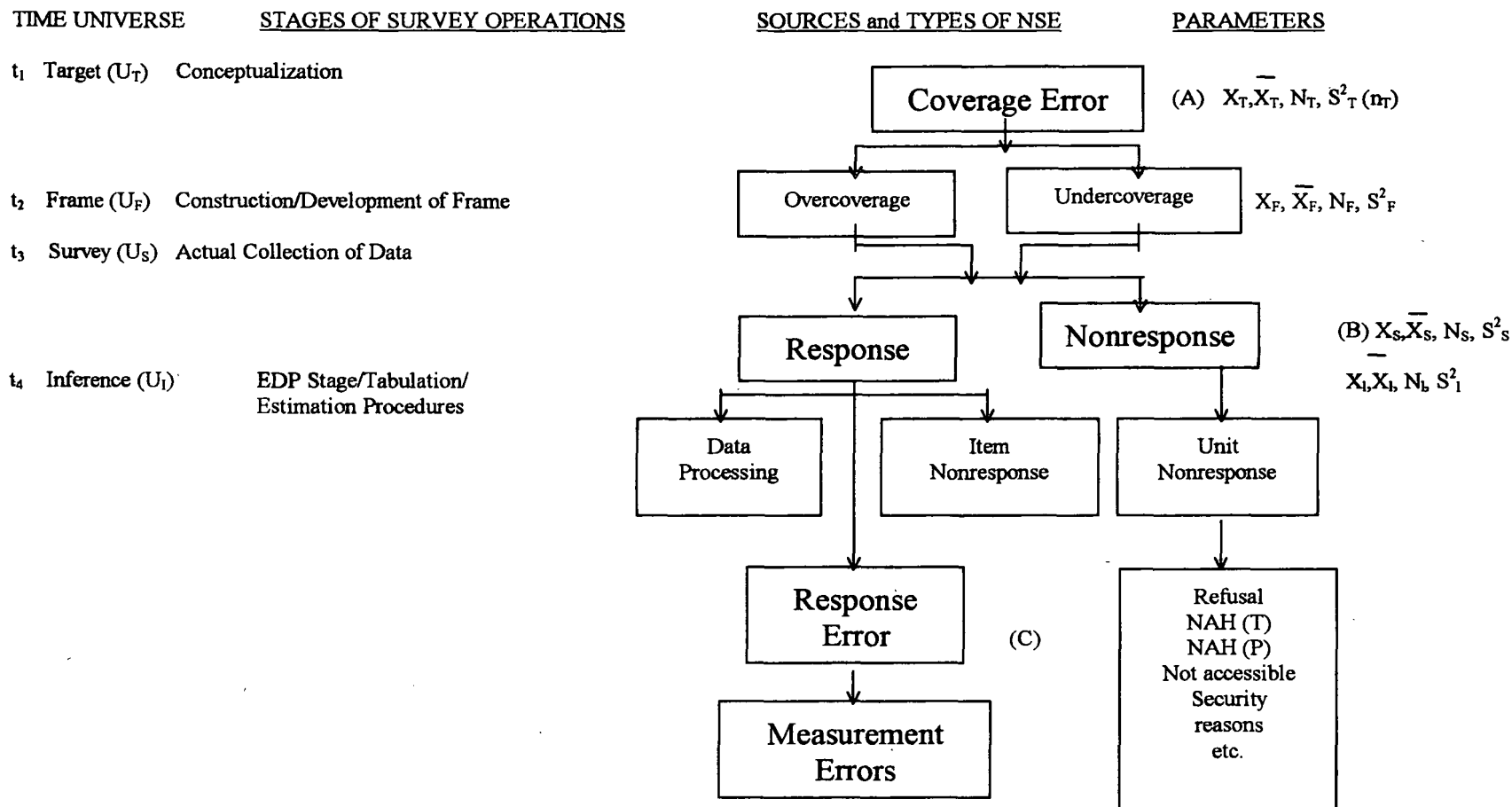
- a. VIP Corporate : pertains to accounts held by an individual assignee who holds an executive position in a corporation
- b. Regular Corporate : pertains to accounts held by an individual assignee who does not hold an executive position in a corporation

### 1.3 Government

**Government Account** : Subscription and accountability is under the name of a government entity. Government accounts require special handling due to the totality of the business of the government entities and peculiar requirements brought about by the payment cycle and tax exemptions.

- a. VIP Government : pertains to accounts held by an individual assignee who holds an executive position in government

**Chart 1**  
**Time, Universe, Stages of Survey Operations, Sources and Types of**  
**Non-Sampling Errors (NSEs) and Parameters**



b. **Regular Government** : pertains to accounts held by an individual assignee who is not an executive in government

1.4 **Other Accounts** : Subscription and accountability is not classified as Individual, Corporate or Government; but requires special classification due to the totality of the business. Typical examples are Public Calling Stations, PHILCOM-EO 109 Reselling ETPI, Reselling, etc.

## 2. Clients by Geographical Location

Individual Accounts may be further identified by Geo-Code. This is an internal coding system that approximates and takes the place of the Postal Zip Code System.

Corporate, Government and Other Accounts are given special Geo-Codes, only for the objective of bill-routing and business accountability. This coding system does not follow any geographical pattern.

Classifications - this is the schedule of Geo-Codes

## 3. Clients by Occupation

This standard classification of occupation may be used as tabulation classification (domains), and may provide value in the analysis of usage patterns. The conclusions derived will serve as inputs for financial and marketing planning.

## 4. Clients by Industry

This standard classification by industry may be used as a stratification variable, and may provide value in the analysis of usage patterns. The conclusions derived will serve as inputs for financial and marketing planning.

## 5. Clients by Cellular Type of Service and Status

## 6. Sampling theory is described in detail in Methodology

## 7. Universes are given in the Introduction of this Section.

## 8. Subscriber base, subscriber churn

8.1 Subscription

8.2 Pre-paid

8.3 Combined subscription and Pre-paid

## 9. Coverage Period of the Study

9.1 Subscription

a. Active as of X period

These are clients that have status "Active"/"Unsuspend"/"Reconnect" as of 01

October 1998, provided further that these clients were Activated in the network on/or before 01 July 1998.

b. Disconnected as of Y period

These are clients that have status "Disconnected" as of 01 October 1998, provided further that these clients were Activated in the network on/or before 01 July 1998, and that the date of Disconnection is not earlier than 01 September 1998.

c. Terminated as of Z period

These are clients that have status "Terminated" as of 01 October 1998, provided further that these clients were Activated in the network on/or before 01 July 1998, and that the date of termination is within the period range of 01 March - 01 September 1998.

9.2 Prepaid

These are clients that have been in the pre-paid service on/or before 01 July 1998.

### 3.3 Methodology: Probability Sample Designs and Estimation Procedures

- a. **Proficiency of Enterprise Staff in Sampling Surveys.** The training, education and development of staff is an important dimension of Total Quality Care Management, a key criterion in Total Quality Management in policy and strategy. The training course conducted by the author on "Sampling Surveys: Generation of Customers' Needs, Requirements, Expectations and Satisfaction" was initiated by Management and held from 7 August to 2 October 1998. This training provided the venue toward improvement of the proficiency of staff in the design and applications of Sampling Surveys and its instruments in the generation of Customers' Profiles (Focus) which was allocated the most points in TQM and in the Philippines Quality Awards.
- b. **Suggested Design.** Oñate (various years) showed that many social, financial and industry indicators such as production, value added, income, expenditures and others arranged in paper strata in increasing order where

$L = 3$  is the number of strata

$n_i = n/L = n/3$  is the sample size in the  $i$ th domain

$$n/3 = \phi, \frac{n_i}{n} = \left[ N_i S_i / \sum_{i=1}^3 N_i S_i \right] = 1/3$$

and [Total Expenditure (Income)/3] as the interval divider allow allocation with an equal take within sub-universe (or domain) with customers as individuals, households, establishments/enterprises, government and very important clients. In addition, separate and combined ratio estimators may be imposed in the paper strata with  $X_i$  = expenditure and  $Z_i$  = income (concomitant) and the correlation is relatively high and greater than



(1/2) CV ( $Z_i$ ) / CV( $X_i$ ). This change in estimation procedure will further increase precision. Care must, however, be taken to minimize and control NSEs.

c. Optimum Allocation with Equal Take

$$\text{Let } n_i^* = n(N_i S_i) / \left( \sum_{i=1}^L N_i S_i \right)$$

Under optimum allocation with equal take

$$\frac{N_1 S_1}{\sum_{i=1}^L N_i S_i} = \frac{N_2 S_2}{\sum_{i=1}^L N_i S_i} = \frac{N_3 S_3}{\sum_{i=1}^L N_i S_i}, \text{ so that } n_i^* = \frac{n}{L} = \frac{n}{3}$$

This gives  $n_i^* = 6$  which could be increased or decreased depending on the specification level on CV( $T^*$ ) by Management

A rigorous proof of the "optimum allocation" technique is given by Oñate and Bader (1990, pp. 106-110). The equal take approach is incorporated into "optimum allocation" which Oñate applied to the data of the Integrated Survey of Household (NSO, 1989), financial and physical indicators (US-Philippines Bilateral Agreement, 1992), production and area statistics in agriculture (various years) and others. "Optimum allocation with equal take" is used by one with good experience and actual knowledge of data sets. This approach will also minimize or avoid the occurrence of non-sampling errors and will be very simple to implement in the field.

- d. A summary of the different estimators of population total,  $T_x^*$ , their variances and estimates of variances with ratio estimators is given in Chart 2.
- e. Oñate's design of optimum allocation and equal take with combined ratio in stratified random sampling (StRS) applied to six provinces in the Integrated Survey of Households (ISH), NSO (Philippines), showed reduction in size of strata to three ( $L=3$ ) and considerable improvements also of precision. Thus, the quality of data is achieved through lower S.E.s and N.S.E.s, cost-efficient, relevance, consistency and timeliness. (See Table 1).
- f. In personal interviews of households, the ISH/NSO reported the experiences on non-response rate (NRR) in the National Capital Region, some cities and Regions I to XII, Philippines. After first callback the NRR is still high (Table 2). In the mail survey of the Bureau Agricultural Statistics on prices received by farmers, the NRR was still 36 percent (unacceptable level) even after several callbacks by mail lasting 120 days. Establishments must consider seriously the problems of SEs and NSEs and the use of mail survey and follow up with telephone until the level of CV( $T$ ) is about 5% and NSEs is between 2 to 5% of sample respondents of external clients. Adjustments and imputation due to NSEs must also be considered in the methodology.
- g. An illustration of the applications of paper stratification into Low, Medium and High (expenditures) in the four domains (Government, Corporate, Individual, Others) for external clients is given in Table 3. The data are tentative.

**Chart 2**  
**Summary of different estimators of population total,  $T(X)^*$ , their variances and estimates of variances**  
**in stratified sampling with ratio estimators**

| Type of Estimator                   | Form of Estimator   | Variance   | Estimator of Variance   |
|-------------------------------------|---|--|---|
| Stratified                          | $\begin{aligned}\bar{T}(st) &= N\bar{x}(st) \\ &= \sum_{i=1}^L N\bar{x}_i\end{aligned}$       | $\sum_{i=1}^L N_i(N_i - n_i)S_i^2(X_{ij})/n_i$   | $s^2[\bar{T}(st)] = \sum_{i=1}^L N_i(N_i - n_i)s_i^2(X_{ij})/n_i$   |
| Separate ratio<br>of means          | $\tilde{T}_Q(st) = \sum_{i=1}^L \bar{q}_i Z_i$  | $\begin{aligned}\sum_{i=1}^L N_i(N_i - n_i) \\ [S_i^2(X_{ij}) + \bar{Q}_i^2 S_i^2(Z_{ij}) \\ - 2\bar{Q}_i S_i(X_{ij}, Z_{ij})]/n_i\end{aligned}$ | $s^2[\tilde{T}_Q(st)] = \sum_{i=1}^L N_i(N_i - n_i) \\ [s_i^2(X_{ij}) + \bar{q}_i^2 s_i^2(Z_{ij}) \\ - 2\bar{q}_i s_i(X_{ij}, Z_{ij})]/n_i$ |
| Combined ratio<br>of means          | $\begin{aligned}\tilde{T}_c(st) &= [\bar{x}(st)/\bar{z}(st)]Z \\ &= qZ\end{aligned}$          | $\begin{aligned}\sum_{i=1}^L N_i(N_i - n_i) \\ [S_i^2(X_{ij}) + Q^2 S_i^2(Z_{ij}) \\ - 2QS_i(X_{ij}, Z_{ij})]/n_i\end{aligned}$                  | $s^2[\tilde{T}_c(st)] = \sum_{i=1}^L N_i(N_i - n_i) \\ [s_i^2(X_{ij}) + q_i^2 s_i^2(Z_{ij}) \\ - 2qs_i(X_{ij}, Z_{ij})]/n_i$                |
| Separate unbiased<br>ratio of means | $T'_u(st) = \sum_{i=1}^L \{r_i Z_i + [(N_i - 1)n_i / (n_i - 1)](\bar{x}_i - r_i \bar{z}_i)\}$ | <p align="center">Use variance for separate<br/>ratio <math>\sigma^2[\tilde{T}_Q(st)]</math></p>   | <p align="center">Use estimator <math>s^2[\tilde{T}_Q(st)]</math></p>   |

**Table 1**  
**Rural Sector: One Percent Sampling Fraction (ISH/NSO)**

| Province      | OLD ISH    |                 | Onate's Design |                 |
|---------------|------------|-----------------|----------------|-----------------|
|               | Stratified |                 | Combined Ratio |                 |
| SAS           | $L$        | $CV(\bar{T})\%$ | $L^*$          | $CV(\bar{T})\%$ |
| Bohol         | 6          | 13              | 3              | 0.9             |
| Bukidnon      | 5          | 8               | 3              | 1.5             |
| Camarines Sur | 8          | 7               | 3              | 1.8             |
| Leyte         | 9          | 3               | 3              | 1.3             |
| Misamis       | 3          | 13              | 3              | 1.4             |
| Occidental    |            |                 |                |                 |
| Pangasinan    | 10         | 4               | 3              | 1.2             |

Optimum allocation and Equal take, 3 strata with combined ratio.

Source: Oñate, BT. & J.M.U.O. Bader (1990)

**Table 2**  
**HH Non-Response Rate. (Box 19/Box 17)**

| Region/Province | Substitution rate after first visit | Non-response rate at first visit<br>Call back |
|-----------------|-------------------------------------|---|
| NCR             | 14.5                                | 9.9   |
| Pasig           | 16.0                                | 7.4   |
| Mandaluyong     | 17.1                                | 16.2  |
| San Juan        | 23.9                                | 20.9  |
| Makati          | 44.8                                | 31.4  |
| Region I to XII |                                     | 3.2 to 9.5                                    |

Source: Oñate, BT. & J.M.U.O. Bader (1992)

**Table 3**  
**An Illustration of the Applications of Paper Stratification in three sub-Strata in the four domains (G, C, I, O,) for External Clients (Expenditures/Year), 1998. Tentative.**

**Government (G)**

|        | <b>P</b>            | <b>N<sub>i</sub></b> | <b>S<sub>i</sub></b> | <b>N<sub>i</sub>S<sub>i</sub></b> |
|--------|---------------------|----------------------|----------------------|-----------------------------------|
| low    | 0-4500              | 514                  | 1225.55              | 629,933                           |
| medium | 4501-18000          | 195                  | 3622.35              | 706,358                           |
| high   | 18001 and up        | 44                   | 14300.08             | 629,204                           |
|        | <b><u>total</u></b> | <b><u>753</u></b>    |                      |                                   |

**Corporate (C)**

|        |                     | <b>N<sub>i</sub></b> | <b>S<sub>i</sub></b> | <b>N<sub>i</sub>S<sub>i</sub></b> |
|--------|---------------------|----------------------|----------------------|-----------------------------------|
| low    | 0-7555              | 613                  | 1945.54              | 1,192,616                         |
| medium | 7556-40000          | 162                  | 7379.98              | 1,198,473                         |
| high   | 40001 and up        | 20                   | 60591.68             | 1,211,834                         |
|        | <b><u>total</u></b> | <b><u>795</u></b>    |                      |                                   |

**Individual (I)**

|        |                     | <b>N<sub>i</sub></b> | <b>S<sub>i</sub></b> | <b>N<sub>i</sub>S<sub>i</sub></b> |
|--------|---------------------|----------------------|----------------------|-----------------------------------|
| low    | 0-2400              | 132051               | 624.2                | 82,426,234                        |
| medium | 2401-23000          | 22850                | 3600.99              | 82,282,622                        |
| high   | 23001 and up        | 547                  | 149056.32            | 81,533,807                        |
|        | <b><u>total</u></b> | <b><u>155448</u></b> |                      |                                   |

**Others (O)**

|        |                     | <b>N<sub>i</sub></b> | <b>S<sub>i</sub></b> | <b>N<sub>i</sub>S<sub>i</sub></b> |
|--------|---------------------|----------------------|----------------------|-----------------------------------|
| low    | 0-9500              | 13336                | 2352.42              | 31,371,873                        |
| medium | 9501-67500          | 2603                 | 11574.32             | 30,127,955                        |
| high   | 67501 and up        | 91                   | 334010.4             | 30,394,946                        |
|        | <b><u>total</u></b> | <b><u>16030</u></b>  |                      |                                   |

**Total**

|        |                     | <b>N<sub>i</sub></b> | <b>S<sub>i</sub></b> | <b>N<sub>i</sub>S<sub>i</sub></b> |
|--------|---------------------|----------------------|----------------------|-----------------------------------|
| low    | 0-3400              | 150375               | 809.32               | 121,701,495                       |
| medium | 3401-34000          | 22002                | 5621.72              | 123,689,083                       |
| high   | 34001 and up        | 649                  | 187716.15            | 121,827,781                       |
|        | <b><u>total</u></b> | <b><u>173026</u></b> |                      |                                   |

**3.4 Questionnaire Contents: External Customers (End-users)**

- a. The questionnaire is a key instrument or process in a probability sampling survey. It must follow the standard practices so that the data obtained therein will be in accordance with the specification with regard to levels of precision (low standard error or CV's of estimators), accuracy (low non-sampling errors), consistency of concepts and definitions, just-in-time or timeliness, relevance to objectives, user-friendly and least cost. The Internal clients (employees) will be included as a sampling frame to measure the level or degree of satisfaction (a) at work and (b) outside work. This dimension will be included in the work program and the frame is easily available in the Personnel Division.
- b. Quality As a Way of Life and Loving Work are the Services that the establishment renders to the Philippine Society or Customer Satisfaction (Quantitative and Qualitative – delivery time, feelings, complaints) and are measured frequently through sampling surveys. These measures are taken seriously by top management as budgetary and product (services) reliability measures. Also, evaluation of the workforce at all levels and functions is significantly affected by the satisfaction measures or indicators generated by these surveys. An establishment would like to know Who? Which? When? Why? Lost sales revenues?
- c. Questionnaire (Draft)

A questionnaire is formulated to come up with a conclusion on the Sampling Survey statement "Generation of Establishment's Customer Needs, Requirements, Expectations and Satisfaction." The questionnaire is answerable thru ranking

- 1 - Highly Satisfied
- 2 - Satisfied
- 3 - Neutral
- 4 - Dissatisfied
- 5 - Highly Dissatisfied

It is expected that the respondents (clients) would answer based on their experience with the service the establishment provides. It is hoped that a realistic result would be reached in order to guide the company in pinpointing areas which need continuous quality and service improvements. The parameters and estimators for the binomial and multinomial distributions are presented in Oñate and Bader (1990, op. cit).

**d. Contents of Draft Questionnaire**

**A. Demographic Characteristics**

Name of Respondent \_\_\_\_\_ Address \_\_\_\_\_

Age (as of last birthday) \_\_\_\_\_ Civil Status \_\_\_\_\_

Education \_\_\_\_\_ Spouse \_\_\_\_\_ Age \_\_\_\_\_ Education \_\_\_\_\_

**B. Household Members**

| Name | Age | CS | Educ | Occupation | Income |
|------|-----|----|------|------------|--------|
|      |     |    |      |            |        |
|      |     |    |      |            |        |
|      |     |    |      |            |        |
|      |     |    |      |            |        |
|      |     |    |      |            |        |
|      |     |    |      |            |        |

**C. Commodities Availed**

| Commodity | # of Units | # of Users | Date Acquired | Hrs Used per Month | Amt Paid per Month | Still Active? (Y/N) |
|-----------|------------|------------|---------------|--------------------|--------------------|---------------------|
| Pager     |            |            |               |                    |                    |                     |
| Cellphone |            |            |               |                    |                    |                     |
| Landphone |            |            |               |                    |                    |                     |
| Others    |            |            |               |                    |                    |                     |

**D. Satisfaction Requirements**

|               |   |   |                  |   |   |                     |
|---------------|---|---|------------------|---|---|---------------------|
| <b>SCALE:</b> | 1 | - | Highly Satisfied | 4 | - | Dissatisfied        |
|               | 2 | - | Satisfied        | 5 | - | Highly dissatisfied |
|               | 3 | - | Neutral          |   |   |                     |

**(a) Product Performance****Consistency of Establishment's Product Quality**

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| Clearcalls and reception                        | 1 | 2 | 3 | 4 | 5 |
| Easy to contact called party                    | 1 | 2 | 3 | 4 | 5 |
| Easy to receive calls                           | 1 | 2 | 3 | 4 | 5 |
| Reliable communication calls                    | 1 | 2 | 3 | 4 | 5 |
| Lines are not busv                              | 1 | 2 | 3 | 4 | 5 |
| Quality of calls                                | 1 | 2 | 3 | 4 | 5 |
| Variety of units to choose from                 | 1 | 2 | 3 | 4 | 5 |
| Fewest drop calls                               | 1 | 2 | 3 | 4 | 5 |
| Variety of features available                   | 1 | 2 | 3 | 4 | 5 |
| <b>Technical Performance of Establishment's</b> |   |   |   |   |   |
| <b>Products</b>                                 | 1 | 2 | 3 | 4 | 5 |
| Relevant phone features                         | 1 | 2 | 3 | 4 | 5 |
| Activation time                                 | 1 | 2 | 3 | 4 | 5 |
| Can call anywhere nationwide                    | 1 | 2 | 3 | 4 | 5 |
| Has cell sites all over the country             | 1 | 2 | 3 | 4 | 5 |
| No cloning experience                           | 1 | 2 | 3 | 4 | 5 |

|                               |   |   |   |   |   |
|-------------------------------|---|---|---|---|---|
| Can make international call   | 1 | 2 | 3 | 4 | 5 |
| Comprehensive products range* | 1 | 2 | 3 | 4 | 5 |
| Supplier's Quality system*    | 1 | 2 | 3 | 4 | 5 |
| Supplier's Standard TQCM*     | 1 | 2 | 3 | 4 | 5 |

\* Definition

(b) Delivery and Service Performance

|  |   |   |   |   |   |
|--|---|---|---|---|---|
| Reliability of Delivery (promises kept)          | 1 | 2 | 3 | 4 | 5 |
| Speed of delivery (short lead time)              | 1 | 2 | 3 | 4 | 5 |
| Packing of deliveries                            | 1 | 2 | 3 | 4 | 5 |
| Ease/Simplicity of ordering                      | 1 | 2 | 3 | 4 | 5 |
| Feedback on Problems                             | 1 | 2 | 3 | 4 | 5 |
| Confidence on continuity of<br>Supplies/services | 1 | 2 | 3 | 4 | 5 |
| Activation of service                            | 1 | 2 | 3 | 4 | 5 |

(c) Technical Service Performance

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| Ability to innovate (R&D expertise)*                    | 1 | 2 | 3 | 4 | 5 |
| Design Expertise*                                       | 1 | 2 | 3 | 4 | 5 |
| Establishment's Responsiveness on<br>Technical services | 1 | 2 | 3 | 4 | 5 |
| Value added services                                    |   |   |   |   |   |
| Product A   | 1 | 2 | 3 | 4 | 5 |
| Product B   | 1 | 2 | 3 | 4 | 5 |
| Product C   | 1 | 2 | 3 | 4 | 5 |
| Security PIN  | 1 | 2 | 3 | 4 | 5 |

(d) Field Sales Performance

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| Frequent checkcalls                       | 1 | 2 | 3 | 4 | 5 |
| Technical capability                      | 1 | 2 | 3 | 4 | 5 |
| Commercial capability                     | 1 | 2 | 3 | 4 | 5 |
| Empowerment                               | 1 | 2 | 3 | 4 | 5 |
| Easily accessible (available when needed) | 1 | 2 | 3 | 4 | 5 |
| Courteous                                 | 1 | 2 | 3 | 4 | 5 |
| 24 hours availability for complaint       | 1 | 2 | 3 | 4 | 5 |

(e) Pricing Performance

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| Establishment (suppliers) offer the<br>cheapest price complaint | 1 | 2 | 3 | 4 | 5 |
| Negotiable pricing  | 1 | 2 | 3 | 4 | 5 |
| Lowest rates  | 1 | 2 | 3 | 4 | 5 |

(f) Environmental Performance

|  |   |   |   |   |   |
|--|---|---|---|---|---|
| Establishment and its suppliers are<br>Environmentally responsible | 1 | 2 | 3 | 4 | 5 |
| Establishment and its suppliers have                               |   |   |   |   |   |

|  |   |   |   |   |   |
|--|---|---|---|---|---|
| Recycling capabilities & Expertise   | 1 | 2 | 3 | 4 | 5 |
| Waste can be returned to M. or suppliers   | 1 | 2 | 3 | 4 | 5 |
| Establishment contributes to the public awareness for the environment's protection | 1 | 2 | 3 | 4 | 5 |

## (g) Handling the 'Culture of Complaints'

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| Complaints are attended right away                  | 1 | 2 | 3 | 4 | 5 |
| Accessible calling number for complaints            | 1 | 2 | 3 | 4 | 5 |
| Clear instructions on what to do with the complaint | 1 | 2 | 3 | 4 | 5 |
| Improved service due to complaints received         | 1 | 2 | 3 | 4 | 5 |

## (h) Overall Impression of Clients

**Needs improvement on the following (please specify)**

Product Lines \_\_\_\_\_  
 Technical Performance \_\_\_\_\_  
 Services \_\_\_\_\_  
 Personnel \_\_\_\_\_  
 Publicity \_\_\_\_\_  
 Value Added \_\_\_\_\_  
 Others (Please specify) \_\_\_\_\_

Thank you for your time spent in answering our survey.

(How about "Incentives" for answering questionnaire accurately and promptly?)

### 3.5 Specifications on Standard Quality of Data, Schedules, Workforce and Budget Estimate

a The specifications of good standard quality data from sampling surveys are:

- (1) precision or reliability measured by low standard error SE(s) or CV(s) of estimators will be set by Management
- (2) accuracy measured by minimum non-sampling errors NSE(s) will be given by Management
- (3) timeliness in the generation of the data and report - schedule of all activities is about 3 months
- (4) relevance of data to the objectives - keep contents of questionnaire at its minimum;
- (5) consistency of concepts, definitions and methodology on a time series;
- (6) user friendly; and,



- (7) least cost - minimum sample size at desired CV(s) of estimators.
- b. The tentative schedule of activities is shown on Table 4. The estimated duration should be 3 months and the basic technique of collection will be by telephone although Very Important Persons will be interviewed personally. The length of the interview should not exceed one hour.

**Table 4**  
**Schedule of Activities (Tentative)**

| Activity   | Hours/<br>Strata             | Total<br>no. of<br>days | Min.<br>no. of<br>days |
|--|------------------------------|-------------------------|------------------------|
| 1. General planning (field organization, objectives, design of working procedure or sampling design, budget preparation, etc.) | -                            | 20                      | -                      |
| 2. Preparation of questionnaires and instructions  | 1.5                          | X                       | 5                      |
| 3. Program development for data encoding and data collection models  |                              | 15                      | -                      |
| 4. Selection of personnel  |                              | 1                       | -                      |
| 5. Training of personnel   |                              | 3                       | -                      |
| 6. Pretests  | 3                            | X                       | 5                      |
| 7. Collection (listing and enumeration)  | Telephone<br>-<br>Personal - | X                       | 20                     |
| 8. Processing (screening, editing, coding, machine tabulation)   | 0.05                         | X                       | 10                     |
| 9. Preparation of final report (preparation of statistical tables and publication of report)                                   | 8                            | X                       | 10                     |

The assumptions considered in developing the table are as follows:

- (1) Results of the telephone interview will be directly encoded.
  - (2) Answers to the personal interview, will be encoded by the personnel at the end of the day; and
  - (3) Other techniques will be used in processing and report generation.
- c. The workforce will be determined by the design, which will probably be stratified random sampling with the application of optimum allocation with equal take. In the revenue example, there were three sub-strata (low, medium, and high) for the four major strata, (domains) namely: Individual, Corporate, Government and others. There were a total of 12 cells. Estimates of totals are obtained for each major stratum which when added will be the total for the entire universe. The sample sizes will be initially pegged

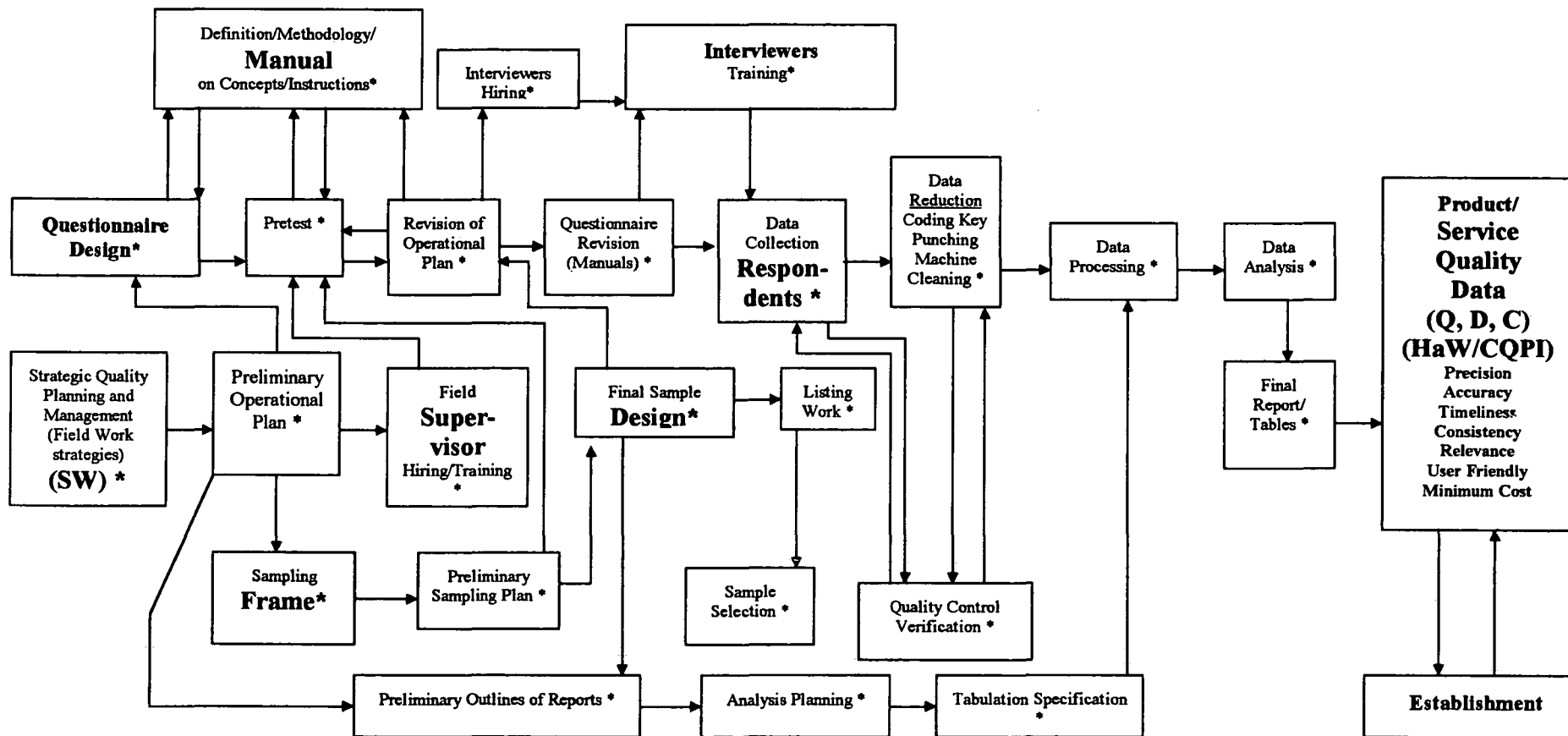
at 6 samples per sub stratum or 18 samples per major stratum. The sample for the entire universe is computed as no. of sample per major stratum x no of major stratum (domain), i.e., in our example, we compute it as  $4 \times 18 = 72$  samples. Whenever feasible, ratio or regression estimators will also be applied. The  $n_i^* = 6$  may be increased depending on the CV(T) as desired by Management.

- d. Four or five of the participants will serve as the nucleus of the Survey Team. The rest of those who have completed the Sampling Survey Course will be asked to serve as research or data collector. The nucleus will serve to provide technical and administrative control over the Survey Team. The initial rough estimate of the budget is P400 per questionnaire, sample size is  $72 \times P400$  per questionnaire, and the total cost of the survey would be about P 28,800 which does not include the imputed cost of internal staff.
- e. The nucleus team will update, develop and further refine the instruments of the survey, conduct consultations with management, pre-tests, update budget taking in consideration the time a staff is assigned to the Survey Operation. This approach is an Internal application or arrangement of Sampling Survey on "Consumers' Focus and Profiles."

### **3.6 Interactions (Synergism) Between Instruments and the Establishments**

These interactions are given in Chart 3 where each Instrument is subjected to a standard process or practice to conform to the software of TQM. The respondents are the external clients (or internal customers) whose satisfaction levels will be measured. The interactions will generate a totality which will insure the specifications set by management, say, CV(T) at less than 5% and NSE or Non-Response Rate of about 2 to 5%, standard and consistent concepts and definitions, just-in-time (3 months), cost-efficient, or small sample size, relevance to objectives and establishment-friendly.

**Chart C**  
**OPERATIONAL STAGES, PROCESSES AND FLOWS OF A PROBABILITY SAMPLE SURVEY:**  
**CONTROL POINTS\* AT EACH STAGE AND CORRESPONDENCE WITH TQM CRITERIA**



#### 4. Concluding Remarks

- 4.1 This paper emphasized the techniques and methodologies (Oñate, 1996) on how probability sampling surveys (optimum allocation and equal take) are applied to measure on a time series the levels of customers' needs, requirements, evaluations and satisfactions on the establishment's standard quality products and services. Customers will include both external (end users) and internal (employees). The key instruments (processes) are based on standard quality practices. For the sake of confidentiality no data are presented but the methods are discussed in detail such that any interested establishment/firm/company can follow and apply these techniques on their own initiative and particular sub-sector of industry. The illustrations are applied to external customers but could easily be extended to internal customers (employees) and suppliers.
- 4.2 As a dimension of Total Quality Care Management of TQM, a group of managers at a telecommunication firm attended a management course conducted by the author on "Generation of Customers' Needs, Requirements, Evaluations and Satisfactions Through Sampling Surveys" which group will serve as nucleus who will apply these techniques as an "Internal" Expert or "Quality Control" Group in the firm. The next goal is maximizing customer equity by balancing acquisition of new clients and retention of old ones which direction an establishment steers its entire marketing program (Blattberg and Deighton, 1996).

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