

# QUALITY MANAGEMENT: DEVELOPMENT OF A FRAMEWORK FOR A STATISTICAL AGENCY

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### 1. INTRODUCTION

Much of the success of Japanese businesses has been attributed to their commitment to quality. Thus, over the last twenty years, in North America and elsewhere, there has been an increasing focus on "quality management" (QM) as a distinct and necessary element of a business organization if it is to be competitive. According to the particular enterprise, QM may appear under a variety of different names such as "total quality management", "integrated quality management", "continuous quality improvement", "total quality control", etc. In essence, these all refer to the same basic philosophy, expressed most notably by G.E. Deming, J.M. Juran and P. Crosby, and referred to here as QM. In this context, the "quality" of a product is interpreted in a broad sense to mean fitness for use, at appropriate cost and timeliness, from the viewpoint of the customer rather than the supplier.

As evidence of the importance attached to QM, there are national awards for quality achievements. In Japan, one of the most prestigious awards that can be earned by a business is the Deming award for quality. The Malcolm Baldrige National Quality Award, instituted in 1987, is the highest recognition for quality achievement in the U.S. Canada's first national quality award was introduced in 1989 as one of the Canada Awards for Business Excellence.

Quality has been a concern of national statistical agencies since their inception. Quality improvements have been achieved under a variety of different guises, such as error assessment, program evaluation, survey redesign, etc., rather than through concerted effort under the umbrella of a formal "QM program".

Over the past few years, statistical agency awareness of QM has heightened, perhaps as a result of pressures associated with funding by cost recovery, tighter control on resources, and ever increasing demands from users. Specific references to quality management have begun to appear in statistical agency strategic objectives and initiatives. For example a recent Statistics Canada planning document stated that:

"Ensuring that each statistical program has the means of assessing the quality of its output in order to provide a basis for decisions in investment in quality improvement, is a major priority of the Agency".

The objective of this paper is to explore the elements of QM which might be appropriate for a statistical agency, and to provide a basis for discussion. In particular, it leads to the question of whether the thrust for quality at a statistical agency benefits from a formal QM framework.

To standardize terminology and make it easier to relate to

QM literature, agency outputs, whether goods or services (i.e., publications, electronic data dissemination, answering enquiries), are referred to as "products". Users of these products are referred to as "customers". Sources of input data, i.e., individual respondents supplying data directly, or administrative or commercial sources, are collectively referred to as "suppliers".

### 2. ELEMENTS OF QUALITY MANAGEMENT

#### 2.1 Introductory Remarks

Notwithstanding their rather evangelical style, Deming's "14 Points", Juran's "Journey from Symptom to Cause" and Crosby's 14 step "Quality Improvement Process" provide good starting points for discussion. Their ideas are not contradictory: although there are several prophets, there is only one QM religion. Elements of these basic ideas are presented in the following paragraphs. They are, of necessity, very abbreviated. To give the full flavour of QM, no attempt is made to tailor the descriptions to the situation of a statistical agency: that is the subject of later sections.

#### 2.2 QM Elements

##### a) Customer Focus

Customer satisfaction is the underlying driving force of QM. Customer needs are identified and translated into measurable specifications, which are continuously updated. The customer-supplier relationship is viewed as a partnership. The goal is to provide products which meet or exceed customer expectations. Quality is thus defined and quantified in customer-supplier terms.

To help in the definition of quality, Early (1990) distinguishes two aspects: features and absence of defects. Features reflect the extent to which the product is designed to meet customer needs. Features determine customer satisfaction. Defects, which are the deviations from a perfect product, lead to customer dissatisfaction, regardless of the extent to which the product has special features.

##### b) Internal Customers

Processes which contribute directly or indirectly (i.e., by providing infrastructure) to final products are viewed as comprising a sequence of steps. Between steps, there is, in principle, a customer-supplier interface. The internal customers thereby defined can be viewed in the same light as external customers. Thus, although most organizational units are not on the front line dealing with external customers, they are suppliers with customers.

##### c) Suppliers as Part of the Process

By the same token, suppliers of input goods and services are considered to be an extension of an organization's processes, and similar quality standards are applied. "Just-in-time" delivery, which drastically reduces inventory levels,

is an example of the benefits of a close relationship with suppliers.

**d) Right First Time ("Zero Defects")**

The theme is that prevention is better than correction. In place of setting targets in terms of percent defective, to be achieved by inspection, and correction if necessary, the goal is "upstream quality control", i.e., "doing it right the first time", by designing processes to be as error free as possible, within cost constraints. It is considered that flaws in processes, not employees, are responsible for most defects.

Causes of defects in the production process are classified as regular or irregular. Irregular causes can be addressed and corrected without changing the process. Regular causes, giving rise to some average defect rate and a standard variation about it, are intrinsic to the process. They can be addressed only by "re-engineering".

**e) Continuous Improvement**

Continuous improvement of all processes is necessary to anticipate or respond to changing customer needs, to incorporate new technology, and in response to particular problems.

**f) Quality Measurements, Tools and Standards**

Basic to the notion of continuous improvement is the capacity to monitor processes, and to measure the quality of products, and the effects of changes on quality. Measurement tools include: Shewhart charts for monitoring and detecting when processes go "out of control"; cause-effect fish-bone diagrams; and Pareto analysis for analyzing and prioritizing problems. Competitive bench-marking is used for setting standards where no objective measures of quality can be defined. As an example, Xerox Canada mentions the use of Canadian Tire as a competitive benchmark against which they have judged the performance of their distribution system.

**g) Senior Management Commitment/QM Policy**

It is widely believed that QM will be effective only if top management is committed. Evidence of commitment is usually a quality mission statement, and a policy or charter indicating what quality means to the organization, how it is to be achieved and how it blends with, or is part of, the organization's overall strategy. As an example, the Xerox quality policy is:

"Xerox is a quality company. Quality is the basic business principle for Xerox. Quality means providing our external and internal customers with innovative products and services that fully satisfy their requirements. Quality improvement is the job of every Xerox employee."

**h) Integrated Quality Management Structure**

A typical QM structure includes a quality council, a quality administrative unit and quality improvement teams. The quality council is responsible for ensuring that the quality policy is being put into practice. The quality unit is its executive arm, providing services in areas of organization, planning, training, communication, etc. Quality (or "continuous") improvement teams are responsible for devising and implementing process improvements. Teams cover all functions, including both production and infrastructure, and may work over a range of levels. Membership is usually cross functional, involving operational and technical staff associated with the various processes. Decisions are based on consensus.

**i) Total Employee Involvement, Training and Recognition**

In principal, employees throughout the organization are encouraged to "buy in" and are actively involved in

suggesting and implementing quality improvements. Responsibility and accountability are shared ("employee empowerment").

Staff at all levels receive training, beginning with management and working down. According to needs, the training typically involves:

- orientation - overview of quality policy, implementation plan;
- problem solving skills;
- communication skills - dealing with customers, conducting effective meetings, etc.

Reward and recognition systems are modified to honour employees who contribute to quality improvement through team participation, innovation and initiative.

**j) Enhanced Communication**

Building and using external and internal customer-supplier relationships to define, measure and improve quality, brings improvements in communications systems.

**2.3 QM Implementation**

QM literature stresses that each organization has its unique QM needs, and that its approach must be determined accordingly. If an organization is in a crisis, a full scale QM campaign involving employees at all levels may be the best approach. In other circumstances, it may be more appropriate to focus on selected elements of QM rather than mount a campaign.

In general, QM may be viewed as a management style, an approach for convincing employees of the need for continuous improvement, motivating them to identify problems and empowering them to develop and implement solutions.

**3. APPLICATION TO NATIONAL STATISTICAL AGENCIES**

**3.1 Introductory Remarks**

QM is a proven success for business organizations selling their products in the market place. But can QM principles and practices be carried over to national statistical agencies, operating, as they do, in a quite different environment from businesses?

The objective of the following paragraphs is to identify and comment upon the differences between businesses and statistical agencies insofar as they may affect the appropriate approach to QM. A distinction is made between the differences which result from the fact that the statistical agencies are (part of) government departments, and the differences due to the unique nature of the agency processes and products, i.e., statistical data collection and dissemination.

**3.2 Differences due to Statistical Agencies being Part of Government**

**Government Funding**

With the exception of limited "cost recovery" activities, agency funds come from general government allocations to be obtained by taxes, not from the sale of products. This has a number of consequences.

There is no "bottom line" as a basis for summarizing the efficiency and effectiveness of the agency as a whole.

Products are generally priced to recover only the additional costs of producing and disseminating them once

the underlying data collection and processing has taken place. It follows that the agency is in a monopoly position for most of its activities. There is unlikely to be competition from the private sector for products which are funded by government. Thus, customers cannot exercise control on quality by changing suppliers. The cost of quality (or lack of it), which is a major driving force behind QM in the business world, cannot be assessed in terms of sales, profits or market share.

Government employees are in a public "fishbowl", and this restricts organizational approaches. For example, encouragement or recognition of employee contributions by construction of extensive sporting/recreational facilities at government expense might be viewed unfavourably by taxpayers.

These points do not invalidate the application of QM principles.

First, many processes within business organizations cannot be directly related to a product in the market place, e.g. personnel, administration, and yet these processes are considered in scope for QM. Similar processes within a statistical agency can be handled in a similar way. Recognition and treatment of internal customer-supplier relationships for sequences of processes should be essentially the same for any organization.

Second, sales, profits, and market share are not the only indicators used by business organizations to measure product quality. They may be insufficient as measures in the sense that they do not indicate the causes for movements which may be observed such as, for example, a fall in profits. Businesses use additional, more explicit measures of customer satisfaction and dissatisfaction, e.g., monitoring compliments and complaints received, and conducting customer satisfaction surveys. Such measures can be paralleled by statistical agencies. They can be obtained by personal contact with important customers, or by an opinion survey of customers.

Finally, cost recovery activities are playing a small but growing role in statistical agencies. For example, the New Zealand Department of Statistics has a cost recovery target of 25%. With respect to products sold on a full cost recovery basis, a statistical agency is essentially in the same situation as any other business.

### **Constraints on Products and Processes**

A statistical agency, like any other government department, is restricted in its choice of products and processes. Certain products and procedures are legislated, e.g., the decennial census, the confidentiality provisions. Expansion of products is constrained, e.g. goods and services must not duplicate the output of other government departments. These restrictions contrast with the freedom of choice with respect to products and processes enjoyed by the head offices of business organizations, and reduce the scope for QM by preventing fundamental changes in products or procedures.

The differences between government departments and businesses in this respect should not, however, be exaggerated. The constraints imposed by law and by the government on a statistical agency may be no more restrictive than practical and legal constraints on some industries.

### **3.3 Differences Due to the Nature of Statistical Agency Processes and Products**

#### **Wide Range of Customers and Products**

Another difference between statistical agencies and many business organizations arises from agencies' diversity in customers and products.

There are typically many different classes of customer. Some classes are difficult to detect as they rarely indicate their presence by purchase of products, e.g. researchers using data made publicly available through libraries. The fact that such customers exist may be revealed when a product is withdrawn.

There is a wide variety of products. A single (survey) process may yield many products. Alternatively a product may be generated by combining outputs of several survey processes. Furthermore, with numerous unknown customers, the precise uses to which they put products is not known. Thus, their requirements i.e. the desirable product features, are difficult to identify.

There is no doubt that these factors make it hard to define quality in customer terms and to translate it into measurable process specifications, in accordance with QM principles.

#### **Statistical Products are Intrinsically Error Prone**

Statistical estimates are likely to contain errors from a wide range of possible causes. Fellegi (1981), and the US Federal Committee on Statistical Methodology (1990a, 1990b) provide comprehensive summaries of the various types of error and what can be done to reduce them.

The existence of errors has a number of implications.

First, some types of error, in particular sampling error, occur by conscious design. Thus, if errors are considered in QM terms as "defects" it is clear that a principle of "zero defects" is not applicable, at least not literally.

Second, as stressed by Fellegi (1981), customers are not in a position to detect errors by observing the data outputs alone. Even if the agency makes available all of the information it has concerning errors, the magnitudes of the errors are difficult to assess. Total error models exist in concept, but estimation of all their components, particularly the interaction terms, is problematic.

Third, even if errors could be precisely measured, their impact in terms of customer dissatisfaction depends upon the diverse and unknown uses to which the data are being put.

This is not to say that indicators of quality in customer terms are unavailable. Customer dissatisfaction can be monitored directly in the form of numbers and types of customer complaints. It can be monitored indirectly using such total error models as do exist (e.g. Linacre 1987), by identification of discrepancies between related data outputs, and by use of other information available, in particular the frequency and extent of revisions to each product.

#### **Suppliers of Data Receive No Payment**

The majority of raw data received by a statistical agency is derived from individual and business respondents receiving no tangible compensation. This is in complete contrast to the situation for a business organization in the market place.

The argument that respondents obtain benefits from the statistical products is tenuous. First, statistical products, though subsidized, are not all free. Second, these products are available to respondents and non-respondents alike.

Third, the respondents may not be users of the data - even in the sense of being affected by decisions based on it. Individuals may not be interested in census tabulations: the operations managers who supplied production data may not be the planners who use it. Often, the only reward for the respondent is having the satisfaction of being a good (corporate) citizen.

### 3.4 Summary

Examination of the environmental differences between business organizations operating in a free market and statistical agencies working within the boundaries of government suggests two major impediments to the direct application of the QM principles outlined in Section 2 to a statistical agency.

First, it is difficult to establish target levels of product quality in customer terms. Desirable features, e.g., range of products, or timeliness, which lead to customer satisfaction, are difficult to identify due to the wide variety of unknown and potential customers. The impact of defects, i.e. errors, leading to customer dissatisfaction, are hard to assess because the magnitudes of errors are often unknown (due to their multiplicity) as are their impacts upon customers (due to the wide range of uses). It follows that the appropriate allocations of resources across products, and across process steps for a given product, are difficult to determine as the effects of changes to these allocations cannot be easily measured in terms of output quality. The "cost of quality" assessment principle is hard to put into practice.

Second, due to the fact that raw input data are obtained, for the most part, without payment, the supplier-customer partnership cannot be based on the same type of mutual benefit as is applicable in transactions between business organizations.

Although these factors obviously have to be taken into account in defining the appropriate QM strategy for a statistical agency, they by no means invalidate the need for such a strategy.

## 4. QUALITY IMPROVEMENT ACTIVITIES AT STATISTICS CANADA

### 4.1 Introductory Remark

Although there is presently no formal QM program at Statistics Canada, quality improvement has been named as one of the agency's strategic priorities, and there are many on-going, quality related activities. The aim of this section is to briefly describe a selection of these activities.

### 4.2 Quality Improvement Activities

#### a) Customer Focus

There is a division devoted to the assessment of the quality of statistical products on a (rotating) program by program basis. The evaluation focus is relevance and timeliness of products, with some comments on accuracy and processing procedures. Much of the evaluation is done by outside consultants who specialize in the fields to which the products are primarily addressed.

Over the past 10 years, the agency has established a considerable number of subject matter and federal/provincial advisory committees as a means of obtaining feedback on the relevance, timeliness and accuracy of statistical products.

Statistics Canada commissions annual surveys of public

attitudes towards the agency as both a collector and a producer of statistical data. Questions are asked concerning the application of the confidentiality provisions, paper burden and the accuracy of the data. The responses are indicative of the quality of Statistics Canada's work as perceived by the public, but also may reflect public attitudes towards government in general.

Customer services are assessed using a team of "pseudo-clients" who periodically call agency offices to ask typical questions. Staff responding are assessed on points such as service in language of choice, time spent waiting, courtesy and helpfulness.

The agency has a well defined policy for informing users of data quality and methodology (Statistics Canada, 1988). Presently, however, the policy, though it may be widely adhered to, is not enforced.

#### b) Internal Customers

The pay and benefits unit is presently engaged in an initiative to improve the accuracy and timeliness of the services it provides to Bureau employees. The intention is to standardize procedures, stream-line paper work and to reduce the amount of checking and double-checking that currently goes on.

#### c) Suppliers as Part of the Process

There is presently no sense in which the most important suppliers i.e., respondents, are likely to regard themselves as part of the process. However, they are a very important part of the process. Work is now underway to develop and apply standard measures of non-response. Respondent burden, especially in Business Surveys, is regularly measured and monitored.

#### d) Right First Time ("Zero Defects")

A re-engineering initiative was introduced in 1990. Its objective is to review the complete process sequence for selected surveys and to identify where efficiencies can be obtained without significant sacrifice of relevance, timeliness or accuracy, and where accuracy can be improved without significant increase in cost.

#### e) Continuous Improvement

There are a number of QM initiatives at divisional level which involve or could lead to the formation of continuous quality improvement teams. For example, in Geography Division, a quality charter has been drafted, QM discussion groups and employee training have taken place and a consultant has been hired with a view to initiating a comprehensive QM divisional program. In connection with the business register a draft framework for quality improvement has been prepared (Colledge et al., 1990). It was presented to the Fifth International Round Table on Business Survey Frames and has been followed up by a questionnaire to Round Table participants with the objective of establishing quality benchmarks for business registers.

#### f) Quality Measurements, Tools and Standards

Staff of the internal audit division assess the efficiency with which all programs generate their products, both internal and external. The focus is on accuracy and costs.

Beginning with four prototypes in 1990, annual program reports are being prepared by staff of each program on a rotating basis. An important feature of the reports is a set of performance measures for assessing data accuracy, timeliness and costs, including response burden.

The agency has various sets of standards, guidelines and operating procedures to promote quality. An example is the "Quality Guidelines", a "manual providing advice for the production, maintenance and promotion of quality for

statistical processes".

#### **g) Senior Management Commitment and QM Policy**

Although senior management is supportive of quality management it has not chosen to issue a quality mission statement nor to define a formal quality council.

#### **h) Integrated Quality Management Structure**

QM is not integrated. There is, however, a centralized quality assurance unit with special expertise in designing acceptance sampling and process control systems for clerical operations. The unit has expanded its activities recently to include general consultation on quality improvement. An embryo QM facilitation team is meeting with operational staff in selected areas to explore the possibilities for establishing quality improvement teams. Also, several centres of expertise have been established within the agency. Their function is to provide assistance to staff engaged in various functions related to carrying out statistical activities or analyzing and presenting the results of such activities. An example is the Questionnaire Design Resource Centre.

#### **i) Total Employee Involvement, Training and Recognition**

Two full days of the three week course for middle managers are devoted to presentation and discussion of QM principles and practices.

A task force concerned with removing managerial impediments made a number of recommendations earlier this year, in keeping with employee empowerment. As a result, several changes have been made, for example, managers are no longer constrained by person-year budgets as well as financial budgets.

In October 1990, Statistics Canada held an international symposium on quality. There were a few presentations, in particular those by Early (1990) and Williams (1990) which discussed QM in general terms. The majority of the papers dealt with specific aspects of quality and were mostly concerned with accuracy.

An operations division set performance standards for certain of its units and encouraged the unit members to achieve and exceed these standards. The focus was improvement of efficiency without loss of accuracy. It proved to be very effective. Part of the benefits of improvements beyond the standards were passed on to employees in the form of time off work. This novel reward practice had to be terminated following union objections.

#### **j) Enhanced Communication**

In 1990, the informatics and methodology units conducted a survey of their internal customers to obtain feedback on the quality of services. Managers were asked to identify and implement procedures to address the problems which came to light through the survey.

### **5. QUALITY MANAGEMENT AT OTHER STATISTICAL AGENCIES**

#### **5.1 Introductory Remark**

In considering the most appropriate approach to QM it is informative to know what is happening at other national statistical agencies. The following paragraphs briefly summarize a few initiatives at some other statistical agencies.

#### **5.2 US Bureau of the Census**

In 1990 the US Bureau of the Census (USBC) embarked on a major QM initiative. It began as a nominal response to a US Department of Commerce policy statement concerning QM, but has gained a momentum of its own. The approach

being adopted is two-pronged; a combination of specific quality initiatives and a general thrust. A number of quality improvement teams have been established to address specific issues. An example of an initiative is quality improvement of the process for redesign of questionnaires to be used in the next (1992) round of Economic Censuses. In parallel, there is a general thrust which will eventually embrace all processes. A quality policy has been developed by senior management and all senior level staff have attended a QM orientation course. A consultant has been hired to assist in the development of the QM plan and to provide training. A goal for the near future is to blend the QM policy into the agency's long term strategy.

The reception from senior and middle level staff has been mixed, ranging from enthusiasm, through cautious involvement, to wait and see. The general impression, one year after the initiative began, is that it has already gone much further than anyone initially expected.

A number of individual QM initiatives were begun prior to this integrated approach and still continue. For example, Garrett (1987) reported on an application of Deming principles to improving the quality and productivity of business surveys.

#### **5.3 US Bureau of Labor Statistics**

Juran and Deming have both given seminars at the Bureau of Labor Statistics (BLS). In some areas, managers have received QM training. As at Statistics Canada, there are individual initiatives and programs addressing quality but no overall QM umbrella. For example, Clayton and Winter (1990) reported on applying Juran concepts to the improvement of data collection in the current employment statistics survey.

#### **5.4 Australian Bureau of Statistics**

In conjunction with the introduction of new arrangements (National Project Centres) for regionalizing of some functions and for processing data, the Australian Bureau of Statistics (ABS) has hired consultants to train the new Project Centre staff in QM. The ABS has also implemented a program whereby groups of staff are encouraged to evaluate and redesign their working environment. All employees will be involved.

#### **5.5 New Zealand Department of Statistics**

There have been many individual initiatives aimed at improving quality and productivity stimulated by the necessity to increase cost recovery revenues. Assistant Statistician L. Cook (1990) drafted a discussion paper as the possible starting point for the introduction of a formal QM initiative.

#### **5.6 Concluding Remark**

In summary, with the exception of the USBC, statistical agencies appear to be in much the same position as Statistics Canada: encouraging and supporting a wide range of quality initiatives and programs without an overall QM program umbrella.

### **6. QUESTIONS AND COMMENTS**

#### **6.1 Introductory Remark**

The objective of this section is to list questions that should

be answered in defining an appropriate QM framework for a statistical agency. The general issues to be addressed are:

What are the priorities?

Would an integrated QM structure help?

Should all employees be involved?

The following paragraphs contain a number of more specific questions relating to individual QM elements.

## 6.2 Issues in Application of the QM Elements

### a) Should there be a more concerted effort to redefine quality from the perspective of agency customers?

Following Fecso (1989), the quality of agency products can be considered in term of four components:

- (1) relevance: addressing the real needs of customers, designing the right features, "doing the right thing";
- (2) accuracy: conformance of products to specifications reflecting customer needs;
- (3) timeliness: timeliness of product delivery, responsiveness of services to ad hoc requests
- (4) cost: "doing the right thing" with the resources available or at less cost

Even though timeliness could be included within relevance and accuracy it is defined as a separate factor because of its importance to customers.

The first three components provide a measure of effectiveness. The fourth component reflects efficiency. It is important to include this factor in defining quality, even in the absence of full customer payment for the product, as resources expended in producing a product inefficiently, or to an accuracy in excess of specified requirements could be profitably spent in improving quality in some other respect, e.g. in providing additional products.

While these factors do not lead immediately to a quantifiable definition of the quality of a statistical product, they do give some perspective. Relevance, timeliness and (minimum) cost are features associated with customer satisfaction. Lack of accuracy relates to defects and customer dissatisfaction.

### b) Would it be worthwhile encouraging operational work units within the agency to undertake a systematic review of their operations from the perspective of customer - supplier partnerships?

There is anecdotal evidence to suggest that units involved in the transfer of products from one to the other often have very different perceptions of their roles.

### c) Should improvement of the respondent-agency interface be regarded as having highest priority of all QM initiatives?

Avenues for investigation include:

- cognitive research - what respondents understand given the questions and instructions;
- response variability, e.g. the stability of the contact point for economic surveys, the repeatability of the response;
- data availability, e.g., the extent to which requests for data match business bookkeeping practices
- use of new collection methods, e.g. re-engineering the collection process as exemplified by the BLS employment survey improvement;
- treating respondent burden as a cost to be included in decision making.

### d) What are appropriate priorities and guidelines for continuous improvement?

With respect to the four components of quality - relevance, accuracy timeliness and cost - the customer is rarely able to assess accuracy, does not usually pay the full cost of products, and thus tends to attach most importance to relevance and timeliness factors. On the other hand, agency employees are acutely conscious of accuracy or lack of it, and sensitive to timeliness, but not to relevance. As regards cost, it seems that staff would invariably prefer to spend additional resources reducing the errors in an existing product than on broadening the product range. This suggests that continuous improvement guidelines should emphasize relevance and efficiency. Examination of a product, and the processes which produce it perhaps needs to be a two part exercise: first an examination of relevance, then of accuracy, timeliness and cost.

It may also be useful to think of process reviews as being of two types: first, short term investigations to identify and eliminate obvious problems - the irregular deficiencies; second, a more profound examination and re-engineering to eliminate intrinsic (regular) process deficiencies.

### e) Is "zero defects" a legitimate target for clerical operations?

On the one hand, "building in" quality or "doing it right the first time" is more efficient than "inspecting in" quality. However, should a great deal of effort be invested in the accuracy at questionnaire level when these individual data may have little impact on the final product, the estimates?

### f) Should there be a more substantial effort to introduce quality and performance measures, tools and standards?

There seems to be lots of scope for the use of competitive bench-marking. Procedures for identification of "non-productive" activities, and fish-bone diagrams to help diagnose sources of errors may also have some applications.

Clerical quality control systems and procedures can be based on acceptance sampling, with feedback and decreasing sampling as quality improves or can use a process control approach. Which is the most appropriate?

Development of more comprehensive total error models might help in decisions regarding allocation of resources across the various steps in the survey process.

Quality measurement in terms of customer complaints, frequency and extent of revisions, and of consistency between series could be introduced to supplement traditional measures of accuracy.

### g) Would a formal QM policy be beneficial?

A QM policy from senior management could be regarded as a potentially useful tool for stimulating quality improvement initiatives. On the other hand, it could be considered overkill - yet another strategic directive that is announced but not implemented. Or, if forcibly introduced, it may be looked upon as a directive designed to extract more work from employees with no extra reward.

### h) Would quality improvement initiatives benefit from a formal QM structure?

Is integration and coordination of quality initiatives necessary or desirable? For example, would formally constituted continuous improvement teams generate more quality improvements?

### i) Should there be a major campaign to involve all employees in quality improvement processes?

The potential benefits of stimulating employee enthusiasm are enormous. There is little doubt that employees closest to a process may know most about how to fix it. However,

such a campaign would require a major commitment of resources and deflection of effort from ongoing activities if it were not to be a flop. Businesses that have mounted an all-out campaign have usually done so in order to provoke a major turnaround or to avoid a crisis. Does the agency consider itself to be in a state of crisis with respect to its customers, respondents, or internally?

**j) Should changes in reward and recognition systems be considered to stimulate quality improvement initiatives?**

Performance pay could be put on the table at contract negotiations. QM based incentive schemes in business organizations are beginning to focus on rewarding team efforts.

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