A longitudinal comparison of perception through Q-Methodology towards ISO certification

Professor Fredrick K. C. Tao
Director -f Research Programs, Asia International Open University (Macau)
Email: ftao@hkstar.com

Professor L. C. Koo
International Management Centres Association (IMCA)
Email: lckoo@hknet.com

ABSTRACT
This is a longitudinal trend study spanned over one year of the perception of two groups of postgraduate students in Macau towards ISO certification. It attempts to reveal the temporal change of respondents' attitudes towards the impact of ISO on the organization and on the individual respectively. The timing is interesting, as the second survey was conducted at the time of Macau's sovereignty was being handed over back to China. People's subjective views are analysed by Q methodology. In the first round the four factors impacting on individual were: Clear Guidelines, Problem Prevention, Control, and Process Review. The four factors in the second round were: Planning, Checking, Control, and Paperwork. The four factors impacting on the organization in the first survey were perceived to be: Quality Regulation, Planning & Monitoring, Documentation, and Capability Review. The four factors of ISO impact on organization one year later were revealed as: Planning, Quality Assurance, Inspection, and Problem Prevention.

Keywords: Q-Methodology, ISO certification, Longitudinal Study, Performance

1.0 Introduction

By the turn of the century, the number of ISO certified companies has incresed to about a quarter of a million. Despite this magnificent achievement, the controversial debate on the pros and cons of adopting ISO by individual companies still continues (Dale 1994, Ho 1994, Koo et al. 1999, Mallak et al. 1997, Mo et al. 1997, Quazi et al. 1997, Seddon 1997, Tao 1999). The impact of ISO certification on the individual employees and on the organizations is dependent on the surrounding circumstances. Tao et al. (1999) claim it would be difficult to assess the impact of ISO objectively as this could involve establishment of casuality relationship. Yet measurement and understanding of people's subjective views are equally important because the perception of people is de facto reality from their perspective (i.e. *Reality is reality and perception is also reality*).

This survey is interesting as far as timing is concerned. The second round of this longitudinal trend study took place at the turn of the millenium when the sovereignty of Macau was about to return to China. In addition, the ISO certification scheme was about to be modified towards the end of 2000. In this respect the temporal change of people's attitude towards ISO would be of interest to the business practitioners and academia alike.

Tao, F. K. C., Koo, L. C. (2000) "A longitudinal comparison of perception through Q-Methodology towards ISO certification" *Proceedings of The 5th International Conference on ISO9000 & TQM,* Singapore

1.1 Q-Methodology as a survey approach

Q-Methodology primarily deals with subjectivity (Marten, 1999). Subjectivity is a person's point of view on any matter of personal and / or social importance. The domain of things to be studied in this survey has to be firstly defined (e.g. characteristics derived from the 20 ISO clauses). In this survey a total of 55 ISO related items were used (Tao et al. 1999). These items constitute the Q-sample. Then the sample of respondents (call the P sample) has to be identified. Normally P sample is smaller than the Q sample of items. The respondents from the P sample are then asked to rank (Q-sort) the items of Q sample in the form of a quasi-normal distribution. Such Q sorts, per individual respondent, are correlated. The resulting correlation matrix is factor analysed. Factor loadings refer to the 'profiles' of individual respondents; and factor z-scores refer to the position of the Q-sorted items.

In Q-Methodology the subjective points-of view are communicable and always advanced from a position of self-reference (McKeown et al. 1988). It is reckoned as a method of impression under which the personal or intraindividual significance of 'test stimuli' is important. The subject assign scores in terms of some relevant conditions that bear his internal frame of reference. In other words, Q-Methodology ensures that self-reference is preserved rather than confused with external frame of reference brought by the researcher. The freeware PQMethod 2.06 from Kent State University's Listserver (Brown, 1996) was used to perform the Q-Methodological computation.

2.0 Research Design

Similar to the first round of survey (Tao et al. 1999) a convenient sample of 19 MBA students were asked to perform the Q-sort of 55 ISO related items. The demographic pattern of the respondents was similar to the previous round. Six respondents were clerks, one supervisor, two managers, and eight professionals. Nine respondents were from public sector and eight from service sector and two from utilities sector. Only one respondent had ISO certification and two were in process of applying ISO certification. All 19 respondents opined ISO as good with support reasons such as: quality & productivity improvement, mistake avoidance, procedure documentation, enhance competitiveness, efficient utilization of resources, better corporate image, and tighter control.

Before the Q-sort, respondents were briefed in both ISO certification scheme and the Q-Methodology. Although many of the respondents did not have direct experience with ISO certification, they were matured enough to appreciate the impact of ISO on them as individual employees and on their organizations.

2.1 55 Q-sample items

The 55 ISO Q-sample items were listed on 55 randomly numbered cards. Each respondent was asked to rank sort these cards on a quasi-normal Q-sort table firstly on how these ISO items impact on them as individuals and then on their organizations.

The 55 ISO 9001 related items (i.e. the Q-sample) are as below:

1. Management responsibilities

1.1 Corporate quality policy development, statement, deployment, implementation, communication, and understanding

1.2 Organization, structure, responsibility, and authority
1.3 Management review of the system to ensure its effectiveness

2. Quality system
2.1 Documentation and implementation of procedures and instructions
2.2 Quality manual describing how the company operates and listing the requirements of various standards
2.3 Quality plans, work instructions, and inspection instructions

3. Contract review
3.1 Definition and documentation of internal and external customer needs and requirements
3.2 Contract and tender compatibility
3.3 Quality planning
3.4 Capability of compliance with requirements

4. Design control
4.1 Design and development planning
4.2 Identify and allocate resources
4.3 Definition and control of design inputs, outputs and interfaces
4.4 Review, approve, record and control design changes

5. Document control
5.1 'Document' needs to be defined
5.2 Review and approval of documents by authorized personnel
5.3 Correct issues of necessary documents available at appropriate locations
5.4 Changes to documents are authorized and recorded

6. **Purchasing**
6.1 Suppliers' assessment and monitoring of performance and capability
6.2 Records of acceptable suppliers
6.3 Formal written definition of requirements and specification

7. Purchaser supplied material
7.1 Verification, storage and maintenance of customer supplied material for use on their order

8. Product identification and traceability
8.1 Unique and positive identification of material, parts, and work-in-progress through all stages of production, delivery and installation

9. Process control
9.1 Identify and plan the process
9.2 Monitoring of key characteristics and features during production
9.3 Processes carried out under controlled condition

10. Inspection and testing
10.1 Established procedures for inspecting and testing
10.2 In-process inspection and testing
10.3 Final inspection and testing

11. Inspection, measuring and test equipment
11.1 Control, calibration and maintenance of equipment needed to demonstrate compliance with requirements
11.2 Documentation and calibration records

12. Inspection and test status
12.1 Identification of inspection and test status (i.e. untested, tested, checked, reject, meets requirements)
12.2 Confirmation that test and inspections have been carried out

13. Control of non-conforming product
13.1 Segregation of non-performing materials, parts and products, where practicable
13.2 Review and decide on appropriate remedial action (e.g. destroyed, repaired, reworked, or regraded)
13.3 Reinspection

14. Corrective action
14.1 Investigation and analysis of causes of problems
14.2 Taking preventive action
14.3 Assignment of responsibilities for corrective action

15. Handling, storage, packaging and delivery
15.1 Methods and equipment which prevent product damage and/or deterioration
15.2 Receipt and delivery of items into and out of storage

Tao, F. K. C., Koo, L. C. (2000) "A longitudinal comparison of perception through Q-Methodology towards ISO certification" *Proceedings of The 5th International Conference on ISO9000 & TQM,* Singapore

15.3 Procedures to ensure that the product is packed to prevent damage throughout the entire production to delivery cycle

16. Quality records
- 16.1 Adequate records relating to inspections, test and process control, demonstrate achievement of product quality and effective operation of quality system
- 16.2 Traceability and full history
- 16.3 Storage, retrievability, legibility and identification
- 16.4 Method of disposition when no longer required

17. Internal quality audit
- 17.1 Compliance with the documented system
- 17.2 Reporting of discrepancies and results to personnel responsible for the area audited

18. Training
- 18.1 Assessment and identification of training needs
- 18.2 Provision of the required training
- 18.3 Written job responsibilities and specification
- 18.4 Training records

19. After-sales servicing
- 19.1 Procedures for performing and verifying that needs and requirements are met

20. Statistical techniques
- 20.1 The use of samples to determine product and service quality
- 20.2 Process capability determination and acceptability through analysis

3.0 Research findings

3.1 Comparison of factors from two rounds of Q-Methodology studies

Four factors were specified for Varimax rotation for both rounds in this longitudinal trend study. The Impact of ISO on **individuals** for the two rounds (factors with the respective Q-sample items with z-scores exceeding 1) is summarized as below:

First round survey in 1998	**Second round survey in 1999**
Clear Guidelines: 1.2 1.2 2.1 2.3 18.3 4.1 2.2 9.1 6.3 5.1 17.1 2.3	**Planning:** 2.3 1.1 18.3 3.3 1.2 14.3 14.1 14.2 4.1
Problem Prevention: 10.2 1.3 10.3 14.1 12.2 14.2 19.1 6.3	**Checking:** 3.3 5.3 1.1 5.1 2.3 14.3 13.3
Control: 5.2 4.3 1.2 9.2 14.1 9.3 15.3 1.1 16.3 4.4 13.3 18.2	**Control:** 10.1 4.1 1.2 1.1 4.3 19.1 2.3 16.2 2.2 14.1
Process Review: 3.1 4.4 4.3 13.2 3.3 9.1 1.1 1.3 2.2 19.1	**Paperwork:** 18.3 4.4 6.3 4.1 4.3 9.1

Similar analysis was conducted for ISO impact on the **organizations** and the summarized results are as follows:

First round survey in 1998	**Second round survey in 1999**
Quality Regulation: 1.2 3.3 1.1 2.2 1.3 18.3 9.1 4.2 4.1	**Planning:** 1.2 1.1 4.1 3.3 2.3 4.2 19.1 14.3 9.1
Planning & Monitoring: 14.1 2.3 1.3 14.2 9.2 19.1 16.1 14.3	**Quality Assurance:** 1.2 1.1 4.1 9.1 14.3 19.1 2.2 20.2 1.3 11.1 3.1
Documentation: 16.1 3.1 5.1 1.1 9.3 2.2 4.4 6.3	**Inspection:** 9.1 11.1 1.2 4.3 18.1 10.3 12.1 5.2 13.1 10.2 9.2 11.2 18.2

Capability Review:	**Problem Prevention:**
4.2 4.1 1.3 3.2 13.2 18.1	1.1 3.3 1.2 14.1 2.3 2.2 1.3 18.3 15.3

It is interesting to observe that in the second round the 19 respondents clearly perceived the impact of ISO certification as a planning tool. The descriptions of the four factors are also in line with the qualitative comments made by the respondents in the survey questionnaire.

3.2 Other findings in the second round survey

Some additional traditional questionnaire items were asked in the second round. The perceived benefits of quality programmes in descending order of effectiveness are: improve customer service; better teamwork; improve productivity; develop quality culture, develop staff, and reduce costs. The key training needs are in: problem solving, leadership, management skills, teambuilding and TQM. The organizational commitment level of the 17 respondents was quite high. The average organizational commitment level is 4.002 in a 5-point Likert scale which was adopted from the Mowday, Porter and Steer model (1982).

The respondents were also requested to rate the performance of their employers from marks ranging from 0 (worst) to 100 (best). These marks are correlated with their organizational commitment levels. The Pearson correlation coefficient is 0.678 with 2-tailed significance level of 0.003. Thus more committed employees view their employers more positively.

4.0 Conclusion and recommendations

This paper summarizes the findings of a two round longitudinal trend research using Q-Methodology. The subjectivity of respondents is revealed more systematically with Q approach which can preserve respondents' own frames of reference. On the whole the respondents in this study have positive views towards the impact of ISO. This however may be a biased P-sample with most respondents not having direct experience with ISO certification.

Longitudinal researches are useful in understanding the temporal change of some phenomena. Instead of trend study the longitudinal study can yield more useful underlying meaning by adopting a panel study approach (i.e. the same group of respondents are used throughout the longitudinal study). Causal relationship may be more readily established by panel study than trend study.

As the world has been changing so rapidly, it is important to more thoroughly understand the impact of ISO certification on the organizations as well as on the employees themselves. This is particularly relevant when the ISO scheme is undergoing some major modifications in its 2000 version. Some rigorous action researches with respondents selected from organizations transiting from the existing version to the new one would reveal more interesting and useful findings than this current research can.

References:

http://www.rz.unibw-muenchen.de/~p41bsmk/qmethod/

Brown, Steven R. (1996) "Q Methodology and Qualitative Research" *Qualitative Health Research* November, 6 (4) pp. 561-567

Dale, B. G. (1994) *Managing Quality* Prentice-Hall, New York

Ho, S. K. M. (1994) "Is the ISO 9000 Series for Total Quality management?" *International Journal of Quality & Reliability Management* Vol. 11, No. 9, pp. 74-89

Koo, L. C., Fredrick K.C. Tao, and Hannah Koo (1999) "Charting staff attitude along the journey towards getting ISO certification" *Managerial Auditing Journal* Vol 14 Number 1/2 pp. 44-50

Mallak, L. A., Bringelson, L. S., and Lyth, D.M. (1997) "A cultural study of ISO certification" *International Journal of Quality & Reliability Management* Vol. 14 No. 4, pp. 328-348

Marten, Brouwer (1999) "Q Is Accounting for Tastes" Journal of Advertising Research Mar-Apr pp. 35-39

McKeown, B., and Thomas, Dan (1988) *Q Methodology* Sage University Paper series on Quantitative Applications in the Social Sciences, 07-066. Beverly Hills: Sage Pubns. 83 pages

Mo, J. P. T. and Chan, A. M. S. (1997) "Strategy for the successful implementation of ISO 9000 in small and medium manufacturers" *The TQM Magazine* Vol. 9, No. 2 pp. 135-145

Mowday R. T., Porter L. W. Steers, R. M. (1982) *Employee-Organization Linkage: The Psychology of Commitment, Absenteeism, & Turnover* New York: Academic Press, Inc

Quazi, H. A. and Padibjo, S. R. (1997) "A journey towards total quality management through ISO 9000 certification – a Singapore experience" *The TQM Magazine* Volume 9, No. 5 pp. 364-371

Seddon, J. (1997) "Ten arguments against ISO 9000" *Managing Service Quality* Vol. 7, No. 4 pp. 162-168

Tao, Fredrick K. C., Koo L. C., Koo, Hannah (1999) "A study of the perceived impact of ISO Certification on companies and individuals through Q-Methodolgy" *Proceedings of the Fourth International Conference on ISO 9000 & TQM*, Hong Kong pp.157-164