Continuous Improvement in Quality Management of Official Statistics in Hong Kong, China

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1. Introduction

Census and Statistics Department (C&SD) attaches great importance to management of data quality in compliance with the international standards and guidelines. A comprehensive Quality Management System (QMS), which directs and controls the production and dissemination of official statistics with regard to quality, has evolved in C&SD in recent years. “Continuous improvement” to ensure the effectiveness and efficiency of the QMS is a key element of the system. As such, C&SD has all along been making continued and dedicated efforts to enhance its data QMS with a view to excelling itself in the provision of quality statistics.

A colleague from C&SD presented in the 2008 Quality Conference a new framework for assessing the quality level of statistical products, which is part of the C&SD’s QMS. The first round of the assessment was conducted in the early half of 2009 and the major results and lessons learnt in the exercise will be shared. Making reference to the results of this quality assessment and various existing international quality tools, a number of new/enhanced strategies/measures have been/are being implemented in different areas with a view to enhancing the QMS. These strategies/measures will be depicted in this paper.

2. Existing Data Quality Assurance Framework

There are three salient features of the existing data quality assurance (QA) framework in C&SD, viz. (i) total quality approach; (ii) on-going assessment; and (iii) continuous improvement.

The quality of statistical data is far more than a simple concept and thus a multi-dimensional perspective has to be taken. In operationalising the definition of quality in statistical work, a total quality approach is adopted. Instead of just equating “quality” with “accuracy” as most people commonly think, five other dimensions, viz. relevance, timeliness, accessibility, comparability and coherence are also considered important aspects of data quality on top of accuracy. These six quality dimensions are somehow related to one another and the ways that they interact can also impact on data quality. C&SD fully takes these quality dimensions into account when designing and managing its statistical systems.

The undertaking of QA is a very important aspect of the management of a statistical system. All staff involved are responsible for upholding and where possible, enhancing the performance of the statistical systems under their charge with the primary goal of rendering quality services. To discharge the responsibilities effectively, all levels of supervisory staff are expected to:

(i) employ various effective means to ensure the statistical outputs are of quality standard;
(ii) conduct regular review on performance of the statistical systems under their charge; and
(iii) be responsible for cultivating the mindset of QA among all the supporting staff.

To upkeep their consciousness in this aspect, all subject professionals in the department are required to conduct self-assessment on the statistical systems under their charge regularly. The latest round of such assessment work on the quality level of statistical products was conducted in 2009 and the results are depicted in Section 3 below. Moreover, a dedicated QA review team has been formed some years ago. Besides providing guidelines and assistance to subject professionals on matters related to QA, the team is also responsible for reviewing the QA measures and practices adopted in the department for possible improvements.

Finally, with changes in the operating environment, particularly the increasing public demand on quality services from C&SD but the decreasing cooperation from respondents to provide quality data, upkeeping the quality of official statistical work has become a great challenge. Some of the good QA measures and practices in use may become less effective as the working environment changes. Therefore, continuous improvement to ensure the effectiveness and efficiency of the data quality management mechanism is required. In this connection, C&SD has fostered an environment for continuous quality improvement and taken some measures recently to further enhance the QA mechanism of some statistical processes. These measures will be briefly introduced in Section 4 below.

3. Assessment of quality level of statistical products

As presented in the 2008 Quality Conference, a new framework for quantitative assessment of the quality level of the C&SD's statistical products had been developed with reference to the experiences of some overseas statistical organisations and national statistical offices. In brief, the subject professionals in C&SD are required to assess the quality level of the statistical products under their purview through answering 19 assessment questions with pre-defined response categories based on a set of general guidelines prepared by the independent QA review team of the department. The 19 assessment questions are converted from 19 quality indicators which cover various elements of the above-mentioned six quality dimensions adopted in the department. Moreover, a set of quantitative benchmarks are set specifically for each of the individual statistical products under assessment by the subject professionals concerned. These benchmarks are required to be moderated by the QA review team and finally endorsed by the Directorate staff of the department before being put into use for the above purpose. Throughout the whole process, the QA team plays an important role in giving guidance and advice to individual subject professionals and reviewing the results of their assessments to ensure impartiality.

The first round of the assessment was conducted in the early half of 2009. The results reveal that most of the products under assessment have already achieved a high quality level in terms of the six quality dimensions and only minor improvements are required to be made. In particular, more effort is required to be made in enhancing the relevance of the products through various means in identifying the user groups, collecting information on user satisfaction and identification of users’ needs of information on a regular basis.

The significance of the assessment is to keep the subject professionals alert to the quality level of the statistical products under their purview in terms of the whole set of quality dimensions instead of focusing on just one or a few of them. The subject professionals are required to repeat the assessment on a regular basis under the coordination of the QA review team. Moreover, the set of 19 quality indicators is not meant to be permanent and exhaustive. It is open to regular supplementation and
revision as and when necessary.

4. Recent enhancements of the QMS of official statistics

“Continuous improvement” to ensure the effectiveness and efficiency of the QMS is a key element of the system. Making reference to the results of the above quality assessment of key statistical products and various existing international quality tools, including ISO 9001:2008 (QMS) standard\(^2\), a number of new/enhanced strategies/measures have been/will be implemented in the following areas with a view to enhancing the QMS.

Staff engagement

Building and maintaining a quality culture among all staff is one of the key success factors in any QMS. Moreover, the knowledge, experience and motivation of staff are also relevant factors. Along this paradigm, several measures have recently been implemented to enable all staff to better understand the quality policy and objectives of C&SD and to equip them with the necessary tools and skills in meeting the quality objectives. Some examples are depicted in the following paragraphs.

(i) Enhancing the channels of communication between the senior management and staff

Open and sincere communication between the senior management and staff members of C&SD is crucial to developing a progressive corporate culture and an inspired work force. It also in turn enables the collaboration of the senior management and staff in attaining the common goals of the department in a more effective manner. Over the past years, the senior management has been taking continuous effort to strengthen two-way communication with staff members of different ranks via various means. Recently, on top of the existing channels of communication with staff, a new programme called the “Meet the Directorate”, which have added a dimension of personal touch and direct dialogue to the existing communication mechanism, has been launched in C&SD. The various means of communication between the senior management and staff could ensure that the quality policy and objectives of the department is well understood among different ranks of staff on the one hand, and facilitate the communication within the department regarding the effectiveness of the existing QMS on the other.

(ii) Promoting the sharing of knowledge and experience among staff

Cultivating a culture that encourages knowledge and experience sharing behaviour is of utmost importance for the success of the QMS. C&SD started to nourish this culture years ago and by now, this culture has largely been built among different ranks of staff. Regular sessions for statistical professionals and sub-professionals to promote sharing of knowledge acquired through training courses on technical and professional areas as well as experiences and lessons learnt in their daily work (e.g. handling of problem cases of data collection) are organised. Recently, knowledge and experience sharing among field staff has been further promoted by producing training videos on handling of problem cases in data collection by field staff, which aim at highlighting the lessons learnt and better ways to deal with similar cases in the future.

In addition, in order to effectively manage knowledge and experiences of our work and facilitate their sharing amongst staff, a web-based Knowledge Management Support System (KMSS) is being developed in C&SD. This is a one-stop portal enabling all statistical staff

to organise and manage knowledge, expertise, practices and other useful information in an effective and consistent manner through the leverage of information technology.

User engagement
To ensure that the needs of various sectors of the community can be suitably taken into account in the development of government statistical work and provision of statistical services, the needs and requirements on statistical services are currently collected and monitored through various means. At present, there are some regular channels for collecting data users’ feedback on the statistical services of C&SD, including direct feedback from enquirers/subscribers of statistical data/products, “feedback and comments” corner in the C&SD website, customer opinion survey, etc. Meanwhile, C&SD also organises some customer relations programmes (e.g. Meet-the-Clients sessions) and meetings with specific user groups (e.g. Customer Liaison Group on Trade Matters, Coordinating Committee on National Income and Balance of Payments Statistics, Interdepartmental Coordinating Committee on Population and Related Statistics, etc) for tapping their views on specific areas of statistics.

As mentioned above, the results of the assessment of quality level of statistical products reveal that more effort would be required to be made in enhancing the relevance of the statistical products of C&SD. To further strengthen the existing endeavour in this aspect, the department is contemplating to organise user forum to tap views from more selected groups of data users on the “relevance” aspect of selected areas of official statistics. User forum is a direct, focused and proactive way for collecting information on data needs and user satisfaction from data users. The preliminary thought is to focus on some of the popular statistics first as more data users having experience in using the statistics are involved and they may be in a better position to provide more feedbacks on their needs and requirements.

Project management
The role of subject professionals as project manager of statistical surveys and systems under their charge has been strengthened. Guidelines have been drawn up by the QA review team to assist the subject professionals to further enhance the QA procedures and indicators for each statistical process with particular emphasis on data collection, validation and editing, imputation and macro review processes. Some existing/enhanced QA procedures of these statistical processes are highlighted below:

(i) Data collection
Control measures are in place to ensure that visits and contacts with the respondent have actually been made. Specifically, spot checks where the field supervisors conduct surprise attendance checks to ensure that the field officers have worked in their duty areas as scheduled are conducted. Re-visit checks on a sample basis are also conducted to reinforce this. This involves the field supervisors contacting the respondents by telephone or field visits to verify selected data in the completed questionnaires.

In addition, quick initial manual editing is done by each field officer on all completed questionnaires. Afterwards, to ensure that key survey concepts are applied correctly and sufficient remarks are provided by the field officer for dubious data entries, the field supervisors are required to vet completed questionnaires of their subordinates before passing the questionnaires to indoor supporting team for data input. During the vetting, the supervisors would check if there are conceptual errors, careless errors such as missing entries, calculation errors as well as insufficiency in provision of remarks for dubious data entries.

To further assure the accuracy of the data provided by the respondents of establishment surveys, tailor-made electronic forms have recently been developed in cooperation with some
establishments to facilitate extraction and computation for provision of data items according to
the requirements of the questionnaire. Besides assurance of data accuracy, this can also save
resources on both parties.

(ii) Data validation and editing
Besides the manual editing in the data collection process mentioned above, computerised
validation is carried out to detect data records that are potentially in error when guarded
against a set of pre-defined rules. These rules are reviewed regularly by making reference to
editing results in past survey rounds and external relevant information.

Data records failing the validation process will be scrutinized by indoor staff against any
remarks jotted down by the field officers in the corresponding survey questionnaires. For
questionnaires with no/insufficient remarks, they will be passed back to the responsible field
officers concerned for verification, and where possible, to provide further supporting
explanations. If necessary, they are required to contact the respondents to obtain further
information for explaining the irregularities by telephone interviews or even by field visits for
the other cases. Amendments to the data records concerned may be required after field
verification. To strengthen the verification process, for data records still having reasonable
doubts, the supervisor will arrange further checking of the case by another team of staff and if
necessary, bring the case up to the attention of the senior supervisor for perusal.

Moreover, prominent cases having significant impact on the survey results will be identified in
advance and monitored closely by subject professionals throughout the whole survey process,
in particular regarding results of any validation/verification/imputation performed on them.

(iii) Imputation
Although imputation can improve the quality of the data by correcting for missing, invalid or
inconsistent responses, it should not be overdone. In case imputation is inevitable, care must
be exercised in choosing appropriate imputation methodologies in order to ensure that the
relationships between variables will be preserved as far as possible and hence the underlying
distributions will not be distorted. As such, subject professionals have to closely monitor the
whole imputation process to ensure that the imputation has been done properly. They should
decide on whether imputation has to be performed and if so the imputation methods, ensure
that proper records on all imputations performed are maintained and bring up significant cases
to the senior management for scrutiny or endorsement.

(iv) Macro review
Before the statistics to be released are finalized, the subject professionals need to review and
ensure the reliability and accuracy of the statistics in a process of macro review. C&SD has
recently implemented a number of new measures in this area to ensure the work is to be done by
all subject professionals in a more systematic manner using a common set of standards. These
new measures are meant to assist the subject professionals in tackling the work more from a user
perspective thus making them more effective in identifying apparent abnormalities in the
statistics. Moreover, with the new standard framework, the macro review work can greatly
facilitate the senior management in grasping the crux of any salient points requiring their
special attention in regard to the statistics to be released thus ensuring their overall quality.

A number of guidelines and good practices in this aspect have been prepared for reference and
deployment of all subject professionals. The good practices include:

(a) Early alert to senior management of any abnormality and/or turning point changes
through compilation and analysis of preliminary statistics;
(b) Comparison of the statistics compiled with other economies to facilitate the identification of peculiar observations locally and hence the underlying reasons;
(c) Highlights of the impacts/concerns arising from the release of the statistics;
(d) Visual presentation of statistics to facilitate the identification of any trends or patterns;
(e) Contribution analysis on major variables accounting for the change to facilitate the identification of the contributors;
(f) Collection of market intelligence for assessing the reliability of the statistics; and
(g) Cross-checking/reconciliation of statistics with other data sources to ensure consistency

To facilitate the effective implementation of the macro review process, it is being planned to conduct this process via a new workflow system under the above-mentioned KMSS. The workflow system involves intelligent routing and tracking of information/tasks based on some pre-determined logics, rules or practices. By developing the workflow system for the macro review process, it enables the capturing of a complete audit trail of the flows of documents in the process and real-time details of the work-in-progress. Besides serving as an office automation system, the workflow system will also serve the purpose of QA through the building of a number of quality checkpoints in the end to end stage involved in the workflow. A number of QA measures will be incorporated in these checkpoints, which must be passed before moving on to the next stage. The following benefits are perceived using this workflow system:

(a) Single point of access - A number of officers of different ranks are involved in the macro review process. Moreover, the required tasks are at present performed in different media, including the internal email system and physical files. This renders the capture, storage and retrieval of any knowledge assets generated in the process and the implementation of any QA measures rather inconvenient at best and not effective at worst. The workflow system will serve as a single point of access to work which enables much more efficient communication among the various officers involved and enable the limitations of the existing practice overcome in an effective and efficient manner;

(b) Enhanced QA measures - The workflow system will be designed in such a way that officer responsible for each of the stages involved has to complete the specified tasks and sign off before passing on to the next stage. The sign off arrangement in the workflow system will ensure clear responsibility for the quality and soundness of the outputs and no QA procedures are overlooked for each stage; and

(c) Better maintenance of knowledge base - The workflow system will serve as a single work-bench where all information useful to officers involved (e.g. messages entered/documents created for a particular cycle of the workflow and by a particular officer, messages/documents related to particular areas, etc.) are systematically kept and could also be retrieved easily and conveniently. The most up-to-date information is always guaranteed because of the versioning control from a single source. The knowledge generated from each cycle can be conveniently captured into the system and serve as useful reference in future cycles of the workflow.

Control of records

To ensure the effective operation of the QMS, records of statistical processes and QA measures should be well controlled and a documented procedure should be established to clearly define the controls needed for the identification, storage, protection, retrieval, retention and disposition of the records. In particular, control of the movements of completed survey questionnaires is one of the key aspects of QA. There are from time to time occasions in which the completed survey questionnaires are transferred amongst different officers for reference or
checking for one-off or ad hoc purposes. Records of such movements are essential but easily missed out. As such, some good practices in controlling movements of completed survey questionnaires have recently been drawn up to form a basis for self-review of individual subject professionals on their current status. After self-review, the work procedures will be suitably refined by the subject professional if there are any discrepancies between their current practices and the good practices suggested.

**Internal auditing**

As mentioned above, to assure the accuracy of statistics released, a number of QA measures in statistical processes having major impacts on data accuracy have already been implemented in each statistical system of this department. With the aim of monitoring and verifying the effective implementation of the QA measures using an evidence-based approach, it is being planned to implement an audit programme, which comprises a series of internal audits of the QMS of the department making reference to the guidelines as stipulated in ISO 19011\(^3\) and those prepared by some overseas statistical organisations and national statistical offices, in the years ahead.

Proper documentation is a prerequisite of high quality. Checking on the completeness and adequacy of the documentation of each statistical system has been conducted by the QA team in the past few years. As such, the internal audits being planned will focus on the QA measures. Besides verification of the implementation of the QA measures as specified in the system documentation, these audits will also aim at assessing the sufficiency and effectiveness of such QA measures, identifying areas for improvements in QA and good practices for future sharing with other subject professionals.

**5. Way Forward**

The above new/enhanced measures are put forth with full engagement of staff at the managerial, supervisory and operational levels of the survey team concerned as well as peer sharing review of workable proposals and implementation experiences among various survey teams. Coupled with the QA measures in various statistical processes that have already been in place, these new/enhanced measures can further assure the accuracy of the statistics to be released. C&SD will continue to enhance the effectiveness and efficiency of the data QMS by making reference to various international quality guidelines as well as good practices in QA adopted in other national statistical offices.

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\(^3\) ISO 19011 refers to the set of guidelines for quality and/or environmental management systems auditing promulgated by the International Organization for Standardization (ISO).