



The South Africa I know, the home I understand

# Quality management practices in the South African Consumer Price Index

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## **1. Introduction**

Quality management has been an integral part of the Consumer Price Index (CPI) programme at Statistics South Africa (Stats SA) since 2005. It was then that the field force was introduced for the collection of retail and rental prices. The quality management system has evolved over these 10 years and while largely hidden from the user community, it provides Stats SA with the confidence that the index delivers what it promises to users.

Prior to 2005, pricing data on retail items was gathered directly from store management by means of a paper questionnaire. Realising that this was not usual practice elsewhere in the world, a team of field workers was employed over the course of 2005 and 2006 to directly record the price information according to a new methodology. Given that the fieldworkers were dispersed across the country and were not directly monitored on a day to day basis, it was essential to set up a strong system of quality control. This formed the starting point for a comprehensive quality management system.

It is worth noting that Statistics South Africa does not have any organisational approach to managing quality. The work described here represented a significant innovation for the agency, parts of which have subsequently been emulated in other surveys.

## **2. The approach to quality management**

When referring to quality management in Statistics South Africa, there are three terms that are often used interchangeably, but are not in fact synonymous.

*Quality Control* (QC) is a system of routine checking activities with which to measure and control the quality of a product – in this case the collected data. The QC system is designed to provide regular and consistent checks to ensure data integrity, correctness and completeness; and also to identify and address errors. Physical checking of actual questionnaires and data editing are forms of quality control.

*Quality Assurance* (QA) activities are aimed at testing the veracity of the processes, and not the immediate correctness of data. They are aimed at providing confidence

in the quality of the product by assessing the performance of a process according to certain criteria. Examples of quality assurance in a data collection environment are quality audits and reviewing of performance measures after the survey.

In the case of quality control, the aim is to deal immediately with any substandard data, either by fixing or discarding it. Quality assurance has a longer time horizon. It aims to fix identified problems in the next cycle of the activity – for example next month's collection.

The third concept is *quality management*. There are many different ways of defining quality management, but the approach adopted is that of Total Quality Management (TQM). This can be defined as an “holistic approach to long-term success that views continuous improvement in all aspects of an organisation as a process and not as a short-term goal” ([www.businessdictionary.com](http://www.businessdictionary.com)). Quality management should include control and assurance activities.

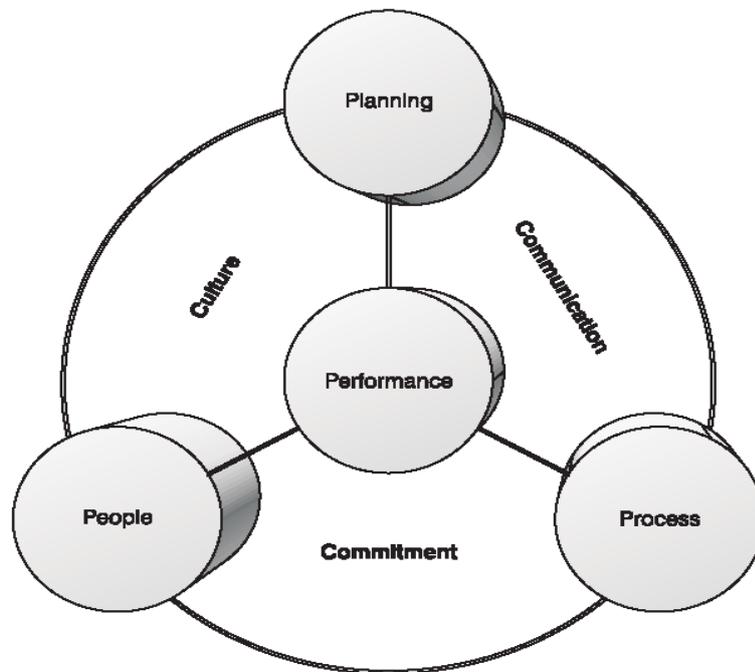
Total Quality Management was consciously adopted as the quality management approach because of the broadness of its scope and adaptability to different circumstances. According to Oakland (2003), TQM is an approach in which quality is emphasised in every aspect of the business and organisation; its goals are aimed at long term development of quality products and services. Total quality management is a broad culture change vehicle with internal and external focus. It embraces

- behaviour,
- service issues,
- quality assurance,
- quality control,
- performance management, and
- continuous improvement.

The TQM model has four hard components – four P's – processes, people, planning and performance, which are the keys to delivering quality products and services to customers and continuously improving overall performance. The three C's – culture, communication and commitment provide the glue or soft outcomes. These

components are illustrated in Figure 1. Total quality management is far more than a means of detecting data errors. It is essentially a way of planning, organising and understanding each activity and depends on each individual at each level.

**Figure 1: Oakland's (2003) Total Quality Management model**



### **3. Quality management in the South African CPI**

The CPI is the most closely watched economic indicator in South Africa given its impact on monetary policy, and wage and benefit increases. Not only must the CPI be produced according to the highest standards, it must be seen to be of the highest standard to attract the credibility it requires.

Based on the adopted TQM model, ensuring the quality of the CPI involves four main dimensions:

1. Quality control
2. Quality assurance
3. People management
4. International benchmarking

### **3.1. Quality control**

Detailed inspection of each questionnaire and its data takes place at two points. Firstly, a fieldwork supervisor inspects each questionnaire completed by a price collector. If necessary, the supervisor will revisit the store to verify information. Each supervisor signs all cover pages to verify that the store was visited and stamps their name on any questionnaire with a verified price change.

During the early days of this approach, the fieldwork supervisor checked the forms before they were sent to head office for processing. Errors identified during this phase of quality checking were corrected and allocated to the fieldworker. The error report would then be sent to head office where it was updated with the errors identified during quality control.

At head office, the forms were manually checked by the quality controllers for completeness and accuracy before being captured. This process was beneficial in the beginning but as the fieldworkers understood basic principles of methodology and completing the questionnaire, the error percentage dropped significantly. Thus, this process became redundant.

It was at this stage that the current process of capturing the forms first as they are received from the field and then sent for editing was introduced. Editing goes through four phases:

**Validation Phase** – This phase ensures that all unit codes (e.g weight and volume codes) are correctly allocated. Unit codes are used during the calculation of the average prices.

**Phase 1** - Logical edits, ensure that current and previous month's data do not have contradictory values e.g. compare current month's Brand Name with the previous month.

**Phase 2** - Range edits, identify whether the data item value falls inside a determined acceptable range.

**Phase 3** - check the correctness of all the allocated item status codes.

### **3.2 Quality Auditing**

A team of auditors is employed at head office. They conduct field audits of each team twice a year. The auditors are employed only to audit CPI price collection activities. Once a location is selected, the auditors will draw a sample covering a variety of products for each price collector. Audits are also conducted on prices collected centrally and housing rentals and these follow a similar process to the outlet audits. A key feature of the auditing process is that it is run independently of the collection team. The auditors reporting to a different manager and the field teams never know when they will be audited. This independence ensures minimal contamination of the audit process through fieldworkers improving their performance temporarily because they know when an audit will take place.

The purpose of the quality assurance audits is to guarantee that CPI methodology is correctly applied by fieldworkers in the outlets. The audit process allows for auditors to confirm if prices and products collected by the price collectors are indeed correct. Respondent interviews are also part of the audit as they give an indication about the behaviour of fieldworkers when visiting outlets.

On returning to head office, an audit report is drawn up and sent to the data collection team. The report would contain an 'audit error percentage' for each price collector and the team in aggregate. The report also contains a set of 'corrective actions'. These are specific incidents where the team was found to have not recorded the right information about a product. It is possible for the field team to 'appeal' against a corrective action, but once accepted, it should be implemented in the following month's collection. A monitoring system is in place to ensure that corrective actions are implemented.

The benefit of audits is that they assist in monitoring whether fieldworkers are complying with the prescribed methodology. They highlight problems with the price collection process, or collection areas, and also problems with individual price collectors. This information provided by the audit is used as an indication for additional training for staff, and provides an opportunity for overall improvement of the quality system.

### **3.3. People management**

The most important element of the quality management system is the process of planning and reviewing put in place for the field teams. The system has been designed to fit in with the organisation's performance management process and that used by all government departments in South Africa. A custom-designed computer system facilitates the capturing, flow and analysis of information from the field teams.

At the beginning of each financial year, each field team compiles a quality improvement plan which identifies the areas of needed improvement for the team. Based on this, performance plans are compiled for each team member. The plans serve as official documents for the Human Resources (HR) process. Each quarter, teams are afforded an opportunity to identify their performance gaps by reviewing previous performances, achievements and failures. A full set of performance indicators is used by teams and individuals as informants to performance gaps.

At the end of each financial year, an assessment of team and individual performance is undertaken. Again this forms part of the formal HR performance management process. While annual performance scores are agreed between the team member and supervisor in a face to face discussion, most of these measures are derived quantitatively from the quality management system.

Integrating quality management into the aspects of performance management has proven to be a success in the South African CPI as it has created a culture of quality, teamwork, innovation and learning. It facilitates continuous improvement and provides feedback to people in all areas of business operations.

### **3.4 Continuous review and improvement**

Teams in the CPI are also encouraged to meet regularly to review their performance. A system based on the Plan-Do-Check-Act (PDCA) cycle is utilised. PDCA is a process of continuously reviewing past performance, planning and implementing changes to working methods and then assessing the results. Use of the PDCA cycle has assisted in teams becoming self correcting, rather than waiting for management to pick up problems and issue instructions for correction. The approach taken

permits individuals to manage their own performance and apply the PDCA cycle to achieve continuous improvement.

### **3.5 Computer system to manage performance data and planning**

Performance reviews are captured on our online quality improvement system. The online system allows for analyses of problems, through root cause analysis. The analysis is done on all categories of the price collection process such as methodology, team functioning, quality, respondent management, planning and resources.

Further to root cause analysis, the quality system groups all identical problems using Pareto analysis after which teams can strategise and formulate objectives and actions to implement for addressing the identified performance gaps. A quality plan for teams and an individual performance plan are the ultimate output of this review process. The contents of the team's quality and individual performance plans include objectives which address price collection gaps, quality improvement and personal development objectives. Subsequent to the planning stage will be the implementation of the planned actions and measuring their results.

### **3.6 Performance appraisals**

Performance measurement at the individual level relies on formal quarterly reviews and appraisals. Annually, performance appraisals are conducted for all staff. These are normally aimed at assessing the performance of individuals to see how well they have met the expected deliverables. Performance criteria used are error rates from the audit and editing process, quality improvement objectives, respondent management and team functioning. The criteria used for assessing measures which are non-quantitative are based on the identified objective, the frequency of activities taken and the results obtained.

Recognising good performance is important as an incentive for teams. Each year the top teams and individuals in each province and across the country are been acknowledged with awards. When possible, these certificates and trophies are presented at an awards dinner.

### **3.7 Training**

All newly-appointed staff in the CPI, irrespective of what job they will occupy, have to undergo price collection training. This initial training is reinforced every two years with a three-day CPI training course to ensure that staff keep abreast with changes in methodology. Training on quality management techniques and 'soft skills' such as management tools are also included in this training. All other training requirements for staff are addressed by the organisation's Human Capacity Development (HCD) division. The identification of training needs and development plans for individuals is linked to the strategic objectives of the division and the specific gaps of each staff member.

### **4. International benchmarks**

The use of internationally acceptable methods and standards is a priority for the South African CPI. These form the basis for the methodological quality of the CPI. It is necessary to periodically assess the compliance to these standards. To date there have been two independent assessments.

The first was a peer review. This is an assessment by a CPI expert from another country who takes a fresh look at the core requirements of a CPI and the extent to which the national figure follows these. The core requirements are based on the check list contained in the United Nations practical guide to producing CPIs. This review took place in 2011. It is also our intention to do a self assessment against this checklist periodically. The review found that the South African CPI was generally in good shape, although a number of specific recommendations for improvement were made. A summary of the report and Stats SA's responses to it were presented at a user meeting in 2011 and placed on the Stats SA website.

The second was an assessment by Stats SA staff of the CPI's compliance to the South African Statistical Quality Assessment Framework (SASQAF). The SASQAF consists of nine dimensions of quality, based on the IMF's Data Quality Assessment Framework (DQAF). The assessment dimensions are:

- Pre-requisite of quality
- Relevance

- Accuracy
- Timeliness
- Accessibility
- Interpretability
- Comparability and Coherence
- Methodological Soundness
- Integrity

The CPI was the first Stats SA product for which independent assessment against SASQAF was carried out and therefore served as a pilot in the application of SASQAF to other Stats SA products. The assessment determined an overall strong score of 3.6/4. This affirms the CPI compliance to a wide range of statistical quality criteria. The assessment started in 2011 and was completed in 2012. However, the final report was only signed off in 2014.

## **5. Measuring the quality of the CPI**

Day (2007) states that quality measures should be set for each stage of the production process. These measures should be as quantitative as possible and be evaluated against pre-determined targets on an ongoing basis. Problems should be flagged during the production process allowing immediate corrective action to be taken if necessary. Performance measures are an integral feature of TQM as they provide employees with motivation for sustained process improvements. They have become a key element in the management of the CPI especially for process control and performance improvement. Performance indicators are useful to identify and throw light on problem areas and therefore act as positive indicators for improvement.

Over time, indicators for measurement have been developed for most processes in the CPI. The performance of these indicators is reviewed through a monthly indicator meeting. The indicator meeting is a platform which has been created in the CPI to review the performance of processes on a regular basis with the aim to facilitate continuous improvement and provide feedback regarding process improvements.

Figure 2 below illustrates indicators for some of the key processes reviewed during the monthly indicator meetings.

**Figure 2. Performance Indicators for some of the key processes**

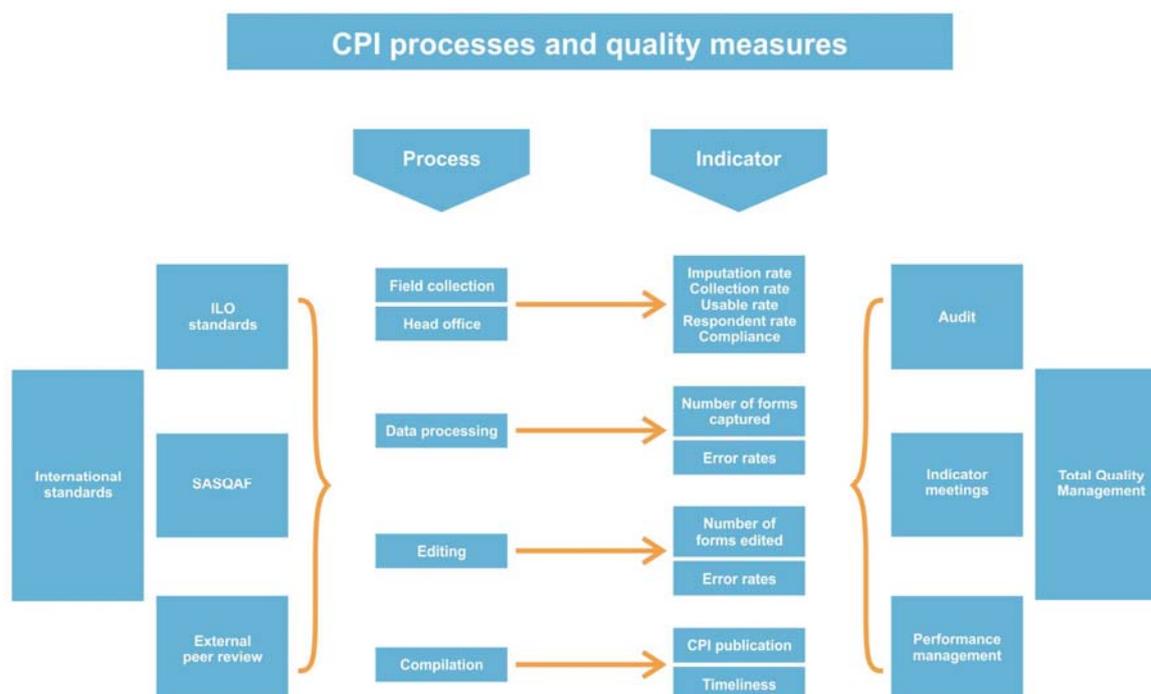
<b>Process</b>	<b>Indicator</b>
Collection of prices at the outlets	Collection and respondent rates - <i>Imputation rate</i> - <i>Eligible for collection</i> - <i>Percentage collected</i> - <i>Percentage usable</i> - <i>Items with less than 3 and less than 5 prices</i> Timeliness Individual and team error percentages Compliance reports Corrective actions for audit
Data Processing	- Number of forms captured - Accuracy - error rates - Timeliness - Progress reports
Editing phase 1 and 2	Timeliness Accuracy - error rates
Compilation	Timeliness Clearance document.

The overall measure used for calculating the quality of the CPI is the imputation rate. This is the percentage of elementary indices that must be imputed for the month. The structure of the South African CPI is such that an elementary index is for a product (e.g. brown bread) in a specific area (e.g. Cape Town). There are 9 607 elementary indices in the South African CPI. An imputation means that there was not one comparable price for two consecutive months for that specific product. Most imputations are in the goods categories collected by the field teams.

As a preventative mechanism, we measure the number of less than three and less than five prices per elementary index. These are targeted for sample enhancement (referred to as product maintenance). Product maintenance is an ongoing process

used in the CPI for managing the imputation rate, managing items with no prices, and also for managing product and outlet substitution. The results of the product maintenance exercise are constantly monitored.

**Figure 3. The CPI quality management system**

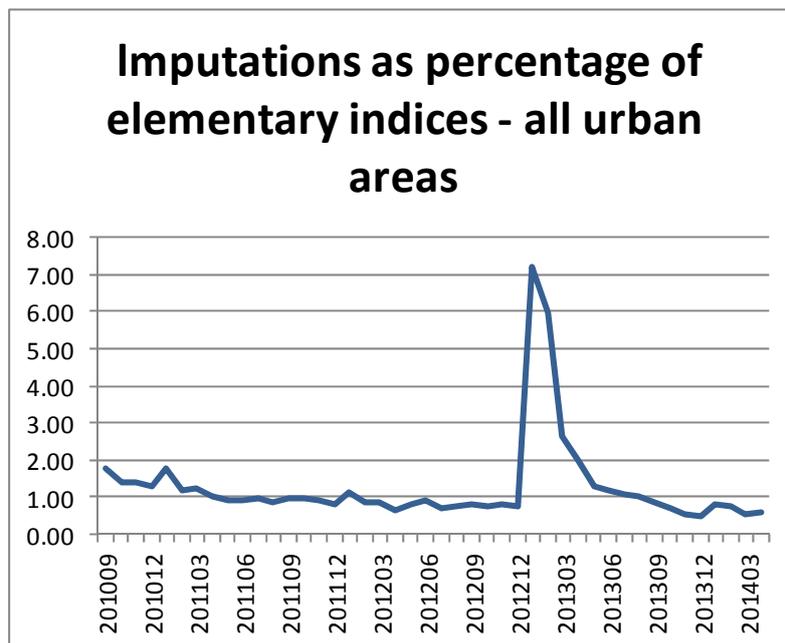


## 6. Results of managing quality

Over the past nine years, the emphasis of the quality management process has shifted, from a focus on error rates to imputation rates. Error rates are an input measure that assumes that if a form is correctly completed, then the rest of the process will take care of itself. Imputation rates encompass a broader view of ensuring that an adequate number of usable price observations are collected in a month.

Figure 4 shows the imputation rates from September 2009. It is interesting to note a spike in the imputation rate in early 2013. This resulted from the introduction of new basket items, without the necessary lead time to manage the process properly. Significant effort was taken during the first quarter of 2013 to deal with this problem, with the result that the imputation rate dropped significantly.

**Figure 4: Imputation rate**



## **7. Challenges and improvement areas**

In reflecting on the development of the quality management system, it is instructive to note that we have done less well on the softer elements identified in Oakland's model - communication, culture and commitment. One constraint in advancing these elements is that they largely depend on dynamics in the broader organisation. As there is no quality management system operating across Stats SA, there is little support for potential initiatives in this area.

A further challenge is that because the field workers are dispersed across the country, and there is no dedicated provincial or district management for CPI, it is possible for staff to 'get away' with not complying with procedures. There have been isolated cases where staff fraudulently completed forms without visiting outlets. Substantial effort was made initially in educating the provincial and district management on the 'CPI quality management' methods. We have found that these managers tolerate the activities, rather than becoming active participants.

The data shows that problems are most often experienced in small teams in small towns. Problems are often as result of weak skills and poor relations between team

members. This points to a work allocation and management problem in these areas, rather than simply non-compliance with methods and procedures

Identifying the most appropriate performance measures is difficult and calculation errors have occurred in the past, leading to incorrect management decisions. It is not easy to know when an indicator has served its purpose and should no longer be measured. Too many indicators can confuse decision making, whereas too few limits the information available.

## **8. Conclusion**

Continuous improvement is a hard journey. It is tempting for all role players, ranging from top management to fieldworker teams, to get into a rut and carry on doing things the way they were done last year. But it is critical to keep asking the difficult questions, and to keep all teams motivated and interested in improvement. By empowering – rather than policing – the data collection teams, there is always the risk that the trust will be abused (and indeed it has on occasion). But these are the exception. On the whole the quality journey has been a most rewarding one, and the outlook for continuous improvement is sunny.

## References

Day, A. (2007) Performance Indicators: The Librarian's challenge. Emerald back files 11(5)

Oakland, J.O. (2003).TQM texts with cases (3<sup>rd</sup> Edition). Elsevier Ltd.

United Nations (2009), Practical Guide to producing Consumer Price Indices

www.businessdictionary.com, <http://www.businessdictionary.com/definition/quality-management.html>