

# Measurement in the Service Environment Use or Abuse

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## **ABSTRACT**

*The importance of measurement has been recognised for a very long time. In the case of quality management, the primacy of measurement was recognised at the very beginnings as the basis for statistical quality control. The manufacturing sector has used measurement, coupled with standardisation, to significant effect in the improvement in the quality of products. This sector has also used measurement to good effect in the standardised service quality features of the product and service package. For instance, percentage of orders delivered on time may be viewed as a service element of a product and service package. In the service environment, however, there has often been a lack of agreed, standardised measures with which to conduct comparisons over time and between service providers. In some cases, this has resulted in different measures being used at different times. In other cases, it has resulted in the same things apparently being measured in different places but using different measures. This paper explores some of these issues and questions whether the quality movement is being well served when much of this measurement is being carried out in the name of quality improvement.*

**Keywords:** Service Quality, Measurement, Standardisation

## **1.0 Introduction**

The use of measurement in industry, commerce and the public sector has increased dramatically in the last half century. In many cases, this trend has resulted from the increasing demands for improvements in quality of goods and services. The origins of measurement are traceable back many thousands of years to the human pursuit of attempting to quantify largeness and smallness. The development of societies, where there is any form of commerce replacing self-sufficiency, results in a need for quantification. Societies have, over time, developed their own systems of quantification to facilitate the needs of such commerce. These systems operated locally and served their local marketplaces. In many cases, the systems varied over time, being recalibrated on the occurrence of some event, which was of significance to the community. The fact that the systems were local and served the needs of locally based commerce and other activities meant that they were fit for purpose. There was no need to take account of the needs of other societies, since there was little or no commercial activity between the relatively isolated communities.

In the case of distance, or length, it was common, in early times to base measurement on the unit of length of body parts. In the case of the ancient Egyptians, it was the length of the forearm of the reigning pharaoh (Juran[1979]), whilst in mediaeval Britain, it is reported that all the men were lined up on a particular Sunday and had their right foot measured. The average length was that community's basic unit of measurement for the remainder of the year(Murphy[1988]). Thus, the unit of length in ancient Egypt changed on the death of a pharaoh and that in mediaeval Britain was adjusted annually. This ability to change basic units of measurement were clearly, potentially, an inhibiting factor in the development of international science.

Clearly, these localised systems of measurement would also be entirely unacceptable in today's world where we have industry and commerce operating in global markets. Considerable effort is devoted to the establishment and maintenance of standards, which are recognised and accepted on a global basis. This is the inevitable result of global trade, but it is also the result of considerable evolution of the science of metrology over many decades. The consequence is a robust system of measurement, which is not subject to arbitrary spatial or temporal modification or change. Furthermore, these measurements in the main relate to the tangible. The nature of accuracy, precision, variation, and measurement error are acknowledged and understood. In the service environment, where the service element is intangible and instruments are being used for measurement, the rigorous approach to validity and reliability may not always mirror the evolution of the science of metrology. This is despite the extensive efforts of practitioners in the psychological and social sciences who have made significant contributions to understanding in the study and measurement of human behaviour. If this is the case, the quality movement may be being poorly served by the proliferation of data collection, which is often being done in the name of quality improvement.

## **2.0 The Importance of Measurement**

The need to quantify has, then, been apparent from the earliest times. The system of quantification depends on:

- (i) the definition of standardised units,
- (ii) instruments which are calibrated in terms of such standardised units
- (iii) the use of these instruments to quantify

This process of quantification is called 'measurement'. (Juran[1979])

### **2.1 Measurement and Standards**

The need to standardise became increasingly apparent in the wake of the Industrial Revolution, as trade became more internationalised and mass production and inter-changeable parts took over from the craft approach to production. Two major measurement systems emerged, the metric system and the imperial system. The modern metric system or *Système Internationale d'Unités* (SI) had its origins in the late 18<sup>th</sup> Century in France. The SI system of units became widely accepted and adopted throughout the world in the 1970's, with only the United States retaining the Imperial system. Along with the system of standardisation of the units of measurement, came the move to increase the level of standardisation in other areas. The British

Standards Institute (BSI) was the successor organisation to the “Engineering Standards Committee” which met in 1901 to address the issue of standardisation and its role in international competitiveness. BSI has subsequently issued thousands of standards on many different matters. Most countries now have their own standards organisations and, internationally, there are bodies such as the International Organisation for Standards (ISO). In a recent report, Foley[1997] described the ‘technical infrastructure’ of a country as comprising three principal elements: written standards, physical standards(measurement) and quality. It was defined as:

“that collection of activities, rules (often in prescriptive or legislative form), principles and concepts that establishes, maintains and gives authority, traceability (increasingly to international norms) and confidence to the measurements, quantities (products), qualities(services), relationships and standards that support, guide and often direct the production of all goods and services.”

Foley, therefore links the areas of measurement, written standards and quality. He applies them through the idea of ‘technical infrastructure’ to both goods and services.

### **3.0 Measurement in the Manufacturing Sector**

The manufacturing sector has a significant history of applying measurement methods to the production of products. The advent of statistical quality control has seen the recognition of variation widely, though not universally, adopted. In the main, manufacturing companies, through the adoption of certification to the ISO 9000 series of standards have also complied with the requirement to calibrate measuring equipment and instruments to recognised standards. These developments have contributed significantly to the improvement in the quality of goods provided to consumers by manufacturing industry.

In the case of measurement in fields which are not governed by international standards, manufacturing industry has had a less impressive track record. In many cases, the measurements that have been used by management to measure manufacturing performance, including labour utilisation, machine utilisation and productivity, for instance, have not been sufficiently sophisticated to characterise the real performance of the company. In the service element of manufacturing companies’ offerings to the marketplace, many companies have not adopted the same level of insight into service quality improvement as they have to the improvement in product quality. Manufacturing companies have also come to the realisation that, through studying failure in the quality improvement process, much can be learned about the complexity involved in quality improvement and the change processes involved. It is in the areas that are not covered by units of measure and standards that the main failures have been found to occur.

### **4.0 Lessons from Manufacturing**

In situations where there is recognition of the concept of ‘technical infrastructure’ and its applicability, manufacturing companies, in the main, have tackled the problem of quality improvement in a reasoned and systemic way. To really embrace the quality improvement

process, however, they must go far beyond those areas which are governed by measurements and standards. They must also seek more meaningful measures than the relatively unsophisticated machine and labour utilisation, and productivity measures which were deployed in the past. In many cases, the only thing that these measures had to recommend them was that they were relatively easily calculated.

In the service element of manufacturing companies' offerings, the absence of standards has given rise to potential abuses. For instance, it would appear that the proportion of orders delivered on time might be a reasonable and often quoted measure of service quality. It was found that one company in a group of companies had defined "on time delivery" such that a delivery was deemed to be 'on time' if the firm was able to invoice the customer in the month that it had budgeted to issue the invoice. Needless to say, that company was the best performer in the group when measured on delivery performance (although it was not scoring 100% even using that definition). The same company would obviously not have unilaterally decided to define the metre as consisting of 99 centimetres and ship metre sticks of 99cm in length! They had equally obviously not consulted their customer base about the definition of 'on time delivery'.

The complexity involved in attempting to characterise a complete manufacturing organisation has been recognised internationally and there has been a move away from using single elements of an array of criteria to characterise the overall performance. The award models developed by, for instance, the European Foundation for Quality Management, (the Business Excellence Model) and the Australian Quality Council, (the Business Excellence Framework) present organisations with a challenging set of criteria against which to assess themselves. These are internationally recognised instruments which are standardised and fine tuned. There are well-defined criteria incorporated to guide the judgements of anyone assessing the organisation. There may be opportunity to debate whether the weights applied in these models may be fine tuned to meet the needs of different industry sectors.

## **5.0 Measurement in the Service Environment**

There has been a proliferation of measurement in the service environment over the past decade. The instruments have varied from the extremely crude in the form of the "Are you happy?" sheets to the much more sophisticated instruments like SERVQUAL. There are many variants in between. The instruments have been variously used to 'measure' service quality in retailing, professional services, healthcare provision, in the private sector and the public sector. Many have also been used to 'measure' the service quality elements of manufacturing organisations. In the higher education sector, there has been a move to measure 'teaching quality' and 'research quality'. In the case of higher education, the methods and 'instruments' used for teaching quality assessment in Scotland were different from those used in England. In Australia, the exercise was abandoned because of a lack of confidence in the process and instruments being used. In the case of higher education research quality, the methods and instruments used in Scotland were the same as those used in England. However, in Australia, the approach was entirely different from that used in the UK.

On the micro level, many industries have now laid down standards for the time taken to answer the telephone when an enquiry is being made. The solution has been to deploy technology to assist in the fulfilment of the standard specification. The outcome for the enquirer has, in many cases, been the delivery of the call to a waiting system which provides music - or worse – proceeds to advertise the other services that the company provides. The situation before the ‘improvement’ in service quality was that the enquirer waited for a long time for someone to answer the telephone. The only cost to the enquirer was the time wasted waiting for an answer. After the ‘quality improvement’ process was completed, the enquirer incurred that cost and the additional telecommunications provider’s charges. Thus, there was no improvement in service quality as experienced by the enquirer, additional costs were incurred by the enquirer, and the ‘system’ delivered the service in keeping with the new, ‘improved’ standard. The lack of coherence in the higher education examples and the diminution in service resulting from ‘quality improvement’ activity in the telephone service example illustrate how the quality movement may be open to criticism and perceived failure.

## **6.0 Lessons for the Service Environment**

There are many excellent service providers. Many of the organisations which are presenting themselves for the quality awards and winning prizes are from the service sector. There are many manufacturing organisations which are providing excellent product and service packages. There are, however, many organisations which are not addressing the issues of service quality as well as they might. There is no well-established, internationally accepted, science of metrology which can be applied to aspects of services. There is no “Definition of standardised units called “units of measure” which permit conversion of abstractions into a form capable of being quantified.” There are no “Instruments which are calibrated in terms of these standardised units of measure”. (Juran[1979])

There are, however, useful instruments developed and being developed which make a contribution to the measurement of quality in the service environment. There are also considerable efforts being devoted to the advancement of knowledge and understanding of some of the more complex aspects of characterising organisational quality and, thereby, developing quality improvement models. It is essential, therefore, that the validity and reliability of instruments to be used in the service environment is tested and established before these instruments are used in the general quality improvement arena. Otherwise, if the instruments are used and their validity and reliability are unknown or suspect, the subsequent contribution to knowledge and understanding of the systems which are subject to study and the subject of quality improvement effort will at best be zero, and may be negative. The availability of well established and validated instruments which were accessible and promoted on the scale of metrology standards may encourage the more, and more appropriate, measurement in the service environment.

## 7.0 Conclusions

In conclusion, therefore, it is incumbent on those who are practitioners in the field of quality to ensure that the work that is done is founded on sound theoretical principles and to recognise that there is, as yet, no equivalent of Foley's technical infrastructure in relation to measurements of overall organisational performance. This means that the uninformed application of measurement instruments must be avoided. It also means that, when taking an instrument which has been developed and validated in one environment, we cannot assume that the same instrument will be valid and reliable in an environment where its validity and reliability has not firstly been tested.

Donnelly and Dalrymple[1996] have addressed this issue with regard to the SERVQUAL instrument. This instrument was developed for use in the private sector in the USA. The reliability and validity in that environment were thoroughly investigated by those who developed the instrument (Parasuraman et al. [1988]). A group of studies in the local government sector in the UK resulted in a series of zones of applicability of an adapted SERVQUAL instrument being proposed by the authors. These zones of applicability were related to the extent to which the service being measured had a reasonable analogue in a private sector transaction. In the course of that research programme, local government managers demonstrated interest in and commitment to quality improvement and were enthusiastic about the potential that the SERVQUAL approach presented for the crucial measurement processes inherent in any quality improvement activity. The research demonstrated that caution was required in dealing with the portability of the SERVQUAL model and the dimensions of quality identified by Parasuraman et al. did not emerge from the analysis of the survey data analysis.

In conclusion, therefore, it is important to enshrine measurement as part of the quality improvement process. In the case of service quality and overall organisation performance, measurement activity must be approached carefully. The quality improvement professional must ensure that what is being measured is, in fact measurable and what is measured does genuinely characterise a quality issue which is important to the customers and stakeholders of the organisation.

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