The Paperwork Factory

Total quality control should not be confined to manufacturing.

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■ When people hear that a bank has a quality control department they are amazed. Banking, and all service industry, is as much a production-oriented operation as is manufacturing. The principal product of service industries is service to a customer. There are many different types of services which must be kept in inventory at all times and must be delivered in a timely manner and without making a mistake.

Just as the service industry has a manufacturing component, manufacturing has a service component. In spite of the importance of the service areas in manufacturing, it is rare to see quality control applied. When we hear the term "total quality control" used in a company, it generally refers only to the manufactured part of the product. Only in Japan and a small minority of companies in the US does it include sales, accounting, data processing, production control, purchasing, etc.

How can the quality professional extend the concept of total quality control into the service component of manufacturing industries'? It is quite simple when you understand what service is and what its relationship is to manufacturing. Then it is possible to use many of the same tools of quality control that are used in manufacturing. Some modification is needed, considering the basic differences, but on the whole the same methodology is used.

The product of a service is the result of some action taken, such as typing a letter, entering data into a system, completing a phone call or advising a customer on how to handle a particular transaction.

Comparing service to manufacturing

Service processing differs from manufacturing in four principal ways:

- Specifications
- Product
- Measurement of output
- State of control

A manufacturing process cannot take place without a "blueprint" specifying the exact dimensions and materials of construction. The equivalent document in service is the "procedure." Unlike the blueprint that must exist in written form, the procedure may be verbal training received by the salesman, purchasing agent, etc., when first starting to work. While no one would think of manufacturing an item without an updated blueprint, it is often the practice in service areas to perform work with old, and even without any procedures whatever. As a result people performing service work must do the best they can. Many service errors are due to inadequate training of procedures.

The manufacturing process nearly always turns out a product that is tangible. Something is made that has form and is measurable in several ways. The service process usually turns out an intangible product such as a decision. Compared to manufacturing, it is much harder to specify standards in service operations.

The product of the manufacturing operation can be measured in various physical dimensions such as length, area, capacity, mass and similar objective standards. As a result, using variable measurements, that is, measurements that can be expressed on a continuous scale, one can control most manufactured products. The service area process rarely lends itself to such a form of measurement. The best that can be done in service operation is to distinguish between correct and incorrect. This form of measurement is called attribute measurement.

Since much of manufacturing is mechanical, the quality of

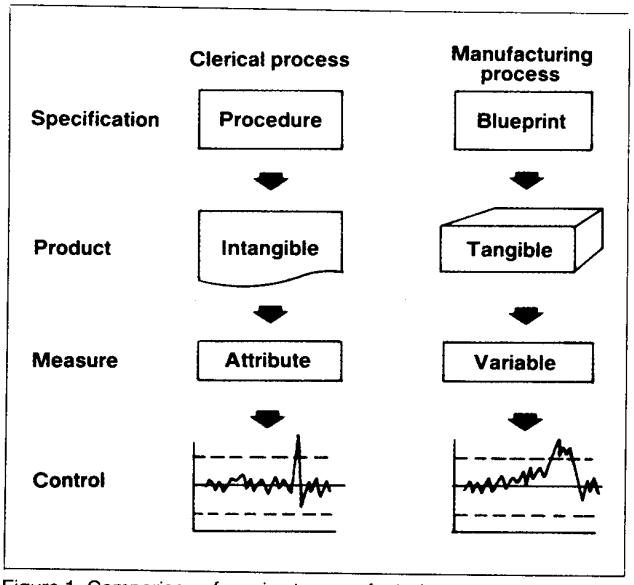

Figure 1. Comparison of service to manufacturing.

the process tends to remain in control until it gradually shifts due to tool wear and finally falls out of control. When this occurs, an adjustment brings it back into control to repeat the process. Service operations, however, depend upon human beings. There is more variability in service processing than in manufacturing and it tends to be more random. Figure I shows the various differences between service, or clerical process and the manufacturing process.

Workflow pipeline

An important principle of service quality is shown in Figure 2 of thre clerks in a department contributing to the total output of th department. It is of importance in determining the method o measuring service quality.

In the diagram, the three clerks are merging their output into the department output. A large number of papers on quality control for service industry concentrate on the measurement of the quality of the department output. While this measure gives some valuable information-the process average-it fails to give satisfactory data for the improvement of quality of the department. The process average is a coarse measure that is useful in tracking the performance of the department. This is part of the job of service quality control. To be entirely effective, however, it is necessary to develop a measure for the standard of quality that each clerk can achieve and is expected to perform.

The approach to this is to consider the impact of a clerk who performs at a less satisfactory level then others. If Clerk A is assumed to be worse than Clerk Band C it can be readily seen that the department output will have more defective items to the extent that Clerk A introduces excess defective because of poor work. The level at which the department can operate is really represented by the performance of Clerks Band C, the process capability. The process average of the department is worse than the process capability to the extent that Clerk A exceeds the process capability.

The function of service quality control is first to determine the process capability and secondly, to identify any deficient persons such as Clerk A. A good service quality control system will also develop sufficient data for operations management to locate the problem that causes the outlying person to do so badly, and thereby achieve correction. This process will result in quality improvement since the department brings its process average into line with process capability.

The hazards of checking

Unfortunately, most managers of services depend upon a checking process for their quality control. And what is more unfortunate is that many managers turn over their responsibility for quality control to clerks who check the work of others. In fact, checking is the single most used tool for quality in the service industry. Yet this significant topic has had little attention. The assumption is that any qualified person can do checking. Often too many "other" jobs are given to the checker.

There are two principal methods of checking-dependent and independent. Dependent verification is more frequently encountered in service industry than independent. Dependent verification is simply the comparison of the finished work to a standard such as an original order. Proofreading~ is a prime

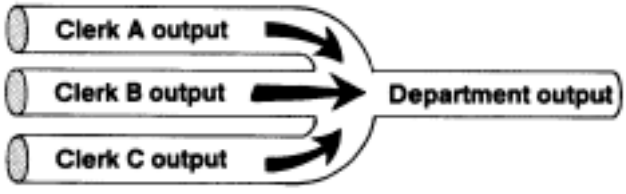

Figure 2 The workflow pipeline

What's a QC test lab doing in a bank?

In addition to the paperwork factory, there are also some manufacturing operations that take place in service industries. The Irving Trust Company of New York is an $18 billion bank. In its many operations, the bank processes hundreds of thousands of checks every day as well as processing hundreds of rolls of microfilm.

Small deviations from standard in high speed production sorters not only result in machine down time but are a frequent source of mistakes. To assure the quality of the processing, the bank has a completely outfitted laboratory capable of testing the checks according to ANSI X3.2 and X3.3 as well as paper standards in proposed ANSI X9b. In addition, the process controls on microfilm require the methelyne blue test according to ANSI Ph4.4.

example of dependent verification. Independent verification is doing the work in two distinct ways and comparing the results. The use of keypunch verification is an example of independent verification.

In general, dependent verification is not as effective as independent verification. The "hypnosis" effect comes into play. This is the same effect that causes people to make the same mistake twice when rechecking an arithmetic operation. While independent verification is not a failsafe method of checking work, it is, on the whole, much more efficient in error detection.

In order for the checking function to be a satisfactory method, it must fulfill four requirements:

- Completeness
- Catch all the errors
- Return the errors to the originator
- Keep good quality control records

Insufficient training methods are generally the cause of in consistencies in checking. Generally new checkers are trained by the incumbent checker. If a checker is asked to prepare a list of items that they check, the list will generally contaln items that need not be checked, as well as omissions of important items that should be checked. This occurs because the incumbent checker, doing the training, will pass on his/her idiosyncrasies to the new checker. If during the training period error items should pass before the new checker, they might learn how to handle them. Otherwise they are entirely dependent on procedures and experience.

Studies have shown that checkers do not catch all the errors. Their find rate depends on the type of checking and the complexity of the items being checked. To illustrate the point, consider the sentence below. Allow yourself 30 seconds to count how many times the letter "F" appears in the sentence.

> Federal funds are the result of years of scientific study combined with the experience of years.

This type of exercise is a classic example of dependent verification. In this case it is advisable to look for the letters by scanning from the last word to the first. The general experience with this sentence is a find rate of approximately 60 to 70 percent. This compares with the normal find rate of checkers.

Generally, errors are returned to the area that made them. However, supervisors mayor may not return these to the originator. An error creates a delay, and under the pressure of deadlines, supervisors often get them corrected without the originator being involved.

Checkers do not generally keep good quality control records.

Various pieces of equipment are used for these tests. For the MICR (Magnetic Ink Character Recognition) symbols, a specially equipped oscilloscope is used. The Micrex MICR tester allows interpretation of signal strength and shape. A Nikon C-6 comparator with 20 and 50 power objectives allows printing defects to be detected. A special fiberoptic light source gives the necessary illumination while an X- Y stage fitted with a two inch micrometer each way, allows measurement to the nearest 10-thousandth of an inch. A Nikon light-section microscope permits measurement of embossment of the printing on paper to the nearest 10-thousandth of an inch.

Additional equipment consists of a 12-power pocket comparator, a Glardon gauge for checking print position, a "basis" weight scale and a paper micrometer. For the methelyne blue test, a Beckman spectrophotometer is used.

In those cases where records are kept, they generally are a summary of errors found, listed by type. These records are unsatisfactory since they do not reflect the source of errors in such a way that measurements or corrections can be made. Record keeping, like returning defective items to a clerk, should not be a function of checking. Checkers should concentrate on knowing what to look for and the finding of errors.

Tools for service QC

There are a number of tools available to the quality practitioner to solve problems of service quality. One method, used at The Irving Trust Co., New York, called Quality Improvement Program (QUIP) is a statistical comparison of the output of individual operators. QUIP determines process capabilities and finds any operator performing at a worse rate than the rest. Other uses for this method can be applied to salesmen by recording the number of successful sales calls versus unsuccessful ones. A successful sales call might be defined as a sales call that obtained an order of a specific size. The QUIP method can determine the overall success rate (process capability) of the operation and identify any salesperson whose performance is statistically inferior to the success rate. In a similar way one can measure the number of orders received correctly by sales district versus those received incorrectly. Again a review can be made to determine if any salesperson is statistically beyond the performance capability of the group.

It should be noted that the performance capability of a group as a whole may not be a satisfactory one. If that is the case, the indication is that management action is required to make drastic changes with respect to training, operations, forms, product or any of a number of factors that can adversely influence the system.

The coming decade will see more and more emphasis on total quality control as a means of operating at maximum efficiency in our economy. Total quality control should not be confined to the manufacturing area but should be expanded to the service component of manufacturing that exists in every industry. W. Edwards Deming pointed out in his recent book that many of the problems of poor quality originate with management and staff areas such as purchasing, design, etc. The time has come to introduce to all of these areas the same disciplines that have made manufacturing in the US some of the best in the world.

Note: In the "F" example, there are six F's in the sentence.

For a copy of the Quality Improvement Program (QUIP), enter number 503 on reader information card.