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QUALITY AND QUANTITY GOALS IN SERVICE INDUSTRIES: COMPATIBLE OR CONFLICTING STRATEGIES?

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Although the traditional belief has been that a tradeoff or negative relationship exists between quality and quantity, companies in the manufacturing industry have recently been successful in pursuing both goals simultaneously. This exploratory study was performed to determine whether these two goals (quality and productivity) are compatible within the context of a service industry. As a representative of the service sector, the authors examined the relationship between productivity figures and quality rates of claim processors within a medical insurance company.

Data collected from the computerized work measurement system revealed a slight, but significant positive relationship between quality and productivity. This existence of this positive relationship contradicted the popular belief that a tradeoff exists between these two variables. Just as manufacturing-industry companies have discovered, service-industry companies (such as this medical insurance company) can simultaneously pursue compatible, not conflicting, goals of quality and quantity.

Background

With the onset of the Industrial Revolution, quantity goals became the focus of managers as they strived for ever-increasing levels of production, often at the expense of quality. To remain viable among competitors, management found it necessary to increase output, thereby reducing costs to maintain competitive prices. However, in today's global competitive market, increased production alone is no longer sufficient to insure financial success. Managerial objectives have evolved from a single goal of increasing productivity (or quantity) to a combination goal of improving both quantity and quality.

Methodology

The goal of this study is to determine whether a significant relationship exists between productivity and quality in service industries. To address this research question, data were gathered for a group of claims processors in a major medical insurance company located in the southeastern United States. Quality and productivity data were subjected to biva-

riate regression analysis in order to determine the strength of the relationship between the two variables. The Pearson product-moment correlation coefficient (r) and the coefficient of determination (r^2) were used to identify the direction and strength of the relationship.

The correlation coefficient and the coefficient of determination were used to evaluate the relationship between the independent variables and productivity and to show how well a claims processor's quality rating explains her productivity rating. Analysis of variance and the t-test were used to evaluate the homogeneity of the population of claims processors with respect to quality and productivity ratings.

Data were available on 235 claims processors. These processors worked in 23 different sections and all used the same computer system to process claims (or performing the necessary procedures to pay, deny payment, or suspend a claim). All processors were female, had received equal training, and held similar job titles. They could be divided into two groups: those who process claims from only one company (single coverage) and those who process claims from different companies (multiple coverages).

The following confounding or nuisance variables which could produce undesired sources of variation that may affect the dependent variable were identified: (1) the subject's length of employment with the company; (2) the subject's work section; (3) single-coverage versus multiple-coverage processing; (4) the subject's absence rate; and (5) the month of the year. Because any of these variables could have an effect on productivity equal to or greater than the effect of quality, subjects that had similar standings on the the nuisance variables were chosen.

The instrument used to collect the data was a company-established system which calculated employee productivity and quality. The company began measuring productivity in 1980 when it purchased a commercially-available work measurement program—a program currently used by many other companies in the insurance industry. The basic measurement defines productivity as predetermined standard hours divided by actual hours. An example of the productivity computation is shown in Figure 1.

Figure 1
Productivity Computations

Actual hours = PH - (NPH + SAH + UAH + TAH + UH)

Where: PH = Paid hours

NPH = Non productive hours (employee available for work, but no work available)

SAH = Scheduled absence hours (planned or approved)

UAH = Unscheduled absence hours (not planned or approved)

TAH = Training or administrative hours (time in which processor is being trained or is performing activities to accomplish day-to-day department activities)

UH = Unmeasured hours (time for which standard hours have not been established)

If a claims processor generated 80 standard hours of work in 75 actual hours, productivity would be 1.067 computed as:

$$\text{Productivity} = 80/75 = 1.067$$

Quality is defined as the percentage of total claims processed and paid correctly without dollar errors divided by the number of claims paid.

The company's quality control program, established in 1982, randomly selects 4 claims per day (or approximately 80 claims per month, depending on the number of days worked) for each processor. Then the company's quality control staff reviews the claims to detect dollar errors. If, from a monthly sample of 72 claims, a processor has 2 dollar errors, the employee's quality rating would be 97.2 percent.

Productivity figures are generated and distributed bi-weekly, while quality ratings are generated and distributed monthly. For this study, the bi-weekly productivity ratings were combined into a monthly figure. Recognition is given to the "Department of the Month" with the highest productivity that meets a minimum quality performance level. Individual employees are recognized for quality ratings if their work meets minimum productivity levels.

Reliability of the productivity and quality measure should be high since sources of error for productivity measurement would be limited only to incorrect allocation of hours and miscounting of claims processed. Because the measurement system has been in effect over nine years, giving employees and management extensive experience in reporting these data, it was determined that the tracking of time and claims was accurate. Sources of error in the quality measure would be limited to miscounting claims or to mistakes in the review process. Support for the validity of the productivity and quality measures is based on their wide use within the insurance industry.

The data for this study were compiled from various computer-prepared reports produced by the insurance company. For each claims processor, monthly productivity, quality, and absence rate measurements covering the one year period were collected, along with data on the number of months they had worked at the company, the section where they worked, and whether they processed claims from only one client company (single coverage) or several client companies (multiple coverages).

Bivariate regressions between quality and productivity were performed for each month for each employee. The number of cases available for this analysis was 107, as data were not available for every month for every employee.

As a second step for determining whether or not productivity and quality were correlated, a correlation analysis was performed on the entire data set. For this latter analysis, the monthly records of each employee for the entire year were used to represent a case. This produced 2,585 separate combinations of productivity, quality, absence rate, work section, coverage type, and length of employment for the 235 employees. Of these 2,585 cases, 1,727 had non-missing values for all of the variables.

Next, a multiple regression analysis was performed on the entire data set. The dependent variable productivity was regressed against the independent variables quality, absence rate, work section, coverage type, and the length of employment. A total of 1,882 cases was used in the regression.

To investigate the effect of coverage type, the data were divided into two groups: employees who process single coverages and those who process multiple coverages.

T-tests were performed to determine if the differences between the mean productivity and quality ratings for the two groups were significant.

In order to investigate the effect of length of employment on productivity, a oneway

analysis of variance was conducted, with employees divided into five employment categories:

- (1) 0 to 20 months' employment, (2) 21 to 40 months' employment, (3) 41 to 60 months' employment (4) 61 to 80 months' employment (5) more than 81 months' employment

Results

Table 1 shows the coefficients of correlation and their associated F values. The correlation coefficients are assigned significantly different from zero for seven of the eleven months for which data were available.

Table 1
Summary of Monthly Correlation Coefficients
 From Bivariate Regression Between Quality and Productivity by Month

<u>Month</u>	<u>Correlation Coefficient</u>	<u>F Value</u>
February	.2807	8.978*
March	.1600	2.758
April	.1358	1.972
May	.2579	7.483*
June	.1513	2.461
July	.1572	2.661
August	.3745	17.133*
September	.3779	17.492*
October	.1950	4.149*
November	.2354	6.159*
December	.1996	4.354*

* The months where the correlation coefficients are significant Critical $F_{1,105} = 3.950$

The correlation coefficient for the correlation analysis was +0.881 (significant at $p < .0001$) indicating the existence of a positive correlation between productivity and quality.

In the multiple regression analysis the predominate independent variable was quality, followed by coverage type and length of employment (significant at $p < .0001$). However, the employee's absence rate and work section were not significant and were therefore excluded from the next analysis. Using a multiple regression analysis (which included only quality, coverage type, and length of employment) revealed that the relationships were significant. The correlation coefficient for this analysis was +0.2363 indicating that productivity was positively correlated with the independent variables.

The t -tests showed that the productivity ratings differed significantly ($p < .0001$) for

employees processing single versus multiple coverages; however, the quality ratings did not significantly differ between the same groups.

The results of the analysis of variance indicated that the productivity ratings of employees varied with their lengths of employment. Interestingly, the mean productivity increased after 20 months' employment but then decreased for the group of employees who had worked for the company for more than 81 months.

Conclusions

Based on statistical analysis of data collected from a major medical insurance company's computer-based work measurement system, a positive relationship between productivity and quality was found to be significant at the 95% confidence level. The relationship was significant, but only 3.54% of the variation in productivity could be explained by the variation in quality. Even when the additional significant independent variables for which data were available (coverage type and length of employment) were used in a regression analysis, only 5.58% of the variation in productivity could be explained.

This existence of a positive relationship between quality and productivity in the service industry contradicts popular belief that quality and productivity are conflicting goals. The implications of these results are that acceptable levels of both productivity and quality can be maintained and that an increase in quality can have an associated improvement in productivity. While the generalizability of these results is limited, it does provide an impetus for additional studies using more rigorous research designs.