



## THE DECLINING NEED FOR TRADITIONAL PERFORMANCE MEASURES IN JIT PRACTICES

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### Abstract

This paper presents the results of an empirical study investigating various performance measures that are being used to support practices related to JIT. Using canonical correlation analysis we tested a multivariate relationship between these performance measures and the practices. Our findings indicate that manufacturers' efforts to focus more on these practices affected the way they measured their operations' performance. Firms with a higher level of emphasis on JIT practices were found to focus less on traditional financial measures and more on contemporary or non-traditional measures.

### The Declining Need for Traditional Performance Measures in JIT Practices

#### Introduction

The success of Japanese companies in becoming world class manufacturers has inspired manufacturers all over the world to adapt and emulate many of the Japanese management philosophies. One critical ingredient that distinguishes these philosophies from ones that were used in the past is the increasing focus by manufacturers on the manufacturing *processes* instead of the manufacturing *results*. The argument is that a result-oriented focus is probably suitable for *mass production* manufacturers but surely not for *mass customization* manufacturers. Unlike in mass customization, mass production system products are produced with the primary goal of minimizing operating costs with little focus on other performance indicators. It is a well-known fact that in a mass production system, operating performance is evaluated based on measures generated from traditional cost-based accounting data. These measures stress the importance of evaluating and monitoring the *end-results* of the system instead of the performance of the activities *in* the system. Consequently, other critical measures that could be used to reflect the overall system performance are generally ignored (Fry and Cox, 1989; Kaplan, 1990). Srikanth (1992) wrote, "After 15 years of studying productivity problems in dozens of companies, I have concluded that in most companies at any given moment, employees are working on the wrong task. The real problem is that workers think that they are working on the right task. Traditional measures create this problem." (Srikanth, 1992; 49). Articles written by Kaplan (1990,

1/1993,9/1993), Maskell (1991), Plenert (1995), Hayes (1986), Fry (1992), Dhavale (1996), and Skinner (1969), also support this argument. These authors proposed new performance measures that should be used to reflect how a system is truly operated and to supplement or replace some of the traditional cost-based performance measures.

This paper presents the results of a study examining the degree to which manufacturing firms use various performance measures and how the utilization of these measures relates to the firms' manufacturing practices. The focal point of the study was to investigate the firms' awareness of the need for them to use new contemporary performance measures in supporting the new manufacturing environment. Our investigation focuses on identifying the level of emphasis given by these companies towards various performance measures relative to the emphasis given to the level of JIT practices.

### **Issues in Performance Measures**

In recent years, traditional cost accounting measures have been criticized for their inadequacy in providing performance indicators that can clearly help a company achieve its ultimate goal. The measures are known to sometimes produce conflicting and misleading information that could undermine the achievement of a company's strategic objectives. Srikanth (1992) wrote:

“Performance measures are the key element in determining whether or not an improvement effort will succeed. The reason is simple: The actions of individuals in manufacturing are driven by the measures used to evaluate performance. If traditional performance measures conflict with improvement ideas -- and they often do -- the measures inevitably will inhibit improvement.” (Srikanth, 1992; 49)

According to a survey, conducted by the National Association of Accountants (NAA) and Computer-Aided Manufacturing-International (CAM-I), 60 percent of all the executives polled expressed dissatisfaction with their firms' performance measurement systems and about 80 percent of these executives were from the electronics industry (Dixon, et al, 1990).

Most traditional cost based measures were designed around the turn of the century, with the main purpose of providing information useful in evaluating the operating performance of mass production companies, which were prevalent during that era. The measures had their origins in the scientific management movement of 80 to 100 years ago (Kaplan 1990). That environment featured mass production of standardized products with the sole purpose of minimizing cost. However, today's manufacturing environment has significantly changed as a result of the increasing global competition and technological improvement. Cost minimization is no longer the only factor that is in the minds of CEOs and managers. Quality, flexibility, time, innovation, and customer service are increasingly becoming major issues for today's businesses. Countless articles and books have been written suggesting new performance measures that should be used either to complement, or to replace the old, cost-based measures. However, the question is how have manufacturers adjusted their performance measures in response to new manufacturing approaches?

## Performance Measurement and Just-In-Time

Some of the known critical elements in assuring a successful JIT implementation are top management commitment, employee involvement, supportive organization culture, training, time, and capital investment. However, many have suggested that the lack of an appropriate performance measurement system could also impede a successful JIT implementation. The argument is that many performance measures, which are mostly based on traditional cost accounting, are inappropriate for today's JIT environment. The performance measures would mostly produce irrelevant or outdated feedback for the workers to use to improve their performances. Although some financial measures are still needed for reporting and certain improvement purposes, there are obviously many that should be eliminated. These measures include direct labor efficiency, labor and machine utilization, labor productivity, and labor and overhead variances. These measures emphasize performance to a standard and encourage over-production. For example, utilization is a measure used as a means to maximize output from any one machine or one worker. This type of measurement contradicts the JIT principle that requires small batches, level production, pull not push, and producing only what is immediately needed, no more and no less. Another example is efficiency, which measures the performance of a worker by measuring how busy the worker is, while at the same time the worker is required to produce only what is needed to meet the JIT production requirement (Schneider and Leatherman, 1992). As a result, workers are being penalized for producing only on demand even though they might use the non-production time to make quality and productivity improvements.

Lummus and Duclos (1992) argued that a company should not claim itself a complete JIT company if it continues to use traditional methods of measuring efficiency and productivity. "Companies may claim to be practicing JIT but continue to use employee efficiency measures as indicators of performance. If these are the measurements reported, the firm has not completely converted to the JIT philosophy." (Lummus and Duclos, 1992; 64)

Dugdale and Shrimpton (1990), Holbrook (1985), and Maskell (1986) argued that traditional cost accounting measures, especially the ones used to gauge shop floor performance, may lead to decisions conflicting with the JIT goal. Green et al. (1991) assert that traditional cost accounting tends to impair JIT implementation since the features of cost accounting measures rely on standards, emphasize variances and efficiencies, and are preoccupied with direct labor.

The decreasing labor content in almost any product in the market today can also be used to justify the declining need for measurements that focus on labor cost and the related standards. While in the past labor content contributed significantly to the final cost of a finished product, the improved manufacturing technology in today's environment has resulted in lower percentage of labor cost in the final product. In fact, labor content in some manufacturing firms is now less than 2% of product cost, making labor standards virtually meaningless (Green et al., 1991).

"In a JIT environment any system for measuring performance must be designed to reflect the new production philosophy. Such a system should be capable of measuring and reporting progress toward total quality control, reducing inventory levels, faster setup times, reduced lead time, and new product launch

times. Equally important would be measures indicating improvement in on-time deliveries, floor space utilization, and quality yield. . . . Such a system may require the elimination of some traditional short-term financial measures and include some new, more relevant non-financial measures of performance.” (Green et al., 1991; 52)

Some authors propose the use of specific performance measures to support individual JIT practices. For example, Dhavale (1996) suggests performance measures for cellular manufacturing and focused factory systems and Convey (1994) suggests a performance measurement system in cross-functional teams. Hendricks (1994) and Mc Nair et al. (1990), on the other hand, suggest new performance measures that could be used to support the entire JIT system. These authors also suggest that the performance measures must be linked to the companies' critical success factors, strategy, and corporate mission.

Utilizing the appropriate performance measures is critical to any JIT firm. Without the proper measures, JIT will fail to perform to its fullest potential. Maskell (1991) suggests that a performance measurement system is best changed at the initial stage of JIT implementation or introduced as part of JIT philosophy to reduce the possibility of employee resistance to these new performance measures. This suggestion may lead us to conclude that an improved performance measurement system should be considered a significant element of JIT implementation.

### **Significance of The Study**

So far, very few studies have been carried out to investigate the relationship between performance measurement systems and the new manufacturing environment. However, the few studies that we found that investigated this relationship were mostly limited to case studies and were not comprehensive enough to explain the general relationship between the performance system and the JIT practices. Furthermore, they did not consider the performance measurement system as a significant element of JIT implementation. Therefore, we believe that a more comprehensive study on the relationship between performance measurement and JIT implementation should be done in order to raise the awareness among managers and firms as to the importance of having the appropriate performance measures to support their new manufacturing environments.

### **Method**

A questionnaire, divided into two parts (see Appendix A), was designed to measure the variables in this study. The first part consists of requests for information related to the respondent's level of emphasis given to certain JIT practices. The questions measure the levels of JIT implementation with the assumption that more emphasis given on these practices would mean a higher degree of JIT implementation. This assumption is based on the fact that JIT is a never-ending, on-going process, and is implemented mainly on the basis of continuous improvement philosophy. Therefore, the degree of its implementation is very subjective. No one company could stop at any given time and claims that it has successfully implemented the

philosophy. One way for us to measure the degree of its implementation is to measure the level of emphasis given to the related practices.

The second part of the questionnaire is adopted and modified from “Performance Measurement Questionnaires” (PMQ), which was developed by Dixon et al. (1990) based on part of a research project investigating manufacturing performance measurement conducted by Boston University Manufacturing Roundtable. In this part of the questionnaire, respondents were asked to state their perceived level of importance for each performance factor and the level of emphasis given by the company to this factor. PMQ was initially used by Dixon et al. to examine an individual company’s performance measures and their relationship with the improvement areas the company was focusing on. It provides “a means by which an organization can articulate its improvement needs, determine the extent to which its existing set of measurements is supportive of the necessary improvements.” (Dixon et al., 1990; 67). The authors claimed that PMQ “really worked” and had been used in many manufacturing situations and applied in marketing, logistics, service, and other contexts. Schmenner and Vollman (1993, cited in Vollman, 1994), also used the instrument in their survey of 92 firms to observe the generality of the instrument in different industries. The survey reported similar findings across the industries, suggesting elimination of many traditional cost based measures.

**Table 1.** Performance Measures and Their Categories.

<u>Category</u>	<u>Performance measure</u>
Quality	Conformance to specifications Cost of quality Vendor quality Sales forecast accuracy Record accuracy Number of suppliers Yields
Time	Manufacturing lead times Vendor lead times Changeover/setup times Meeting project milestones
Flexibility	Number of engineering changes Number of materials part numbers New product introduction New model introduction New process/equipment introduction
Delivery/Customer Service	Meeting production schedules On-time delivery Customer surveys
Social/ Environmental	Education/training budgets Safety Minimizing environmental waste Environmental monitoring

Cost/Financial and Traditional	Inventory turnover Cost-reduction: dollar savings Dollars of capital investment Process R&D costs Product R&D costs Dollar shipments per period Unit material costs Unit labor costs Unit overhead costs Margins (Contribution/Gross) Return on investment Capacity utilization Department budget control
Obsolete	Indirect labor productivity Direct labor productivity
Variances	Labor Efficiency Machine Efficiency

In addition to these 39 performance measures, we included two measures, labor efficiency and machine efficiency, which we think are becoming obsolete and clearly not suitable for the manufacturing firms in the JIT environment. Based on numerous articles, such as Maskell (1989), Hendrick (1994), and Neely et al. (1995), we were able to categorize these performance measures into seven categories. The categories and their corresponding performance measures are listed in Table 1.

Based on surveys done by Schmenner and Vollmann (1993) and Dixon et al. (1990) with the instrument, all performance measures in the first five categories can be considered new to some manufacturers. The sixth category can be classified as a combination of new and traditional cost-based measures. The last category, however, consists of those measures that are becoming obsolete and no longer suitable in a JIT environment. We named this group the obsolete performance measures.

Participants for this study were regional APICS (American Production and Inventory Control Society) members working in the manufacturing environment. Their names and addresses were obtained through APICS headquarters. This population was chosen because most of the subjects were believed to have in recent years participated in some form of JIT implementation and to have observed the benefits and pitfalls of such implementations. Out of 500 questionnaires sent out to the chosen sample, 86 were returned and used in the analysis, giving us a response rate of 17.2 percent.

Factor analysis was initially performed on JIT practices so that they could be grouped into a few meaningful constructs. Although previous articles (i.e Mehra & Inman, (1992), Ramarapu et. al. (1995)) have suggested some forms of grouping for these practices, the constructs suggested in these two articles differ from each other. Therefore, we believe a new factor analysis has to be performed with our data set. The first step in a factor analysis is to run a principal-component

analysis to determine the number of factors adequately account for observed correlation. Using the criteria of eigenvalue greater than 1, three factors were extracted. Next, the orthogonal rotational approach was used to obtain theoretically meaningful factors and the simplest possible structure. There are several different approaches available for performing orthogonal rotation. We chose to use Quartimax rotation in simplifying the rows of a factor matrix because Quartimax focuses on rotating the initial factor so that a variable loads high on one factor and as low as possible on other factors. The rotation converged in 5 iterations. The factor loadings of the items were between .45 and 0.81, which are considered significant enough in interpreting the matrix. “In short, factor loadings greater than +0.30 are considered significant; loadings of +0.40 are considered more important; and if the loadings are +0.50 or greater, they are considered very significant . . . this guideline is very useful when the sample size is 50 or larger.” (Hair, 1992; 239)

Based on the computed factor loadings, we classified Factor 1 as Production Strategy, Factor 2 as Supplier/Vendor Strategy, and Factor 3 as EDI (Electronic Data Interchange). The results of this analysis are presented in Table 2. The names of these factors were assigned based on our earlier prediction of the model and what has been suggested from the previous literature. We also employed Kaiser-Meyer-Olkin’s measure to evaluate the fit of the model. The resulting measure of sampling adequacy was .80240.

Based on the results of our factor analysis, a reliability analysis was performed to justify the consistency of the items in each factor. This analysis is called Internal-Consistency Analysis and the reliability coefficient, which measures the degree of internal consistency for each factor, was estimated using Cronbach’s alpha. The analysis was carried out separately for each of the three factors using SPSS reliability program (see Table 3). The table shows that the reliability coefficients are above 0.81, indicating that the scales developed were reliable enough to derive the model configuration. Typically, reliability coefficients of 0.70 or more are considered adequate (Nunnally, 1967).

### **Relationship Between JIT Elements and Performance Measures**

The relationship between the degree of JIT implementation and the various performance measures emphasized by the firms was analyzed using canonical correlation analysis. Our intention was to show that a higher level of JIT implementation would force a firm to give greater emphasis to the new performance measures than the cost/traditional performance measures.

Using canonical correlation analysis we were hoping that the data collected would support the hypothesis,

H<sub>a</sub>: companies with a higher level of JIT implementation put greater emphasis on the new, non-traditional, performance measures than companies with lower a level of JIT implementation.

Canonical correlation analysis is usually used to analyze the relationship between several predictor variables (the independent variables) and several criterion variables (the dependent variables). Since we are looking at several items in each variable (the JIT element and

Performance measure), the use of ordinary correlation analysis or regression analysis may not be appropriate. Performing separate multiple regression analyses, one for each of the criterion variables, is also not recommended because “. . . it defeats the purpose of having multiple criterion measures, since the information provided by the interrelationship among the criterion variables is not taken into account.” (Dillon & Goldstein, 1987; 339)

In the canonical correlation analysis, JIT elements were considered the criterion variables and the performance measures the predictor variables. The strength of association between each set of predictor variables and the criterion variables was assessed by inspecting the magnitudes of both the canonical correlation and the redundancy index. In this analysis we had to determine a linear combination of the predictor variables that maximally correlated with a linear combination of the criterion variables. Variates were then computed from both sets of variables. A variate is similar to a dimension or factor in a principal components analysis. However, a variate consists of a maximally correlated predictor and a criterion part. The maximum number of variates that can be extracted is the minimum number between the number of predictor and criterion variables. In our analysis the maximum number of variates was three (the number of predictor variables), which corresponds to three canonical correlation coefficients possible. However, each coefficient had to be tested for its significance in explaining the relationship.

**Table 2:** Factor Loadings of JIT elements with their corresponding factors

<b>JIT elements</b>	<b>Derived Factors</b>		
	<b>(1) Production Strategy</b>	<b>(2) Supplier/Vendor Strategy</b>	<b>(3) EDI</b>
Set-up Time Reduction	.5136		
In-House Lot Sizes	.4766		
Group Technology	.6531		
Cross-Training	.7622		
Preventive Maintenance	.6982		
Uniform Flow Loading	.5121		
Statistical Process Control	.6860		
Focus Factory	.7249		
Employee Involvement	.8146		
Employee Empowerment	.7600		
Jidoka	.5777		
Improved Performance Measurement	.4866		
Work Team	.7776		
Vendor Lot Sizes		.6038	
Reduction on Number of Suppliers		.7195	
Vendor Lead Time Reduction		.6387	
Quality Certification of suppliers		.7210	
Kanban		.5364	
Long Term Supplier Agreement		.6880	



Supplier Development Program		.7985	
EDI with Suppliers			.4531
EDI with Distributors			.6150
Eigenvalues	8.972	2.224	1.563
Percent of Total Variation	40.8	10.1	7.1

**Table 3:** Internal consistency results for the critical factors of JIT elements

Critical Factors of JIT elements	Number of Items	Cronbach=s Alpha
Production Strategy	13	.9014
Supplier/Vendor Strategy	7	.8461
EDI	2	.8140

To test the statistical significance of the canonical correlation in the level of JIT factors relative to the level of performance measures used, we analyzed each of the canonical variates one at a time. Using SPSS Manova program for canonical correlation analysis, Wilks lambda was calculated, giving us a value of 0.333 with the Bartlett's approximation of 87.40. This is greater than  $\chi_{.05}^2,_{21} = 32.6706$  and we can conclude that the null hypothesis should be rejected and that the correlation was significant at the 0.05 level. After this conclusion, the remaining canonical variates were tested after the first significant variate was removed from the model. This procedure was repeated until each significant variate was removed. This procedure, which is called dimension reduction analysis, resulted to two significant canonical variates.

**Table 4:** Results of canonical correlation analysis between JIT elements and seven dimensions of performance measures (firm's emphasis).

Predictor Variables	Canonical loadings	
	Variate 1	Variate 2
Quality	.868	.288
Time	.816	.023
Flexibility	.672	-.533
Customer	.693	-.163
Social	.792	.318
Cost/Accounting or Financial	.673	-.158
Obsolete	.475	.050
% Explained Variations	29.096	1.334
<b>Criterion Variables</b>		
Production Strategy	.989	.149
Vendor/Supplier Strategy	.723	.655

EDI	.502	-.392
% Explained Variations	58.442	20.442
Canonical Correlation Coefficients	.746	.422
Redundancy index	.326	.036
$X^2$	87.40	23.00
d.f	21	12
$P(X^2)$	<0.0001	0.039

The canonical loadings of the variables with the two significant canonical variates are presented in Table 4. The test statistics  $X^2$  for the two significant variates are 87.40 and 23.00, which are significant at less than 0.0001 and 0.039 respectively. This shows that the predictor variables are significantly related to the criterion variables. From the table we can also see that the two canonical correlation coefficients, 0.746 for variate 1 and 0.422 for variate 2 are quite large, which means that the canonical variate pairs are highly associated. These two variates are associated with Production strategy and Vendor/Supplier strategy. This conclusion is established from the Roy-Bargman Stepdown F-Test, which indicates that only two variates associated with Production Strategy and Vendor/Supplier strategy were significant at 0.05 level. From variate 1, we can conclude firms that put greater emphasis on the first six groups of performance measures are also the ones having higher levels of JIT implementation. The last group of performance measures (the obsolete performance measures) does not seem to significantly contribute to the correlation pair since it has the lowest canonical loading. From this value we can conclude that these performance measures are perceived as less important by the firms with higher levels of JIT implementation. Variate 2 shows that a higher level of flexibility resulted in a higher level of Vendor/Supplier strategy. The third JIT factor (EDI) was found insignificant in the canonical correlation analysis.

### Conclusion

This study has shown that the importance of the five traditional performance measures, indirect labor productivity, direct labor productivity, variances, labor efficiency, and machine efficiency is decreasing as manufacturers increase their emphasis on JIT practices. Unfortunately, we were unable to show a negative relationship between the level of JIT implementation and the level of emphasis given to this group of performance measures. However, the group's low canonical loading indicates that as more emphasis is given to JIT practices, the need for these performance measures relative to the other non-traditional performance measures is decreasing. The result of this analysis also shows that firms are beginning to realize the importance of non-financial operating measures and are placing greater emphasis on these measures in their daily operations.

This conclusion supports the assertion that in order for a JIT company to realize its real performance and competitive effectiveness, performance measures have to change in order to support the JIT effort. The measures must be developed to accurately reflect manufacturing performance and used with the purpose of helping workers and managers to continuously improve. Although the number of companies that are aware of this requirement is increasing,

there may be many that are still heavily dependent on the old traditional performance measures to manage their daily operations. We believe some of the companies may be unaware of the need to use the appropriate performance measures in running an effective production system. Furthermore, the managerial accounting courses that are currently being taught in colleges and universities across the country, must properly address the new performance measures required by the new manufacturing Philosophies.

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# Appendix A

## PART I Manufacturing Practice Items

Practice/Improvement area	Companies Emphasis On the Item									
	None	>>>>>>>	Major							
SET-UP TIME REDUCTION	1	2	3	4	5	6	7	N/A		
IN-HOUSE LOT SIZES	1	2	3	4	5	6	7	N/A		
GROUP TECHNOLOGY	1	2	3	4	5	6	7	N/A		
CROSS-TRAINING	1	2	3	4	5	6	7	N/A		
PREVENTIVE MAINTENANCE	1	2	3	4	5	6	7	N/A		
VENDOR LOT SIZES	1	2	3	4	5	6	7	N/A		
REDUCTION ON THE NUMBER OF SUPPLIERS	1	2	3	4	5	6	7	N/A		
VENDOR LEAD TIME REDUCTION	1	2	3	4	5	6	7	N/A		
QUALITY CERTIFICATION OF SUPPLIERS			1	2	3	4	5	6	7	N/A
KANBAN	1	2	3	4	5	6	7	N/A		
UNIFORM FLOW LOADING	1	2	3	4	5	6	7	N/A		
SPC	1	2	3	4	5	6	7	N/A		
FOCUS FACTORY	1	2	3	4	5	6	7	N/A		
EMPLOYEE INVOLVEMENT	1	2	3	4	5	6	7	N/A		
EMPLOYEE EMPOWERMENT	1	2	3	4	5	6	7	N/A		
JIDOKA (QUALITY AT THE SOURCE)	1	2	3	4	5	6	7	N/A		
LONG TERM SUPPLIER AGREEMENT	1	2	3	4	5	6	7	N/A		
SUPPLIER DEVELOPMENT PROGRAM	1	2	3	4	5	6	7	N/A		
IMPROVED PERFORMANCE MEASUREMENT	1	2	3	4	5	6	7	N/A		
WORK TEAMS	1	2	3	4	5	6	7	N/A		
EDI W/SUPPLIER	1	2	3	4	5	6	7	N/A		
EDI W/DISTRIBUTOR	1	2	3	4	5	6	7	N/A		

## PART II Performance Factors Items

Performance factors	Companies Emphasis On Measurement									
	None	>>>>>>>	Major							
INVENTORY TURNOVER	1	2	3	4	5	6	7	N/A		
CONFORMANCE TO SPECIFICATIONS	1	2	3	4	5	6	7	N/A		
COST OF QUALITY	1	2	3	4	5	6	7	N/A		
MANUFACTURING LEAD TIMES			1	2	3	4	5	6	7	N/A
VENDOR QUALITY	1	2	3	4	5	6	7	N/A		
VENDOR LEAD TIMES	1	2	3	4	5	6	7	N/A		
DIRECT LABOR PRODUCTIVITY			1	2	3	4	5	6	7	N/A
INDIRECT LABOR PRODUCTIVITY	1	2	3	4	5	6	7	N/A		
CHANGEOVER/SETUP TIMES	1	2	3	4	5	6	7	N/A		
SALES FORECAST ACCURACY	1	2	3	4	5	6	7	N/A		
NUMBER OF ENGINEERING CHANGES	1	2	3	4	5	6	7	N/A		
EDUCATION/TRAINING BUDGETS	1	2	3	4	5	6	7	N/A		
RECORD ACCURACY	1	2	3	4	5	6	7	N/A		
ON-TIME DELIVERY	1	2	3	4	5	6	7	N/A		
CUSTOMER SURVEYS	1	2	3	4	5	6	7	N/A		
NUMBER OF SUPPLIERS			1	2	3	4	5	6	7	N/A
NUMBER OF MATERIALS PART NUMBERS	1	2	3	4	5	6	7	N/A		

CAPACITY UTILIZATION	1	2	3	4	5	6	7	N/A		
MEETING PRODUCTION SCHEDULES	1	2	3	4	5	6	7	N/A		
COST-REDUCTION:DOLLAR SAVINGS	1	2	3	4	5	6	7	N/A		
DOLLARS OF CAPITAL INVESTMENT	1	2	3	4	5	6	7	N/A		
PROCESS R&D COSTS	1	2	3	4	5	6	7	N/A		
PRODUCT R&D COSTS	1	2	3	4	5	6	7	N/A		
SAFETY	1	2	3	4	5	6	7	N/A		
NEW PRODUCT INTRODUCTION			1	2	3	4	5	6	7	N/A
NEW MODEL INTRODUCTION	1	2	3	4	5	6	7	N/A		
DOLLAR SHIPMENTS PER PERIOD	1	2	3	4	5	6	7	N/A		
NEW PROCESS/EQUIPMENT INTRODUCTION	1	2	3	4	5	6	7	N/A		
UNIT MATERIAL COSTS			1	2	3	4	5	6	7	N/A
UNIT LABOR COSTS	1	2	3	4	5	6	7	N/A		
UNIT OVERHEAD COSTS			1	2	3	4	5	6	7	N/A
VARIANCES	1	2	3	4	5	6	7	N/A		
RETURN ON INVESTMENT	1	2	3	4	5	6	7	N/A		
MARGINS (CONTRIBUTION/GROSS)	1	2	3	4	5	6	7	N/A		
DEPARTMENT BUDGET CONTROL	1	2	3	4	5	6	7	N/A		
YIELDS	1	2	3	4	5	6	7	N/A		
MEETING PROJECT MILESTONES			1	2	3	4	5	6	7	N/A
MINIMIZING ENVIRONMENTAL WASTE			1	2	3	4	5	6	7	N/A
ENVIRONMENTAL MONITORING			1	2	3	4	5	6	7	N/A
LABOR EFFICIENCY	1	2	3	4	5	6	7	N/A		
MACHINE EFFICIENCY	1	2	3	4	5	6	7	N/A		
OTHER: _____	1	2	3	4	5	6	7	N/A		
OTHER: _____	1	2	3	4	5	6	7	N/A		
OTHER: _____	1	2	3	4	5	6	7	N/A		
OTHER: _____	1	2	3	4	5	6	7	N/A		