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MEASUREMENTOF PERFORMANCE USING OBJECTIVE MATRIX

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Some indicators as parameters to measure performance are commonly used by people. A measurement tool named Objective Matrix (OMAX) has some special advantage. It is more objective and representative to describe workers' performance based on numerous objective indicators and it can quickly obtain their positions (in below, standard, or can achieve their targets). It can quickly compare comprehensive worker performance because it is represented in a unity block/diagram. The purpose of this paper is to find out the application of performance measurement by OMAX for its technicians in a ready mix concrete company. Application of measurement was performed in a ready mix concrete company located in Bandung, Indonesia. A measurement has been done based on their performance indicators covering consistency to take numerous test specimens (effective indicator) and unconformity of concrete quality (quality indicator). The value was based on actual performance score multiplied by the percentage of each indicator's influence. Based on the research, the average score of drop quality were 16% and completeness of test specimens was 82 %. The best performance of workers to gather complete specimens was 98.3% and best performance for drop or rejects quality were 0%. The worst performance of drop or quality rejects was 24.14% and the worst performance of complete specimens was 74.69%. However, value was more than average, so their performance was sufficient.

Keywords: OMAX, Indicator, Value, Completeness of specimen, Drop of quality, Technician.

1 INTRODUCTION

Objective Matrix (OMAX) concept is the productivity measurement concept developed in company level, and was developed by James L. Riggs (1983) from Oregon State University. It can be developed to measure performance ratio. This model was based on Multi Criteria Performance / Productivity Measurement Technique or MCP/PMT (Nindyo *et al.* 1999). This technique (MCP/MTP) has been used at organization level (Phusavat 2004). However, some authors recommended in that performance, measurement was an effective and important way to support productivity improvements (Slack *et al*. 2001, Sumanth 1994, Drucker 1974, Tangen 2004).

Effective quality and efficiency can impact productivity; they are part of the basic performance criteria in which an organization needs to measure, analyze, and evaluate (Sink *et al.* 1989), as shown in Figure 1. They correlated that productivity was influenced from national to personal level (Kendrick 1993).

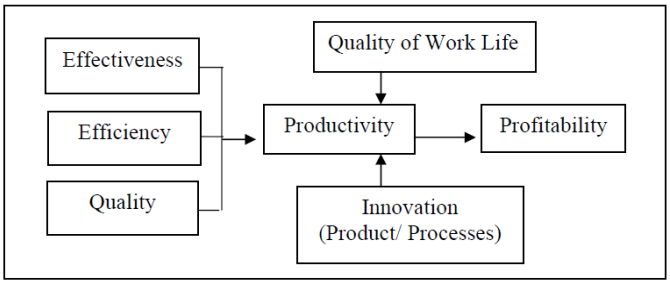


Figure 1. Correlation among performance (Sink *et al*. 1989).

OMAX measurement has performed to address the problems in measuring the performance of the human resources element in which the influence of human nature sometimes makes it difficult to take the measurement.

The purpose of this study is to:

- Introduce Objective Measurement Matrix in a ready mix concrete company.
- Apply Objective Matrix at the workers level (lab technicians) in a ready mix concrete company.
- Identify performance problem in that company

2 METHODS

In the preparation of OMAX, the role of all members of the company was measured; ranging from the lowest level of workers to top managers. Employee involvement is in providing information about the common value of the productivity achieved, while the involvement of top management is determining the goals and weighting each of productivity criteria.

The data was taken from a sample in a ready mix concrete company in Bandung, Indonesia through the creation of a sample of cube test specimen measuring 4 cm x 4 cm x 4 cm (according to the rules of a company's quality standards). Data was taken by purposive sampling method, using secondary and primer data. Primer data was obtained by survey, observations (discussion), and secondary data by historical report and documents of company. Determination of several performance indicators was performed based on management decisions.

The first indicator was related to effectiveness, in this case was analogous to consistency of completeness of test specimens as required. Sumanth (1994) stated that effectiveness was the degree of accomplished of objective and showed how well a set of result is successfully achieved. In practice, effectiveness was expressed as a ratio of actual output to expected output (Sink *et al.* 1989). The second parameter was drop of quality of numerous test specimens that did not meet the requirement after the tests were performed. The lab technician is responsible for the quality of concrete – to make mix design and manufacture of test specimens in the field.

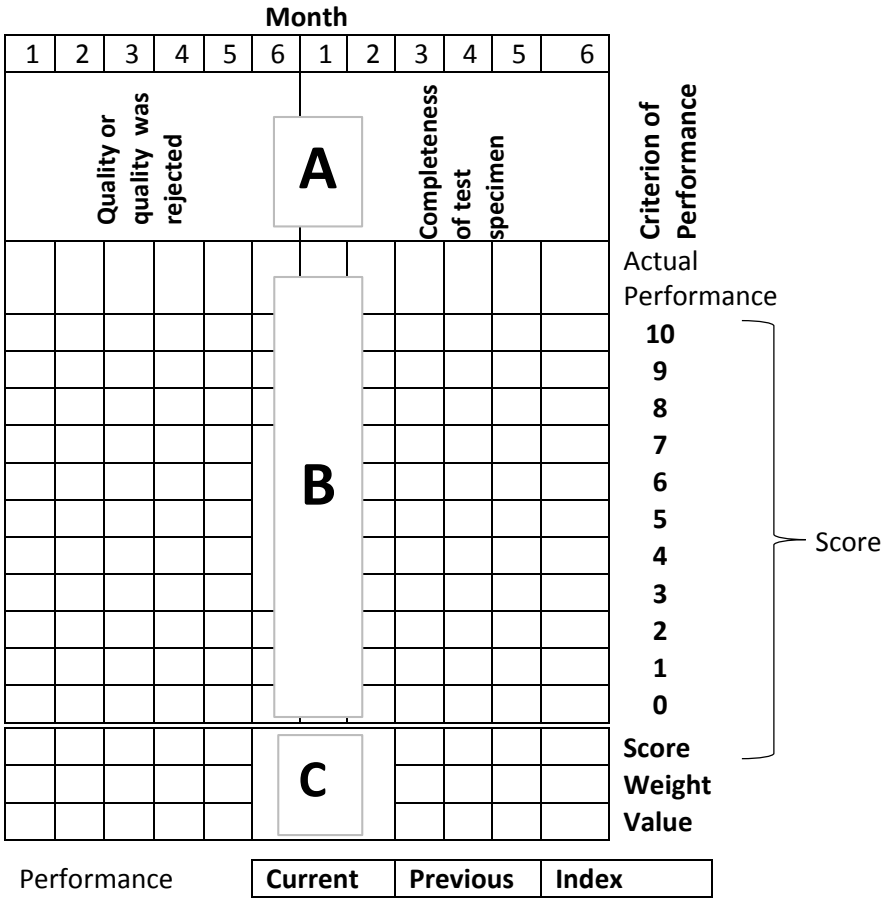


Figure 2. Objective Matrix.

Referring to Figure 2, we can divide the matrix into parts: A is the performance criteria and consists of indicators, B is actual performance and score, C is summary of performance that consists of score, weight, and value. Management has decided the weight of drop of quality was 55% and the weight of completeness of test specimen was 45%. Calculation of drop of quality and completeness (in %) based from this formula:

$$Number\ of\ Drop\ Quality\ = \frac{number\ of\ actual\ \ rejected\ quality}{number\ of\ actual\ test\ specimen\ had\ been\ made}\ \text{x}\ 100\% \quad (1)$$

and,

Number of completeness of test specimen =

$$\frac{Number\ of\ actual\ test\ specimen\ that\ had\ been\ made}{Number\ of\ test\ specimen\ that\ had\ been\ made\ as\ company\ standard}\ x\ 100\% (2)$$

Interpolation can be done between target and average performance; between average and the worst performance (Riggs 1983).

However, average performance for this paper was at a score of 5, slightly higher than the basic concept average, which was at score 3 (Riggs 1983). We can analyze more detail for the same range points between the highest score and average, between the average and the lowest score.

In Table 1, we can see the performance of workers: for the worst number of test specimens based on historical data was 66% and for number of rejected quality or drop was 24%. Average value for completeness of test specimen was 82% and the average value for rejected quality was 16% (at score 5). All calculation was based on formula in Eq. 1 and 2. Management can decided the worst performance based on last historical data. The average performance was determined based on actual data in the beginning of measurements. The maximum performance on maximum score was decided as a realistic target. Management also decided the weight of indicator of quality rejected as 55%; larger than the indicator of completeness of specimen (45%). Every worker (technician) has a measurement standard based on above matrix, and the positioning of actual performance score can be seen. Performance indicator can be calculated as seen in the formulas below:

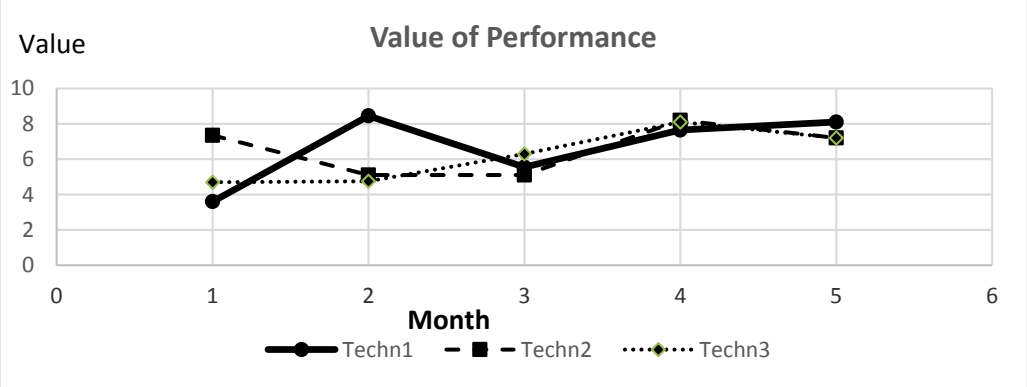
$$\text{Value} = \text{Score of Actual Performance x weight in \%} \tag{3}$$

$$\text{Performance Index} = \frac{Current\ Value - before\ value}{Before\ Value} \tag{4}$$

3 ANALYZE AND FINDING

Analysis was conducted by using complete data for technicians performance (see Table 1) based on Value (Eq. 3). In figure 3, the best performance was technician 1, because of his best performance at the end of measurement; his value performance has also increased. Technician 1 has decreased his performance from the 2nd month to 3rd month because of technical problem in field and the limitation to handle the manufacture of some test specimens for high quality concretes that have precise quality.

Figure 3. Performance value among technicians.



However, he has studied to improve his performance successfully. In Table 1 below, it can be found the performance index (see Eq. 4) for technician 1 has increased. All technicians had to be aware that rejected quality problem should be addressed, although score of rejected quality given was still in a tolerable limit (in Table 1, number of rejected quality for technician 3 increased from 2.7% to 3.2% but has got the same score at 9).

Table 1. OMAX for technicians,
Source: a Ready Mix Concrete Company data, in Bandung, Indonesia, 2006.

Technician Performance

	Month										
	1		**2**		**3**		**4**		**5**		
	Number of completeness of test specimen	Number of Rejected Quality (drop of quality)	Number of completeness of test specimen	Number of Rejected Quality (drop of quality)	Number of completeness of test specimen	Number of Rejected Quality (drop of quality)	Number of completeness of test specimen	Number of Rejected Quality (drop of quality)	Number of completeness of test specimen	Number of Rejected Quality (drop of quality)	
Techn1	**96.67%**	**24.14%**	**98,41%**	**4.84%**	**83%**	**12.50%**	**89.10%**	**0.80%**	**89.70%**	**1.30%**	**Act**
	8	**0**	**9**	**8**	**5**	**6**	**6**	**9**	7	9	Score
Techn2	**98.33%**	**11.86%**	**81.20%**	**10.53%**	**81%**	**11.60%**	**87.00%**	**0.00%**	**81.70%**	**2.00%**	**Actual**
	9	**6**	**4**	**6**	**4**	**6**	**6**	**10**	5	9	Score
Techn3	**94.74%**	**20.37%**	**74.69%**	**11.57%**	**75%**	**2.60%**	**89.70%**	**2.70%**	**82%**	**3.20%**	**Actual**
	8	**2**	**2**	**7**	**3**	**9**	**7**	**9**	***5***	9	***Score***
	100%	**0%**	**100%**	**0%**	**100%**	**0%**	**100%**	**0%**	**100%**	**0%**	**10**
	97.36%	3.20%	97.36%	3.20%	97.36%	3.20%	97.36%	3.20%	97.36%	3.20%	**9**
	93.52%	6.40%	93.52%	6.40%	93.52%	6.40%	93.52%	6.40%	93.52%	6.40%	**8**
	89.68%	9.60%	89.68%	9.60%	89.68%	9.60%	89.68%	9.60%	89.68%	9.60%	**7**
	85.84%	12.80%	85.84%	12.80%	85.84%	12.80%	85.84%	12.80%	85.84%	12.80%	**6**
	82.00%	**16.00%**	**82.00%**	**16.00%**	**82.00%**	**16.00%**	**82.00%**	**16.00%**	**82.00%**	**16.00%**	**5 Score**
	77.84%	17.60%	77.84%	17.60%	77.84%	17.60%	77.84%	17.60%	77.84%	17.60%	**4**
	74.88%	19.20%	74.88%	19.20%	74.88%	19.20%	74.88%	19.20%	74.88%	19.20%	**3**
	71.92%	20.80%	71.92%	20.80%	71.92%	20.80%	71.92%	20.80%	71.92%	20.80%	**2**
	68.96%	22.40%	68.96%	22.40%	68.96%	22.40%	68.96%	22.40%	68.96%	22.40%	**1**
	66%	***24.00%***	**66%**	**24%**	**66%**	**24%**	**66%**	**24%**	**66%**	**24%**	
	45	55	45	55	45	55	45	55	45	55	**Weight**
	1		**2**		**3**		**4**		**5**		
	360	0	405	440	225	330	270	495	315	495	**Sc x w**
Techn1	**3.6**		**8.45**		**5.55**		**7.65**		**8.1**		**Value**
			135%		-52%		38%		6%		**Index**
	405	330	180	330	180	330	270	550	225	495	**Sc x w**
Techn2	**7.35**		**5.1**		**5.1**		**8.2**		**7.2**		**Value**
			-31%		0%		61%		-12%		**Index**
	360	110	90	385	135	495	315	495	225	495	**Sc x w**
Techn3	**4.7**		**4.75**		**6.3**		**8.1**		**7.2**		**Value**
			1%		33%		29%		-11.11%		**Index**

4 CONCLUSIONS

Based on the analysis and findings, conclusions and recommendations are as follows:

1. OMAX described the detail performance of every worker, but this tool has given some tolerance limit about rejected quality at certain range.
2. Overall the performance of lab technicians was above average value, but all technicians had to be aware about rejected quality, especially for some high quality concrete specimens because it could influence for some customers. For this case, the rejected quality at certain range should be given more attention by applying a zero defect principle.
3. Performance Index has fluctuated; it was caused of technical problem in field and limitation of some workers to handle high quality concretes.
4. More intensive training and supervision are needed for technicians, so they could do their best work.

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