DEVELOPMENT OF A MODEL FOR MANAGEMENT OF PRODUCT QUALITY AND THE CERAMIC TILE PRODUCTION PROCESS

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1. INTRODUCTION

Ceramic tile, due to its characteristics, aesthetics, resistance and durability, is one of the elements used as a surface finish in civil construction. In order to satisfy the needs of the final consumer, the ceramic tile needs to have quality, and a range of measures have been taken in Brazil for the industry to deliver quality output.

The properties of ceramic tiles sold on the market should be in accordance with the specifications set by technical standards. Therefore, each company should determine the values and tolerances of the variables in the production process in accordance with working conditions and continually adjust them to ensure that the goods manufactured satisfy and maintain a specified level of quality through time.

2. METHODOLOGY

2.1. DEVELOPMENT OF THE MANAGEMENT MODEL

The management model considered for the manufacture of ceramic tiles is based on raw materials control, process control and control of the final product in order to guarantee merchandise which conforms to technical specifications and also satisfies the customer.

2.2. APPLICATION OF THE MODEL

This quality management model has been applied in four companies located in the state of São Paulo where 63.7% of Brazilian ceramic tile production was based in 2006.

2.2.1. Initial Evaluation

Table 1 shows the model implementation indices in the initial evaluation, carried out to determine the quality management practices in each company, which evidenced the existing differences. In company I compliance with the considered model was at 88.6% whereas it was 63.8% in company II; in company III it was 92.6% while in company IV it was 30.2%

INITIAL EVALUATION	**INDEX**			
Item	Company I	Company II	Company III	Company IV
1 Administration and general information	**100%**	50.0%	**100%**	37.5%
2 Installations	**100%**	60.0%	60.0%	60%
3 Reception and inspection of raw materials	**100%**	57.1%	85.7%	28.6%
4 Production	85.7%	73.2%	98.2%	37.5%
5 Quality control and inspection of final product	73.9%	65.2%	91.3%	21.7%
6 Storage and product dispatch	91.7%	66.7%	**100%**	33.3%
7 Client demands	**100%**	85.7%	**100%**	28.6%
8 Quality management	88.2%	35.3%	82.4%	5.9%
Total	**88.6%**	**63.8%**	**92.6%**	**30.2%**

Table 1. Implementation index of the quality management model in the initial evaluation

2.2.2. Final Evaluation

During the final evaluation of conformity to the considered model, company I obtained 96.6%, company II 96.0%, whereas in company III the final result was 98.0% and 90.6% in company IV.

The results obtained show that all companies increased their implementation index when the elements of the management model which were not being practised during the initial evaluation were applied. The most noteworthy improvements were observed to have taken place in the companies which had scored the worst during the initial evaluation, namely in company II where the percentage increased from 63.8% to 96.0% and company IV where a change from 30.2% to 90.6% occurred.

INITIAL EVALUATION	INDEX			
Item	Company I	Company II	Company III	Company IV
1 Administration and general information	**100%**	**100%**	**100%**	**100%**
2 Installations	**100%**	**100%**	**100%**	80%
3 Reception and inspection of materials	**100%**	**100%**	**100%**	**100%**
4 Production	95.6%	96.4%	98.2%	83.9%
5 Quality control and inspection of final product	91.3 %	91.3%	91.3%	82.6%
6 Storage and product dispatch	**100%**	**100%**	**100%**	91.7%
7 Client demand	**100%**	**100%**	**100%**	85.7%
8 Quality management	**100%**	88.2%	**100%**	**100%**
Total	**96,6%**	**96.0%**	**98.0%**	**90.6%**

Table 2. Implementation index of the quality management model in the final evaluation

3. CONCLUSIONS

Implementation of the considered model requirements contributed to an increase in quality management levels in companies, particularly involving the following:

- Establishment of standardised methodologies for the achievement of controls in the production process.
- Improvement in internal control operations in the companies.
- Establishment of a training base for new employees and periodical training for current employees.
- Dedication and better quality commitment by employees.
- Knowledge dissemination of the normative standards of other markets
- Development of a base for recording and tracing the quality controls of the production process and the products.
- Establishment of requirements for carrying out self evaluation though the systematic auditing of quality control in the company.

Improvement in ceramic tile quality can be achieved by improvement of quality management in company processes; however, this does not occur in isolation. Other measures can play a role, such as the market, consumer behaviour, manufacturing costs, new technology used during production, manufacturer strategies and culture, and quality reference standards established by the technical standards.

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