Scientific Journal of Impact Factor (SJIF): 4.72

e-ISSN (O): 2348-4470
p-ISSN (P): 2348-6406

International Journal of Advance Engineering and Research Development

Volume 4, Issue 10, October -2017

Continuous Improvement and Quality Management Initiatives In Ceramic Industries

Sagar Patel [1] ,Dr.Mohammad Israr [2]

Reacher Scholar,RAI University & Assistant Prof Lukhdhirji Engineering College,MORBI[1]
Principal,Dungarpur College of Engineering and Technology,RAJASTHAN,DUNGARPUR[2]

Abstract: *Purpose of this paper is to study the role and benefits of Quality Management Systems in ceramic manufacturing which have been implemented. The perspective of case studies from both manufacturing and service organizations working in ceramic industries. In this paper, case study of relating to a ceramic tile manufacturer describing the benefits of their Quality Management Systems. The results present Quality Management Systems continue to be beneficial in a range of industry sectors and are still growing on a global basis.*

Keywords: *quality,initiatives,quality control,future growth,continuous improvement.*

I. INTRODUCTION

The ceramic tiles appear to have less impact than concrete tiles on Climate Change, Resource Depletion and Water Withdrawal, while for the remaining damage categories, Human Health and Ecosystem Quality, the difference between the two alternatives was too low to be considered significant. The use of wood chips led to significant impacts, mainly related to respiratory inorganic. Assessment of the data quality identified that the data is of generally high or acceptable quality. The sensitivity analysis and uncertainty assessment show that the conclusions are robust [1].

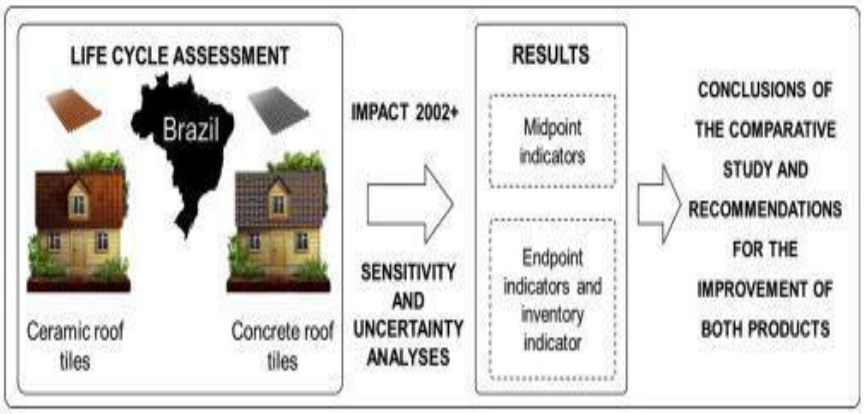


Fig. 1 (a) Scheme of the life cycle system boundaries of a ceramic roof tile

For concrete tile manufacturing as shown Fig. 1(a), clay is assumed to be obtained in the same way as for the ceramic tiles, while sand is assumed to be either extracted from river sand pits or artificially produced by crushing rocks (artificial sand). For the latter, a sensitivity analysis was carried out in order to verify differences in the results. The limestone, the main raw-material for cement production, is extracted from quarries with the use of explosives. Seven main processes were identified in the production of concrete tiles: from crushing and grinding of limestone to the coating of the tiles. Limestone (90%) is crushed before being kept in storage bays, along with clay (10%). This mix is then crushed and grinded to obtain a particle size of about 0.050 mm. The resulting flour, or raw meal, is introduced in an oven and initially heated to be then introduced in a rotary kiln, with temperatures up to 1450 °C to obtain the clinker [2]. Cooling then takes place, down to 80 °C, and then the clinker is mixed with gypsum and additives to obtain the commercial cement mix. The latter is mixed with sand (70%) and water (10%) to produce the concrete to shape the tiles. A coating agent is applied to the tiles as a protection layer.

The pressing process in the automated production of ceramic tiles is a complicated process that involves fully functional machinery and efficient coordination of the working crew. Quality control (QC) of the process relies on reasoning and acting on information coming from measured signals on the automated machinery. For QC, it is necessary to establish that these

measurements are correct for the purpose of final product quality. In the process, tile batches are produced within a tolerable range of tile rejection. However, if the percentage of rejects rises above a certain threshold, e.g. 6%, the QC staff is responsible for finding the cause of the defect

[3]. Following the publication of a few studies evaluating the environmental performance of roofs [4-5], and two Life Cycle Assessments of ceramic tiles in Spain [6], the Brazilian National Ceramics Industry Association (ANICER) identified the need to evaluate the potential environmental impacts associated with the life cycle of ceramic roof tiles, in order to compare them with an equivalent concurrent product (concrete tiles).

II. MATERIALS AND METHODS

A. Goal of the study

The goal of the study is to compare the life cycle environmental impacts of roof covering over a 1 m2 area using ceramic roof tiles with the same function fulfilled with similar concrete roof tiles.

B. Scope of the study

The assumptions made in this study are based on average conditions present in the country. Due to the lower thermal performance of concrete tiles when compared to ceramic ones [7], it may be necessary to apply an aluminum insulation layer to reduce heat radiation of concrete tiles. In this study, the baseline scenario assumed that building energy use is similar between the two systems without the insulation layer.

However, the assumption of adding an aluminum layer for the concrete tiles system was tested in the sensitivity analysis. For the ceramic tiles, it was assumed that 16 tiles are needed to cover an area of 1 m2 of roof, amounting to a total weight of 38.4 kg (i.e. 2.4 kg per ceramic roof tile), while for concrete roof tiles these values corresponds to 10.4 tiles and 46.8 kg (i.e. 4.5 kg per concrete roof tile), respectively (Table 1). The structure built to support the roof is considered equivalent for both alternatives.

Table 1. Key characteristics (weight, tiles per area, lifespan) of the studied roof tiles (ceramic and concrete), based on average data in the Brazilian context [1]

Characteristics	Ceramic roof tiles	Concrete roof tiles
Weight (kg)	2.4	4.5
Roof coverage (tiles/m^2)	16	10.4
Total weight per m^2 (kg)	38.4	46.8
Lifespan (years)	20	20

The boundaries for both systems were defined from the extraction and processing of raw materials to the end-of-life stage, i.e. land filling. The ceramic tile system boundaries are represented in Fig.1(a), for which clay extraction was assumed to be done with the aid of retro-excavators, wheel loaders and bulldozers. Four processes were considered in the manufacturing of ceramic tiles. The preparation of the clay dough was assumed to be carried out with a loading shovel and by means of mechanical mixing. This operation is followed by the mechanical shaping of the tiles using molds. During the drying phase, the water content is reduced from 25% to 3% (SEBRAE, 2008) and tiles are finally cooked to reach its solid final outcome.

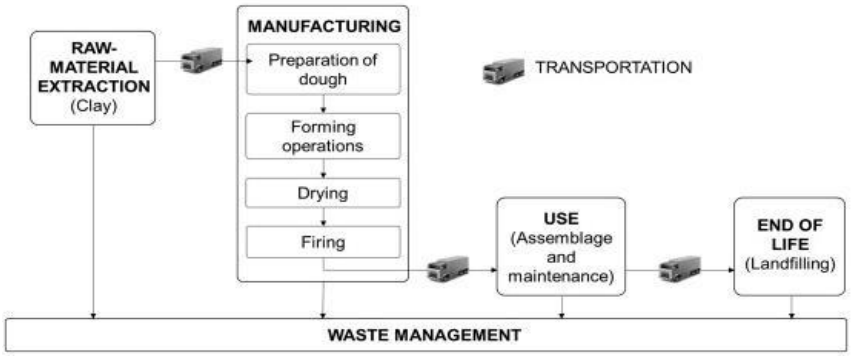


Fig. 1 (b) Scheme of the life cycle system boundaries of a ceramic roof tile

III. ROLL OF QUALITY MANAGEMENT SYSTEM

This issue has already been explored to some extent in the underlying reasons for the various types of audit. But these can really be summarized under one reason - SURVIVAL. In any competitive situation regardless if the organization is manufacturing or providing services, business will go to the more efficient provider. Auditing is a tool to inform an organization's management of the efficiency of its processes – when carried out by Third parties it is not subjective and if a company is judged as meeting the requirements of a management system such as ISO 9001:2008 a certificate is issued which can then be used as a sign of acceptability to customers. It saves an organization from having to prove quality standards to discriminating customer and currently it is widely recognized worldwide so speaks an international language.

The popularity of ISO 9001 over recent years has increased significantly as discussed below. Auditing is a tool of evaluation and improving of the management system. To the purposes of auditing belong:

ascertaining consistency of the elements of the system with determined requirements, establishing efficiency of the introduced system to achieve particular purposes, enabling the registration of the management systems in the organization, evaluation of the fulfillment of requirements resulting from determined rules.

Table 2. Top ten countries for ISO 9001:2000/2008 certificates [9-10]

Country	No. of certificates	
	In year 2006	In year 2008
China	162799	224616
Italy	105799	118309
Japan	80518	62746
Spain	57552	68730
Germany	46458	48324
United Kingdom	40909	41150
USA	44883	32400
India	40967	37958
France	21349	23837
Netherlands	18922	-
Korea. Republic	-	23036

IV. CASE STUDY: CERAMIC TILES MANUFACTURER

A. Background:

This Ceramic tile manufacturer is the oldest private manufacturer of ceramic tiles in Poland, which currently is one of the largest and most modern factories in the sector. The Ceramic tile manufacturer has a rich range of designs of assorted tiles for kitchens, bathrooms, floors ,decorative wall tiles and special tiles to order hand painted by artists. The company built a custom purpose new fully automated manufacturing plant to enable it to meet it's customer needs as well as that of the local community in terms of the environment. Production lines have been installed in the production area which allow for single firing of tiles improving the productivity of the plant. The ceramic tile manufacturer implemented a Quality Management System and underwent a Certification audit in November 2003 against the requirements of ISO 9001.

B. Benefits

During an interviewing with the Managing Director, there were many benefits from auditing the plant including:

Encouraging employees to feel more involved through improved communication, whilst the continuing assessments carried out by BSI can highlight any skills shortages.

Change of approach by the staff - a greater identification with the company.
The assessment of the Quality Management System focused on the operating processes which helped to reduce waste and customer complaints.

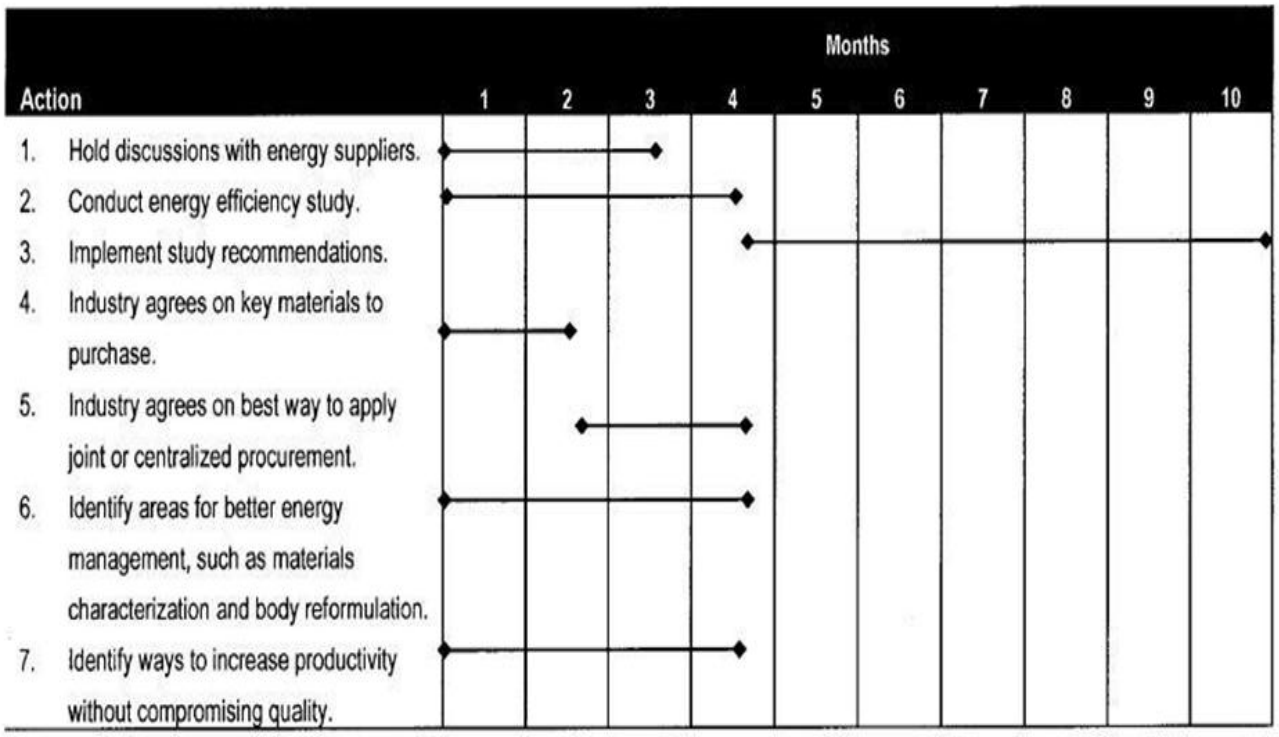
The implementation process ensured an improved the understanding of the processes in the Company and obliged the company to define the responsibilities and authorities of all staff, which were then confirmed by the third auditors. This gave the company a greater confidence that organization of the Management systems had been implemented in an effective manner. Additionally, it also underpinned the achievement of the Award of the Construction Minister in Pozna 2007 for the best ceramic products and entry onto the Polish Stock Exchange.

C. Further developments

The industry has implemented an Integrated Management System to include ISO 14001 and OHSAS 18001.

V. TARGETS AND EXPECTED RESULTS

The first objective of this initiative should be cost reductions of 10 percent in jointly purchased materials. Significant educations in operating costs through process and productivity improvement have yet to be determined. At least one new technology implementation (process or equipment) per manufacturer per year should be another target. Fig. 2 is a timeline for this initiative.



VI. CONCLUSION

The aim of this paper is to study the role and benefits of Quality Management Systems in ceramic manufacturing which have been implemented. The perspective of case study from both manufacturing and service organizations working in ceramic industries. In this paper, case study of relating to a ceramic tile manufacturer describing the benefits their Quality Management Systems. The results present Quality Management Systems continue to be beneficial in a range of industry sectors and are still growing on a global basis.

REFERENCES

[1] Danielle Maia de Souza et al., "Comparative Life Cycle Assessment of ceramic versus concrete roof tiles in the Brazilian context," Journal of Cleaner Production, science direct, vol. 89, no.0, pp. 165-173, 2015.
[2] Bovea, M.D., Saura, U., Ferrero, J.L., Giner, J., "Cradle-to-gate study of red clay for use in the ceramic industry," Int. J. Life Cycle Assess. Vol. 12, pp. 439-447, 2007.
[3] Franjo Jovic and Alan Jovic and Darko Krmpotic, "Quality control engineering in automated ceramic tile production using a signal information content approach," Advanced Engineering Informatics, Science direct, vol. 27, no., 1, pp. 93 - 107, 2013.
[4] Bribian, I.Z., Capilla, A.V., Us_on, A.A., "Life Cycle Assessment of building materials: comparative analysis of energy and environmental impacts and evaluation of the eco-efficiency improvement potential" Build. Environ. , vol. 46, pp. 1133-1140, 2011.
[5] Kosareo, L., Ries, R., "Comparative environmental Life Cycle Assessment of green roofs," Build. Environ. vol. 42, pp. 2606-2613, 2007.
[6] Bovea, M.D., Saura, U., Ferrero, J.L., Giner, J., "Cradle-to-gate study of red clay for use in the ceramic industry" Int. J. Life Cycle Assess., vol. 12, pp. 439-447, 2007.
[7] Mariane, A., "Desempenho comparado: telhas de concreto x telhas ceramicas," Guia Construçao 27. PINI Web. , 2012
[8] SEBRAE, Serviço Brasileiro de Apoio as Micro e Pequenas Empresas, 2008. Ceramica Vermelha para Construçao: Telhas, Tijolos e Tubos. Estudos de Mercado SEBRAE/ESPM.
[9] International Organization for Standardization (ISO), The ISO Survey 2006, International Organization for Standardization, Geneva, 2007.
[10] International Organization for Standardization (ISO), The ISO Survey 2008, International Organization for Standardization, Geneva, 2009.
[11] K. Stephens, M.T. Roszak, " A study of the role and benefits of third party auditing in Quality Management Systems"J. Achievement in Material and manufacturingEngg., vol. 43, no.2, Dec. 2010.

