APPLICATION OF THE SIGNIFICANCE MATRIX TO DETERMINE SIGNIFICANT ENVIRONMENTAL ASPECTS AND IMPACTS OF THE CERAMIC SECTOR

(CASTELLÓN REGION)

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The present study was undertaken to identify possible environmental aspects of the ceramic production process in the Castellón Region, and evaluate potential associated environmental impacts.

According to International Standard ISO 14001:96 *(Environmental Management Systems. Specifications and guidelines for use),* an environmental aspect is any element of the activities, products or services that can interact with the environment. A significant environmental aspect is one that has or can have a significant environmental impact.

In turn, the same standard defines environmental impact as any change in the environment, whether adverse or beneficial, resulting wholly or partially from the activities, products or services of an organisation.

The significance matrix is a specific tool for identifying environmental impacts in the ceramic sector, which facilitates the determination of environmental aspects and impacts and their significance assessment for the correct application of ISO 14001:96

The scope of the study ranges from the extraction of the raw materials used in the process to the transport of the finished product for distribution, marketing, use and disposal. It therefore includes the intermediate composition spray-drying stages, glaze, colour and frit production, together with the manufacture of ceramic products and the two auxiliary tile manufacturing processes - co-generation and process wastewater treatment and reuse.

The present study was conducted considering a standard company, whose products include practically the whole range of assumptions applicable to the matrix, namely, spray drying, floor and wall tile manufacturing, co-generation and process wastewater treatment and reuse.

Using the matrix allows identifying aspects and associated impacts. Owing to the diversity of the situations to be found in the sector, the model allows weighting or assessing the significance of each detected impact.

Finally, after detecting the impacts, the evaluation enables identifying those that are significant for the company. This assessment will serve as the basis for establishing an environmental policy for reducing or minimising these impacts.

The model was subsequently applied to the remaining standard companies found in the sector, from a working standpoint, which can include particular features such as:

√ With or without a spray dryer
√ Proximity to an urban or residential area
√ Proximity to streams, reservoirs, or gullies

Together with the above, the following were also considered:

√ Location
√ Aquifers
√ Prevailing winds

FIRST STEP

The matrix was taken and the possible environmental aspects and associated impacts of the activity were identified, indicating the intersections. This task was performed by the factory Technical Director, Production Manager or outside consultant, who subsequently brought together the data to draw up Table 1.

SECOND STEP

Table 1 was drawn up,

ASPECTS	PROCESSES				
	1	2	3	4	5
Accidental loss of raw materials					
Consumption of natural resources					
Reuse and/or recycling					
Energy consumption					
Products past their sell-by/use-by date					
Factory location					
Heavy vehicular traffic					

Table 1.

1: RAW MATERIALS RECEPTION
2: PRESSING
3: DRYING
4: ETC.

THIRD STEP

After identifying the RAW MATERIALS RECEPTION activity, Table 2 was drawn up.

PROCESS: RAW MATERIALS RECEPTION

ASPECTS	IMPACTS			
Heavy vehicular traffic	Exhaust fume pollution	Dust emission	Noise	
Accidental loss of raw materials	Dust emission	Generation of HWs	Soil pollution	
Consumption of natural resources	Depletion of resources			
Reuse and/or recycling	Reuse of packaging			
Energy consumption	Depletion of resources			

Table 2.

An impact evaluation was then performed according to the section on the Evaluation of Environmental Impacts.

EVALUATION OF IMPACTS: RAW MATERIALS RECEPTION

IMPACT	±	I	EX	PE	SI	PR	I	FV
Gas pollution	-	5	4	2	4	4	**42**	**55**
Dust emission	-	5	4	2	2	2	**38**	**51**
Noise	-	5	2	2	2	2	**32**	**45**
Generation of HTWs	-	10	2	4	2	2	**54**	**67**
Soil pollution	-	12	1	4	4	4	**63**	**76**
Depletion of resources	-	2	1	4	2	4	**21**	**34**
Reuse of packaging	+	1	1	2	1	1	**11**	**23**

Table 3.

$I = \pm [4i + 3EX + PE + SI + PR]$

Where:

$P = (P_1 + P_2 + P_3) = 10$ where $P_1 = 2$ $P_2 = 4$ $P_3 = 4$

$AC = 2$ where $B_1 = 0$ $B_2 = 1$ $B_3 = (P + AC) = 12$

$FV = I + B_1 + B_2 + B_3$

ALARMS:

Impacts with FV equal to or over 60 = Generation of HWs

Impacts with FV equal to or above 70 = Accidental soil pollutio

It was thus found that:

There was a significant impact in raw materials reception, namely generation of Hazardous Waste (packaging waste that contained chemical products) produced at the reception of glaze and colour raw materials.

There was a significant impact from possible soil pollution caused by accidents in raw materials transport (glazes and colours), for which a specific management programme needs to be developed.

Impacts were found close to threshold values, which are to be considered potentially important.

The result of this evaluation is set out in the folowing matrix:

ENVIRONMENTAL FACTORS		ACTIONS	CONSTRUCTION STAGE																
			EXPROPRIATIONS	ACCESS CONDITIONING	EARTH MOVEMENTS	BUILDING	FIXED MACHINERY INSTALLATION	FERMENTATION FLOOR CONDITIONING	DISPOSAL CONTAINMENT WALL	LEACHATE DRAINAGE NETWORK	SURFACE STREAMS DRAINAGE NETWORK	FIRE BREAKS	ENCLOSURES	ELECTRIC MAINS – TELEPHONE	WATER MAINS	LANDSCAPING	VEHICULAR TRAFFIC	BUILDING WASTE
ABIOTICS	AIR	CHEMICAL POLLUTION																	
		PHYSICAL POLLUTION																	
	WATER	SURFACE																	
		SUBTERRANEAN																	
	EARTH	LOSS OF SOIL																	
		SOIL POLLUTION																	
		EROSION																	
BIOTICS	VEGETATION																		
	CROPS																		
	FAUNA																		
CULTURAL	LANDSCAPE																		
	HEALTH																		
	SAFETY																		
	RECREATIONAL VALUE																		
SOCIO - ECONOMIC	EMPLOYMENT																		
	SOCIAL ACCEPTANCE																		

ENVIRONMENTAL FACTORS		ACTIONS	RUNNING STAGE				ABANDONMENT STAGE					
			VEHICULAR TRAFFIC	U.S.W. DITCH STORAGE	WASTE TREATMENT	O.M. FERMENTATION	MARKETING BY-PRODUCTS	WASTE WATER – LEACHATES	WASTE DISPOSAL SITE EXPLOITATION	FACILITY DISASSEMBLY	SEALING - LINING	RESTORATION
ABIOTICS	AIR	CHEMICAL POLLUTION										
		PHYSICAL POLLUTION										
	WATER	SURFACE										
		SUBTERRANEAN										
	EARTH	SOIL LOSS										
		SOIL POLLUTION										
		EROSION										
BIOTICS	VEGETATION											
	CROPS											
	FAUNA											
CULTURAL	LANDSCAPE											
	HEALTH											
	SAFETY											
	RECREATIONAL VALUE											
SOCIO - ECONOMIC	EMPLOYMENT											
	SOCIAL ACCEPTANCE											

LEGEND

HIGH POSITIVE IMPACT	LOW NEGATIVE IMPACT
MEDIUM POSITIVE IMPACT	MEDIUM NEGATIVE IMPACT
LOW POSITIVE IMPACT	LOW NEGATIVE IMPACT