COMPETITIVENESS AND PROFITABILITY. NEW CHALLENGES FOR THE FRIT, CERAMIC COLOUR, AND GLAZE INDUSTRY [1]

Enrique Tortajada Esparza, Ignacio Fernández de Lucio, Daniel Gabaldón Estevan

INGENIO. CSIC-UPV. Valencia. Spain.

ABSTRACT

The Frit, Glaze and Ceramic Colours industry currently comprises 27 companies in Spain with an overall turnover of almost 1,000 million Euros and employs around 4,000 workers. Since the 1990s it has developed business policies based on two strategies, one oriented towards growth, both horizontal and vertical, with marked exterior growth and affiliates abroad, many of them specialising in providing manufacturing and technical assistance. The other strategy is more concerned with innovation, converting it into a technological resource for the ceramic sector. All this guarantees its world leadership position.

These activities have involved making heavy investments (new plants, facilities with the latest technology available and investment in innovation) that are evidence of an admirable, outstanding standard of entrepreneurial dynamism. In spite of all this, the period since the nineties has seen a progressive drop in productivity and profitability. This is worrying because it indicates we have reached the end of an era and has an impact on the future strategies of these companies.

Our study analyses and evaluates the economic results earned by the subsector, highlighting the variables that define the relevant trends in its evolution. It covers the period between 1993 and the present, a period during which the subsector's current structure has been configured. To this end we have used information from company databases and foreign trade information. We have also conducted interviews with experts that have allowed us to complete the information and check the hypotheses.

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The financial profitability of the subsector has progressively fallen by 50%, reaching a level of 10%. Likewise, prices of raw materials and natural gas have risen, and now account for 70% of production costs. Internal competition has also increased due to pressure exerted by ceramic companies and the proliferation of companies on the market, competition that has not only led to improvements in the quality of products and services, but has also caused reductions in real prices and margins. Increased competitive pressure and regulatory problems are foreseen in the near future from the Asian glaze industry.

1. INTRODUCTION

The ceramic sector has grown during recent decades, supported by the expansion of the construction sector and in response to an increasingly sophisticated demand for floor and wall tiles. This activity, which was traditionally disperse, is concentrated in locations such as Castellón in Spain and Sassuolo in Italy, leading to the creation of genuine industrial districts, according to Marshall's definition (BECATTINI 2002).

The Castellón district is characterised by great dynamism based on technological innovation, which is basically produced by suppliers (according to the taxonomy used by PAVITT (1984)). On the one hand these consist of the mechanical equipment industry from abroad (essentially from Italy), which supplies presses, kilns and a variety of equipment; and, on the other, the frits, glazes and ceramic colour industries, suppliers of the materials used to make glaze, which also offer technological and solutions and have influenced the evolution and dynamism of the ceramic product, and subsequently the ceramic industry. This assertion is shared by many authors and by the actors in the ceramic district (ESCARDINO (2001), LÓPEZ (2003), GIL and LLORCA (2004), FUERTES (2005)).

Generally speaking, the role of mechanical industry in providing the best technologies for the ceramic production process has been highlighted more, since they have allowed the energy cost per unit product to be reduced. Mention has also been made of the importance of the efforts in innovation made by these companies and by institutions in the scientific and technology environment of the ceramic innovation sector system, as well as several departments at the Jaime I University, the Institute of Ceramic Technology (ITC), and the Ceramic and Glass Technology Institute of the Spanish High Council for Scientific Research, in particular (FERNÁNDEZ *et al.* (2005); (GABALDÓN *et al.* (2007)). Its steady competitive position has meant that, in the same way as the client industry, it is a successful exporter and has opened commercial branches and production plants in external markets where ceramic companies exist and operate (NAGER and CRASTA, 2006).

This is a very young subsector in Spain, having progressively broken away from the ceramic subsector approximately fifty years ago. At the moment it comprises 27 companies that turn over about one thousand million euros (1033) and employed almost four thousand workers (3776) in 2006, according to ANFFECC, the Spanish Association of frit, glaze and ceramic colour manufacturers. Its formation and evolution over time have been analysed, contributing key ideas on the development and clarification of its role in the evolution and consolidation of the ceramic district in Castellón, and its current leading position (GABALDÓN et al (2007), TORTAJADA el al. (2007)).

In spite of this, the subsector has been facing some important challenges in recent years, which must be dealt with efficiently. On the one hand, it is showing a persistent

reduction in profitability (MARTINEZ-ISAAC (2002), ILLUECA and MARTINEZ (2002)). It is also subject to increasingly strict environmental laws due to a growing demand from society for more sustainable production standards and consumption, derived from international pacts (IPPT Directive, the REACH programme, the Kyoto Agreement, etc), which may have an impact on competitiveness given the administrative burden involved and the cost of introducing and maintaining the facilities affected (FUERTES (2006); GONZALVO and IRÚN (2006); GABALDÓN *et al.* (2007)).

Our study analyses and evaluates the financial results obtained by the subsector, highlighting the variables that define the relevant trends in its evolution. It covers the period between 1993 and the present, a period during which the subsector's current structure has been configured. To do this we have consulted databases supplying statistical business information (mainly SABI) and official sources (INE, ICEX, Foreign Trade, etc). This information has been completed with further information gathered via surveys and direct interviews and people with knowledge of the sector.

The work is divided into five parts. Following this first part, the second reflects on the current situation of the industry, putting it into context, comparing its results with those of the ceramic sector and making intra-industrial comparisons. The third part studies the evolution of this industry in terms of investment and profits gained as a result of the competitive strategies adopted. Part five contains the most relevant conclusions. Finally, we have included references.

2. THE CURRENT SITUATION OF THE INDUSTRY.

2.1. PARTICIPANTS

This industry is positioned in the *filiere* of ceramics among the ceramic subsector and the other actors involved: mineral extractors-miners and processors, spray dryers, and wholesale distributors in general, and also pigment and inorganic colorant manufacturers, as well as the manufacturers of the additives used in the glaze.

A total of 27 companies producing and selling frits, colours and glazes were identified. In Table 1 we have shown the companies with demonstrated activity, listed in order of turnover. They are mainly located in the ceramic district of the central areas of Castellón (La Plana and L'Alcaltén). Onda, Alcora, Castellón, Villarreal, Almazora, Vilafamés, among other locations, and account for more than 90% of the production, in a 400 km^2 area separated by distances no greater than 25 km.

The average size of the industries is large (148 employees – 35 million turnover per company), which contrasts with the predominance of small companies in wide branches of enterprise in the Autonomous Region of Valencia. **There is a wide variety of companies of different sizes, ranging from those whose turnover barely reaches one million euros and which are very specialised, to large groups with turnovers equal to or in excess of 200 million euros, with highly diversified activities and added value services, with production plants and delegations abroad.** The subsector has a concentrated structure. **The 14 companies with 100 or more employees, 52% of the total, account for 84% of the workers in the industry. This structure has remained stable over recent years.**

It is interesting to make special mention of several groups of companies: a) Foreign capital groups: 1) **Ferro Corporation**: North American in origin, it specialises in metal coatings and saw the opportunity to access the ceramic coating market by entering the Spanish and Italian markets (Ferro Spain and Ferro Italia) by acquiring several established companies. 2) **Grupo Colorobbia**: Originating in la Toscana (Italy), this is one of the pioneering groups resulting from the emancipation of the glaze sector from a ceramics manufacturer. 3) Other smaller foreign capital groups are Johnson Matthey Ceramics and Pemco International. b) Local: 1) **Grupo Torrecid**: This comes from the Alcora ceramics sector; it founded Al Farben (colours) and has recently acquired the Reimbold & Strick group among which is the Spanish company CC de Tortosa. 2) **Grupo Esmalglass-Itaca**, which was founded as an initiative of ceramic technicians and entrepreneurs.

	COMPANY	LOCATION	TURNOVER	EMPLOYEES		
			Thousands of euros	No.	(%)	Cumul.
1	FERRO SPAIN S.A. (a)	ALMAZORA	174,566	734	18%	18%
2	COLOROBBIA ESPANA SA	VILAFAMES	120,738	387	10%	28%
3	ESMALGLASS SA	VILLARREAL	108,139	400	10%	38%
4	TORRECID SA	ALCORA	87,961	330	8%	46%
5	ITACA.	POBLA TORNESA	71,899	217	5%	51%
6	JOHNSON MATTHEY C. (b)	CASTELLON	60,749	163	4%	56%
7	FRITTA SL	ONDA	45,731	199	5%	60%
8	QUIMICER SA	ONDA	34,066	153	4%	64%
9	COLORIFICIO C. BONET SA	RIBESALBES	33,774	153	4%	68%
10	SALQUISA(a)	CABANES	31,845	112	3%	71%
11	ESMALTES SA	ALCORA	29,232	117	3%	74%
12	COLORES C. DE TORTOSA SA	TORTOSA	24,159	142	4%	77%
13	COLORONDA SL	ONDA	23,160	83	2%	79%
14	VIDRES SA	VILLARREAL	23,684	125	3%	83%
15	AL FARBEN SA	ALCORA	22,158	89	2%	85%
16	CERFRIT S.A.	NULES	19,534	146	4%	88%
17	VERNIS SA	ONDA	15,897	70	2%	90%
18	COLOR ESMALT SA	ALCORA	14,610	87	2%	92%
19	PEMCO ESMALTES S.L.	VITORIA	10,597	74	2%	94%
20	WENDEL EMAIL IBERICA. (c)	NULES	10,370	53	1%	95%
21	ESMALDUR SA	S. JOAN MORO	9,894	37	1%	96%
22	COLORES CERAMICOS SA	ONDA	9,648	51	1%	98%
23	PRODESCO SL.	MANISES	4,344	41	1%	99%
24	VITRICOL S.A.	ONDA	3,468	30	1%	99%
25	COLORES OLUCHA SL	ONDA	1,261	9	0%	100%
26	COLORES CER. ELCOM, S.L.	MANISES	746	4	0%	100%
27	COLOR. CER. LAHUERTA SL	MANISES	586	11	0%	100%
	TOTAL	.....	**992,816**	**4,017**	**100%**	

Notes: a) Recently acquired by ENDEKA CERAMICS Group. 2007; b) Now known as KERAFRIT; c) Only part of the turnover corresponds to products of the industry.

Source: In house. SABI.

Table 1. – The frit, ceramic colour, and glaze industry. Spain 2005

Glaze production was an activity traditionally carried out by the ceramic companies themselves. In Spain, these activities started breaking away at the beginning of the 1940s and 1950s (TORTAJADA et al., 2007). This began earlier in Italy, at the beginning of the 20th century, especially in the artistic ceramic industries in Toscana and Veneto. It was from the end of the 1960s and 1970s when the subsector was identified by externalisation of the activity in Sassuolo, specialising in floor tiles. Chemical multinationals started diversifying their portfolios of products, and gave a decisive push to the Spanish industry (BURSI and FRANZONI, 2006).

In Italy, there were 24 companies in 2005, all of which were located in the Sassuolo district (the Emilia-Romagna region) except for two in Toscana (Colorobbia and Cover) and another in Ravenna (Vitroceramici). (The number of frit manufacturers in Italy would apparently be even smaller if we follow GONZALO and IRUN (2006), who say there are only 9 plants in Italy (21 in Spain) and approximately 42 establishments in Europe. Therefore, many of the 24 mentioned are not producers, although they do market the products). Among those with the highest turnovers are companies that are also present in our market and industry (Ferro Italia, Colorobbia, Johnson Matthey Ceramics and Samlticeram Unicer) and that are involved in manufacturing. There are affiliates of Spanish companies (Torrecid, Esmalglass, Fritta, Vernis, CC Bonet (Cer.Ser), etc.) that specialise in importing and preparing glazes. Other companies belong to ceramic companies (Ramacolor, Garcolor, Arco from the Marazzi, Gardeinia and Iris groups, respectively), which are not relevant in Spain. Their turnover in 2004 was 518 million euros, lower than that of the Spanish sector (50%). The fact that the Italian ceramic sector uses less glaze than the Spanish, is due to its specialisation, because wall tiles are less important there than porcelain tile, to which little or no glaze is applied (RICHIARDIELLO and MINICHELLI (2006)).

2.2. COMPARISON OF THE ECONOMIC-FINANCIAL STRUCTURE. 2005.

In this section we present the updated economic-financial profile of these companies, drawing attention to certain indicators regarding turnover, employment, cost structure, export quotas, indebtedness, profitability, etc; comparing them with other industries, such as the ceramic industry and the intra-industrial dispersion, i.e. the behaviour of large companies in comparison with the rest of the industry.

2.2.1. Balance of the situation.

Table 2 sets out the balance of the aggregated situation for the glaze companies and the ceramic industry, giving information about their balances at 31 December, 2005.

Industry	Ceramic Industry (a)		GLAZE INDUSTRY		Companies with fewer than 100 employees		Companies with more than 100 employees	
Balance of the situation.	**Million €**	**(%)**	**Million €**	**(%)**	**Million €**	**(%)**	**Million €**	**(%)**
TOTAL ASSETS	**5.584**	**100%**	**1.281**	**100%**	**152**	**100%**	**1129**	**100%**
Fixed (I)	2.580	46%	624	49%	56	37%	568	50%
material+g.facilities	1.890	34%	372	29%	50	33%	322	29%
intangible	146	3%	26	2%	2	1%	28	2%
fixed financial assets	544	10%	223	17%	4	3%	219	19%
Circulating (C)	3.005	54%	657	51%	96	63%	561	50%
stocks	1.155	21%	190	15%	34	22%	156	14%
debtors	1.551	28%	411	32%	55	36%	356	32%
treasury	299	5%	56	4%	6	4%	59	5%
NET EQUITY	**2.259**	**40%**	**591**	**46%**	**69**	**45%**	**522**	**46%**
TOTAL LIABILITIES	**3.326**	**60%**	**690**	**54%**	**83**	**55%**	**607**	**54%**
Fixed liabilities (F.L.)	985	18%	212	17%	26	17%	186	16%
Creditors to L.L.	974	17%	200	16%	25	16%	175	16%
Other F.L.	11	0%	12	1%	1	1%	12	1%
Liquid liabilities (L.L.)	2.341	42%	477	37%	57	38%	421	37%
Financial debt (FD)	976	17%	137	11%	10	7%	127	11%
Commercial creditors	808	14%	236	18%	28	18%	208	18%
O.L.L.	557	10%	104	8%	19	13%	86	8%
RATIOS								
DEBT		**60%**		**54%**		**55%**		**54%**
Debt to LP (F.L./I)		**38%**		**34%**		**46%**		**33%**
Financial D to P.C. (F.D./ C)		**32%**		**21%**		**10%**		**23%**

Note: a) The CNAE 2640 group of companies (approximately 400 companies with registered accounts).
Source: SABI. In house.

Table 2. Comparative balance of the situation. 31/12/2005

The glaze industry declares total assets of 1,281 million euros, which represents 23% of the ceramic sector. Curiously, the assets of both industries are similar in composition (46-49% for fixed and 51-54% circulating. The fixed assets weighed slightly more in the glaze companies than the proportion of fixed financial assets (17% versus 10%).

With regard to asset financing, six points more self-financing was seen in frit companies over tile companies, with a debt coefficient of 54% as opposed to 60% in ceramics, the latter sector being more heavily dependent on short-term finance. Net assets amount to 591 million euros, a quarter (26%) of the value for the ceramic firms.

Companies with more than one hundred workers, 52%, represent 87% of turnover and 84% of employment; they also account for 88% of the total aggregated assets in the sector. Furthermore, these companies are responsible for a large part of the fixed financial investment (98% of the total, 219 million euros), which foreseeably reflects the strong investments in subsidiary companies (controlling share capital), reaching 19% of total assets as opposed to 2% of the small ones (17% of the average). To a lesser, but also relevant extent, these companies monopolise the intangible assets (93% of the total), a predictable results of their commercial promotion policy.

The liability structure is quite homogenous among both groups of companies, as in both the larger and smaller firms, long-term finance accounts for 31% of liabilities, while liquid liabilities makes up the remaining 69%. However, the most outstanding feature is that although the level of debt is the same (54%-55%), larger companies tend to choose shorter-term debt while small companies are more likely to take on long-term debt.

2.2.2. Cost Structure and Results

Table 3 provides comparative information about the costs, margins and results of the ceramic and glaze sectors and also compares the companies in the latter section according to size.

What is initially evident is the noticeable difference between the cost structures of both industries. The glaze companies spend proportionally more than the ceramic companies on raw materials and materials (58% as opposed to 44% of turnover respectively) and proportionally less on the other cost items (personnel, although average salaries are higher, other operating costs, amortisations and financial costs). Economic and financial profitability, as well as the cash flow and added value rates per employee are higher in the glaze industry that in the ceramic industry.

Industry	**Ceramic Industry (a)**		**GLAZE INDUSTRY**		**Companies with fewer than 100 employees**		**Companies with more than 100 employees**	
ITEMS								
Turnover (d) (millions of €)	4,165		993		127		866	
Employees	28,884		4,017		639		3,378	
COST STRUCTURE	**Million €**	**(%)**	**Million €**	**(%)**	**Million €**	**(%)**	**Million €**	**(%)**
Personnel	911	23%	155	16%	23	18%	132	16%
Raw materials and materials	1.755	44%	550	58%	66	53%	484	59%
Amortisations	255	6%	49	5%	7	5%	43	5%
Other operating costs	972	24%	184	19%	29	23%	155	19%
Financial and similar costs (c)	86	2%	14	1%	1	1%	12	1%
TOTAL Ordinary Costs	3.979	100%	951	100%	125	100%	826	100%
RESULTS AND RATIOS	**Million €**	**%s/(d)**	**Million €**	**%s/(d)**	**Million €**	**%s/(d)**	**Million €**	**%s/(d)**
Ordinary results	196	4.7%	68	6.9%	2	1.8%	66	7.6%
Extraordinary Results	33	0.8%	9	0.9%	1	0.5%	9	1.0%
Company Tax	51	1.2%	7	0.7%	2	1.5%	5	0.5%
Result of financial period (b)	178	4.3%	71	7.2%	1	0.8%	70	8.1%
Cash-Flow	476	11.4%	120	12.1%	8	6.0%	113	13.0%
Added Value	1,693	40.6%	295	29.7%	33	26.4%	262	30.2%
ECONOMIC PROFITABILITY((b+c)/Act.)		**4.7%**		**6.6%**		**1.5%**		**7.3%**
rotation (d/Asset)		74.6%		77.5%		83.5%		76.7%
margin ((b+c)/d)		6.3%		8.5%		1.8%		9.5%
FINANCIAL PROFITABILITY (b/Net)		**7.9%**		**12.0%**		**1.4%**		**13.4%**
Turnover per employee	0.144		0.247		0.198		0.256	
Added Value / employee	0.059		0.073		0.052		0.077	
Cash-Flow per employee	0.016		0.030		0.012		0.033	

Note: a) CNAE 2640 group of companies (approximately 400 companies with registered accounts).

Source: SABI. In house.

Table 3. Cost structure and results. Glaze and ceramic industries. 2005.

We also observe that companies with more than 100 employees, in spite of having had a better year in terms of results, turnover and cash flow for example, face heavier costs for materials and lower staffing costs in comparison with SMEs. No differences can be seen in the other operating costs (gas, electricity, etc). The profitability and costs of the industry are shown in more detail below. It would seem clear that raw materials are a relevant cost item in the case of glazers. The price of these is extremely influential on final profitability.

3. EVOLUTION OF THE INVESTMENT AND PROFITABILITY.

3.1. COMPANY INVESTMENT AND STRATEGIES.

The frits, ceramic colours and glaze industries have striven to gain new externalised or outsourced work not done by the ceramic companies, with the aim of providing them with these services. Two basic strategies have enabled them to survive and adapt to what the ceramic sector needs.

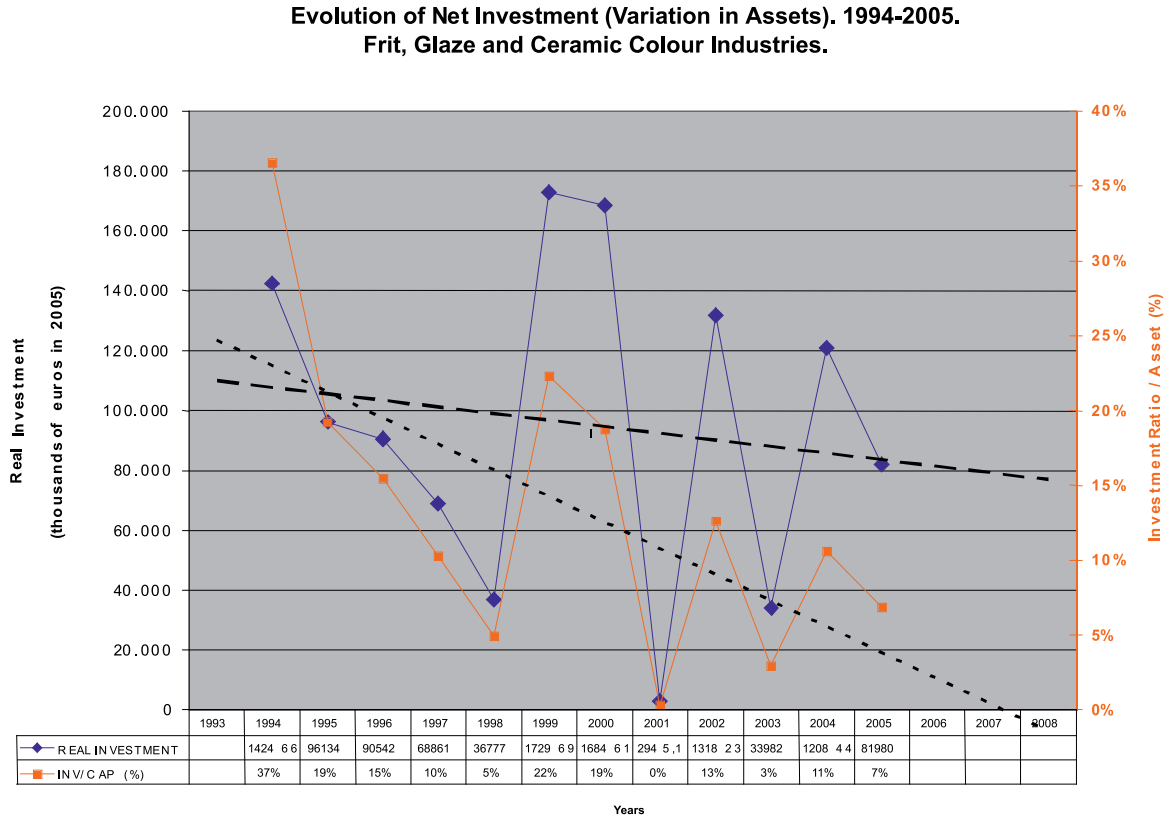
On the one hand, a continuous strategy of innovation, based on R&D and the firm support of innovations emerging in collateral subsectors, applying these to the ceramic sector (GABALDÓN *et al*., 2007). The contribution of the frit industry to the ceramic district, after the incorporation of chemists and university specialists during the 1970s, materialised mainly in: Replacing or reducing suspicious components such as lead, selenium and antimony in glazes; Developing porous single-firing technology for tile manufacturing; Developing spray drying and thus the introduction of cogeneration; Developing new glazes, particularly for porcelain tile, Developing screen printing decoration technologies and, lastly, digital ink jet printing. All this has enabled glaze production processes to be improved, and also the added value of the product to increase by offering technical support and design to clients.

On the other hand, logically, given the above, in order to be able to profit from R&D and all the investments required for the innovative efforts, the leaders have developed organic business growth strategies, achieving synergies and extending the scale of their activities in areas bordering the initial ones, both horizontally and vertically, covering the raw material sectors and expanding their offer: To provide valuable services to clients, they have needed to widen their range of products (frits, glazes, ceramic colours, etc) and their clients: tile manufacturers, floor tile manufacturers with different technologies, products for third firing, for dinner services, for ceramic artware, etc. On the other hand, companies have aimed to control the supply of their raw materials for their own and their clients' use: Mineral mines and processing of minerals (spray dryers, zirconium, aluminium, etc) and adopting a strategy for internationalisation. Internationalisation began a long time ago, by opening up to foreign customers, exporting to countries where the ceramic companies were located. Later on, getting a foothold abroad with their own establishments began at the end of the 1980s and 1990s, aiming to improve service to customers and also reduce certain costs. The large Spanish companies have affiliates in around twenty countries. Among the most important European locations are Italy (6), Portugal (3) and the United Kingdom (3). In America Brazil is particularly relevant with five affiliates, followed by Mexico (4) and the United States (2), and in Asia there are five in China and four in Indonesia.

The investment required to develop these competitive strategies has been heavy, and should be evaluated. For this purpose, a follow-up of the company accounts from 1993 to 2005 was made to analyse the evolution of investments and the profitability achieved by these companies.

Firstly, the so-called Net Investment has been studied, for the sectoral aggregate, defined as the interannual difference in value of the total assets reflected in the company accounts. In Figure 1 two variables are shown. The abovementioned annual Net Investment (with data correcting monetary depreciation, equivalent to euros in 2005) and the ratio between this and the value of Total Assets the previous year. Furthermore, some trends have been identified.

The sector has been making very high levels of investment. It can be confirmed that during the past 12 years, with large annual fluctuations, average volumes of net investments of around 90-100 million euros per annum have been maintained (with a slight downward trend), although their weight in comparison with total assets have been reduced from almost 37% (1994) to 10% or lower, from 2001 onwards (an average of 7% during the past five years). This could be a worrying aspect in a sector with technological leadership.



Source: SABI. Prepared in-house.

Figure 1. Evolution of Net Investment in the Glaze Industry.

Likewise, the origin of the funds invested has been analysed (annual variations in funds, internal or from outside), that give us information about how these new investments have been made during the past decade. Depending on the economic situation, more own funds have been used (1997-1999) than alien funds (1994-96; 2000-2003). It can be seen that, towards the end of the 1990s intense efforts were made to self-finance (indebtedness of up to 30%), although, the trend then changed in the sense that indebtedness increased (up to 75% in 2001; 55% in 2005) following the logic imposed by low interest rates and also by the limitations of the volume of own funds against the heavy needs for resources required to finance the expansion of the industry.

3.2. BEHAVIOUR OF TURNOVER, EMPLOYMENT AND FOREIGN TRADE.

Since 1990 an important growth in turnover has been seen, following in the wake of the ceramic sector, according to data from the ANFFECC. In 2006 it reached levels of approximately 1,000 million euros, in physical units it reached a figure of 1.5 million tons. These figures show the world leadership of the Spanish subsector. The advantages have been aimed both at the local ceramic industry and those in other countries. This is currently 42% of local sales and 58% of export sales. Between the years 1990 and 2006, sales multiplied by five. This has produced a strengthening of the industry, with the extension of production capacity and the entry of new companies.

At least two time period are examined. In the first, from the beginning of the 1990s to the years 2002, there was lineal growth in sales, with annual increases of between 55-60 million euros, which were distributed as follows: one third in the domestic market and two thirds in exports. Between 2002 and 2005, this norm would disappear for the conjunct, but not for exports, which continued to increase to 35-40 million per annum, while local sales would stagnate or reduce, as did local ceramic production. From 2005 onwards sales in both areas slowed down, although it is not yet clear whether this is a trend.

The employment sector has been growing regularly since 2005; in 15 years it has multiplied by 2.5, from 1500 in 1992 to 3,800 workers employed, according to ANFFECC. With regard to turnover per worker, two periods can be distinguished; the first until 1997, with marked growth from 170 to 240 thousand euros per employee, a ratio that persisted until 2005, which implies a reduction in real terms when monetary depreciation is taken into account.

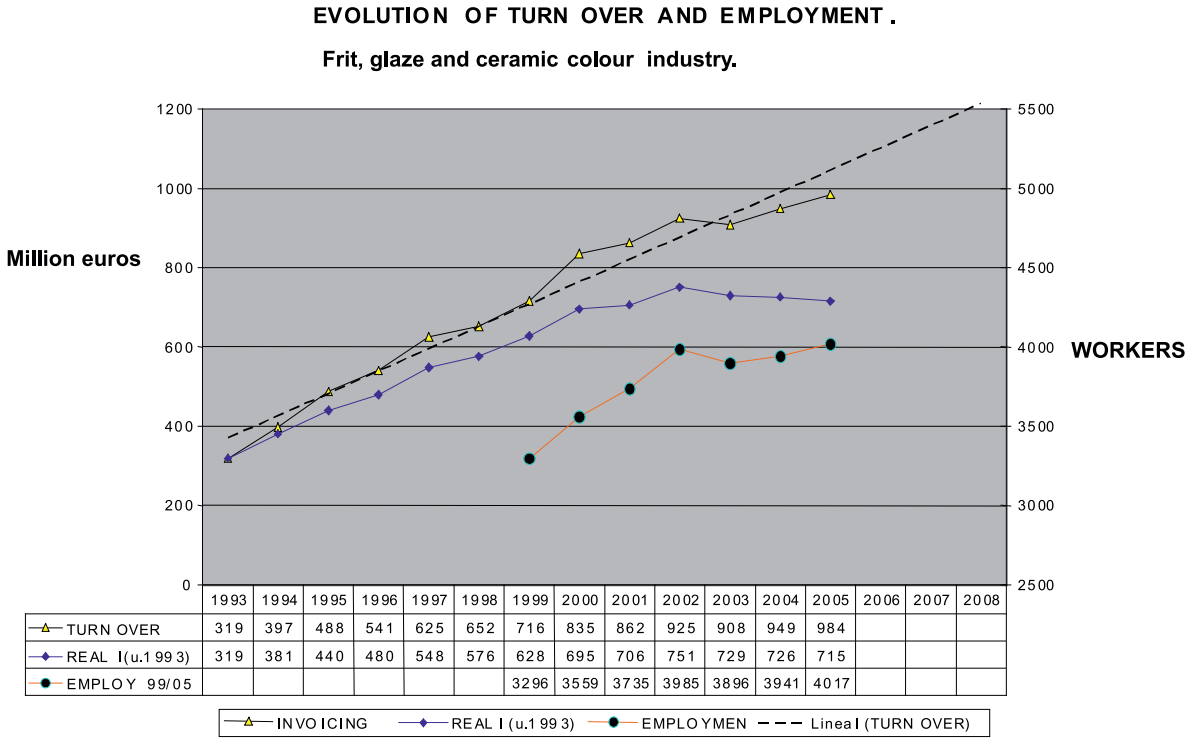
If we use data from the company accounts (SABI) the same conclusions can be reached. Figure 2 contributes aggregated data on income and from employment in the subsector. (The employment series could not be completed for the years 1994-98 because of lack of data from many of the companies).

In view of the evolution of turnover in the industry, which follows almost lineal trends, it would not seem unreasonable to assume that investment will continue in the percentages seen before. However, the evolution appears to be slightly different if turnover is expressed in constant monetary units (from the 1993), as is shown in the abovementioned graph. If not the volumes, perhaps it is the sale prices that finally show this stagnation. A stabilisation of real income can

therefore been seen, especially after 2002, a situation shared by employment in the sector, stabilising at around 4,000 employees.

Exports are spread out over a wide geographical area. With regard to imports, the small volume is chronic. Imports only account for 14% of exports and 17% of internal consumption. They come from different countries in the European Union, mainly Italy and more recently China, and they are products with a high unit value (i.e. ceramic colours). The trade balance of these products continues to be very favourable to Spain with the majority of countries. However, changes which are still minor today can be observed, because of the growing international competition and the boom of China in the production and international trade. This has led to the Coverage Rate of the imports being 693% in 2005.

Set out below, therefore, are a series of interesting details about the type of product prepared and exported by the Spanish industry, as well as their average unit value (Table 4).



	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
TURN OVER	319	397	488	541	625	652	716	835	862	925	908	949	984			
REAL (u.1993)	319	381	440	480	548	576	628	695	706	751	729	726	715			
EMPLOY 99/05							3296	3559	3735	3985	3896	3941	4017			

Source: SABI. Prepared in-house.

Figure 2. Evolution of invoicing and employment.

Products		Composition of the exports								Average price of the exports		
		Year 2000				Year 2005						
		Quantity		Value		Quantity		Value		Year 2000	Year 2005	Var.
	TARIC Code	Thou. Ton	(%)	Million €	(%)	Thou. Ton	(%)	Million €	(%)	euros / kg	euros / kg	(%)
Total	**3207**	**590**	**100**	**382**	**100**	**757**	**100**	**513**	**100**	**0,65**	**0,68**	**+5**
Colours	320710	31	5	83	22	58	8	144	28	2.68	2.48	-7
Glazes	320720	61	10	35	9	153	20	89	17	0.57	0.58	+2
Lustres	320730	1	0	2	0	3	0	4	1	1.65	1.31	-20
Frits	320740	497	84	263	69	543	72	277	54	0.53	0.51	-4

Source: Prepared in-house. AEAT. Foreign Trade Data Base. Chamber of Commerce.

Table 4. Composition of frit, glaze and colour exports. Years 2000 and 2005.

Between 2000 and 2005 there has been an increase in exports of products with greater added value, growth in weight of ceramic colours and glazes in comparison to frits, whose exports in physical units have barely moved (+9%) in comparison to those seen by ceramic colours (+87%) and glazes (+151%). In summary, between 2000 and 2005, the following variations have been seen: a) Increased amount: +28%; b) Increase in average price: +5%; c) Increase in value: + 34%.

Regarding the change in average price, if an annual sequence is observed, the increase basically corresponds to the year 2005, given that the 2000-2004 period showed minimum oscillation, between 0.63-0.66 €/kg, (which represents a constant decrease in euros). However, if we look closely, the average Price is higher (5%) because the reference mix has changed, i.e. the weighting of the components, the weight of the more expensive products increasing. However, individually, all the prices have fallen, with the exception of the price of the glazes that has risen slightly (+2%); thus, the average value of the other products has fallen: frit, 4%; colours by 7%; and lustres by 20%. With the initial weighing in 2000, on weight, the average price has fallen by 4%.

In 2006 it can be seen that export prices grow by 9%, positively supported on glazes (+5%) and frits (+12%), with a reduction in ceramic colours (-9%). In contrast, the evolution of the prices of raw materials has been adverse for the industry. Recently, natural gas and materials like zinc oxide have been trapped in spirals of increasing prices.

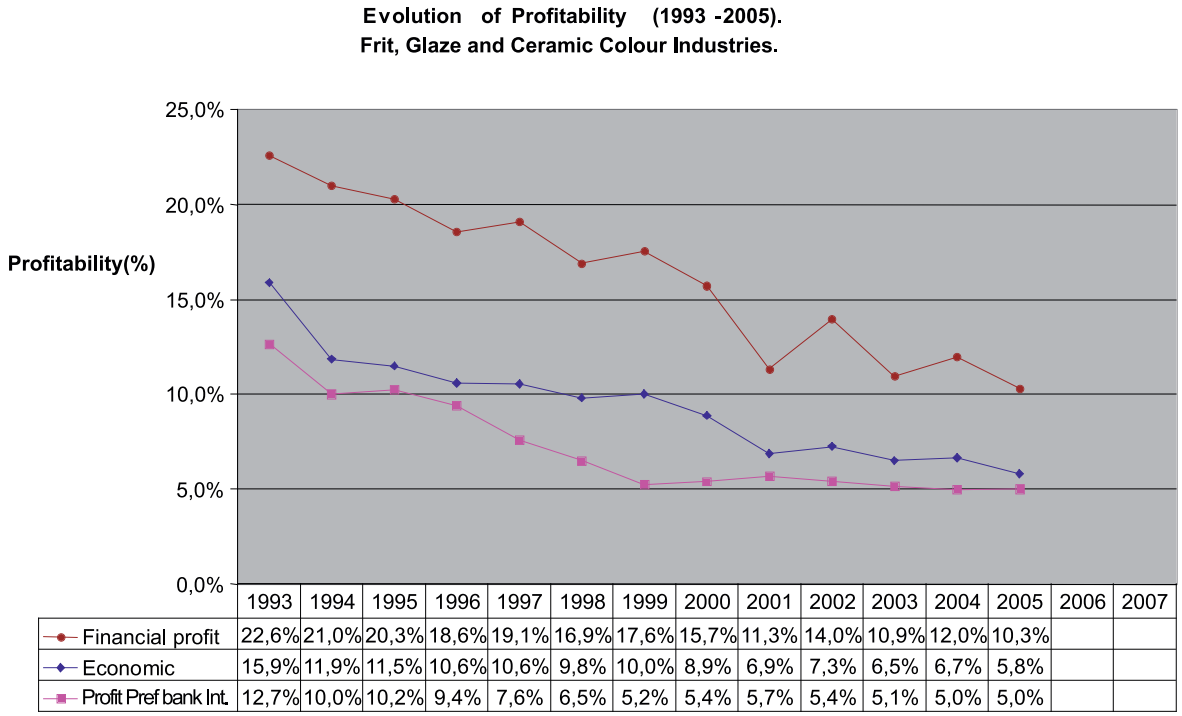
3.3. EVOLUTION OF THE RATE OF RETURN.

Finally, the evolution of capital returns in the glazing industry has been analysed (Figure 3). Profitability is compared with two preferential rates of interest granted to companies by banks (according to Bank of Spain data). It is seen that own funds have earned between 9-12 points more than the reference indicator, but this difference decreased intensely from 2000 onwards, to levels between five and eight points. Economic returns, applied to capital as a whole, have evolved in along with the reference indicator, only outperforming it by between one and five points. The behaviour varies by company. It has been seen that certain groups (Colorobbia and Torrecid) and companies specialising in colours have seen economic profits above those average for the sector.

MARTINEZ-ISAAC (2002) had already forecast that the sector would lose profitability in the 1990s, falling from 32% in 1990 to 15% in 2000. LLUECA and MARTINEZ (2002) pointed to the loss of productivity and profitability in the industry. The trend has therefore been confirmed. In ANÓNIMO (2003), reductions in prices and margins in the sector are highlighted as a consequence of greater competition, motivated by the appearance of new actors and strong industrial investment, which has also been shown in our study.

It has been effectively shown that during the period analysed, income has grown by almost two per cent below costs. These have evolved between 10% and 13% according to rates and with the exception of the cost of finance, which has fallen (1% per annum).

However, the composition of operating costs (Table 3) has remained steady through time. The two-year periods between 2004-05 and 1994-95 show similar averages in that the most striking differences in cost structures are produced in capital costs (depreciation, which increased by almost one point from 4.4% to 5.3%, and financial costs that reduced by the same amount during the period, from 2.4% to 1.5%. Personnel costs did not change (around 16%) but raw materials went down one percent, from 59.2% to 58.1%, as did other operating costs, which fell from 17.7% to 18.7%. These data do not reflect or show the important price rises affecting certain raw materials (zinc oxide) and natural gas.



	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Financial profit	22,6%	21,0%	20,3%	18,6%	19,1%	16,9%	17,6%	15,7%	11,3%	14,0%	10,9%	12,0%	10,3%		
Economic	15,9%	11,9%	11,5%	10,6%	10,6%	9,8%	10,0%	8,9%	6,9%	7,3%	6,5%	6,7%	5,8%		
Profit Pref bank Int.	12,7%	10,0%	10,2%	9,4%	7,6%	6,5%	5,2%	5,4%	5,7%	5,4%	5,1%	5,0%	5,0%		

Source: SABI. Bank of Spain. Prepared in-house.

Figure 3. Evolution of the rate of return.

It is relevant that in 2005 the results of the activity, following the trend set in earlier years, had fallen sharply, in general, because of a slow-down in income. In spite of this, the results of the financial period have decreased less in comparison with 2004 (only by 8%), thanks to the support provided by extraordinary-type profits and because corporate tax has been cut (thanks to an accounting application of a tax credit that allows future tax savings to be brought forward).

4. CONCLUSIONS. THE CHALLENGES AHEAD.

The Frits, Glazes and Ceramic Colours industry is made up of 27 manufacturers who together turnover 1,033 million euros and provided employment to around 4,000 workers in 2006. These magnitudes mean this industry comparatively outperforms the traditional industries of the autonomous region of Valencia, such as the toy industry. Immersed in the ceramic district of Castellón, it has contributed to the success of the Spanish ceramic sector, which turns over four times the amount.

This has arisen from the outsourcing of supply and processing of the raw materials for glazing. For just over thirty years it has been developing a strategy of continuous innovation that has led to it becoming the technology pillar of the ceramic sector, and another strategy of business growth, with its efforts towards internationalisation, both from a commercial standpoint, selling up to 60% of its production abroad, and installing new manufacturing plants abroad to provide services to clients in the area, taking a leadership position that is recognised by all.

It has been immersed in intense activity, supporting its clients in the fight for competitiveness in two senses: through its activities to improve the quality of the materials it offers, its functions, aesthetics and design, which results in greater differentiation for ceramic products; and through a structure that offers service to the client that includes not only help prior to manufacture of the product, such as design, but also later help with fine tuning and solving problems during the production stage.

The evolution of the activity has been studied starting at the beginning of the 1990s, with intense growth in all the critical variables (investment, turnover, employment, exports, etc), that refer to the high competitiveness achieved. However, recently stagnation of investment intensity has been observed (with the exception of recent investments made to adapt to environmental standards, adopting the best available techniques) and real turnover. Furthermore, the trend for the prices of energy and raw materials such as zinc oxide to rise has been eroding the operating margin and the results.

The consequence of this has been an intensive loss of profitability, which is confirmed in this work (it has fallen by 50% in just over a decade), especially pronounced since 2001, after which an escalation in the price of raw materials and natural gas has taken place, now accounting for 75% of production costs. Likewise, competitive pressure is increasing on the international market. With the expansion process of the Asian glaze industry, the deregulation processes since 2005, commercial problems are foreseen for the Spanish industry, which works with higher costs and faces investments imposed by environmental regulations that its competitors are not obliged to meet.

Only the permanent improvement in the quality of the product and the added service provided will allow this leadership position to be maintained. The solution may lie in adopting familiar strategies, although with new approaches which may even include changes in mentality. Firstly, the industry requires reorganisation (mergers and acquisitions, specialisation) and internationalisation should follow (the search for new clients, multilocalisation); finally, innovation must be encouraged, especially in collaboration with other actors in the sectoral system of ceramic innovation, to find the most relevant technological advances.

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