The Brazilian Ceramics Industry

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1 Introduction

The Brazilian ceramics industry is of great importance for the country because its share of the Gross National Product is in the range of 1 %. Brazil has a population of about 180 million inhabitants. Geographically, the population is mostly concentrated in the south and south-east of the country. Within this region the population is mostly concentrated in urban zones, a fact that is important for the analysis of the industrial distribution of the ceramic sector, for the research of consumption trends to meet the basic necessities of the population.

It is the convention in Brazil to define the ceramics sector in terms of segments which are, in turn, differentiated by the products, and more precisely, by the markets involved. The main segments are classified according to annual production values (Table 1) and the locations of production plants. The main European equipment manufacturers have production and assembly units in Brazil for all sectors. However, some production equipment is imported. The volume of Brazilian equipment and machinery production for ceramics manufacturing is about 25,000,000 US-$.

2 Building and Heavy Clay Ceramics

This segment involves perforated bricks, common solid bricks, structural blocks, sealing blocks, roofing tiles, glazed pipes, pavers and clinkers. This is a "grass roots" activity and in general focusses on civil construction from the simplest to the most sophisticated. Distribution throughout the country is in the form of individual proprietors and small companies, almost always as simple family businesses. Data collected show that there are 11,000 production units, each with an average of 25 to 30 employees, amounting to 250,000–300,000 jobs (Table 2). These process about 60,000,000 t of raw materials per annum. All steps of the manufacturing process have a substantial impact on transportation facilities and conditions as well as on the environment in the clay mining region (extraction).

The average distance to which the final products are delivered is about 250 km. Beyond this, transport costs become prohibitive. For roofing tiles, the distribution distances are up to 500 km and in some cases for specials, up to 700 km. Annual production is valued at 2,500 million US-$. These earnings remain in the areas where building and heavy clay ceramics are produced and have a considerable social impact due to job creation due to general civil construction, especially home construction.

Table 1
Production values for the main Brazilian ceramic sectors

Segment	Production Value [1000 US-$/a]
Building and heavy clay ceramics	2,500,000
Ceramic tiles	1,700,000
Natural raw materials	750,000
Refractories	380,000
High-performance and other ceramics	300,000
Sanitaryware	200,000
Tableware and decorating materials	148,000
Synthetic raw materials	70,000
Electroceramics	60,000
Manufacturing equipment	25,000
Abrasives	20,000
Total	6,153,000

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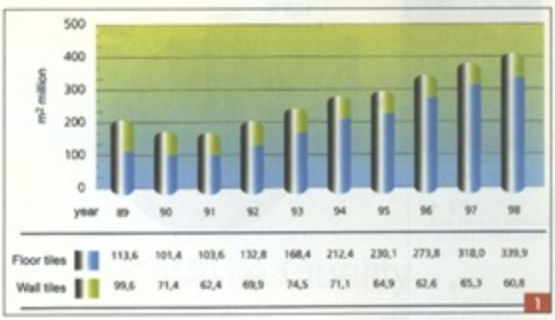


Fig. 1
Brazilian production of ceramic tiles (Source: Anfacer)

Table 2
General data focussing on the building and heavy clay ceramic industries

Brazilian production	60,000,000 t
Production value	2,500,000,000 US-$
Number of jobs	300,000
Exports to:	neighbouring countries

3 Ceramic Tiles

The production of ceramic tiles is one of the most important segments which has shown considerable technological advance. This segment is represented by 121 industrial units, producing wall tiles, floor tiles, facing tiles etc. to the extent of 400.7 million m² in 1998. This represents

Table 3 Data on the ceramic tile industry in Brazil	
Production capacity (1998)	455,000,000 m²/a
Production (1998)	400,700,000 m²/a
Production by dry processing	40 %
Production by wet processing	60 %
Production value	1,700,000,000 US-$
Number of factories	121
Number of jobs	25,000
Exports	155,000,000 US-$

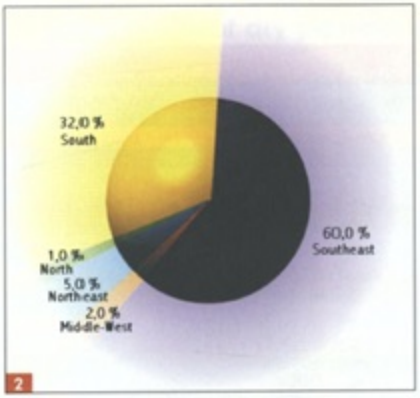


Fig. 2
Geographic distribution of installed production capacity of ceramic tiles (Source: ANFACER)

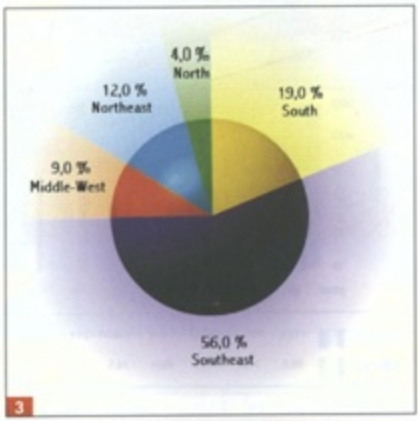
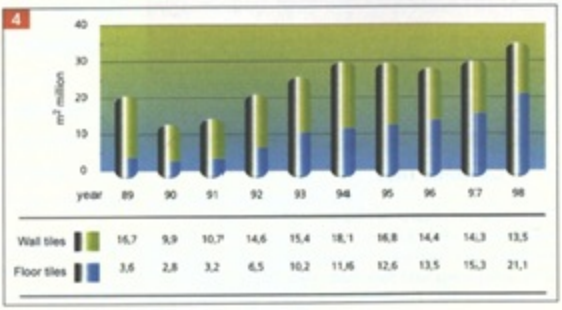


Fig. 3
Geographic distribution of apparent consumption of ceramic tiles (Source: ANFACER)

Fig. 4
Exports of wall and floor tiles (Source: ANFACER)

Fig. 5
Brazilian exports of ceramic tiles (Source: ANFACER)



88.1 % of the installed productive capacity of 455 million m²/a (Table 3). Brazil is the world's fourth largest tiles producer after China, Italy and Spain. Production decreased in 1989, recovered in 1993, remained stable during 1994/95 and increased in 1997, 1998 and 1999. The production value in 1998 reached about 1.7 billion US-$, with exports about 155 million US-$ for 34.6 million m². (Figs. 1–4). The per capita consumption is 2..2 m² in 1997, whereas in Italy, Portugal, Taiwan and Spain it is 3.1, 4.9, 5..5 and 5.5, respectively. There is still opportunity for growth in Brazil.

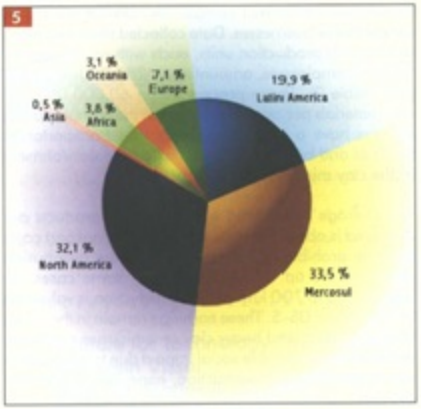
As regards foreign markets, Brazil can increase its market share. Italy and Spain export about 78 % of the world's market requirement and Brazil's share is only around 5 %. Almost 60 % of Brazil's exports go to North and Latin America with the exception of the Mercosul countries and Europe. About 33.5 % of the exports go to the Mercosul countries (Fig. 5).

4 Refractory Materials

This segment is composed of about 40 companies, seven of which have about 80 % of the nation's market share. The turnover of the refractory industry in Brazil in 1998 was 380 million US-$, producing 420,000 t (Table 4).

The decline in refractory consumption follows a global trend. The steel industry is the main consumer of refractories. Today's high-performance refractories allow a low utilisation index per t of steel. The fact that the refractory industry has to co-exist with the private steel sector has affected the performance of refractory manufacturers as the steel industries consume about 70 % of refractory production. The new buyers demand a lot more of refractory manufacturers, and the latter have been facing some serious problems in terms of prices and competition from foreign producers. These are the main reasons for concern about quality and productivity. Many industries have been working towards

Table 4 Most important data of the refractory industry	
Brazilian production (1998)	420,000 t
Production value	380,000,000 US-$
Number of jobs	4,000
Exports	38,000,000 US-$
Imports	23,000,000 US-$



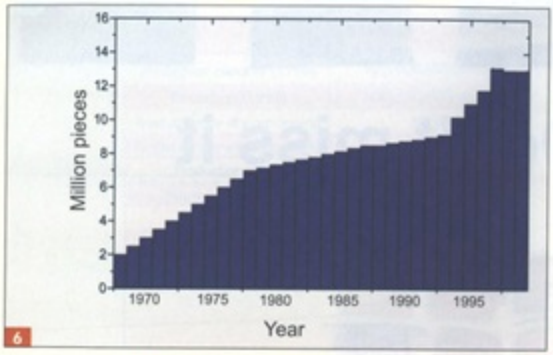


Fig. 6
Development of sanitaryware production (Source: ANFACER)

Table 5
Location of the Brazilian sanitaryware manufacturers

Company	Brand Name	Number of Factories	State
DECA	Deca	2	São Paulo
DECA	Deca	1	Rio Grande do Sul
INCEPA	Celite	1	Espírito Santo
INCEPA	Incepa	1	São Paulo
INCEPA	Celite	1	Minas Gerais
INCEPA	Celite	1	Pernambuco
IDEAL STD.	Ideal	1	São Paulo
IDEAL STD.	Ideal	1	Rio de Janeiro
ICASA	Icasa	1	Minas Gerais
HERVY	Hervy	2	São Paulo

Table 6
General data on the sanitaryware sector

Brazilian production (1998)	13,000,000 pieces
Production value	200,000,000 US-$
Number of jobs	6,000
Exports	800,000 pieces

implanting quality systems which contribute to increased product efficiency and cost reductions. Some have managed to receive certificates conforming to ISO 9000 norms which facilitates participation in foreign markets.

The refractory industry has also had to face international competition and has gone out to conquer foreign markets. Many companies in this sector have been successful in their attempts. Apart from Latin American countries – the traditional buyers of Brazilian products – these companies have found customers in the Middle East, Africa, India and Australia. The possibility of increasing export volume improved with the foundation of the Mercosul trading agreement. Many market niches in USA and Europe are also being supplied by Brazilian manufacturers. To meet technological developments in this area, the companies have renewed and signed new contracts for technological co-operation with Japanese, English and other companies. Recently, a financial and technological co-operation was set up between a group of English and Brazilian companies. This is considered to be the best approach to face highly competitive markets requiring technological innovations.

Table 7
Evolution of the tableware industry in Brazil

Year	Production	Domestic Market	Exports	Imports
1994	70,000 t 135,000,000 US-$	35,000 t 87,000,000 US-$	35,000 t 48,000,000 US-$	4600 t 5,500,000 US-$
1995	67,000 t 145,000,000 US-$	32,000 t 97,000,000 US-$	35,000 t 48,000,000 US-$	10,000 t 12,500,000 US-$
1996	63,000 t 142,000,000 US-$	30,000 t 95,000,000 US-$	34,000 t 47,000,000 US-$	9000 t 11,000,000 US-$
1997	50,000 t 90,000,000 US-$	28,000 t 73,000,000 US-$	22,000 t 27,000,000 US-$	8,000 t 10,000,000 US-$

5 Sanitaryware

There are five companies with twelve factories in this sector. Table 5 gives the locations of these companies. There are 4 new factories under construction in the states of Pernambuco and Paraíba. The production capacity is about 19,500,000 pieces/a, thus registering growth compared to previous years. The production in 1998 reached 13,000,000 pieces (Fig. 6) and employed about 6,000 persons. This segment is the world's second largest after China (Table 6).

The internal market is fully supplied with products ranging from the conventional to the more luxurious. The quality of Brazilian sanitaryware is good and a lot is exported to South and Central America. There are also exports to USA which require products according to US-norms. These manufacturers are developing systems for certification according to international norms (ISO).

6 Tableware

The tableware industry is one of the more traditional ones in the country; perhaps the precursor of the ceramic tiles industry. Even before the economy opened up, it was taking part competitively in foreign markets and was exporting a significant part of its production. However, in the last few years, a number of companies in this sector have closed and others have reduced their production capacity. There has been a gradual disappearance of industrial centres for individual proprietors and small companies. The tableware industry is considered to be labour-intensive (50–65 % of industrial cost value, and hence for this reason, is considered to be of high priority by countries such as China, Portugal and Great Britain).

The exchange rate of the national currency up to the beginning of 1999 has jeopardised this sector by making exports non-viable. Another factor is the low price of imported items from Asian countries. After the changes in the economic policy, the sector became more competitive. An overview of the tableware sector is shown in Tables 7 and 8.

200 companies are located in the south and south-east regions. These companies are OXFORD, SCHMIDT, GERMER, POZZANI, RENER, FIORI, VILA RICA and other individual proprietors or small companies concentrated in the city of Pedreira and of Porto Ferreira in the state of São Paulo and in Campo Largo, Paraná state.

7 Electroceramics

Five large companies focus on the production of electroceramics which are jointly responsible for the production of about 24 000 ts in 1998, corresponding to a production value of 60 million US-$ (Table 9). The

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Table 8
Data on the Brazilian tableware industry

Brazilian production (1998)	65,000 t
Production value	140,000,000 US-$
Number of jobs	30,000
Exports	30,000 US-$

installed capacity is 50,000 t/a, and is hence under-utilised. The factories are situated in São Paulo, Paraná and Ceará states, employing around 1,500 people.

To compensate for the decline of the internal market, increase in exports is being sought. These have risen over the years, attaining 15 million US-$ in 1998. The main markets are Latin America and USA.

Table 9
Data of the electroceramics production

Brazilian production (1998)	24,000 t
Production value	60,000,000 US-$
Number of jobs	1,500
Exports	15,000,000 US-$

The electroceramics segment is quite competitive on the international level due to the installed capacity and increasing participation of countries with highly competitive prices like India and China. The requirements of the external market and the barriers of the internal market have enforced the establishment of an adjustment process, in order to act competitively in these markets. These demands have been the main aspects that have promoted the reorganisation of the electrical ceramics industry in order to increase its level of participation.

In Brazil, the performance of this segment depends on the consumption of state-run electrical power companies. The reduced level of governmental investments and funding difficulties have reduced the opportunities for development. However, it is hoped that the Brazilian electric power complex will invest heavily in replacing and expanding its network with the objective of increasing the participation of electroceramics and to improve its standards of reliability and service. Some electric power companies have been contracting out expansion and line installation services, with the objective of reducing costs, thus offering new opportunities for the use of electroceramics, resulting in a consequent increase in demand for its products and extension of its activities.

8 Advanced Ceramics

The market for advanced ceramics in Brazil in 1988 was 250 million US-$. In 1998, it was about 300 million US-$. There are about 25 companies manufacturing high-performance ceramics. In addition, there are a dozen other small- and medium-sized companies manufacturing products such as guide wires, crucibles, tubes, mechanical seals etc. There are also companies manufacturing raw materials for the advanced ceramics industry.

9 Raw Materials

This segment is fundamental to the ceramics sector as processing and product manufacturing are closely linked to the quality of the raw materials used. The companies usually have their own reserves and mines.

Nevertheless, the changes that have taken place in the ceramic producing companies have resulted in shifting the supply of raw materials to third parties. The suppliers in general (small-scale) can be found distributed all over the country, almost always close to the centres of consumption. The estimated market for natural raw materials is 750,000,000 US-$ and for synthetic raw materials is 70,000,000 US-$.

10 Teaching and Research

In Brazil, about forty teaching and research institutions have laboratories that are involved mainly in ceramics research and development. The 1996 study conducted by *Prof. Dr. Edgar D. Zanotto* about the occupation trends of graduate material engineers reveals that 27 % of graduates remain in the same university or institute and that the remainder are employed by the ceramic sector. Of these 17 % are employed in the refractory industry, 13 % in the technical and electronic ceramics industries, and the rest in other ceramic sectors. The ceramic tiles sector stands out as it is employing more and more materials engineers. According to the same study, the number of professionals was estimated to be 200 materials engineers with graduate degrees only, 220 with master's degrees and 110 with doctorates. A steady increase in the number of engineers in the years to come is forecast.

11 Organisations Linked to the Ceramics Sector

The Brazilian Ceramics Association has registered various organisations linked directly or indirectly to the ceramics sector. The associations linked directly to ceramics are about 35 organisations and 40 syndicates. Taking Brazil's size into consideration, it is obvious that a large number of institutions are regional. The Brazilian Ceramics Association publishes two technical journals and has been organising the annual Brazilian Ceramic Congress since 1954. About 500 papers were presented at the last congress in which about 800 participants took part.

12 Fairs Focussing on Ceramics

Despite the position occupied by the sub-sectors of the Brazilian ceramic industries in the world, the number of fairs exhibiting products and recent developments in the area of ceramics is limited. These fairs are linked to the civil construction sector and to organisations such as the Brazilian Ceramics Association that promote and disseminate technical and scientific research.

The most important fairs held regularly are:

- FEICON – International Fair of the Construction Industry (held annually in São Paulo)
- FEHAB – International Fair of the Housing Industry (held annually in São Paulo)
- CONSTRUIR – Civil Construction Fair (held bi-anually in Rio de Janeiro)
- FIEPAC – International Exhibition of Ceramic Equipment, Products and Art Work (held annually by the Brazilian Ceramics Association in São Paulo and Florianópolis)
- FETEC – Maximiliano Gaidzinski High School Fair (held bi-annually in Criciúma, SC).