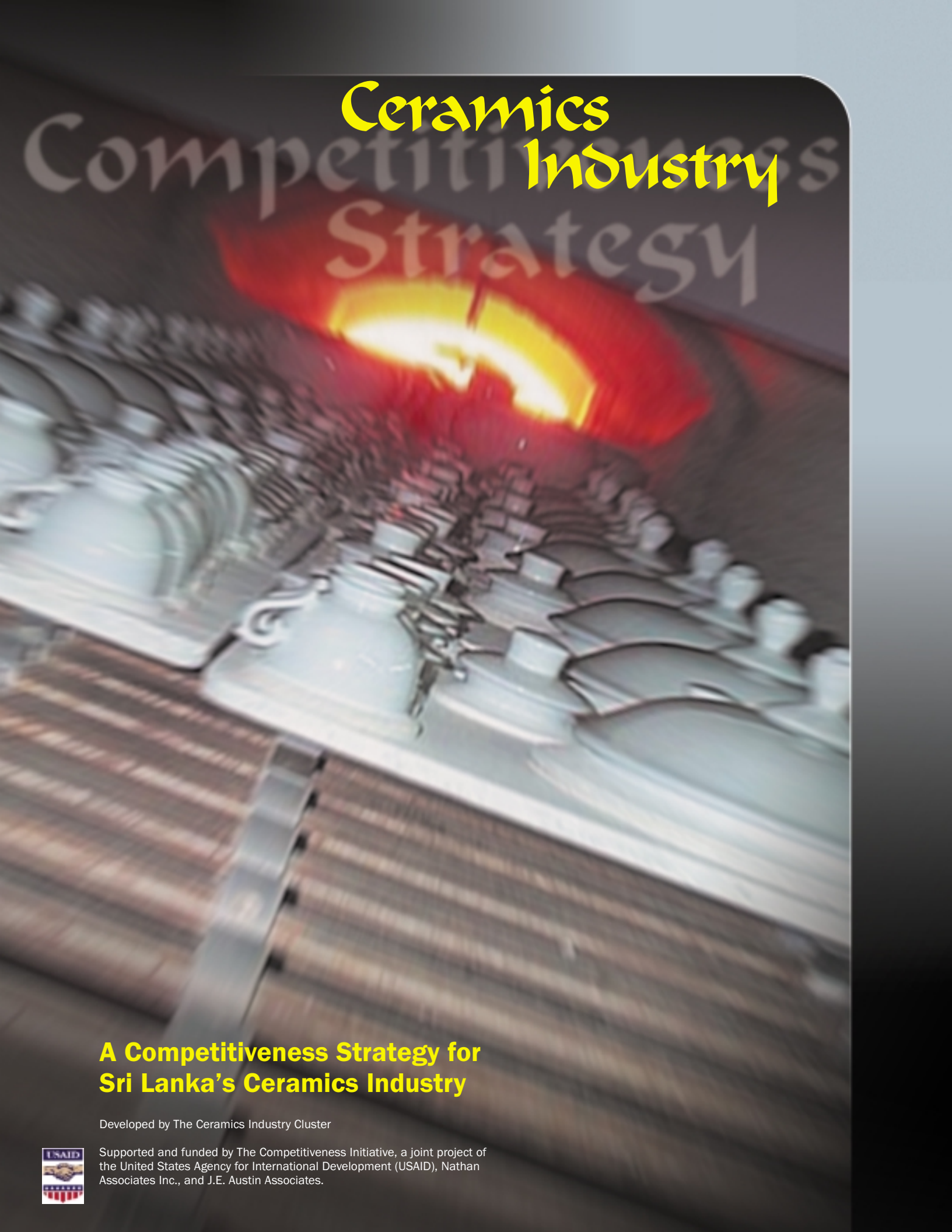

Ceramics Industry

A Competitiveness Strategy for Sri Lanka's Ceramics Industry

Developed by The Ceramics Industry Cluster

Supported and funded by The Competitiveness Initiative, a joint project of the United States Agency for International Development (USAID), Nathan Associates Inc., and J.E. Austin Associates.

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This report outlines a strategy for Sri Lanka's competitive success in ceramics. It distills assessments of Sri Lanka's opportunities for and constraints on achieving competitiveness. The recommendations herein chart a path for growth that can resolve near-term barriers and set the stage for medium-term and long-term progress in Sri Lanka's ceramics industry.

Contents

ILLUSTRATIONS

Figures

Table

Photographs

Executive Summary

The quality of Sri Lankan ceramics is equal to or better than that of any Asian competitor and is comparable to that produced anywhere in the world. The level of skill reflected by this accomplishment, combined with ready access to most of the raw materials necessary in the industry, should make Sri Lanka a world leader in traditional ceramics products. With about US$47 million in exports per year, however, Sri Lanka controls less than one percent of the global market and its market share in several countries is eroding.[1] Low-cost, high-volume producers, such as China, are quickly learning the trade and moving into high-quality product categories. Sri Lanka's ceramics industry cannot compete with such producers on price; it must instead make itself known in global markets by focusing on continuous improvement, innovation, and upgrading.

The ceramics industry in Sri Lanka has three segments: tableware, both porcelain and stoneware or earthenware; ornamental artware, such as figurines; and ceramic tiles. Each segment exports to foreign markets and sells through buyers and wholesalers, with little or no direct contact with retailers or consumers. No segment has established its own recognized brand name, which severely limits sales prices in the export market.

A major strength of Sri Lankan industry in general is its exceptionally effective, well-trained workforce, which produces high-quality products. While good theoretical and technical education is available, little attention is paid to practical training, and, therefore, no facilities or equipment are available in the educational system. Each manufacturer's technical capability is adequate to meet present needs, but there is little capacity for growth in the industry overall. Supply-chain management is lacking, with internal efforts focused mostly on process issues, such as the high cost of energy. Sri Lanka does not have local petroleum or natural gas resources, as do most Asian competitor nations. And while excellent raw materials are available locally, the supply is inconsistent and must be sourced from a quasi-

[1]Central Bank of Sri Lanka, *2001 Annual Report, Exports of Sri Lankan Ceramics in 2000.*

monopoly. Thus, most companies import a certain percentage of their raw materials, including kaolin and ball clay. Internal supplies of support materials, such as refractories and grinding media, are scattered and ineffective. The industry has not yet undertaken joint purchasing of these materials. In addition, communication among industry members is fragmented.

The Ceramics Cluster has identified three strategic initiatives that will help the industry address these constraints and become a leading provider of ceramics products:

- ***Design and Marketing Excellence.*** This initiative calls for face-to-face meetings with customers, branding, the creation of a "Ceylon Quality" umbrella for worldwide recognition, publicity through several government agencies, and a search for new markets.
- ***Supply Chain Management.*** This initiative calls for energy cost management, planning for joint purchasing and management of the internal supply chain, and process control and productivity improvement.
- ***Centers of Technical Excellence.*** This initiative calls for upgrading the technical workforce and leadership in new technologies and industries. It involves unifying three entities into a leadership group for advanced technology and training, creating a certification agency in conjunction with the Ceylon Quality umbrella, linking with an international university, upgrading technical facilities and test equipment, and continuous internal training.

The success of these initiatives will depend in part on overcoming the historical reluctance of the industry to deal with retailers and consumers and threats posed by technical breakthroughs among competitor nations. It will also depend on continuously monitoring fashion and industry trends and using benchmarking exercises to keep up with leading competitors.

The Competitive Environment for the Ceramics Industry

The ceramics industry in Sri Lanka is composed of three segments: tableware, both porcelain and stoneware or earthenware; ornamental artware such as figurines, statuary, and decorations; and ceramic tile, including wall tile and floor tile. Ceramics is part of the fashion industry, a business in which *perception creates demand.* Product standards are therefore driven by perceptions of style and design. The profitability of Sri Lanka's ceramics industry is suffering from a lack of brand identity—a marker of style and design. This lack of brand identity limits the options for increasing sales prices and in competitive markets drives down profitability. Poor supply chain management, high energy costs, and weak technical management are also hindering profitability.

Sri Lanka's high cost of energy, primarily gas, as a percentage of operating costs—20 to 45 percent—leaves the ceramics industry at a disadvantage when compared to oil- and gas-rich Asian competitors who can compete on the basis of lower price. And, while Sri Lanka's factory labor force is competitive with other Asian nations, its relatively short supply of skilled technical management hampers advancement. The technology base for ceramics manufacture is primarily acquired through experience and on-the-job training, but scattered centers of knowledge in Sri Lanka could, if properly organized, move the industry into newer, more competitive areas.

The ceramics industry as it stands can strengthen its market position and move into new markets with a different technology base—given the right mix of industry coordination; support from academia, research institutes, and government; and establishment of a policy environment conducive to the growth and betterment of all Sri Lankans.

This report explores how the industry can transform itself. It first examines the opportunities for and constraints on the competitiveness of Sri Lanka's ceramics industry, then recommends a strategy with specific initiatives to set the stage for industry growth.

INDUSTRY CONSTRAINTS AND OPPORTUNITIES

Global Market Context

In recent years the ceramics industry has undergone vast change. The manufacturing base is moving from traditional centers in Europe (Stoke-on-Trent, Limoge, Bavaria), Japan (Nagoya) and the tri-state area of the United States (New York, New Jersey, Connecticut) to East and South Asia, Eastern Europe, and South America. Manufacturers from the traditional centers are seeking to lower costs by (1) decreasing consumption of high-cost, and therefore lower margin, material; (2) moving production to areas with low labor costs, with subsequent damage to traditional employment; and (3) outsourcing production. Given high costs in developed markets, manufacturers are attempting to stay viable by moving away from traditional ceramics into more leading-edge products—higher value added products and services. At the same time, retailers are finding designs and products from emerging markets more attractive and "traders in places such as Hong Kong are realizing that the expensive ware from Europe and Japan could in many cases be made in Indonesia, Sri Lanka and China."[2]

Consequently, increasing competition among Asian nations has forced companies to relocate. Factories in the Philippines have shut down and moved to Vietnam, factories in South China are looking to move into the North or Center of the country, and factories in South Korea and Japan have moved to China or Indonesia.

In addition, an increase in casual dining is changing buying patterns, decreasing the popularity of formal tableware from famous established brands. Tableware is now a fashion item with a relatively short lifespan. This means that design, marketing, and the timeliness of design in the tableware segment are more important than ever.

Also important is increasingly stringent food-contact legislation being introduced in the United States. Worldwide standards, however, are not uniform and confusion exists about the differences between standards.[3]

Production Trends

Production in traditional tableware manufacturing regions decreased by US$750 million in the five years to 1997, while Asian production increased by US$1 billion. European Union (EU) hotel ware manufacturing continues to do well, but is being hit by peak tariffs in

[2]*Asian Ceramics & Glass Magazine,* October 2001.

[3]These standards include European standards, standards of the U.S. Food and Drug Administration, and California's "Proposition 65."

traditional markets such as the United States—a situation created by Chinese producers targeting the U.S. market with low-price imports and pushing EU producers out in some areas.

Employment Trends in the European Ceramics Industry

Employment in the ceramics industry as a whole decreased by an estimated 24.9 percent between 1992 and 1997. In the tableware sector alone employment fell an estimated 33 percent between 1992 and 1996, and another 26 percent from 1997 to 1998. In the United Kingdom, market share and production fell approximately 10 percent in 1998 compared with 1997, and then another 5 percent in 1999. Turnover and total employment in traditional ceramics was down by 25 percent between 1996 and 1998. Twenty percent of that drop occurred in 1998. Profitability halved over the same period. Employment in the ceramics industry in the UK accounts for 1 percent of all UK employment, but in Stoke-on-Trent 51 percent of jobs are in ceramics and related industries.

In Germany, low-price imports were blamed for a 4.4 percent fall in employment from 1997 to 1998. In France, three ceramic factories closed in 1998, costing more than 500 jobs. In Italy, employment fell an estimated 48 percent between 1997 and 1998, and in Portugal it fell 35 percent in the same period.

The "China" Factor

In China, about 800 medium and large firms and more than 1,000 smaller enterprises specialize in ceramic and porcelain products; 50 to 60 percent of factories use imported production lines (about 2,000 sets of advanced facilities and machines come from Italy, Germany, and Japan); and ceramic companies employ approximately 500,000 staff and have annual output of more than 10 billion pieces, accounting for 60 percent of world output. The ceramics industry in China is characterized by locally sourced raw materials, low labor costs, heavy government subsidies, and state ownership of most large companies. It is also developing technologies and equipment to reduce pollution, cut energy consumption, and improve technological process and product quality.

Though it is the world's biggest producer of daily ceramics, China's reputation among buyers is based less on quantity and more on price. Most Chinese products are between 10 and 100 times cheaper than those produced in Germany and Japan. At the same time, however, quality suffers. Products from the mainland have been viewed as inferior, largely because many manufacturers have failed to invest in new technology and still use traditional manual methods. But this is changing. Most of the mainland's major ceramics manufacturers, determined not to be left behind, have spent the last decade upgrading equipment, often with the help of overseas investment from Taiwan or Hong Kong. With the entry of China into the World Trade Organization quality standards may very well have

to be revamped. In addition, a new industrial system has begun to take shape, involving research and design institutes, colleges, and specialized enterprises.[4] Moreover,

> Manufacturers (in China) are improving quality and adding value to their products, from materials sourcing to packaging. They get support from ceramic and porcelain institutes, R&D groups and certification organizations established to promote industry.[5]

Not surprisingly, most Sri Lankan ceramics manufacturers are threatened by Chinese products flooding local and international markets. Competition among Asian manufacturers of ceramics—especially those in China and South Korea—is forcing suppliers closer to home, such as India, to explore new markets and consider producing a range of contemporary products more attuned to global tastes. In fact, under its Export Promotion Council, the Government of India is launching an export drive in 2002 to boost awareness of Indian ceramic products among overseas buyers, especially in markets in Brazil, Argentina, and Canada. Such initiatives involve

- Providing exporters updated information on design trends and product development;
- Obtaining professional advice and service for improving technology, product design and quality, and packaging standards and specifications;
- Sponsoring sales and study delegations of member exporters to buying countries;
- Organizing meetings of exporters with international experts on gifts and handicrafts;
- Supporting industry workshops and seminars;
- Participating in specialized international trade fairs abroad; and
- Organizing product exhibits for the Indian Handicrafts & Gifts Fair in New Delhi, said to be the largest fair of its kind in Asia.

U.S. Market

Two growing sectors of the U.S. market—tableware and ceramic tile—hold promise for the Sri Lankan ceramics industry. Since 1998, the U.S. tableware market has been growing 4 to 5 percent per year and the ceramic tile market approximately 7.7 percent per year.

The U.S. tableware market includes dinnerware, flatware, glassware and crystal, and ornamental artware. Sales in that market are estimated to be approximately $5.3 billion for 2002. Most sales growth is channeled through mass merchants, and recent growth has been

[4]*Peoples Daily,* 1999.
[5]*Global Sources Ceramics and Porcelain 2000.*

driven by consumer demand for high quality, fashion, and value. Price is also a demand, but to a lesser extent. Ornaments that reflect sentimental value are in high demand, including ornaments commemorating occasions such as weddings, births, or anniversaries. To benefit from this growth and the emphasis on fashion, Sri Lankan producers—already manufacturers of high-quality items—need to acquaint themselves with fashion trends by cultivating closer relationships with customers.

Based on raw material usage, the U.S. ceramic tile market is approximately three to four times the size of its tableware market. And per capita, it is the fastest growing in the world.[6] The market is dominated by imports; in some areas up to 70 percent of products sold are foreign manufactured. The U.S. market is expected to grow by 7 to 7.5 percent in 2002, especially in the high-end, design- and style-sensitive segment. Wall tile manufacturing is in a state of flux with several significant manufacturers being bought by other floor covering companies. Market potential exists for good quality, fashionable tile with accompanying trim shapes.

Sri Lanka Market Context

The Sri Lankan ceramics industry produces high-quality products, enjoys abundant raw materials, and has a solid, trainable workforce. It does, however, have weaknesses, including

- Lack of brand awareness and quality recognition,
- Lack of understanding of consumers,
- Lack of cost-effective energy sources,
- Inconsistent quality in raw materials and inadequate internal value-added capabilities,
- Unpreparedness for advanced technology and expanded markets,
- Government and policy environment not conducive to growth, and
- Scarce or costly financing options.

Brand Awareness and Consumers

In the tableware segment the products of the Sri Lankan ceramics industry are comparable to such brands as Royal Doulton, Wedgwood, and Lenox. The ornamental artware segment produces value-added goods comparable to Spain's Lladro products. And, thanks to a highly skilled and trainable workforce, product quality exceeds that found in competing Asian nations—China, Malaysia, Indonesia, and Thailand. But even though its products are

[6]The U.S. market is the fastest growing even though the U.S. consumer buys only 6 to 7 square feet of tile per year per person. Europeans buy 22 square feet; and Italians, 44 square feet.

judged to be equal to, or superior than, internationally recognized brands, the industry is not recognized by brand or country of origin. Most important, the industry does not truly understand its ultimate consumers and views its "end user" as the buyer with whom Sri Lankan manufacturers have been dealing for years.

Skilled craftspeople contribute to the world-class quality of Sri Lanka's ceramic products. Product quality exceeds that found in competing Asian nations.

Energy Sources

Sri Lanka does not have the large oil and natural gas deposits of Asian competitors such as Indonesia and Malaysia, so it must import liquefied petroleum gas (LPG). Energy costs are therefore high, but some of this cost disadvantage may be the result of poor energy management in individual companies.

Raw Materials and Value-added Capabilities

Sri Lanka's ceramics industry is able to produce high-quality products because it has an abundant supply of raw material (kaolin, feldspar, quartz, dolomite, and ball clay in its southeastern and central regions). The geographic distribution of the industry also reflects product categories and the availability of raw material. For example, tableware is manufactured in Piliyandala and Negombo; porcelain in Mathale, Dankotuwa, and Kosgamuwa; and tiles in Balangoda, Jalathara, Horana, and Meepe.

The Geological Survey & Mines Bureau (GSMB), formerly the Geological Survey Department, has identified mineral deposits of economic importance. Reserves for some mineral commodities cannot be estimated mainly because they occur in veins, pockets, and lenses rather than as continuous and extensive deposits. Most known mineral reserves are inferred. Assessing the tonnage of proved reserves for each mineral commodity requires detailed investigation. But most reserves—inferred, proved, or exploited—are sufficient for periods of 20 years and more, the approximate period for the amortization of most industrial units.

Sri Lanka is blessed with high quality raw materials necessary for the ceramics industry. These storage bins contain feldspar, dolomite, and silica sand.

Despite the abundance of non-metallic minerals, some raw materials, such as kaolin and ball clays, must be imported from the UK or elsewhere to satisfy the whiteness of body needed for porcelain tableware. In addition, problems with the quality and consistency of raw materials have led the industry to import machinery, specialized materials, such as stains, and some raw materials. The Lanka Ceramics Ltd. group is the only company that has fully diversified operations in ceramics ranging from tiles to crockery to sanitary ware. It also controls about 80 percent of the supply of raw material.[7] This quasi-monopoly on raw materials, such as kaolin and feldspar, may be causing actual or perceived inconsistent quality in those materials.

In addition, internal value-added capabilities are inadequate. For example, the local decal transfer printing industry has not been able to produce decals of picture quality with half tones, so product must be sourced from China or Japan.

Advanced Technology

As currently defined, Sri Lanka's ceramics industry can succeed with the technology it has but it should begin preparing for the future. The lack of technology transfer, particularly for potential new areas, and inadequate communication and direction between the ceramics industry and potential technology resources is impeding industry growth. The industry is especially lacking in research and development (R&D) and technical support. Higher technology is available for advanced ceramics but there must be coordination among several laboratories and universities.

Government and Policy Environment

Government and policy environment constraints involve public investment, laboratory access, mining, import regulations, and labor laws. Since the 1980s, more than 25 Sri

[7]This supply is expected to last for at least 20 years.

Lankan ceramics enterprises have received Board of Investment (BOI) approval, with total investment estimated at more than Rs. 3,900 million ($US59.3 million). But public investment in training, testing, and R&D, has not kept pace with industry growth. The testing laboratory at the Ceramic Research and Development Corporation (CRDC) has been privatized and its use since restricted to several firms because of confidentiality issues. This restriction has left a technology gap because the laboratory is the most technically advanced organization for advanced ceramics and physical plant. In addition, significant deposits of strategic raw materials under residential areas have remained untapped because of zoning regulations.

According to the Director General of Sri Lanka Standards Institution (SLSI), Imports (Quality Control of Ceramic) Regulation 2000 has been issued under the Imports and Exports (Control) Act No. 01 of 1969 (as amended by Act No. 48 of 1985 and Act No. 27 of 1987) by Gazette notification (2000/02/29). In accordance with the regulations, all ceramic ware imported to Sri Lanka and intended for use with food must conform to permissible limits for cadmium and lead release stipulated in the regulation. Importers are required to give the Director General of SLSI a certificate of compliance for each consignment imported. Such certificates should be obtained from an accredited agency in the exporting country recognized by the SLSI. Samples for testing will be drawn from ceramic consignments, as necessary, to ascertain conformity with the regulation's requirements. Local firms and consumers, however, are concerned about low-price, hazardous imports, some of which have found their way into the country despite safety regulations and may pose health risks because of their lead or cadmium content.

Labor issues have lately been raised as a considerable hindrance to industry evolution. Specifically, the inconsistency and lack of uniformity in labor laws is hampering workforce development.

Financing

In general, companies grow steadily by reinvesting profits or quickly by accepting financing through external investors and being willing to dilute ownership. But in Sri Lanka local investment capital is scarce and interest rates for traditional bank loans are prohibitively high. In 2001, for instance, a bank customer could obtain a collateralized loan at an interest rate of 18 to 22 percent annually. Loans denominated in foreign currency are available at an interest rate of 4 to 6 percent, close to international corporate rates, but to be eligible the business must have foreign currency earnings. A business with an overseas presence and seeking debt financing on international markets can find cheaper capital, but must bear the risk of exchange rate fluctuations. Such fluctuations may add 8 to 10 percent annually to the cost of capital for companies relying on local revenues or substantially more if the rupee is severely devalued. Sri Lanka's lack of investment capital and high interest rates are significantly restricting growth in most industries, including ceramics.

The Ceramics Industry Cluster

The Ceramics Cluster was formed with the help of The Competitiveness Initiative, a USAID-funded project, to devise a unified, industry-wide strategy for competitiveness. Because it includes members from across the business "value chain"—government agencies, academia, and allied and supporting industries—the cluster is a proxy for the ceramics industry and is a special forum for examining and representing the interests and needs of the entire industry.

The cluster is composed of the chief executive officers of manufacturers and suppliers from the three industry segments; senior officers of government agencies, such as the BOI and the Export Development Board (EDB); representatives from universities and research and testing organizations; the President of the Sri Lanka Association of Ceramic Manufacturers & Exporters (SLACME); and former ceramics industry executives. Because energy is a major cost component of the industry, two major energy companies participate in cluster activities, and other companies from allied and supporting industries are brought in as needed. The core of the cluster includes representatives from all of these groups and is chaired by Sunil Wijesinha, Chairman, Dankutowa Porcelain. The cluster held its first meeting April 16, 2001.

In addition to pursuing a competitiveness strategy, the ceramics industry, through the cluster could serve as a "test case" for resolving competitiveness issues facing other industries in Sri Lanka. For instance, all cluster members operate as contract manufacturers, selling their products under the brand names and labels of others. Some Sri Lankan industry products already have international recognition as value-added products (Noritake Porcelain Tableware, for example), but this recognition rarely translates into awareness of Sri Lanka as the product source. The cluster can raise general awareness of the value of standards, trademarking, and name brand recognition for quality in the market place.

It can also lead the way in showing how an industry sets and achieves standards and brand recognition and protects those with trademarks and other protection afforded intellectual property. The cluster is also well structured to influence suppliers and purchasers, especially foreign companies, so that the local supply chain is better integrated. The increasing number of foreign material suppliers opening missions in Sri Lanka is evidence that the global ceramics industry already recognizes the significance and potential of Sri Lanka.

THE COMPETITIVENESS STRATEGY

The objective of the industry strategy is to *pursue continuous improvement, innovation, and upgrading and so earn a global reputation for high quality and value.*

The entire industry can benefit from a coordinated approach to improvement. For instance, the industry, acting as an effective cluster, can help bring local sources of technology together, creating a synergy that will benefit both business and the university and technical sector. The industry could also benefit from help potentially available through U.S. or European universities. And, while the industry may consider energy costs as its most important issue, it should make the value-added business chain its top priority.

Value Addition versus Cost Cutting

Analysis of the industry's value chain indicates that products made in Sri Lanka, and unbranded, sell to buyers or wholesalers for 20 percent of the retail sales price in the UK, 16 percent of the retail price in Japan, and 12 to 15 percent of U.S. retail prices. The wholesale buyer sells to retail at 50 percent of the retail sales price. This means that there is a price differential of 30 to 38 percent of the retail price, minus distribution costs, that can be considered a target and available for an industry with branded products capable of being sold directly to some retailers. In other terms, this amount is equal to 1.5 to 3 times the present selling prices to wholesalers. Improvements in this chain can outstrip energy savings.

Consider the following (see Figure 1):

- A manufacturer sells a product for $.20 to the buyer/distributor, who sells it to a retailer for $.50, who sells it to a consumer for $1.00.
- Assuming a 50 percent of sales cost to manufacture, manufacturing cost is $.10, profit on sales is then $.10
- Energy costs are 20 percent of manufacturing costs, or $.02; even a 50 percent savings in energy is $.01
- If the manufacturer bypasses the bulk buyer/distributor and sells branded goods at even $.40 to a large retailer, his profit is now $.30 or 30 times a 50 percent energy savings!

Although energy issues are important, real profitability in the industry lies in bypassing the buyer or distributor, or both.

Baseline Advantages

Sri Lanka has two important comparative advantages for a successful ceramics industry—abundant raw material and a trainable workforce.

- ***Raw material.*** Current industry segments—fine tableware, ornamental artware, ceramic tiles, and a minor sanitary ware business—are based on exploiting Sri Lanka's abundant

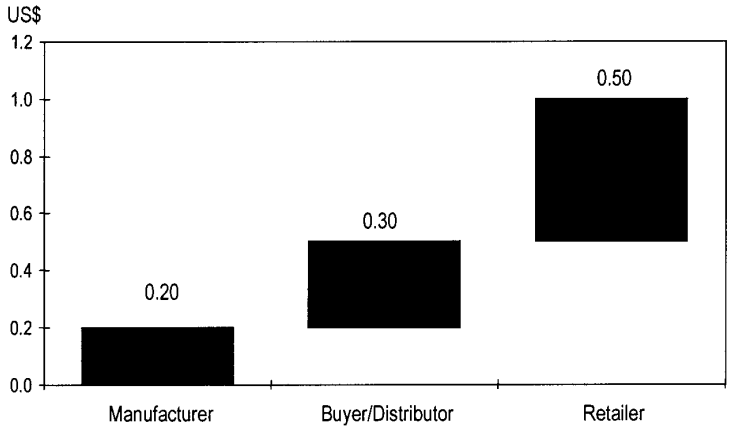


Figure 1. Net Revenue Per Ceramic Item for Each Component of Value System

supply of naturally occurring clays and minerals—kaolin, feldspar, quartz, dolomite, and ball clay. (Ball clay has higher iron and titanium content than desired for some products.)

- ***Trainable workforce.*** Although lagging technologically in some areas, the industry has a trainable workforce. In fact, industry experts consider the quality and cost of the workforce a powerful advantage. In recent years, however, inflation and rising wages have eroded the advantage of low costs, and the general perception is that Sri Lankan labor is no longer cheap. The ceramic industry in Sri Lanka employs more than 20,000 people—2,000 to 4,000 of these in the tile sector, and 16,000 to18,000 in the other sectors.

The Market

In a global context, Sri Lanka's market share has not increased from its early levels. According to the International Trade Centre (ITC) in Geneva, its market share in the tableware segment, which includes other household articles is .65 percent; in ornamental ware, .92 percent; and in glazed tiles (wall and floor), .19 percent.

Tableware, Ornamental Ware, and Tiles

Sri Lanka's largest buyers of tableware and ornamental ware are the United States and the UK. In 2000, Sri Lanka exported almost Rs. 2 billion (US$ 22.4 million) worth of tableware and more than Rs. 0.6 billion (US$ 6.9 million) worth of ornamental ware. Table 1 shows the striking contrast of the rupee/kilogram of exports to Germany when compared with the rest of the exports. The average value of exports to Germany is about 3.5 times the weighted average value of 1kilogram of exports to the rest of the world in tableware, and

Country of export	Tableware			Ornaments		
	Units Kg (000)	Rs (millions)	Rs/Kg	Units Kg(000)	Rs (millions)	Rs/Kg
United States	2,566.1	792.6	308.90	672.1	444.9	661.96
Germany	318.9	326.8	1024.80	66.6	77.4	1162.16
United Kingdom	887.2	243.9	274.91	93.4	29.1	311.56
Italy/Canada	757.1	199.0	262.85	33.7	21.3	632.08
Spain/Belgium	263.3	63.7	241.93	4.5	4.2	933.33
Japan	154.4	54.7	354.30	35.7	28.1	787.11
Other		309.0			6.5	
Total		1,989.6			611.5	

SOURCE: Sri Lanka Customs, 2000.

Table 1. Exports of Sri Lankan Tableware and Ornaments

almost twice the value in the ornamental category. This implies a high level of value addition to Germany and indicates a market worth exploring.

Because of the barriers to entry, local exporters, especially in wall tiles, should not pull out of difficult regional markets, but rather try to identify and exploit niche markets like those they have cultivated in the United States. Local producers should also maintain their presence in these markets, although the margins may be small or operations merely break even. In the short-to-medium term, manufacturers and exporters should build on their success in the North American market where value-added Sri Lankan products have found a niche, and, in the long-term, apply the lessons learned there to other markets.

Porcelain

Unlike the tile and wall tile market, Sri Lanka's porcelain market is export-oriented. It has also grown in volume and value in the last five to six years. Sri Lanka's volumes of porcelain are small compared with that of porcelain tableware giants from Germany, Japan, and the UK. But it has established a reputation in Western markets for having reasonably priced products comparable in quality to the best in the world.

Porcelain tableware exports are generally more price- than product-oriented. Famous brands in the porcelain industry, such as Noritake, have set up factories in Sri Lanka to take advantage of the high-quality raw materials and low labor costs. Thus, they are able to offer reasonably priced products of excellent quality to foreign markets. As such, Sri Lanka's exports have established strong markets in North America and Italy. Regional competitors, who offer lower prices for lower-grade products, cannot erode Sri Lanka's export market if the industry focuses on (1) a porcelain market driven by quality not price and (2) niche markets where value is more important than volume (necessitated by capacity constraints).

Related and Supporting Industries

Research and Development

Sri Lanka's ceramics industry needs more R&D support, especially to make the most of its raw materials. One firm, after doing research at the R&D laboratory belonging to the Lanka Ceramics Group, developed glazes from local raw material. It then substituted these glazes for the more expensive imported glazes in some of its products, cutting costs by around 10 percent. But this example is an exception.

Because ceramics is a "thrust industry," its members believe that research on the sector should be jointly shared, possibly through government assistance. At present, CRDC, the only institute dedicated to the industry, lends R&D assistance to only certain segments. CRDC was meant to service the entire industry, but was handed over to Lanka Ceramics Ltd. (LCL) when LCL was privatized. This has caused some concern among other firms who could benefit from access to the laboratory. Other companies are concerned about the consistency and quality of the materials issued by LCL, which controls 80 percent of the raw material supply and is the only company with fully diversified operations in ceramics.

Although the Industrial Technology Institute (ITI) has capabilities that would greatly benefit the industry, major companies are only now beginning to explore these resources. Information flow and direction between ceramic companies and the CRDC and ITI is poor. Given this situation, it is imperative that the industry collaborates to position itself in the global marketplace.

Packaging and Transport

Most companies outsource packaging, but a few have their own packing plants. Transport costs in Sri Lanka are relatively low, but rising fuel costs are taking a toll. Company forecasting and planning is hampered by the government's unpredictable pattern of fuel price increases. As a result, companies find it difficult to effectively price their products. The industry must work closely with packing and transport companies to ensure that products are delivered to retailers undamaged and on time. Damaged or missed deliveries are a sure way to lose business that has nothing to do with intrinsic product quality.

Organization and Consensus-building

There are about 30 ceramic companies in Sri Lanka—including small and medium sized companies. Competition among the larger local firms is healthy and the firms are differentiated. None appear to compete directly with each other and each appears to have its own market segment in which it competes with global players. The firms have adopted not a low-price but a high-quality strategy.

Differentiation is a powerful strategy in an exporting country the size of Sri Lanka, but it can also make coordination and cooperation seem less important. In reality, though, most of these firms' underlying constraints and many of their likely target customers are the same. All firms can benefit from a coordinated approach.

The three strategic initiatives described in this report rely on cooperation to (1) develop a world-class reputation for Sri Lankan ceramics based on quality and consistency, (2) realize cost savings in the supply chain and closer integration with the local supplier, and (3) develop a highly trained and capable workforce.

THE STRATEGIC INITIATIVES

The three strategic initiatives described in the following chapters will help make Sri Lanka's ceramics industry more competitive. The initiatives include

- Undertaking design and marketing actions to (1) promote brand recognition for industry members, (2) change perceptions of Sri Lanka value under a "Ceylon Quality" umbrella recognized by a world authority, and (3) break into or create new markets.
- Improving supply-chain management for joint purchasing and process improvements and to negotiate lower supply costs, especially for energy, with a portion of savings to be put back into R&D and design.
- Creating centers for technical excellence to upgrade the management and technical workforce and technology capabilities.

The design and marketing initiative will require that each manufacturer become more knowledgeable about the final user of his product, rather than relying on the wholesaler who simply provides orders. Knowledge sharing among the more aggressive industry players, especially in areas in which they do not compete with each other, will raise marketing competence.

The supply-chain management initiative will focus on energy cost reduction as a first step in greater upstream and downstream integration. Cost reduction is usually an operational not a strategic activity, but is included here because it will offer significant short-term benefits and frees funds for investment in R&D and marketing. The industry believes that energy costs significantly hinder competitiveness, even more so, in some cases, than lack of branding. This initiative will also pursue joint purchasing and process and productivity improvement.

The centers for technical excellence initiative provides a vehicle for improving the industry as it is now and as it could be, given a higher level of technology and skills. The labor force is already highly trained for the industry as it stands today. This is especially true of

segments of the industry that rely on hand decorating and artistic talent. But technical and manufacturing management need an upgraded workforce and general improvement.

Technical advances must be pursued, new markets explored, and trained personnel added to the workforce. Competitor nations will be doing the same. Indeed, the strategic initiatives will take several years to accomplish and will need attention to avoid complacency. *Complacency will be the death of the ceramics industry in Sri Lanka.* Industry players know that margins will continue to shrink if they continue to produce and sell as before. Yet, there are threats to the accomplishment of the initiatives.

Industry players have long been reluctant to deal directly with the end consumer or to deal further down the marketing supply chain. This reluctance should be taken into account when developing a branding strategy. The best solution is to encourage the industry to try to implement this new approach for dealing with retailers and to review experiences as they occur.

Technical breakthroughs by competitor nations are unlikely because most equipment manufacturers are concentrating on advances for "high tech" industries. Nevertheless, industry representatives must attend world equipment trade shows to keep abreast of technology developments. And failure to continually benchmark the industry, both internally and worldwide, could hinder progress. The industry must continually monitor internal and external progress.

The initiatives will make Sri Lanka's ceramics industry more competitive in the international market. The industry, however, should not lose sight of its strengths in people and natural resources. The effort devoted to the strategic initiatives should be matched equally by the effort devoted to maintaining current strengths.

Design and Marketing Excellence

This initiative calls for design and marketing activities to promote brand recognition for industry members, change perceptions of Sri Lanka value under a "Ceylon Quality" umbrella recognized by a world authority, and break into or create new markets. Activities include knowing the ultimate customer, the *consumer;* companies branding under their own names and registering names and trademarks; launching a professionally designed ceramics industry portal on the Internet; creating a certification agency that is itself certified by a recognized authority, such as the International Standards Organization (ISO); thinking "outside the box" with regard to the international market; and publicizing and gathering support for these activities from the BOI, EDB, and other agencies.

WHY THIS INITIATIVE?

Without marketplace recognition of the true value of the industry's products, the industry will continue to be driven by buyers, wholesalers, and distributors. These entities are content to have Sri Lankan products remain at existing sales prices because, as bulk buyers, they need not expend energy and resources to sell but need only to distribute to customers via a longstanding supply chain.

Consumers make the ultimate buying decisions for industry product lines. The ceramics industry must establish a level of design and marketing expertise that will enable it to command better prices based on consumers' recognition of quality. Right now the Sri Lankan industry is in the private label, make-to-order marketplace, with consumers already appreciating the quality of its product but unaware of its national origin.

ACTIONS

Know the Customer

The ceramics industry must create a face-to-face dialogue with the ultimate consumer. Some members of the industry have already done so with encouraging results. After visiting consumers, they are now selling under *their companies' own brand names* in selected markets and gaining recognition in those markets. Some have traveled in search of market information, but only to China. They should instead travel to the most important markets—those in the United States and Europe.

Industry members must overcome their historical reluctance for direct engagement with consumers or at least retailers who sell to consumers. Several companies sell, ultimately, to retailers such as Macy's, well-recognized in New York City and other cities in the United States. The Sri Lankan manufacturer sells to a buyer who, in turn, sells to Macy's. The product is shipped directly from the factory in Sri Lanka to Macy's. It would seem reasonable for the manufacturer to negotiate for direct sale and shipping to Macy's. Such an arrangement could lead to lower prices for Macy's than the store now pays to buyer organizations and significantly larger profits for the manufacturer. In addition, products are usually stamped "Macy's." They could be stamped, "Manufactured exclusively for Macy's by XXXXX Ltd., Sri Lanka"—especially if items of the same quality and delivered on the same schedule are sold at a lower cost. But a dialogue must first be opened between the Sri Lankan manufacturer and the retailer.

Sri Lanka's clean, modern factories produce high-quality ceramics destined for such top retailers as Macy's in the United States.

Industry members can mutually support their individual marketing and dialogue building to reinforce the image of Sri Lankan quality and expertise in general. The cluster can encourage more experienced industry players to share information where there is no direct

competition. At the very least, the industry should employ a marketing consultant (or consultants) to lead members through this important first step, and assist in developing a strategy for group marketing visits or materials. Industry members should commit to beginning this activity within the first six months of adopting this strategy.

Develop Branding Strategy

A branding strategy needs to be developed for the industry (or specific industry segments, if they are sufficiently different relative to the marketplace). Creating and establishing new brand names will be aided by product quality and price flexibility. Sri Lanka's ceramic products are comparable to or better than those produced anywhere in the world and have been sold for years at the world's finest retail outlets, but under someone else's brand. Major retailers will be interested in reducing or eliminating the cost of the middleman, and price improvements going to Sri Lankan manufacturers should be more than sufficient to finance a branding study and campaign by world-class experts. The EDB and other government institutions can help identify consultants, or consulting firms, to conduct the branding campaign. The industry should commit to acknowledging this need and request identification and sourcing of the appropriate assistance within three months of adopting this strategy. Branding in new markets, along with learning about and negotiating with consumers or retailers in existing markets, should make the industry more competitive within two to three years.

Skilled Sri Lankan artisans create designs for superior ornamental ceramics whose quality is appreciated but whose origin remains unknown because of a lack of branding.

Launch Web Portal

An industry web portal will help publicize the strengths and value of Sri Lanka as a high-quality sourcing destination for ceramics and porcelain. Now being developed, the portal is scheduled to be launched in April 2002. It will be continuously updated and interactive, providing potential customers with product and design updates and answers to queries.

Create Ceylon Quality Umbrella

The ceramics industry could benefit by having a quality approval organization—such as the Underwriters' Laboratory (UL) in the United States, the Tile Council of America (TCA), or the ISO—test and certify ceramics products. Or having a strong quality approval agency created in Sri Lanka to build a Ceylon Quality mark could offer additional benefits. The Ceramics Cluster could create the agency, or make it a part of the cluster. Initially, physical facilities and testing responsibilities would be at the CRDC. The cluster would purchase and own the test equipment necessary to meet product standards for the various industry segments, but these items would reside at CRDC. The cluster should survey its members to determine testing needs and purchase the necessary equipment. The physical facility should be set up within nine months of accepting this strategy.

After the agency is up and running, an internationally recognized entity, such as ISO or Ceram Research, should be enlisted to accredit the agency. The Ceylon Quality "umbrella" will comprise this accredited agency, publicity generated by such organizations as the BOI, and the web portal. It will stand for product style, design, and performance worthy of worldwide recognition. It may be necessary to make the theme of this agency part of the branding studies. If done properly, and with the right emphasis and publicity concurrent with other design and marketing activities, Ceylon Quality will signify "highest quality" in world markets.

Think "Outside the Box"

Given the combination of industry talent and potential markets throughout the world, the ceramics industry should put aside conventional thinking and aim for innovative approaches to solving industry problems. Here, the cluster can sponsor brainstorming sessions as part of broader industry meetings, or as separate sessions to canvass the industry for innovative ideas. Worthy ideas, especially technical ideas that lend themselves to action by centers of technical excellence, should be pursued at the cluster's direction and the results shared with all industry members.

Develop Publicity and Support

Significant government agencies, such as the BOI and the EDB, should be kept apprised of industry activities and be urged to use their agencies to promote the industry worldwide. It is recommended that these agencies use their influence to place information in widely circulated publications to promote the Ceylon Quality image in the minds of consumers and buyers. The design and marketing committee of the Ceramics Cluster should also consider how other agencies, such as ISO or TCA, can be used.

In tandem with the Ceylon Quality umbrella, themes that uniquely identify the Sri Lanka ceramics industry in worldwide markets should be publicized. The EDB might sponsor a nationwide design contest that industry members could help judge. The winning design should be incorporated into an industry symbol of design and quality excellence.

A marketing consultant or consulting firm should be employed in the first year after strategy adoption to explore possibilities in new, worldwide markets. Sri Lanka ceramic products have barely dented markets in South America, Mexico, Africa, the Middle East, Singapore, or Australia.

ADDING VALUE IN THE BUSINESS PROCESS

As shown in Figure 2, this strategic initiative will directly affect the competitiveness of Sri Lanka's ceramics industry by adding value in the later stages of the business process.

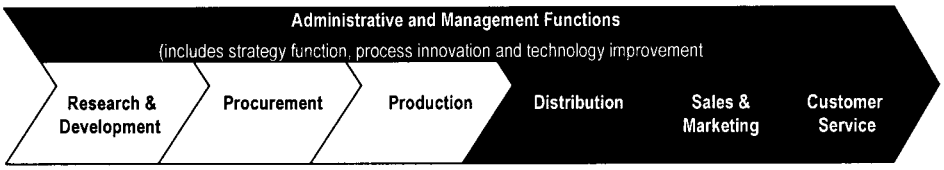


Figure 2. Value of Design and Marketing Excellence in the Business Process

- ***Distribution.*** Sri Lanka's ceramics manufacturers and end-consumers most often communicate through middlemen, yet frequently deliver directly to a retailer. This initiative will strengthen relationships with retailers and help industry capitalize on direct distribution to develop feedback loops that will help bridge the gap in knowledge of end-consumer needs and preferences.
- ***Sales & marketing.*** This initiative will improve Sri Lankan sales and marketing and the acquisition of market intelligence.
- ***Customer service.*** Building a closer relationship with the retailer through built-in feedback mechanisms will help industry better understand what customers want, how to deliver it, how to develop information on end-consumers, and how to start better serving customers after the sale.
- ***Administrative and management functions.*** This initiative should refocus management in manufacturing companies and academic institutes on markets and trends rather than day-to-day operations.

Indicators of Success

Possible indicators of progress for the design and marketing initiative include the following:

- ***Output measures***
  - — Number of companies undertaking studies of key markets.
  - — Number of companies with marketing plans with strategies that include branding.
  - — Number of segment strategies developed.
  - — Use of web portal to promote and publicize the industry.
  - — CRDC accredited as a quality testing organization accepted by the industry.

- ***Outcome measures***
  - — Sri Lankan ceramic and porcelain products known overseas as branded products originating from Sri Lanka.
  - — Significant price increases for Sri Lanka manufacturers.

TARGETS AND EXPECTED RESULTS

This initiative to create a branded image of Sri Lankan ceramic and porcelain products is a long-term undertaking consisting of firm and industry-level actions. These are shown in the timeline for the initiative in Figure 3.

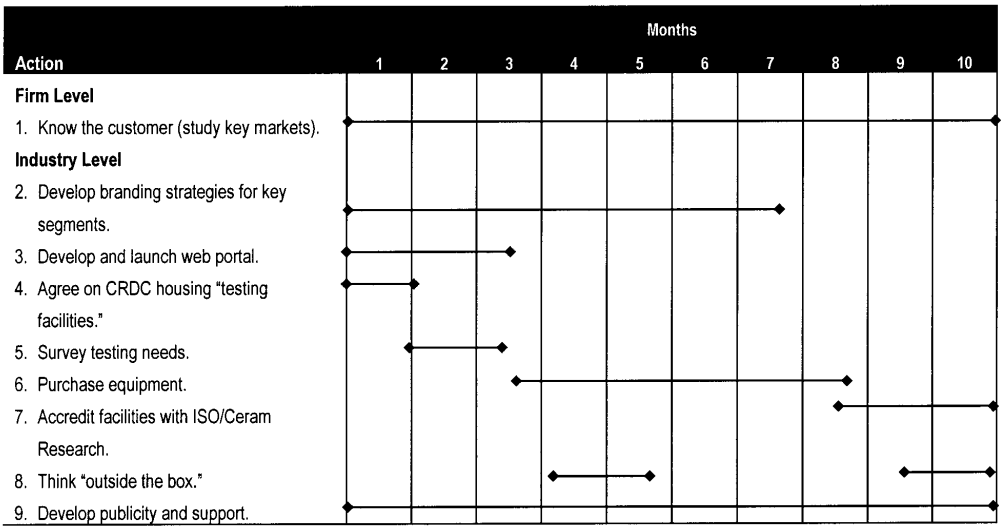


Figure 3. Timeline for Design and Marketing Initiative

Continuous dialogue with new and existing customers is required to ascertain their needs and to develop product, manufacturing, and distribution plans accordingly. By the end of the first six months each manufacturer should contact at least one new customer and all members of the industry should have visited most of their existing customers (i.e., end-user retailers).

Once a consultant is hired to develop branding strategies with industry members, those strategies should be in place within six months.

The Ceylon Quality umbrella can best be accomplished as a part of the Centers for Technical Excellence initiative, but need not wait for that implementation. Industry members should reach an agreement that CRDC is to be the center for testing needs. When a consultant is hired for the Technical Center, industry members can be surveyed to determine testing needs and the equipment can then be purchased. A search should be initiated immediately to determine a qualified, recognized, outside testing and evaluation authority that can lend credibility to the umbrella. This certification should take place within one year of beginning the search. The ultimate goal is worldwide recognition that a Sri Lanka (Ceylon) backstamp denotes quality.

Supply Chain Management

This strategic initiative involves improving the supply chain in the ceramic industry through energy cost management, logistics management, and process control and productivity management. Logistics management will require joint purchasing and management of the internal supply chain.

WHY THIS INITIATIVE?

As design, marketing, and branding gain recognition for Sri Lanka's ceramics industry as a world-class supplier the industry will have to become and remain world-class in manufacturing cost and efficiency. As sales increase, production will expand and the industry *must* have systems in place to meet growing demands. These systems include process control and productivity management systems, as well as systems for output, including shipment, delivery, and distribution systems. The industry will also need to develop a program for keeping abreast of state-of-the-art technologies.

By closely analyzing its supply chain, the industry will also be able to realize cost efficiencies. By working together to improve the supply chain, it will foster the trust and cooperation necessary for the more difficult activities of the other two initiatives—design and marketing and centers of technical excellence.

ACTIONS

Energy Management

Many in the industry see energy management as the most important issue—most probably because they have a *better understanding* of it than of design and marketing. Addressing this issue, and making some progress, could demonstrate the value of industry clustering and cooperation.

Energy management on the supply side heavily favors gas, specifically imported LPG. The only major supplier of bulk LPG to industry in Sri Lanka is Shell Gas. The option here is to open a dialogue with Shell Gas, explain the situation, and ask for cooperation that alleviates problems in the ceramics industry and benefits Shell. This dialogue began October 18, 2001, when members of the Ceramics Cluster and Shell Gas executives met—and relief is a strong possibility. Issues include payment in U.S. dollars, and a demand schedule from industry members that will allow Shell to plan its own supply program better. The demand side is being addressed through an energy efficiency study conducted by Sri Lankan consultants who are recognized as the country's best. The study is tentatively scheduled to be completed in April 2002.

Logistics Management

Logistics management improvements include

- Joint purchasing and centralization of raw materials supply and refractory materials manufacture;
- Strategic sourcing of raw materials; and
- Purchasing semi-worked raw materials.

Some of these may require further study.

Joint Procurement

Joint procurement could reduce costs for raw materials (especially white burning ball clays), refractory materials and kiln setters, plaster, colors and stains, alumina grinding media, and silica pebbles. The industry could very well develop plans to centralize local refractory materials manufacture, now scattered among several manufacturers, and investigate a more efficient raw material processing system for native raw materials. The right consultant will be able to work with industry members to jointly develop a detailed scope of work for both joint procurement and refractory materials centralization and resolve issues about funding the costs and sharing the results.

Strategic Sourcing

Sri Lanka has only one supplier, Lanka Ceramics, for most raw materials—clay, kaolin, quartz, feldspar, and hydrated lime. This may limit opportunities for traditional, domestic joint-procurement, but substantial advantages can still be gained through strategic sourcing. An expert in strategic sourcing and supply chain management should be brought in to identify potential opportunities and quantify their impact.

Semi-worked Raw Materials

Most manufacturers have developed mixes and processes to mold raw materials to a precise formulae and consistency required for particular products and systems. This often requires

additional cost and work with the raw materials. Individually and collaboratively, manufacturers should explore the possibility of having Lanka Ceramics supply a semi-worked product that fits seamlessly into their manufacturing processes. The manufacturer could reduce inventory, increase output, reduce material handling, and minimize waste and maintenance caused by inconsistency in the raw materials. In turn, Lanka Ceramics may obtain higher prices, more sales, and better knowledge of supply needs and timing. This arrangement would give Lanka Ceramics detailed knowledge of the manufacturer's processes and proportions for various body mixtures, so an agreement to guarantee the confidentiality of competitive information would be necessary. Most likely, a "wall" between the supply and manufacturing activities of Lanka Ceramics would be necessary to ensure confidentiality.

Logistics Management Study

A logistics management study should do the following:

- Analyze the top 80 percent of imported and local material purchased by the majority of manufacturers. Identify those for which joint procurement would most likely achieve cost reductions. Assess the utilization rates and fully loaded procurement costs for these products.
- Assess current procurement processes and benchmark where possible, both within the industry and externally.
- Evaluate the feasibility of joint procurement from local and foreign suppliers and establish the steps and timing necessary to achieve the goal. Set up a framework to enable the industry to create its purchasing mechanism and forecast a consistent delivery schedule with volumes and materials needed.
- Estimate the projected savings per unit (on average) of each of the materials selected and for the industry as a whole.
- Work with industry members to identify the limitations of existing supply, with an emphasis on products that require or often require further processing by the manufacturer or where consistency is of particular importance in production.
- Analyze local supply vis-à-vis international sources that are used because of perceptions of better quality, consistency, or service. Determine the technical feasibility of producing those materials in Sri Lanka at a consistent quality and service level to fit seamlessly into manufacturing processes.
- Evaluate the feasibility of closer integration with and strategic sourcing from local and foreign suppliers. Outline the steps and timing necessary to achieve the goal, including financing or co-financing improvements. Prioritize based on cost-benefit, feasibility, and speed or ease of implementation.

- Estimate increased productivity because of reduced down time for equipment, fewer processing steps, and fewer rejects.

Process Control and Productivity Management

The third part of this initiative deals with the potential savings through process control and productivity engineering. These will become more important as design and marketing success increases product demand. There is generally room for growth in industry capacity, but several factories are at capacity. Here again further analysis is necessary in developing plans for improvement. Some gains may be made through materials characterization and body reformulation to save energy via lower firing temperatures. The issue of productivity should be addressed carefully because this is usually taken to mean "more product output per employee." Quantity must not detract from quality—a major industry strength. The industry is striving to create more *value,* so a better way to think about productivity enhancement is more value per worker-day measured by an increasing profit margin—not simply more plates or tiles or figurines.

ADDING VALUE IN THE BUSINESS PROCESS

As shown in Figure 4, this strategic initiative will directly affect Sri Lanka's competitiveness by adding substantial value in the early stages of the business process for companies in the ceramics industry.

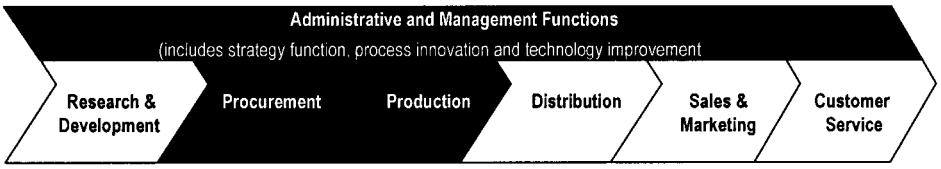


Figure 4. Value of Supply Chain Management in the Business Process

- ***Procurement.*** This initiative goes beyond the technical aspects of getting the right quality of raw materials, to identifying how to source the right supply in the right form early in the supply chain.
- ***Production and administrative and management functions.*** Improving productivity will require better systems, technology, workplace skills, management, and long-term strategic planning. All of these will require more flexible and proactive management and all will help make production processes more efficient.

Indicators of Success

Possible indicators of progress for this initiative include

- ***Output measures***
  - — Supplier discussions for joint procurement and strategic sourcing completed.
  - — Energy efficiency study in all participating organizations completed.
  - — Intra-industry agreement on key material purchases.
  - — Best method for joint procurement determined and agreed to.
  - — Technical assistance to advise group on best methods and procedures.
  - — Development and improvement programs or projects prioritized.
  - — Productivity needs and implementation program established and prioritized.
  - — Benchmarks established for purchasing costs, process status, and productivity.

- ***Outcome measures***
  - — Recognized improvement in costs and productivity from comparison to benchmark study.
  - — Ongoing cost reduction, productivity, process improvement, and state-of-the-art awareness programs.

TARGETS AND EXPECTED RESULTS

The first objective of this initiative should be cost reductions of 10 percent in jointly purchased materials. Significant reductions 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. Figure 5 is a timeline for this initiative.

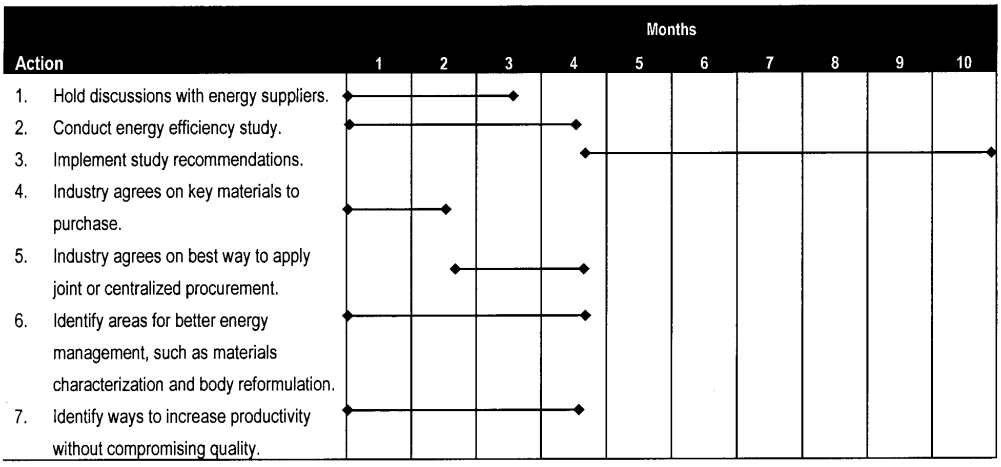


Figure 5. Timeline for Supply Management Initiative

Centers for Technical Excellence

This initiative calls for upgrading the technical workforce and leadership in new technologies and industries. It involves unifying three entities into a leadership group for advanced technology and training, creating a certification agency in conjunction with the Ceylon Quality umbrella, linking with an international university, upgrading technical facilities and test equipment, and continuous internal training. Specifically, it calls for

- Concluding a joint agreement among the industry, the University of Moratuwa, ITI, CRDC, and, possibly, the University of Peredeniya, to advance the industry by sharing generic technical knowledge and facilities;
- Establishing CRDC as the certification agency under which the Ceylon Quality umbrella will operate;
- Linking with outside centers with technical expertise, such as a U.S. or European university, or other reputable organization, such as Ceram Research.
- Establishing a program to upgrade technical equipment and facilities (e.g., improved testing equipment and viable pilot plant operation);
- Upgrading technical personnel through student internships and input from business leaders; and
- Commissioning a feasibility study on advanced ceramics.

WHY THIS INITIATIVE?

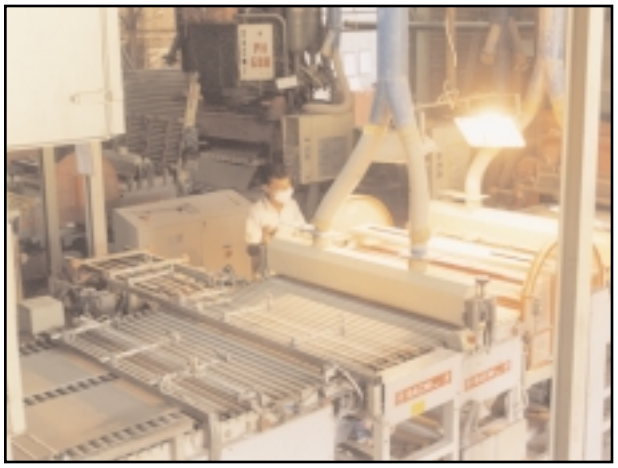
Advancing Sri Lanka's ceramics industry to state-of-the-art relative to worldwide competition, and to advance into other areas, will require centers for technical excellence. At present, the industry has little or no base from which to advance technically. Technology expertise in Sri Lanka has been acquired by sheer hard work. Competent individuals in the universities and technical centers are not supported by mid-level trained personnel. Test and development equipment is scarce and of poor quality. Technical entities rarely cooperate and do not trust each other. Yet a collective approach to raising the level of technology and increasing training and access to market information is crucial to making the industry more competitive.

U.S. organizations—such as the American Ceramic Society, the Tile Council of America (TCA), and the Ceramic Manufacturers Association—offer a precedent for productive cooperation. These organizations hold meetings and have created information systems to allow individuals and companies to exchange technical and market information *without disclosing company secrets.*

Improving the workforce involves improving technical management expertise more than it does the competence of factory laborers. The high quality of factory labor output must not be compromised by trying to improve quantity output. A key strength of the Sri Lanka ceramics industry is the quality of its products, especially handwork and decoration.

Technology can improve quality and productivity. These state-of-the-art roller kilns, now being integrated into plants in Sri Lanka, maintain a constant temperature and allow for continuous processing.

Materials preparation in ceramics manufacturing is clean and modern. Ball mills and spray driers are used in this powder preparation section.



Modern hydraulic presses, increasingly used in Sri Lankan ceramic tile manufacture, ensure the consistent quality that builders and consumers need.

ACTIONS

Develop Joint Agreement—University of Moratuwa, ITI, CRDC

The University of Moratuwa, ITI, and CRDC currently hold the sum of knowledge—outside the industry itself—that can move the ceramics industry forward. But little or no knowledge is shared among these organizations. The University of Peredeniya is constrained by distance that has inhibited joint cooperation in the past, but is a viable source for technical input. The industry must engage these institutions in an agreement to share generic knowledge and to create programs that will move industry technology forward. Research pertinent to new or improved technologies should be conducted and shared with all industry members. The research should be generic in nature and deemed beneficial to the industry in general. Possible research includes the feasibility of manufacturing alumina grinding media for the industry's use and the use of local, as yet unmined, raw materials.

Programs for individual companies can also be conducted, but will be initiated and paid for by the company. A program of legally binding secrecy agreements will have to be worked out in this case.

Establish CRDC as Agency for Ceylon Quality Umbrella

Establishing CRDC as the standard certification organization under which the Ceylon Quality umbrella would operate poses some operational and confidentiality issues. CRDC is held by Lanka Ceramics as part of the privatization of a public entity. Various industry members are therefore reluctant to send materials and products to CRDC for testing. They believe confidentiality may be compromised by data sharing in the Lanka Ceramics family of companies. This issue can be addressed, initially, by signing legally binding secrecy agreements between industry members and CRDC. A long-range strategy will entail arranging for CRDC to become a separate agency, divorced from Lanka Ceramics' ownership.

The Ceramics Cluster should establish this agency within three months and contact the international firm (ISO is recommended as the first contact) at that time to determine the standards to be met for international certification.

Establish Link with Significant U.S. or European University

The link with an outside source of technical expertise can begin with contacts already established by the industry. Rutgers University, a well-known university in New Jersey, and Alfred University in New York have already been contacted about a joint program. Rutgers and Alfred have well-known schools of ceramic engineering and are willing to discuss a possible agreement. This agreement can be broad in scope, including information exchange, student exchange, and specific research programs.

Upgrade Technical Facilities and Equipment

The only way to "stay" competitive technically is to constantly improve. To do this, the industry requires better facilities and test equipment. The lack of such testing equipment as viscometers, whiteness or color meters, and particle size equipment will curtail advancement. While some of this equipment is scattered throughout the industry, there is not enough to allow industry to communicate with the organizations selected as centers for technical excellence. Other equipment and facilities do not function for lack of spare parts or because of general disrepair. The consultant selected to upgrade technical areas should make this a primary focus. Several alternatives exist—using equipment suppliers to provide advance sampler equipment in anticipation of future sales, "scrounging" from other industries and educational organizations, and joint purchasing using the influence of the

cluster. A program should begin as soon as the industry has worked out the organization of the three technical entities previously mentioned. The consultant should identify types and quantities of equipment necessary.

Upgrade Technical Personnel

The dearth of trained technical graduates, either two-year technicians or four-year engineers, will significantly hamper industry progress. While university students generally receive an adequate to excellent theoretical education in ceramics technology, the lack of equipment and facilities deprives them of practical experience. To remedy this, the cluster will use the centers for technical excellence to identify changes needed in curriculum, ensure the distribution of students in factory internships, conduct pilot plant training, and help monitor technology changes elsewhere in the world. Additionally, industry executives should be encouraged to share their experience and knowledge with students and trainees by lecturing at universities or delivering seminars at training schools.

Conduct Feasibility Study of Advanced Ceramics

An extensive study to ascertain the feasibility of producing various types of advanced ceramics in Sri Lanka should be conducted. Care should be exercised in considering the strengths that the Sri Lanka ceramics industry would bring to advanced ceramics and vice versa. For example, it is feasible to use ink-jet printing to replace hand labor in decorations. This is especially true for underglaze stains. But would using the technology be worth the loss of quality likely from eliminating hand decoration? Likewise, space age technologies (nose cones, shuttle tiles) appear to offer no advantage to the industry because there is no base advantage to build on.

- ***Bio-ceramics.*** This would be a good area for investigation. Sri Lanka's skilled, trainable workforce could achieve the quality necessary for finished product, and existing manufacturing techniques, such as slip casting, are suitable. Expertise in the complex organic–inorganic chemistry interfaces of the ceramic materials used would have to be obtained.

- ***Automotive components.*** Some manufacturing equipment and techniques lend themselves to production of automotive components, but new technologies would have to be investigated for some (e.g., isostatic pressing for spark plugs, precision extruding for catalyst supports, materials and complex shape pressing for brake pads). Here, a highly skilled workforce could be very attractive to an international manufacturer seeking to develop new manufacturing facilities.

- ***Garment and textile components.*** This area may be ideal because all required technology exists and only minor materials development is needed.

- ***Defense industry.*** The government's policy of not buying items made in Sri Lanka would have to change for this area to be feasible.
- ***Electronics and electrical components.*** This area offers good possibilities, depending on products selected and the cost structure of the market.

Any venture into advanced ceramics should be carefully studied, both from a manufacturing and marketplace standpoint.

ADDING VALUE IN THE BUSINESS PROCESS

As shown in Figure 6, this strategic initiative will directly affect Sri Lanka's competitiveness by adding substantial value in the "soft" stages of the business process.

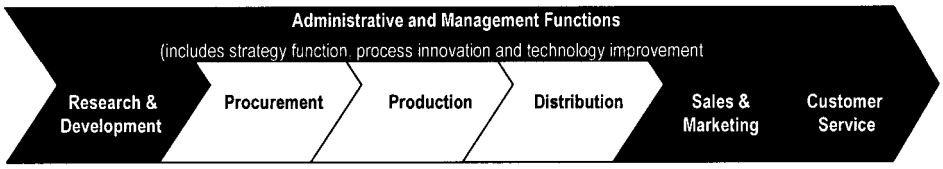


Figure 6. Value of Centers for Technical Excellence in the Business Process

- ***Research & development.*** This initiative will most directly affect the industry's R&D capabilities and approach. Effective forums to coordinate research activities, keep abreast of changes in the market, and cross-pollinate with research institutes around the world will effect the speed and direction of industry development.
- ***Sales & marketing.*** Strong centers of excellence with global relationships will help bring new products and applications to market faster and provide a source for good market intelligence. This will ensure that industry understands the end user better and has the necessary information to react quickly to changes in the marketplace.
- ***Customer service.*** Better consumer information and more far-reaching international relationships will improve customer service.
- ***Administrative and management functions.*** Instilling an industry-wide culture of cooperation, information and technology sharing, and joint product development will require changes and more flexibility in the management structures and procedures of most industry participants.

Indicators of Success

Possible indicators of progress for this initiative include

- ***Output measures***
  - — Existence of an agreement among ITI, CRDC, and University of Moratuwa.
  - — Acceptance of CRDC as the designated, trusted, testing organization.
  - — Joint agreement with an outside university or universities.
  - — Attendance of industry members at trade shows, such as Ceramitec.
  - — Agreement on design and structure of the Ceylon Quality umbrella.
- ***Outcome measures***
  - — Several industry personnel attend a training course outside Sri Lanka.
  - — Each company implements one new piece of technology (process or equipment) every 12 months.
  - — At least one corporation moves into a product area not now part of its corporate structure within 18 months.

TARGETS AND EXPECTED RESULTS

The timeline for this initiative is shown in Figure 7. Targets include the following:

- Joint agreement three months after consultant is hired to coordinate activities.
- CRDC recognized as agency for Ceylon Quality umbrella.
- U.S. university link within one year.
- Equipment lists identified, approved, and purchased.
- One new product area pursued by member company.
- Attendance by one or more members at international trade show.
- At least two employees attend training outside Sri Lanka, or inside country under auspices of recognized expert.
- Feasibility study on advanced ceramics underway.

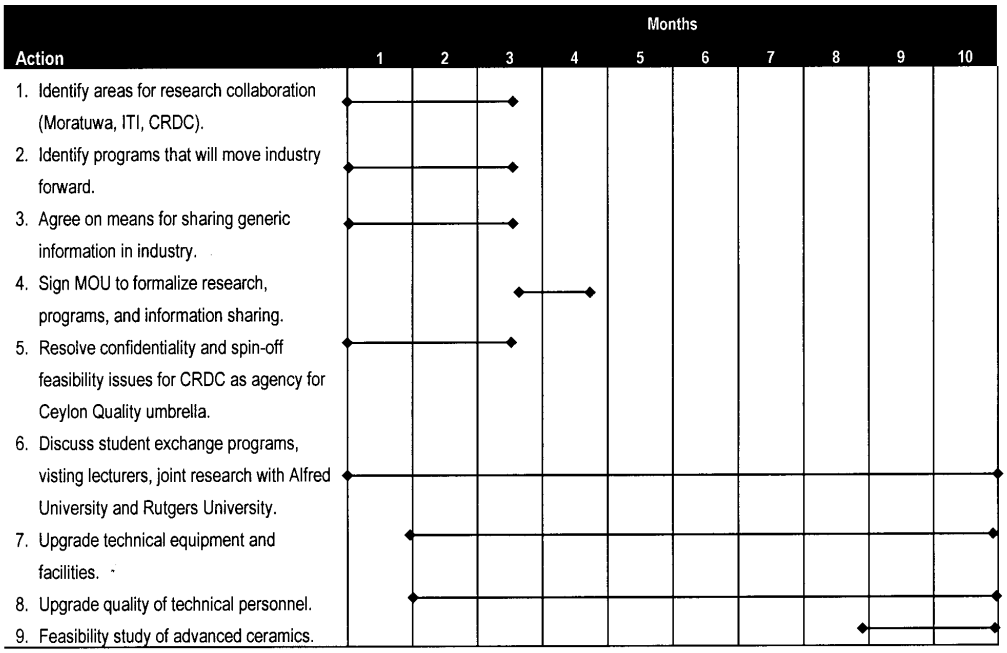


Figure 7. Timeline for Centers for Technical Excellence Initiative

Glossary

BOI	Board of Investment
CRDC	Ceramic Research and Development Corporation
EDB	Export Development Board
EU	European Union
GSMB	Geological Survey and Mines Bureau
ISO	International Standards Organization
ITI	Industrial Technology Institute
LCL	Lanka Ceramics Ltd.
LPG	liquefied petroleum gas
R&D	research and development
SLACME	Sri Lanka Association of Ceramics Manufacturers & Exporters
SLSI	Sri Lanka Standards Institution
TCA	Tile Council of America
TCI	The Competitiveness Initiative
UK	United Kingdom
UL	Underwriters' Laboratory
USAID	United States Agency for International Development