The CECSA case describes the efforts of a Central American manufacturer of sanitary fixtures such as toilets and washbasins to improve quality and service through the application of just-in-time and total quality control (JIT/TQC) concepts. The company had been founded as part of a national policy of import substitution during the early years of the Central American common market, and its products, protected by high tariff barriers, dominated the regional market. However, its sales were affected seriously by the economic and political crises of the 1980s, forcing the company to search for markets outside the region. The case is set in 1987, at the height of the global conflicts that were being played out in Central America and at a time when opportunities for CECSA were opening in new export markets. With encouragement from its partner, an international ceramics corporation, CECSA embarked upon a plan to export to the United States. To meet the demanding quality specifications of the U.S. market, the company introduced the JIT/TQC approach. The implementation of this approach, with its emphasis on quality rather than quantity, required changes in the company culture and in traditional working habits that were difficult to make. The case demonstrates how continuous attention to quality throughout the entire value chain, including requirements made of suppliers, can pay off. CECSA was successful in entering the U.S. market. As new export projects materialized and pressure to meet deadlines mounted, however, many aspects that had been put in place to support the change process, such as the quality Involvement Groups, were abandoned. Other required changes, such as a new incentive system, were not introduced in a timely manner. As a consequence, momentum was lost. As the case closes, the general manager, Antonio Mendez, must decide how to regain the momentum. In a meeting with his key managers, a five-point implementation plan is produced, and the question that remains is whether this plan will be sufficient. The CECSA case illustrates how, in implementing the JIT/TQC approach, there is a continual danger of relapsing into old habits that paralyze the change effort. The loss of momentum, leading to work slowdowns, cannot be attributed to a single factor but to many. An important lesson is the importance of paying continuous attention to detail, to preserve the enthusiasm of personnel and managers alike.  

Company Background and Operations

CECSA was founded by Central American investors in the early 1970s. Its plant was established in the outskirts of Morelos City, capital of Morelos. The purpose of the investment was to take advantage of an increasing demand within the region for sanitary fixtures such as toilets and washbasins. In addition, several Central American countries were providing incentives in the forms of subsidies and tax cuts for exports of manufactured industrial products to developed countries. Although CECSA’s initial operations were on a small scale, targeted at supplying the country’s internal demand, it was able to obtain several housing contracts outside the country. From a 59% share of the Central American market in the early 1970s, CECSA expanded to a share of 92% by 1977.

In June 1987 Antonio Mendez, general manager of Cerámica Centroamericana S.A. (CECSA), said to a visitor in his office, “Our Just-In-Time/Total Quality Control (JIT/QC) program was successfully launched in May of last year. Until December of 1986, we obtained extremely positive results. Since the beginning of this year, however, the program has almost come to a standstill. We are no longer experiencing the production increases that we consistently registered during the first few months. I think even the Christmas break interrupted the program’s momentum,” added Mr. Mendez.

“I get the impression that CECSA’s top management is pushing the program down, but the workers are not pulling it forward. Yesterday, I held a lengthy meeting with all our plant managers and supervisors, and they all agreed to do their best to get the program back on track. We came out of the meeting with several ideas... if we move to implement them in the next two or three weeks, I am sure we will be able to reverse the situation and regain the momentum that we’ve lost,” added the general manager.
Table 1. CECSA: Relative Evolution: Capacity, Production, Sales Earnings, and Marketing

<table>
<thead>
<tr>
<th>Year</th>
<th>Production Capacity (Vol)</th>
<th>Production</th>
<th>Sales ($)</th>
<th>Earnings ($)</th>
<th>Central American Market (Vol)</th>
<th>Share of C.A Market (%)</th>
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*The year base for all the above data is 1970 with the exception of share in C.A. market.

One of the company’s most important decisions was made, in 1969, when CECSA entered into a joint venture with Ceramics International Corporation (CIC), a leading American manufacturer and distributor of ceramic sanitary fixtures. Another major decision involved installing plants in two other Central American countries, in 1971 and in 1980.

The economic and political crises experienced by most Central American countries in the latter 1970s and early 1980s led to a slump in construction, and CECSA’s sales decreased substantially. Sales showed some improvement in the mid-1980s, but the longer term economic environment remained bleak. Table 1 summarizes the evolution of sales prices, market shares, production capacity, and earnings between 1970 and 1985. In 1986, the Morelos operation employed 270 people, 80% of who were assigned to production.

Through the years, CECSA’s founding partners and managers were able to establish a strong and fruitful relationship with CIC. CECSA’s shares were divided equally between CIC and its Central American counterparts, although both parties agreed that management would be left in the hands of CECSA. The relationship with CIC proved to be very advantageous for CECSA. Its corporate capital was strengthened, and it gained access to more advanced technology and manufacturing processes. It also had the opportunity to reach markets outside the region through CIC’s vast distribution network.

Fostering CECSA’s exporting potential was beneficial to both parties. See Appendix A, which briefly describes the economic situation in Morelos and the need for a new approach based on export promotion. CECSA benefited because it needed to replace the volume of sales it had lost as a result of the political, economic, and military crises that had affected most of the region. The more stringent requirements of new markets also encouraged CECSA to improve its production and quality control processes.

For its part, CIC envisioned reinitiating product lines that it had discontinued manufacturing in the United States. These discontinued product lines had been particularly popular among some southern U.S. markets. Likewise, CIC believed it had a great deal to gain by offering some CECSA products to the Caribbean market, whose preferences in terms of features and prices were more similar to those of the Central American market than those of the United States market.

Exporting efforts were intensified from the outset, demanding top management’s full attention. It was necessary to become familiar with the new markets and to learn how to deal with protectionist barriers imposed by some countries. It was also necessary to overcome the skepticism of some CIC officials and some intermediaries in the new markets, who mistrusted the quality and performance of CECSA’s products. These issues were addressed through intense negotiations and plant visits aimed at demonstrating CECSA’s proficiency. The company also made certain that product shipments complied with customer requirements in terms of timely delivery and quality. The gross margin for exports ranged between 15 and 20% of producer prices.

Quality Efforts and Production

Teodoro Zuñiga, Production Manager, showed distinct pride in CECSA’s quality control approach: “For several years now, we have been achieving notable improvements in terms of quality and costs. Despite our dominant market position in Central America, we have always faced competition from Mexican and Colombian manufacturers. In earlier times, we viewed quality only in terms of the percentage of defect-free units that reached the warehouse, but we were unable to determine the cause of the problems. Defects were corrected in any way we could, without getting to the root of the problem. It was the crisis of the 1970s and early 80s that pushed us into the exporting business, making us aware of the urgent need to improve and to concern ourselves with quality. By 1984, a defect rating system had been implemented, which narrowed defects down to three major causes. The rating system also allowed us to identify both the batches of materials used and
the workers involved in manufacturing defective items. Where we once recorded 115 different defects, now we are down to 23. This has enabled us to learn more from the process without any finger pointing. Our goal is to improve the quality and performance of our products every day."

"In addition," continued Mr. Zúñiga, "we no longer depend on a final inspection to sort out defective items. There are controls at each stage of the operation, monitored by supervisors, to help prevent and to spot defects, making final product acceptance easier. We have increased performance from 70% to 85% in the past few years. Our mid-term goal is to reach 92%, like many of CIC’s plants, although we must admit that they have a more controlled manufacturing environment. Our technology is simpler."

One of the first shipments to the United States was fully rejected. “This rejection had a great impact throughout the organization,” recalled the general manager. "At first we simply could not understand it because we thought the quality of our export products was comparable to international standards.” CECSA eventually solved the problem after carefully reviewing tolerance discrepancies. “The experience made us redouble our quality control efforts,” added the general manager.

The Manufacturing Process

CECSA’s production process began in the casting room, with the manufacture of plaster molds for the ceramic pieces that make up toilets, washbasins, and other sanitary fixtures. The plaster parts to form the mold had to be from the same batch; otherwise, the ceramic pieces would expand differently. A ceramic paste, to be poured into the molds, was prepared in another work area by carefully mixing quartz, clay, feldspar, and other materials in proportionate quantities. The quality lab monitored a series of variables for each batch, including viscosity, density, and other paste characteristics.

Next, the ceramic paste was suspended in water and poured or “dripped,” as plant workers called it, by using hoses in a partially controlled environment at normal pressure. These operations were performed by a group of qualified workers with a great sense of craftsmanship. Most of the humidity was absorbed by the mold, and the rest was eliminated by drying the piece at room temperature for three days or in a kiln for 12 hours. At this point, the supervisors performed a full preliminary inspection of each piece. Various ceramic pieces were then assembled to obtain each finished product.

The enamel that covered the items was prepared separately. Once coated, the items moved on to a kilning process. This was performed using pigmentation formulas and other substances. Under no circumstances were items coated with unapproved enamel batches. The shade and gloss of each batch was carefully monitored. If the enameling process failed, losses could reach $18,000 per kilned batch. Enamel coating was a painstaking procedure required to achieve the exact thickness. Otherwise, the color would turn out dull, and the batch would be wasted. The enameled items were grouped in multilevel carts and then kilned in 24-hour cycles. When this operation was completed some unexpected flaws could be pinpointed and related to specific causes. Other defects, however, were still not identifiable. Some staff members labeled these unidentified flaws as “intangibles.”

Before packing and shipping, a battery of tests was performed to evaluate the appearance, dimensions, structural distortion, and performance of each item. Export items were subject to a full inspection, while a sampling approach was used in items destined for local markets. Test results were systematically used to trace the possible causes of defective items or pieces.

The company produced four product lines: economy, regular, deluxe, and super deluxe models. The first two covered a major portion of domestic and regional demand. The deluxe line was targeted at customers with higher purchasing power in Central America and in some Caribbean countries. The super deluxe line was shipped to Panama, Puerto Rico, and the United States.

The Just-in-Time Program

Mr. Mendez explained, “We conceived the Just-In-Time/Total Quality Control Program to meet the challenge posed by international markets. In 1986, we expected to sell approximately 12% of our production to the United States. CIC was interested in our implementing this approach and offered us its unconditional support.”

The “Just-In-Time” concept required that throughout the production process, from the first operation to the last, components and materials had to reach each workstation just-in-time for processing, thus eliminating all in-process inventories.

As a result, each operator in the sequence operated had to give undivided attention to the piece being received. Faults and defects stood out and were more easily detected. “This concept requires a 180-degree shift from traditional attitudes,” explained Mr. Mendez. “Each operator is held accountable for quality. Usage of materials, labor, and energy are reduced. Pieces don’t have to be reworked and productivity increases.”

Program Launching

The Just-In-Time Program was launched in May of 1986. Its most important steps included the following:

Eliminating the Production Incentive

The Just-in-time Program was based on the premise that production goals must be attainable. If an operator’s normal processing capacity was 250 pieces a day, then he would be assigned 250 pieces per day and not 300 “In fact, he may be asked to deliver 230 pieces,” explained Mr. Mendez, “but each and every one must be excellent.”

This shift in emphasis meant changing mentalities and
attitudes in terms of production. Efforts were geared toward doing things right. “This naturally led us to eliminating the production incentive that we had been granting employees,” explained Mr. Mendez. “However—and this is a key point of the program—the employee’s pocket cannot be in any way affected by the change.” For almost a year, CECSA had been paying employees a quality bonus equal to the average sum they had been earning, which represented about 5% of the minimum wage.

**Identifying Plant Departments and Affixing Posters**

Signs were hung in visible areas, identifying the company’s departments and major sections of the plant. Two different sizes of posters were located in the plant’s high traffic areas, each with a mascot figure dressed in the company logo and the words “Just-in-time.” The smaller posters, containing the message “Order + Cleanliness = Quality,” were placed on bulletin boards. The larger posters contained a message seeking employees’ involvement in the program. One poster, put up in a corner of the “dripping” area next to the production manager’s office, had the following message: “We Stand For a New World of Progress. That’s why we need YOU.” T-shirts were also handed out to all employees with the company logo, its name, CECSA, and the slogan “Just-in-time.”

**Cleanliness throughout the Plant and at Each Workstation**

Each operator was held responsible for the order and cleanliness of his/her work area. The production manager initiated surprise inspections that graded site cleanliness on a 0 to 10 basis. Each member of a department was held accountable for that department’s cleanliness. Mr. Zúñiga himself carried out the inspections. The results were distributed throughout the plant in flyers.

**Involvement Groups**

The production manager, together with the general manager and other high-ranking officials, organized regular meetings during working hours with groups of employees to analyze and discuss problems related to production. The purpose of these meetings was to encourage employees to voice their ideas by providing them with the appropriate forum.

**Communicating the Concept “Just-in-time/Total Quality Control”**

Talks emphasizing the need for new attitudes toward quality were given to operators, supervisors, and union workers, and brochures also were handed out to all supervisors. “We explained that the “Just-in-time” system required a complete overhaul of our production procedures in terms of the process flow,” said Mr. Mendez. “No operator could consider his/her job done or pass a piece on to the following workstation until he/she was not certain that the piece would not cause defect delays at subsequent stages.”

During this step CECSA’s presidentt, the general manager, and other members of top management played out a simulation in front of all plant employees. The simulation was performed using a simple, four-operation process. First, the traditional production method was illustrated, in which each operator concentrated on meeting his/her quota without regard for the effects of his/her actions on the jobs of operators at other stages in the process. Data on such variables as the number of units in inventory and the inspection time for finished units were recorded on a large blackboard.

When the time came to simulate the new system, the managers took off their shirts, leaving their Just-in-time T-shirts on. Two runs were made. The first kept a maximum of three units in inventory between workstations, the second, only one. The results indicated that all the variables recorded lower values in the Just-in-time runs. This proved that the system was better and more importantly, that in addition to increasing productivity, product quality was highly visible.

The simulation also showed that when operators did not have to worry about a large inventory from which to take units to work on, they focused their attention more on what they were doing. Communication between operators improved since it was necessary to analyze and discuss problems due to faults attributed to preceding stages. “The simulation caused quite a stir among our personnel,” said the general manager. “All the managers were convinced that the basic Just-in-time concept had been successfully portrayed, and its message understood by our employees. The launching of the program was a hit. We began to see the results almost immediately.”

**The Just-in-time Production System**

The general manager added, “Since its inception, we realized that the Just-in-time production system had to be applied gradually, according to the specific characteristics of our process. That is why it was only implemented, developed and perfected in the First Inspection and Enameling stages. These are key process operations. They precede the kilning stage whose cost is enormous. And not only that, after kilning the piece is in fact finished.

How did we solve the conflict of lower production due to more emphasis on quality? Any possible decrease in incentive earnings was compensated with an equivalent quality bonus. The unit flow to sustain the kilning load was solved by increasing the enameling capacity. Before, we had three booths for this stage. We gradually increased the number of booths and now we have six running. Inspectors and enamelers have more time available to process each unit.

**Initial Program Results**

During the first Involvement Group meetings the workers put forth several ideas. The one that Mr. Mendez remembered the
most was the suggestion by a young employee that the company install more sinks to wash the plastic funnels used in the dripping operation. There was only one sink with five faucets, and the funnel washing area was always crowded. Mr. Mendez recalled:

I was present at that meeting. When the worker finished speaking, all us managers stared at each other, wondering how it was that none of us nor the supervisors ever noticed this. The suggestion was so simple and obvious. It provided a real advantage, since a great deal of the drippers’ downtime, standing in line waiting to wash their funnels, could be eliminated. Within a short time, we had built a second sink with six faucets. Currently, we are planning to move some auxiliary equipment to another area to build a third a sink, always in the vicinity of the dripping section.

This and other similar experiences convinced the general manager that the solutions to many operating problems don’t come from management desks but from the plant workers themselves. “Operators are far more aware of the problems because they do the same operations day in and day out,” Mr. Mendez pointed out.

In subsequent meetings, several workers from the dripping department stated that they never received any information about their work. They wanted to know how many defects of this or that type were traceable to them. The company addressed this concern in two ways. First, signs were set up at each dripping workstation, indicating the name of each worker, his/her production level and the average number of defects incurred in the previous month. Mr. Mendez was satisfied with the results:

Workers are proud of being identified. It has also reinforced our clean station program and increased quality of work because no one wants to see his/her name associated with defects. The operators’ self-esteem has improved, together with communication among fellow workers and with management itself. Today we identify each worker by his/her name. Being called by their names is of great value to every worker. That’s how I realized that one of the best drippers had the same full name as mine.

Second, the company installed blackboards at each department, illustrating the variations in defect percentage levels or rejected piece percentages. The production manager and other plant officials were constantly referring to this information. It became the main source of feedback on collective work quality being performed by the various departments.

Investment was made to increase enameling capacity. Through January 1987, the number of first inspection rejects dropped by more than 50% on the new line, offsetting incremental expenses by a large margin.

The results of the JIT/TQC program encouraged CECSA’s North American partners. Antonio Mendez recounted that in a CIC subsidiary company meeting held in Egypt early in the year, one of the CEOs suggested that if anyone was seriously interested in a program that was worth imitating, they should visit their sister company in Morelos. “This recognition was naturally a source of pride for all of us,” he added.

New Export Projects

The implementation of the JIT/TQC program coincided with an increase in orders from the United States. CECSA had estimated that sales outside Central America would amount to 18% of sales in 1986, but the actual figure for the year was 24%. Based on negotiations with CIC, company management believed that 1987 sales to Puerto Rico and North America could exceed 50% of total production. See Table 2 for summary data on exports between 1980 and 1987.

For the first time since some very small shipments had been made several years earlier, CECSA began exporting directly to the continental United States. Quality requirements had to be rigorously applied to all units destined to the U.S. market. Units with flaws, no matter how small, could not be exported and had to be re-routed to other Central American countries or returned to the domestic market. This theme was “hammered into” employees and supervisors, as Mr. Mendez recalled. Employees’ attitudes changed as they realized that this was an opportunity to ensure the company’s long-term stability and to protect their own jobs.

So as to be consistent with our new philosophy, we applied the JIT/TQC approach with some of our suppliers. We were most successful with our cardboard box supplier. We argued at length that box deliveries had to match our production program and that we did not want to bear the burden of excess inventories as we had in the past. We needed the space and the money for other operations. Finally, our supplier accepted our terms.

CECSA also had to insist that the box specifications be adjusted to those required by CIC, which included printed brands and legends and material tolerance specifications, and that the cardboard and the ink complied with ASTM standards.

The packing box used for units being shipped to the U.S. had to be assembled and glued. The Central American market CECSA used stapled boxes, but these were not acceptable to CIC because staples could scratch the ceramic surface. Within a short time, CECSA had depleted the entire country’s stock of special sealing glue. Moreover, there was no adequate gluing machine for this type of box in Morelos. The problem was solved when the glue manufacturer provided the company with a machine temporarily, until CECSA could buy its own machine. This enabled CECSA to synchronize its box and glue deliveries in such a way as to considerably reduce the inventory that would have otherwise been necessary. “Now

1 ASTM, American Society of Testing Materials, a private nonprofit organization that issues material rules and standards applicable to the production of goods.
our international partner does not have to go through the trouble of unpacking our product, throwing away our boxes, and repacking it in boxes manufactured by its U.S. supplier, as was done with our small shipments several years back,” said Mr. Mendez. Our effort to adjust our boxes to market specifications renders repacking unnecessary, and consumers receive our product the same way it was shipped from Morelos.

Another lesson we have learned in our exporting experience has to do with how we should load the container. CIC sent us a diagram indicating exactly how and where unit components (toilette, tank) should be placed for safe transportation. CIC also helped us to revise product design and quality inspection procedures. We received a visit by a quality auditor who, together with our production and engineering staff, reviewed product designs. They decided, among other things, to reinforce the molds and change certain dimensions to ensure a top quality product.

CECSA was able to absorb the impact of U.S. orders, which continued to increase during the first few months of 1987. Total company unit sales easily increased by 15% from the previous year, mostly due to our export sales to the United States and Panama. Suddenly, in March 1987, CIC ordered the company to re-route future orders to Canada. “This decision did not frighten us,” recalled Mr. Mendez. “With the JIT/TQC program running, the production system can easily respond to sharp variations in demand. But we had to go back to our box supplier, because the Canadian boxes had to be printed in English and French.”

CECSA was able to make its first shipment to Canada in the following month. Mr. Mendez estimated that before the implementation of JIT/TQC it would have taken three to four months, even working at full steam. With the Canadian exports, the program had proven its effectiveness.

“A couple of weeks ago, CIC informed us that we were to resume shipments to the U.S. and continue with our shipments to Canada. We have been provided with specifications for two new models that must be analyzed, tested, and manufactured within a few months. We are working very closely with our box supplier, keeping him posted of new requirements and of our production program schedule. The prototype box will be finished shortly and sent to CIC for its approval. We are, however, one step ahead and have already ordered certain components. We have also suggested to our box supplier that he should begin ordering his raw material supplies.”

### Current Program Status

In referring to the program’s evolution, Mr. Mendez indicated, “The new export projects have distracted us from the basic program. The Involvement Group meetings were interrupted after the first few months.”

The general manager reflected,

> We have not yet been able to establish a true quality incentive that responds adequately to the system’s philosophy. Almost since the beginning of the program, we have been discussing how this incentive should be structured, but no decision has been made to date. Our idea was that we should let time take its course so that workers become familiar with the new approach and new methods, in the hope that the learning curve would take hold. But although most of our operators are qualified technicians and workers, learning the skills they need to modify the process takes time, especially when changes to the approach are as drastic as ours.

Moneywise, the bonus has not been modified in almost a year, and the employees are becoming restless. They feel their income is being reduced because with the compulsory increases to the minimum wage, the money value of the bonus is becoming smaller as a percentage of their total income. In general, the individual production level has decreased, which was expected under the new system. To hold down the work rate, however, employees are using the excuse of having to put more work into each unit, and they are working at a crawling pace that is far too obvious. Matters have not been helped any by the president of the union, who is in the enameling department. His rejection of change has made things worse. Sometimes, when one of the drippers is moved to another location, the ID sign is left in the old workstation, and this has been a cause for discouragement among the operators.

### Table 2. Ceramica Centroamericana S.A (CECSA)

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<sup>a</sup> Estimate.

<sup>b</sup> Includes deliveries to Puerto Rico.

<sup>c</sup> Increase due to bilateral agreements between Morelos and Panama.

Source: company records.
Another thing that has not worked as expected are the course, which would be given by CECSA’s managers, including the general manager, the eleven employees blackboard diagrams, providing feedback to employees on department defects and rejects. My impression is that employees simply do not understand them. First of all, there is nothing on the board to indicate the meaning of the curves. Moreover, I think most of our employees do not even have a clear perception of what a percentage means. A similar barrier also applies to the flow of materials under the new system. Only recently, Mr. Zúñiga realized that even supervisors have trouble understanding how units should flow under the Just-in-time system or why productivity can be increased. In short, it seems as if we in top management forced this program on the employees without their being fully convinced or motivated to take it up openly and without restrictions. That is why program results have come to a standstill, and there are alarming signs of regression. Only the interest in cleanliness has remained the same.

**Action Plan**

“What have we left undone?” Mr. Mendez asked himself. He immediately answered his own question.

It took us a while to understand that we needed to increase the workers’ training so that they would be more willing to actively participate in the program. At yesterday’s meeting, plant managers and supervisors decided to give the program new momentum. We discussed the possibility of acting on an action plan that included several initiatives.

The initiatives included in the proposed action plan were the following:

1. Reconvening the Quality Circles, to meet periodically.
2. Applying the quality bonus, based on reject decreases and defect reductions, within the next few weeks. (Operators currently had only an “equivalent” bonus to compensate their loss of the quantity incentive that had been abolished with the JIT/TQC program).
3. Initiating a one-week course, for all employees, dealing with the themes top management considered vital to promote the worker involvement in the program. Such themes included basic arithmetic and simple statistics to obtain averages and percentages to interpret graphics; familiarity with the company’s administrative procedures such as invoicing; the importance and complexity of export operations; key cost elements; and basic accounting to understand the structure of summary financial statements and the impact of inventories. The course would be given two hours a day, after working hours, in groups of 11 people. Throughout the course, three objectives would be emphasized: quality as the company’s number one priority, a better understanding of the company, and proving to employees through this training effort that the company is genuinely interested in increasing their day-to-day job skills. At the end of the course, which would be given by CECSA’s managers, including the general manager, the eleven employees would go out with the Sales Manager to visit several customers and distributors. The purpose of this would be to allow employees to personally listen to complaints or praise from the people who use or sell the products they help manufacture. After this live feedback, the course would close with a simple ceremony in which a certificate would be handed out to each group that participated.
4. Establishing a series of actions, as a part of standard company procedure, to bring the workers’ families closer to the company. CECSA would send out birthday cards to employee spouses and special gifts when an employee gets married or has a child.
5. Implementing a “Kanban” system in the enameling section to strengthen the JIT process. Kanban, another Japanese concept, seeks to optimize production flows for increasing capacity with existing resources. The enameling area was constantly congested with transportation carts, and the plant layout could be changed to increase dripping capacity.

Commenting on the need for a kanban system, the general manager explained that “…with the demand increase, we are experiencing and assuming that the orders from the U.S. will continue, we need to keep a close eye on the capacity of critical production operations. We cannot afford to one day find ourselves with bottlenecks that get in the way of satisfying customer demands.”

**Toward the Future**

Antonio Mendez was optimistic about recovering the momentum that had been lost. “We had so forced the pace of the JIT/TQC program that we lost sight of how important it is that everyone understand the philosophy behind our new approach. When shipments to the U.S. are resumed and demand once again increases, we cannot allow ourselves to repeat this mistake. Finally, we cannot lose sight of the fact that people are the company’s resource…this is the most important lesson the program has taught us.”

**Appendix A: Brief Summary of The Morelos Economy**

In the 1950s, Morelos and the other five countries between Mexico and Panama, together with most Third World countries had adopted and fine-tuned the development model known as “import substitution.” This development model fostered the protection of domestic companies from international competition in order to create jobs, preserve scarce foreign currency, and industrialize the economies that for centuries had chiefly depended on the countries’ agricultural potential.
Table A1. Morelos Exports (in millions of U.S. dollars)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Exports in U.S.$</th>
<th>Nontraditional Exports to Central America</th>
<th>Nontraditional (Rest of World)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>826</td>
<td>195</td>
<td>97</td>
</tr>
<tr>
<td>1979</td>
<td>934</td>
<td>174</td>
<td>145</td>
</tr>
<tr>
<td>1980</td>
<td>1002</td>
<td>270</td>
<td>159</td>
</tr>
<tr>
<td>1981</td>
<td>1008</td>
<td>238</td>
<td>186</td>
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<tr>
<td>1982</td>
<td>870</td>
<td>167</td>
<td>161</td>
</tr>
<tr>
<td>1983</td>
<td>873</td>
<td>198</td>
<td>147</td>
</tr>
<tr>
<td>1984+</td>
<td>1006</td>
<td>183</td>
<td>214</td>
</tr>
<tr>
<td>1985</td>
<td>927</td>
<td>134</td>
<td>236</td>
</tr>
<tr>
<td>1986</td>
<td>1120</td>
<td>100</td>
<td>334</td>
</tr>
<tr>
<td>1987</td>
<td>1162</td>
<td>112</td>
<td>426</td>
</tr>
</tbody>
</table>

By the early 1980s, most developing countries recognized that the import substitution model had run its course. Plants were far too small for domestic markets. Consumer goods were more expensive than and of inferior quality to those manufactured by international markets. The competitive and economic structure significantly discouraged export activities.

It was not until the early 1980s—as a result of economic and political crises—that Morelos and other regional countries began analyzing alternatives to modify domestic development strategies. Staggered by the global economic recession, oil price increases, and dropping sugar and coffee prices, the Morelos economy experienced a 600% currency devaluation between February 1981 and July 1982. In 1982, the country’s gross domestic product dropped by more than 7%. Its inflation rate bordered 90%. Unemployment increased from 5 to 9%. The remaining regional countries were undergoing similar situations with varying degrees of intensity.

After renegotiating their public and private debts, some Central American countries were encouraged by international development agencies (i.e., AID, International Monetary Fund, and World Bank) to initiate legal and fiscal changes in order to guide the development model toward and “export promotion model.” The object of these agencies was to duplicate the successful experiences of Hong Kong, Taiwan, South Korea, and Singapore in Third World Countries. Consequently, another suggested policy was to familiarize private companies with international competitive scenarios. The underlying conviction was that this was the most appropriate means to generate skills within the countries’ agricultural, industrial, and service industries. This would enable developing countries to achieve long-term sustained growth. Their earnings would be generated in markets less vulnerable to national and international fluctuations.

By vigorously utilizing the mechanisms inserted in the newly enacted Export Promotion Law, Morelos led other regional countries in fostering nontraditional exports (i.e., products other than coffee, bananas, sugar, meat, etc.) to third markets outside the region. Table A1 shows the country’s total exports for the period between 1978 and 1987, including nontraditional products to Central America and third markets. As result of exporting efforts and the implementation of other economic policies, by 1987 the Morelos unemployment rate was 5.5%.

Teaching Note

Case Purpose and Teaching Objectives

The purpose of this case is to understand how the ways in which a JIT/TQC approach is implemented can influence the program results. It explores the operational and cultural changes required to introduce these new concepts. The CECSA case further illustrates how in implementing these approaches, it is so easy to lapse into old habits that paralyze the change effort. To keep the system running smoothly, it is paramount to pay continuous attention to detail and to preserve the enthusiasm of personnel and managers alike. In addition, this case describes the challenges that CECSA, like other successful Central American companies, had to face to expand into other markets outside the region so as to maintain their level of expansion and performance. CECSA’s new business goals were supported by the JIT/TQC system.

This management case has been used in Operations Management courses, in regular and executive Master’s Programs, and in short executive seminars to introduce the Just-in-time concept. It assumes some knowledge of Total Quality Control concepts, and in regular Master’s courses, the case may be preceded by class discussions on the basic JIT elements. Hall (1989), Hay (1988), and Schonberger (1988) are recommended as prior reading material in preparation for the CECSA case.

Suggested Questions for Discussion

1. How did CECSA’s quality management system evolve, and what were its basic elements?
2. How would you assess CECSA’s JIT/TQC program? What problems occurred and why?
3. What would you have done differently? Why?
4. Evaluate the initiatives proposed at the management meeting to relaunch the process. What other actions do you think should be implemented? Why?

Case Analysis

HOW DID CECSA’S QUALITY MANAGEMENT SYSTEM EVOLVE AND WHAT WERE ITS BASIC ELEMENTS? The natural environment that enabled CECSA’s sustained sales growth and performance for almost two decades began to be seriously affected by the Central American crisis of the late 1970s and early 1980s. This

3 This teaching note was prepared by Professor Guillermo D. Selva from the Central American Business Management Institute (initials in Spanish, INCAE). Its purpose is to facilitate class discussion of the management case “Cerámica Centroamericana S.A., CECSA.”
The crisis was further aggravated by an international economic recession. CECSA was consequently obliged to explore other markets in order to alleviate this stagnating pressure.

These other markets, however, had far more stringent quality control levels in terms of specifications, operation, product appearance, packaging, etc., particularly in the United States. Also, their margins were between 25% and 100% lower. The average gross margin of traditional markets fluctuated between 20 and 30%, while new markets ranged between 15 and 20.

Despite these drawbacks, many companies were willing to face the challenge. They were motivated by long-term expectations that could provide a much more solid basis for growth. They not only invested in becoming familiar with their new competitive environments. They also risked exposure to protective measures and attacks from other manufacturers and local vendors attempting to protect their own markets. In CECSA’s specific case, it had to deal with critical and permanent negotiations with CIC customers and vendors who mistrusted CECSA’s products.

As the production manager vividly stated, it was the crisis and the need to supply more demanding markets that forced CECSA to focus on quality issues. The turning point for the company’s conception of quality came when one of its first shipments to the United States was rejected in its entirety. In a few years, quality procedures were fine-tuned. Quality no longer depended on an end-of-the-line inspection that provided the company no information about the cause of defective products. A defect rating system was established. This system aided the company in analyzing defects. Also, personnel training was improved. Logs were created to identify batches of materials, molds used, and the workers involved in each manufacturing stage. The lab testing system also was improved. In summary, quality management was emphasized at each stage of the process. The company could now feel certain and even proud of the quality of its products.

The quality management approach was fully modified. Quality was now based on information records and analysis. The behavior of materials, personnel, procedures, etc. was compared. A major aspect of this new approach was an emphasis on learning from the defects encountered rather than shifting the blame (which is typical of traditional management). Actually, the basis for a permanent improvement culture was being established. The results speak for themselves. Performance improved by 15%, jumping from 70 to 85%. Exports gradually increased. The new market penetration strategy was reinforced. Finally, the sales estimate for 1986 was surpassed (see Table 2).

There was still a long way to go, however. The responsibility for product quality lay on the supervisors, not the workers (who are the real quality producers according to the teachings of Dr. Deming and Dr. Feigenbaum). Training focused on task performance, without emphasizing its relationship with or effect on product quality. Although specific defect detection mechanisms were now in place, a cause-effect analysis was not being systematically implemented. This could hamper any process that by nature is extremely intricate and complex. For example, there was no idea about the origin of many of the problems detected after the kilning process. These were simply written-off as “intangibles.” In addition, as is common practice, workers’ incentives were based on quantity. Workers were obviously receiving unequivocal signals that the company’s most important objective was to meet quantity production goals, quality improvement intentions notwithstanding.

HOW WOULD YOU ASSESS CECSA’S JIT/TQC PROGRAM? WHAT PROBLEMS OCCURRED AND WHY?

Based on the case study and the general manager’s enthusiastic comments, the JIT/TQC program was strongly supported by its top management. This support was vital in implementing new types of work systems. The participation of the company’s president and the general manager in the simulation staged for the employees, together with the general manager’s commitment to the Quality Involvement Groups, are indicative of this support. CIC’s role was also undoubtedly relevant in launching JIT. Due to its positioning in international markets, it was far more familiar with JIT and TQC benefits than CECSA’s management, who was struggling against the loss of its markets. In addition, the apparently close relationship between CECSA and CIC provided an excellent mechanism to transfer CIC’s know-how related to these new approaches. This may have diminished the typical reaction of fear or rejection toward change, encouraging CECSA’s managers to become familiar with the approach’s principles and elements. Moreover, CIC cooperated in performing quality audits.

The system’s implementation process included a series of lectures to all employees and Union members, distribution of detailed information to supervisors, and the simulation staged by top management. Other steps involved stressing cleanliness and job station organization (this is one of the primary actions mentioned in JIT literature); placing posters and signs with slogans (although this is criticized by Dr. Deming); posting signs to identify the plant’s various departments; organizing quality involvement groups; replacing the quantity incentive with an equivalent bonus, to avoid lack of motivation among workers due to a new emphasis on quality rather than quantity.

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4 Export development laws also were enacted (this issue is not discussed in the case). Under these laws, companies exporting outside the region enjoyed certain tax incentives in connection with the percentage of value added domestically to the export product. It should be noted however, that according to several studies about exporting companies, most of them stated that they would have maintained their exports to markets outside Central America even without the tax incentives.

5 Viscosity measurements, humidity content, shine, shades of color, etc. were performed throughout the entire process. Also, specific material batches were related to the personnel involved.

6 This simulation was first used by Hewlett-Packard in the early 1980s, when it began applying JIT principles and methods throughout its plants in the United States.
than quantity, and making the production flow smoother to underscore quality issues in the First Inspection and Enameling stages of the process. In an attempt to ensure quality and lower waste during the critical kilning and “burning” stages, “kanbans” were introduced. Following these two stages, it was possible to recover the materials from rejected products, but labor, enamel, and expensive power costs were lost.

The boost given to the process resulted in changes that effectively strengthened the company’s competitive edge. Rejects after the first inspection dropped by 50%. Productivity improved in some operations (as was the case of the “dripping” stage, by adding extra sinks to wash out the funnels). The stock of certain producer goods was reduced (the cardboard box supplier is a case in point). Physical space was provided to expand the capacity of certain operations. The quality of shipping boxes was noticeably improved. Finally, the production process was made more flexible in order to respond to sudden changes in demand increases and packaging standards within shorter periods of time (this was the case of different shipping boxes for Canada).

Many of these achievements were supported by introducing changes in work habits (operational issues). These changes included an adequate reduction in inventory, managing the relationship with the box supplier, stressing quality, and using kanbans in two key operations before kilning the units. However, one could argue that to a certain extent the attention given by management to individuals and groups in cleaning activities; managerial participation in quality involvement groups; the simulation staged by the president and company managers; identifying workstations and enabling employees to be called by their first names (organizational issues) were all of utmost importance and probably reinforced the preceding actions.

When the pressure generated by new projects began to mount, many aspects that had been supporting the process were abandoned (i.e., quality involvement groups, information that could not be understood by the workers, and lack of training for a full understanding of JIT principles). This probably resulted in decreased motivation among workers and supervisors. The main reason why the process came to a virtual standstill was the equivalent bonus issue. As salaries grew due to performance increases and/or inflation adjustments, the absolute value of the bonus decreased. The union took advantage of this situation to confront management and promote a “turtle pace” of production.

This situation supports the theory that suggests avoiding the contentment that arises from achieving one or two dramatic benefits, thereby preventing an in-depth attainment of the process as a whole. Management was aware that for the process to be successful it was necessary to promote an overall change in the attitude of all the people involved. However, this can only be brought about by implementing a series of carefully articulated initiatives. For these achievements to be permanent, the company’s leaders and main perpetrators must consistently invest time, discipline, and effort.

**WHAT WOULD YOU HAVE DONE DIFFERENTLY? WHY?**  The root of the problems that CECSA faced shortly after initiating the process may be related to some JIT/TQC implementation elements that could have been but were not incorporated by the company. JIT literature strongly emphasizes these elements (Hall, 1982):

- Greater emphasis on adequate implementation planning included a diagnosis of the organizational environment and the identification of key individuals or groups that supported or opposed the process.
- Use of pilot projects to provide the company with a learning tool to detect, in a controlled section of the organization, the positive and negative aspects of the approach.
- Establishment of a structure that might include a management committee, individual, or team responsible for supporting the process and gradually providing an in-depth knowledge of JIT/TQC principles and techniques to managers, supervisors, and workers.
- Organization of ongoing training programs. The company apparently relied upon the initial lectures. Employees were not provided with the tools to analyze and solve problems as a group. They could have been trained in basic techniques on statistical process control or permanent process improvement (i.e., brainstorming, basic information analysis, histograms, cause/effect diagrams, etc.).
- Design of variables with which individual, group, and department performance would be measured. These tools could have been used to compare the current situation with future performance to thereby clearly establish process advancement.
- Focus beyond the production system. The JIT process focused only on the production system; administrative departments and corporate groups were apparently not involved in the process. Although there is evidence that the president and general manager support and are familiar with JIT process characteristics, there is no mention of the efforts displayed by other parts of the organization to synchronize production. In fact, the message seems to be that JIT/TQC is only a production mechanism and not a work philosophy that involves all organization departments and members.

**EVALUATE THE INITIATIVES PROPOSED AT THE MANAGEMENT MEETING TO RELAUNCH THE PROCESS. WHAT OTHER ACTIONS DO YOU THINK SHOULD BE IMPLEMENTED? WHY?**  There are five initiatives mentioned at the close of the case, one of which is 10-hour course for all plant employees; the purpose of the course is to provide educational background on basic math and simple statistics, together with a general idea about the company’s most important administrative procedures.
As Mr. Mendez suggests, this course addresses two major goals. On the one hand, it hopes to recover the trust and motivation of employees. It would do so by providing all employees with information on company procedures and results. This in itself would be exceptional since most Central American companies (whose ownership structure is fully private) scrupulously withhold financial and sales information. On the other hand, the course will attempt to provide simple information management tools (which could have been provided at the beginning of the process) to ensure that the information given is understood by operators, acting as a motivating element.

Other initiatives have to do with bringing the company closer to employee families, by acknowledging special occasions (with flowers, gifts, etc.). Lastly, still other initiatives refer to operational aspects, such as improving enameling operations to avoid work area congestion and identifying the corresponding kanban. This would also free up physical space to be used for final testing procedures.

Many of the weaknesses identified during the original launching of the process were left unattended. One of them is the lack of a support structure that would keep the process in focus without disregarding various details. Another is a training process emphasizing problem solving and learning. The proposed training seems to be geared more toward facilitating the understanding of diagrams designed by others, rather than preparing operators to develop the diagrams and use the information to analyze problem solving.

Another problem left unresolved is the quality bonus issue. This is critical. On the one hand, income is a sensitive matter to workers, who should not associate the JIT process and its new operational and organizational structures with income deterioration. On the other hand, however, it seems the conditions (motivation, measurements, evaluation, etc.) to establish an adequate system that enables adopting a bonus based on product quality performance are not in place. The company should pay special attention to this matter, attempting to alleviate the problem as it is perceived by the workers. The simplest solution might be to update the amount of the bonus each time salaries are adjusted. Although it is not the best answer, employees might relate the bonus to their performance and not to a decrease in their purchasing power (caused by the company).

References