High Performance in Truck Manufacturing:
The TELCO Story

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The story of how an Indian truck manufacturer outperformed four Japanese firms is a good example of the principles of the High Performance Business in action. This school of thought, recently developed at Arthur D. Little, holds that the most successful businesses manage to satisfy customers, employees, and owners while focusing on processes, resources, and organization. Only by addressing all six elements can a firm achieve its true potential. In some cases – such as TELCO's – the results can be nothing short of dazzling.

The Birth of TELCO

Following India's independence in 1947, the Indian Government announced a new industrial policy. It would issue a limited number of licenses in each industry to manufacturers who would produce their products in India and achieve 90 percent Indian content within five years.

Daimler-Benz of Germany entered into a 15-year technical collaboration agreement with Tata, the largest industrial group in India, and obtained a license to manufacture medium-sized and heavy trucks. Their joint venture, the Tata Engineering and Locomotive Company, Ltd. – TELCO for short – began assembling Daimler-Benz trucks in 1954 in a factory in Jamshedpur, a city 100 miles from Calcutta in eastern India. (Three other Indian firms also obtained licenses, two with American partners and one with a British truck manufacturer.)

The TELCO joint venture was extremely successful. It focused on the needs of the Indian customer, modifying the Daimler-Benz truck to suit local conditions. As one of the designers put it, they wanted „an abusable product" – a truck that could be overloaded and driven on marginal roads, and that would still come back for more. By 1965, the Indian content of TELCO's trucks and buses had reached 99 percent, and TELCO had captured 70 percent of the Indian market. Its quality was so good that Daimler-Benz exported TELCO trucks to markets outside India as its own vehicles.

TELCO's performance had been outstanding. But the firm's stiffest challenge lay just ahead.

Although TELCO was making money, company planners recognized that the company's success rested on only one basic vehicle that could be made into a bus or a truck. Looking ahead, they realized that further growth in the market would come only with the addition of other models and sizes of vehicles. Furthermore, the successful partnership with Daimler-Benz was due to end in 1969. In the early 1960s, the leadership of TELCO decided that thereafter the Indian firm could go it alone.

Preparing for Industrial Independence

Sumant Moolgaokar, chairman of TELCO's board of directors, began preparing for industrial independence. He planned to build a brand-new factory complex across the country from Jamshedpur at Pune, approximately 100 miles from Bombay. TELCO's planners immediately set to work drawing up factory layouts, machine lists, and financial charts for Moolgaokar's approval. He rejected them all, saying that first he wanted layouts of the organization, descriptions of the skills that would be needed, and a plan for developing those skills. I had the privilege of being selected by Mr. Moolgaokar as executive assistant to help him in the planning of the Pune project, with responsibility also for human resources development for TELCO.

The site of the new factory in Pune was a sun-baked, rocky plateau that offered little more than 800 acres of space. The first building that was constructed contained the training center. This was in keeping with Moolgaokar's maxim of „Train your workers before you build your machines." Looking ahead in other ways, he directed that two lakes be excavated and the soil used to plant more than 100,000 trees.

Some of the problems that TELCO faced were more difficult than getting trees to grow at Pune. Faced with a decline in the rupee and a desire to keep money at home, the Government barred the firm from buying machine tools and dies from foreign sources. However, the designers and technicians needed to produce these tools and dies were not available in India. What the country did have was a crop of bright, eager engineering graduates. TELCO would have to recruit, train, and set up the facilities for this work force. Mr. Moolgaokar constantly exhorted his planners by saying, „We are not building a truck; we are building an industry."

What began to grow in Pune, along with the trees, was a unique integrated engineering complex, where the design and manufacture of trucks and of the machines and dies required to produce them took place in adjacent divisions on the same site.

A New Way of Operating

The new plant served as a testing ground for a new way of managing people. At the old factory in Jamshedpur, workers had an output-based wage incentive system that churned out high production but made the plant and the labor force rigid in responding to sales fluctuations. The workers, not surprisingly, having spent years perfecting highly focused skills to earn the maximum wages, were reluctant to take on new tasks or learn new skills.

At Pune, TELCO trained multiskilled workers, the best of whom were called „master craftsmen." This approach required more training and a higher base *pay*, but in return we got adaptable employees who could conceive a design, set up the machine to make it, and produce the object or part. Furthermore, at Pune all the employees, from the general manager to the cafeteria workers, were trained in theories of participatory management. High standards were emphasized throughout the plant, and especially from the top, as I discovered one summer day in 1983 when Mr. Moolgaokar came for one of his inspection trips.

I took him to a newly installed transfer line – a massive machine composed of hundreds of miles of wiring and hydraulic piping and thousands of precise components. Its function was to make universal joint crosses. Our machine tool division was very proud to have produced this large and intricate machine in a very short time. *Yet* Mr. Moolgaokar was visibly upset. He took me into my office and pointed out that the hydraulic pipes on the side of the machine were not absolutely vertical. „You must notice these little things," he said. „They all add up to world-class quality."

I commissioned the TELCO school to produce a plumb-bob for every senior manager in the factory. The trainees who produced the simple devices – and who heard the story behind them – got the message as much as the managers on whose desks the plumb-bobs rested. Each one carried an inscription: „Trifles make for perfection and perfection is no trifle."

By the mid-70s, TELCO had created the industry in Pune. Moreover, it turned out a completely new model – a heavier truck designed and manufactured entirely by TELCO. The new model had 90 percent Indian parts and was one of the first vehicles to be completely engineered and produced in a third world country.

The process of launching this new vehicle took a little more than four years. We learned a lot from doing it. Meanwhile, TELCO was exporting trucks to several countries in Southeast Asia, the Middle East, and Africa under the Tata name, often competing head-on with Daimler-Benz, our erstwhile technical partner. (It is worth noting, however, that throughout this period – and even to this day – Daimler-Benz holds shares in TELCO and is represented on the TELCO board.) To meet the needs of our growing export customers, we started designing our trucks ahead of what the Indian market wanted by including such features as dual braking systems, turbocharged engines, and steel cabs.

Project Jupiter

In the early 1980s, the Indian Government decided to open up to outside manufacturers the market for light commercial trucks – a segment TELCO had not yet entered. In applying for a license to manufacture, the foreign firms had to agree that within five years their trucks would be locally produced. Toyota, Nissan, Mitsubishi, and Mazda quickly received licenses, and the race was on. They all chose to produce models very close in size to TELCO's lightest trucks – a growing segment of the market.

At TELCO, we realized that if the Japanese established a foothold, it would be no time until they would move laterally onto our turf. When TELCO approached the Government for a license to enter this new field, we were told that all the licenses had been given out. We persisted and were finally given a license, with the following restrictions: we had to produce light trucks without importing any foreign technology, machines, or parts.

We knew that whatever we came up with would be competing with the best trucks Japan could offer. We knew that the last time TELCO had introduced a new vehicle, it had taken a little over four years. And we knew that if we took that long again we were sunk. We would have to launch a totally new product in 18 months. We decided to make the effort, and we called this massive commitment „Project Jupiter."

The name began with President John F. Kennedy. We Indians remembered his pledge to put a man on the moon in ten years and greatly admired the effort that went into that feat. That got us thinking about celestial objects. Someone suggested the moon, but we wanted something even bigger. General Motors had its Saturn plant, but in Indian

astronomy Saturn is a planet that can bring turmoil. Jupiter, on the other hand, is benign and beneficial. That's what we wanted.

To pull this project off, we realized that we would have to do three things: rethink our process of developing new products, redesign the organization to fit that process, and rearrange our resources in the most efficient way possible. This comprehensive approach exemplifies High Performance Business thinking.

Rethinking the Process

One of the most frustrating things in business is a goal that is constantly changing. If top management cannot settle on what it wants, how can a project be satisfactorily completed on time? We decided to set our goal as early as we could, yet keep the plan of how to achieve that goal as flexible as possible.

Using Program Evaluation and Review Techniques (PERT), we listed only the necessary tasks. We worked backward from the end goal, listing the preceding activities required for each step. For example, to have the new model ready for commercial sales, we would have to deliver spare parts to our dealers, train service technicians, get the vehicles in the dealers' hands, and so on. Working backward rather than forward, we could look at the product development process afresh and do only what needed doing. If we had worked forward, we were more likely to fall back to what we had always done, saying „after we do this, then we will do that" because that more easily comes to mind.

Then we compressed the PERT chart by making parallel as many activities as possible. This became easier because the people responsible for all the intersecting processes were together in the same room working out the new Product Development Process. This included vehicle designers, die engineers, and machine designers. For example, in manufacturing trucks, the normal order is to design a part – say a fender – then design the die with which to make the fender, then order the casting for the die. With our method, the die designer could figure out the overall dimensions of the fender, then order the casting for the die instead of waiting for the final fender design. Thus, the whole process worked much faster. Imagine this for every part of a new truck, and you have an idea of what it was like.

It is important not to confuse simultaneous engineering with simultaneous planning. The former goes on in many automobile companies, but the latter is much harder to achieve. In simultaneous engineering, the decisions on the products and manufacturing process are taken together to optimize product quality and cost. In simultaneous planning, not only are decisions taken together, but all the resources are deployed optimally toward the final goal. For example, the die shop offered its capacity for making vehicle prototypes along with the resources in the vehicle development center so that prototypes could be made more quickly.

Redesigning the Organization

One of my engineers told me that an organization is much harder to change than an assembly line. He was right. First of all, we had to have strong leadership, which we had at the top in CEO Moolgaokar. „We must create an organization we will all be proud of," he said.

The leader of an effort this complex needs three things to succeed. First, he or she should be able to „helicopter" the whole team – i.e., carry them above their own tasks to see the evolving pattern of the program. When they see the bigger picture, they can help eliminate barriers and marshal resources to head off problems.

Second, the leader needs to manage good people effectively. The best manufacturing people are competitive – it's in their blood – and the most productive managers need constantly to foster collaboration and the pooling of resources. At Pune, the senior engineers had to work as a team. We found over and over that engineers from one project could offer suggestions that enormously helped people working on something else. We rewarded cooperation whenever possible, to help everyone achieve a sense of collective responsibility for the major tasks.

Finally, the project leader absolutely must have a high level of authority in the organization. His or her position must fit the level of the task and must have the visible support of the chief executive. With this authority the leader will have the attention of the people on the project team and the pull to make things happen.

A crucial part of our success at Pune was our middle management people. Many of our managers had come from Jamshedpur and had brought with them notions based on their experience of mass production: specialized trades, long production runs, and tension between departments. We had to make them see how the different functions and activities fit together and to encourage them to work more in collaboration.

In the early 1980s, we heard of quality circles and how Japanese workmen on the floor worked together to solve problems. We liked this idea and introduced it – but at the middle management level first, rather than on the floor. Crossfunctional teams of middle managers achieved tremendous cost reductions and were very satisfied by the teamwork and camaraderie they developed. Thus, they bought the idea and took it to the factory floor themselves. We did not experience the resistance from middle managers that other organizations have encountered when they „empowered" workmen in natural work teams or quality circles.

As for the worker out on the floor, a particular concern of ours was what we called „changing the culture." We were tired of hearing that the typical Indian worker was lazy and careless and that he cared nothing about his surroundings. We didn't believe it. We believed that responsibility for changing the culture lay with management.

One day I was walking through the factory at Pune and bent over to pick up a greasy cotton rag that was lying on the floor. „Sorry," said an embarrassed lieutenant. „This is just the culture here – very difficult to change." The man tried to take the rag out of my hand. I held on, looking around for a trash can. There was none in sight.

„What would you do," I asked, „if you were working here and wanted to get rid of this?" The man had no answer. I continued: „Creating a workshop that can easily be kept clean, like laying out a process that can consistently produce quality is your job – not the workman's."

Rearranging Resources

Our strategy was to increase our sales by producing a greater variety of products and to introduce new models at a faster rate. We needed flexible manufacturing resources. We achieved flexibility in our personnel by our system of continuous retraining and by paying higher salaries for greater skills and versatility. We also looked all over the world for the know-how that we could license to manufacture our own flexible technology. For example, we used computer numerical control in-line machining centers in place of special-purpose transfer lines. We also used laser cutting machines to trim panels, which accelerated the process of introducing new models. Not surprisingly, these resources, though initially expensive, paid off handsomely because they could be used continuously, no matter what the product mix. In addition, they could handle greater variety with lower inventories – thus achieving savings that we could place back into our work force in increased pay and training. This was an example of the right balance between economies of scale and economies of scope.

The master craftsman idea is another good example of the benefit of flexible resources in the product development process. Instead of having one individual draw up plans for a brake caliper and a series of other people fabricate the part – each having to wait until the person before him is finished – TELCO could use one person to accomplish the entire process. Our prototypes came out much faster this way.

TELCO's flexible resources of people and machines, combined with simultaneous planning, produced three-dimensional working prototypes of complete vehicles in four to six weeks.

The Results

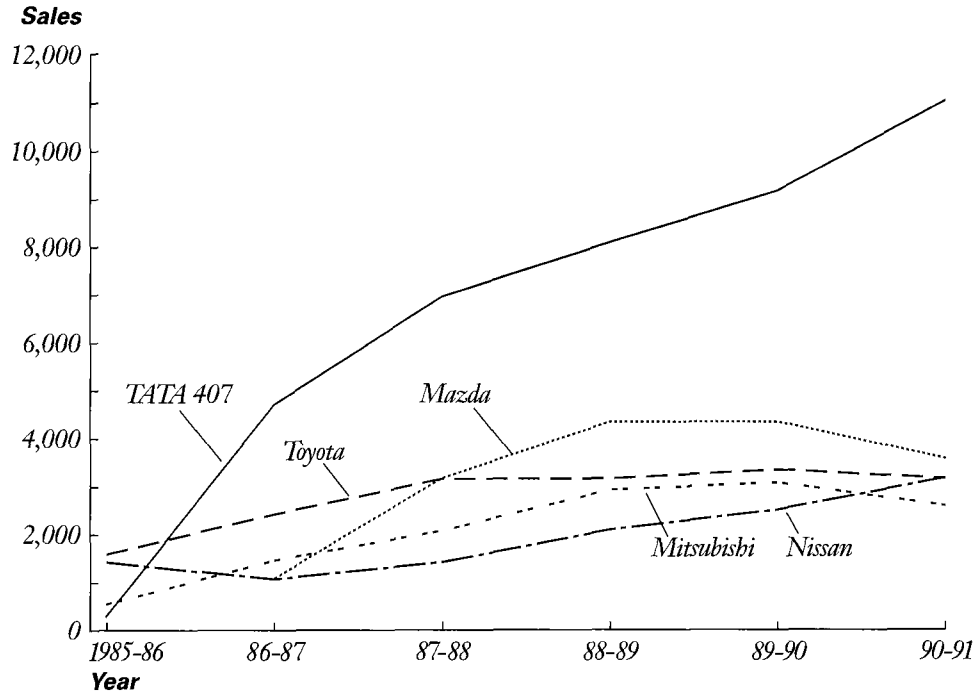
Project Jupiter's first model, the Tata 407, rolled out the door in February 1985 – just 18 months after the project began. To our knowledge, this was the shortest development time ever achieved for a vehicle of this type. In the next four years, TELCO used its new product development process to increase its product range from two basic models to six.

Furthermore, TELCO lived up to its High Performance Business principles by satisfying its customers, its employees, and its owners. The customers indicated their satisfaction by buying more of the Tata 407 than of all the Japanese trucks combined (see exhibit). That satisfaction has extended well beyond India: TELCO's trucks are now exported to more than 40 countries, mostly in Asia and Africa. Recently TELCO has been exploring markets for its products in Europe and the United States.

As for the employees, TELCO's investment in increased pay and training paid off: productivity more than doubled and continues to increase. Perhaps most important, worker satisfaction was extremely high. Workers were proud to work for TELCO. They felt that they had higher skill levels than comparable workers in other firms, and that they effectively established a standard for the industry. The special value of working at TELCO was reflected, for example, in the market for arranged marriages – where the parents of would-be brides gave preference to TELCO grooms!

For the owners, profits increased threefold and continue to rise. TELCO is now the sixth-largest manufacturer of medium and heavy trucks in the world. The firm has an integrated engineering capability to design new models and manufacture all the special-purpose machines and dies required. Not bad for a developing-country company!

Sales of Light Commercial Vehicles in India, 1985-91



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