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IVEY

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INDIAN OIL CORPORATION LIMITED: PROJECT MANTHAN

Manish Kumar prepared this case under the supervision of Professor Abhijit Gopal solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

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Brow furrowed, J. K. Puri sat back in his New Delhi office to take stock of the complexity of the issues he faced. As executive director of optimization, he had been charged with the responsibility of putting in place the informational infrastructure that would give Indian Oil Corporation the competitive firepower it needed to operate within the rapidly expanding and recently deregulated oil and gas sector in India. The monolithic public sector undertaking had long been the country's largest commercial enterprise but had recently been flung into an unfamiliar competitive environment, already teeming with nimble domestic and international participants eager to corner a share of a potentially huge market. All signs had pointed to the urgent need to revamp the company's aging and often ailing systems, and top management had decisively approved IT-based re-engineering in the corporation, which included an enterprise resource planning (ERP) system.

Aptly codenamed Project Manthan,[1] the implementation had been planned in two phases — the first involving 99 sites and the second in over 500 sites — over a period of eight years, to be completed by December 2004. Sixty-six Phase 1 sites had been completed by July 2003, but the operation of the SAP R/3 system had

[1] *Samudra manthan in Hindu cosmology refers to the churning (manthan) of the ocean (samudra) that the forces of 'good' had to effect in order to extract the amrit (nectar) that would give them immortality and dominion over the forces of 'evil'; as the legend goes, deadly poisons appeared at first, threatening to destroy both the divine and the human, but the gods intervened to defuse the danger and allow the amrit to emerge. As Puri noted, "Manthan signifies the nectar of information, churned out of the ocean of data."*

hit a snag: the response times had slowed considerably, resulting in long queues of road truck tankers at various points of sale. The system had slowed to the point that users were complaining that their original procedures had been faster. This problem had occurred twice in as many months.

Puri recognized that the slow response time had huge business and organizational implications. Delays in completing front-end transactions were not well received by customers and threatened to compromise user co-operation in moving the corporation to a more contemporary information processing platform. Moreover, Puri wondered if any such pause might further erode user confidence in the project as a whole. Yet, continuing on without sorting out the problem seemed to pose its own dangers; the competitive environment did not seem to allow for the possibility of pausing the implementation to try to solve the problem. It was April 8, 2003, and top management, concerned about the implications of the slow response times, expected a recommendation within 10 days about whether to proceed with implementation in the remaining sites.

PUBLIC SECTOR UNDERTAKINGS AND DEREGULATION

After independence from the British in 1947, the 1950s and 1960s saw the emergence in India of several public sector undertakings and government control in core industry sectors, from micro-electronics to aircraft manufacture. The assumption at the time was that government regulation and public sector units (PSU) were a necessity for the fledgling nation since these core industries called for sizable investments, which few entrepreneurs had the inclination or capacity to make.

The PSUs certainly helped establish a core industrial base in India. However, they had come to be known for their low productivity, unsatisfactory quality of goods, excessive manpower utilization, inadequate human resource development and low rate of return on capital. For instance, between 1980 and 2002, the average rate of return on capital employed by PSUs was only 3.4 per cent as against the average cost of borrowing of 8.7 per cent. In 1992, the Indian government — as part of a decisive move to stimulate the economy — began to disinvest in many PSUs and deregulate various sectors of the economy, allowing private and foreign participation and ownership in nearly every sector.

Oil Industry Deregulation

Since 1976, the oil industry had operated under the government-controlled administered price mechanism[2] (APM) for petroleum products. The APM ensured

[2] *A retention price concept under which oil companies were compensated for operating costs and assured a return of 12 per cent after tax on net worth.*

a fixed level of profitability for the government-owned oil companies and ensured that products such as kerosene, used by economically weaker sections of the population, and diesel, widely used in public transport and in the agricultural sector, were protected from the volatility of the international market. A strategic planning group set up by the government in 1995 recommended the complete deregulation of India's oil industry by April 2002. Deregulation resulted in the oil industry moving from the APM to a market determined pricing mechanism. Additionally, with the commissioning of the Jamnagar Refinery by Reliance Industries in the late 1990s, India's oil sector had shifted from a deficit refining capacity to a situation of surplus and had reached a 'shakeout' stage. In this environment, the focus had shifted to customer satisfaction, improving margins by driving down costs and optimizing operations to improve bottom-line profitability.

INDIAN OIL CORPORATION LIMITED

Incorporated in 1959 as Indian Oil Company Limited, the oil marketing company merged with Indian Refineries Limited in 1964 to form Indian Oil Corporation Limited (IOCL). As India's largest commercial undertaking, IOCL was engaged in the business of refining, transporting and marketing petroleum products throughout the country. From its inception, IOCL had been a state-owned enterprise with the mandate to build national oil security and competence in oil refining and marketing. In fiscal 2002, it was ranked No. 191 — and was the only Indian company — in *Fortune Global 500*.

IOCL had a divisional structure based on business lines that reflected the individual companies before the merger. Each division was headed by a director who reported to the chairman. The marketing division was responsible for the sales and distribution of various petroleum products to every corner of India — IOCL had over 53 per cent of the market share in petroleum products. The refineries division operated seven of the country's 18 refineries. The pipelines division had been entrusted with the design, engineering, construction and operations of the country's largest network of pipelines. The research and development (R&D) division was engaged in research on lubricants, refinery processes and pipeline transportation. The divisions had wide autonomy in business matters but were required to operate under broad policy guidelines spelled out by the government. For financial and operating performance of IOCL see Exhibit 1.

As Puri observed:

> Our vision is to become a major, diversified, transnational, integrated energy company, with national leadership and a strong environmental conscience, playing a national role in oil security

and public distribution. Pre-deregulation, we focused on market share. Post-deregulation, our strategy is to maintain our leadership by meeting customer expectations at the lowest cost to both IOCL and to our customers. Further, we have focused on increasing our refinery margins and capitalizing on opportunities thrown up by deregulation.

Information Technology at IOCL

Electronic data processing (EDP) was introduced in IOCL in 1966 with punched cards and unit record machines. These were replaced in 1986 by personal computers (PCs). Computers had been traditionally opposed by IOCL unions, who perceived them as replacements for workers. It was only in 1990, after PCs had become a common feature in the organization, that the unions began to accept the mainframe computer system in the organization. However, by that time, the technology had progressed, and IOCL decided in 1992 to replace the mainframes with a distributed data processing environment.

In the first 20 years of computerization, the focus had been on financial systems, payroll and sales statistics. With the introduction of PCs, several initiatives were launched to implement EDP in other aspects of work at IOCL. The first online transaction processing program was implemented in 1989. A distributed digital control system for refinery process controls was implemented in 1993 and subsequently replaced by real-time operations controls in 1996. At the time, key functions in various IOCL divisions were sustained by different legacy software systems developed over the past several years, (e.g. the marketing division had the terminal documentation module (TDM) to capture data at point-of-sale units such as bulk storage terminals, the plant documentation module (PDM) for operations at liquefied petroleum gas (LPG) bottling plants, and the IndAir system for aviation fuel stations). Similarly, the financial management system (FMS), the materials management system (MMS), and the online maintenance and inspection system (OMNIS) were in operation in the refineries and pipelines divisions. There were other legacy systems for stock and sales accounting in the marketing division and for payroll in all divisions. EDP at IOCL worked on minicomputer and PC-based platforms, and significant investments had been made in these basic building blocks. There were also local and wide area networks, but these operated on a limited scale with little standardization.

Like any other large organization, IOCL generated, collated and stored a vast quantity of data, but the information was scattered among different legacy systems, each designed to meet the specific needs of particular divisions/functions/departments. These "islands" of information systems lacked commonality, consistency and communicability. Data for the organization as a whole was generally unavailable. By the mid-90s, the business processes for

identical tasks differed across divisions and, in many instances, even within the different locations of a division. This lack of standardization was leading to suboptimal use of organizational resources. Software developed and procured in the 1980s was still in use in 1996, and it was estimated that the overall technology gap was of the order of five years, with an even greater gap in networking and communications technology. Apart from the technological gap, the IT organization at IOCL also faced the critical challenge of Y2K and its attendant issues.

PROJECT MANTHAN

According to S. Ramasamy, deputy general manager of IT:

> We had information silos; as it is, as a company we have worked in a compartmentalized environment since the merger of the distinct refinery and marketing companies in 1964. Project Manthan was an opportunity to 'integrate' the company using an IT-enabled system.

A thought process was initiated by top management in March 1996 for developing and implementing an integrated information processing, transmitting and archiving system across the corporation. To initiate the process of IT-based re-engineering, workshops were conducted by the functional expertise resource group with about 300 representatives from different areas of the IOCL business. The knowledge generated from these workshops provided the foundation for Project Manthan. The project was thus conceptualized as a common information platform across the organization with a view to ensuring the survival and growth of IOCL in the open market

The core group formulated the scope and objectives of the project, based on the collective knowledge and experience of its members, a literature scan and consultant presentations (see Exhibit 2). The upgrade of hardware, use of a common platform, integration of all functional modules and open architecture was collectively perceived as a synergized system to meet IOCL business requirements (see Exhibit 3). The expectation was that, on completion of the project, IOCL would be able to compete with the best in India and abroad on equal terms.

The cost-benefit equation was also seen in a positive light. Puri noted,

> Our annual distribution cost and expenditure on project services and material account for Rs34 billion[3] and Rs40 billion respectively; even a one per cent reduction through optimization

[3] *Rs32 = Cdn$1.*

and information analysis would entail a substantial savings to IOCL. Initially we targeted Rs2.3 billion as annualized savings but we have revised the target as our expectations have increased with successes in implementation. Until now our focus has been on standardization; with the rollout of the system to the entire corporation by 2004-2005, we will be a position to do a benchmarking of the savings.

The Project Unfolds

"Going alone on this project would have amounted to reinventing the wheel; a competent consultant was necessary to translate our objectives into IT deliverables," remarked Puri. "We also recognized that in-house development would not enable direct access to worldwide best practices." Several international consultancy firms were short-listed for consideration, based on their global standing and presence in India. In April 1997, Price Waterhouse Associates (now PwC) was assigned the task of conceptualizing, designing and implementing an integrated information processing system across IOCL in 29 months. However, the contract restricted IOCL's financial commitment to the initial conception and design stage of the project.

In July 1998, PWC submitted the conceptual technology plan (CTP) and recommended the following actions (see Exhibits 4 and 5):

- Implementation of suitable ERP software;
- Implementation of add-on software packages;
- Installation and commissioning of a robust communication network;
- Installation and commissioning of appropriate hardware; and
- Transition management.

The project gained momentum after approximately 70 people from various functional units of all the divisions joined the core group to facilitate the implementation of the ERP package and add-on software, along with the commissioning of a communication network and hardware infrastructure.

In October 1999, IOCL selected the internationally-reputed ERP package, SAP R/3. The system would be accessed company-wide over a hybrid wide area network. A.M. Rao, DGM (IS) noted the difficulty in selling this centralized approach: "Trying to sell the concept of a centralized system that would connect the entire country was difficult when we were not sure that a telephone call to the other end of the city would occur trouble free." The optimal and efficient performance of the new centralized approach at IOCL called for a telecommunications network unparalleled in the history of corporate India. In 1996, not only was the telecommunications sector controlled by the government,

the reliability of connections and bandwidth adequacy was in doubt. The Manthan team, however, felt that a multitiered communications strategy would provide nearly 100 per cent uptime with adequate bandwidth. IOCL saw this as an opportunity to implement a single integrated communication network for the entire organization, dissolving divisional boundaries by providing voice, video and data connectivity throughout the country.

Sheela Ranjhan, deputy manager of information systems (IS), spoke about the practical difficulties involved:

> As per normal policy, we try to have three modes of communication to any point of sale location. The terrestrial network forms the backbone and meets the requirements of applications that demand high bandwidth, but as it is not dependable, we provide VSAT and ISDN connectivity as backups. This is ideally what we would like to have in the new situation, but our locations are largely based in remote areas of the country, where the communication infrastructure is inadequate. During implementation, we found that we could not generalize and that each location had to be looked at on a case-by-case basis, which resulted in variations from our three-tier communication setup. Further, we faced many challenges related to the regulatory environment. For instance, installing VSAT at our aviation fuelling stations required approval from a government body that represented several ministries; this approval was not always forthcoming.

The project was to be completed in four stages (see Exhibit 6 for details): (1) conceptual design, (2) detailed design, (3) construction, and (4) implementation. As the project evolved, Puri reflected on its progress:

> Manthan has been a unique project embarked upon for the first time in India by any organization of comparable size and complexity. The project stipulated a quantum jump in technology for IOCL. Therefore, we, as well as PwC,[4] had to face a number of unforeseen and multidimensional problems while completing various stages. The methodology adopted by PwC in consultation with the business managers and the IT group was also unique and novel for IOCL. Therefore, a number of issues had to be revisited and rediscovered during this stage. All these factors resulted in delays in the completion of the project.

[4]PwA was renamed PricewaterCoopers (PwC) and, later in 2002, the IT consultancy services of PwC were taken over by IBM Consulting.

One such issue related to add-ons. The core team learned a great deal about the organization over the course of the project that had not been as clear earlier, including the fact that add-ons were going to be far more crucial than initially envisaged.

As A.C. Mishra, chief manager of IS for the add-ons group, observed,

> IOCL is essentially a supply chain organization. In the deregulated scenario, a package or tool for supply chain management is a must as decision-making departmentally has led to sub-optimal operation in the past. With add-ons, IOCL hopes to optimize its entire supply chain, from crude procurement to finished product distribution. We went in for the add-ons as the real time needs of IOCL's core business functions were not adequately addressed by ERP software alone. The add-ons were essentially bolt-ons to SAP R/3. The selection of an add-ons vendor was a long process as integration of supply chain management was a new concept in India in 1998 and there was no benchmarking data available for the country. In October, 2002, Tata Honeywell was awarded the work.
>
> Many software packages considered by IOCL under add-ons were very new and had never been implemented in India and even Tata Honeywell has to rely extensively on their principals, Honeywell. Hence, we had to proceed with caution, eliminating all doubts and uncertainty. As a result, we embarked on the prototype development of some select applications, to prove their utility in the Indian environment and to build confidence amongst end-users. The project team had taken up the implementation of a few packages such as the laboratory information management system, crude scheduling packages for the crude pipelines, demand forecasting for a few selected products in representative areas, and at various end-user locations. The complete add-on implementation is expected to be completed by December 2004.

One of the biggest challenges to adopting the new IT system was the level of computer proficiency in the organization. Of the nearly 9,500 employees in executive and supervisory roles, a large proportion had little experience with computers, let alone with advanced systems such as an ERP. It became clear to management that corporate-wide visibility for IT and the training of all its employees on IT systems was going to be a key factor in project success and the use of IT for business growth.

Apart from launching IT-based training, in 1999-2000, IOCL provided personal computers for home use to all 9,500 executives and supervisors as a means to enhance overall computer literacy and skills. Also, as part of the overall Manthan

project vision, the number of PCs in the workplace was increased to approximately 2.5 computers for every three supervisors/executives.

Going Live

On August 31, 2001, the R&D centre became the maiden go-live site. According to Rao,

> Originally, 22 pilot sites were to go live simultaneously on September 1, 2001, but considering our progress, this looked unlikely; meanwhile, the implementation had taken quite some time and the general perception was, 'The Manthan group has been doing something for so many months but nothing has come out.' We realized that a quick win was necessary for both the core team and the organization. We needed to demonstrate to the organization that Manthan, as a concept, worked in real time.

This is where the idea of a pilot out of a pilot emerged. The core team favored the R&D centre as the maiden site as it offered many advantages, e.g., transaction opportunities for most of the SAP modules and proximity to the head office of IOCL and the Project Manthan team.

Until the rollout in R&D, there were issues related to the morale of the core team. There were no visible results and the team was in its own cocoon. Through the quick win at R&D, the Manthan team grew in confidence. IIPM,[5] Gurgaon, became the second site to go live on SAP R/3 software on October 31, 2001. With the experience gained at the R&D centre and at IIPM, the Manthan team was ready to roll out SAP at other major locations. A dozen locations were short-listed to go live on January 1, 2002. These units together represented the entire spectrum of business operations in refineries, pipelines and marketing.

One of these units was the Panipat terminal. However, numerous issues cropped up on the designated date, including the failure of the communications link: VSAT connectivity could not be established. In consultation with management, the team decided that if the Panipat terminal could not go live by 5 p.m., they would go back to their legacy systems and roll back SAP implementation. Although the product supply remained unaffected as there was sufficient stock for another 24 hours in anticipation of the changeover from legacy systems, anxiety heightened as the deadline approached. Finally, at 4.30 p.m., Panipat was able to conduct its first transactions on the new SAP R/3 system. This experience considerably bolstered the confidence of the project team.

[5] *IOCL Institute of Petroleum Management.*

Buoyed by such successes, Puri observed,

> In the immediate future, if everything goes well, we hope to move toward a paperless office environment and an optimized supply chain. The data generated at the central site from all locations of IOCL will be the backbone for customized portals that will provide ready day-to-day information on key performance indicators to senior management while facilitating the launching of data warehousing and customer relationship management. We believe that our Manthan experience can be leveraged by floating a new company to offer consultancy services to our subsidiaries and joint venture partners on training and implementation related to SAP R/3, networking and hardware selection, while also becoming a beta testing site for major software vendors.

The Response Time Issue

V.N.K. Reddy, manager of the Basis[6] team, pointed out:

> The designed response time during the sizing of servers for the production environment was 2,000 milliseconds. Since the maiden go-live, response times had been as per the design requirements in general. During the first weeks of March and April, however, the SAP R/3 system had slowed down considerably to the point that normal business transactions were disrupted. The response time of some of the application servers was over 10 seconds. The 10 seconds translated to eight to 10 minutes at the user end, due to a cascading effect. We were flooded with calls from almost all our points of sale complaining that the printing of invoices from the system was too slow and was resulting in queues of road tankers awaiting dispatch.

The Bijwasan terminal, a major point of sale, was among those affected. Senior manager P. S. Negi elaborated:

> The Bijwasan terminal is a life line for Delhi. We supply petrol and diesel to nearly 85 per cent of the retail outlets in Delhi as well as to the international airport. Every day, around 350 truck tankers are dispatched from Bijwasan. We started facing problems during the first weeks of March and April. In normal operations, the sales and dispatch for a single truck involve five processes, each taking two to 2.5 minutes. When the system slowed down, each process was taking nearly 25 minutes and resulted in long queues of truck

[6] *SAP R/3 core technology and its architecture is called Basis.*

> tankers, which we were unable to clear in our normal hours of operation. Apart from the inconvenience to customers, who had to wait through fault of their own, the employees manning the terminals worked beyond normal hours to clear the daily quota, which was frustrating and a hindrance to their normal working.

Puri knew Negi's plight would be shared by managers at other SAP R/3 sites. While Puri and his team had faced several challenges in designing and implementing Project Manthan, slow response time threatened to escalate the challenge to a new level. As the Indian petroleum market continued to undergo deregulation and an excess refining capacity appeared for the first time, customers had the flexibility to source their needs from companies that offered the best service at the least cost and time. One of the key business requirements from Project Manthan had been its beneficial impact on the customer relationship. Lengthy transaction processing delays (e.g. the generation of a sales invoice) could, however, trigger customer migration to other oil companies.

Puri was also aware that the poor response time had larger organizational implications. While the project was backed by top management and positioned as an IT-based re-engineering exercise that would align with the business priorities of IOCL, end-users facing slow response times had started to question whether their requirements (such as time required to process a transaction) were being fulfilled. For end-users with lower computer skills, slow response times compounded the challenges they faced in adjusting to the new way of transacting business. These users were now forced to navigate and utilize computer screens that they considered complex and saw as taking longer to complete business transactions than their earlier manual processes. Even to end-users who had been proficient in computer use and accustomed to customized stand-alone software, the response time delays proved to be disruptive and a source of frustration. The project and change managers, who had championed the new system at various units, saw the response time delays as a source of embarrassment. They believed that poor response time was resulting in loss of confidence in the system amongst end-users. Puri and his team began to investigate the factors causing the response time issues.

The Problem and Alternatives

The response time issues had cropped up following the end of a month. The month-end period in IOCL involved consolidation of all past transactions for monthly reporting purposes to aid management decision-making. When the response time issue first came up, the Basis team responded by deferring processing of reporting applications to free up resources for business transactions. This action had improved response time to an extent. Puri learned from his team, however, that other factors could have contributed to the poor response times:

hardware configuration and installation, database design and installation, the way SAP had been implemented (i.e. the amount of customization that had been done), the nature of the processes as well as their loads (i.e. transactions and reporting load), and communication bandwidth limitations. However, the extent of the contribution of each factor was uncertain. Additionally, Puri was aware that the recent version upgrade to 4.6C might have put a higher resource demand on existing production systems.

Several alternative courses of action appeared appropriate. One option was to schedule all reporting and batch jobs after hours when the transaction load was light, but Puri was unsure how end-users would respond to this deferral. Alternatively, Puri and his team could sensitize end-users, using the SAP message service whenever response time increased, by requesting them to defer their reporting jobs in favor of business transaction processing. Puri was, however, unsure if users would heed the messages. Another alternative was to remove the reporting load from the database server and shift it to a business warehouse server. Although this would free substantial resources for transaction processes, the reporting server would require a substantial investment of time and money.

THE DILEMMA

Puri realized there were time and resource costs associated with sorting out the response time problem. Given the three-tiered ERP architecture, it would be challenging to identify which factors — e.g., the SAP application, the database server, the way in which the database has been implemented, the communications bandwidth constraints — were bottlenecks. Puri knew, though, that with more sites going live and increasing end-user expectations, the efficient performance of the technological system was crucial.

Puri also understood that he did not have direct control over several causal factors, such as the adequate allocation of bandwidth by the government-run telecommunications provider. Such constraints resulted in several questions for Puri with respect to the future course of Project Manthan. The primary decision he needed to make was whether or not to proceed as planned with implementation at the remaining sites. If he were to recommend continued implementation, he would have to keep in mind that response times could worsen due to the additional load of the new sites. If he were to recommend stalling the implementation, he would have to account for the implications of such a decision as well as come up with a suitable action plan to bring the project back on track. Puri also had to come up with a strategy to address the growing discontent of end-users and management related to the poor response times. In doing so, he knew that the suitability of a centralized IT architecture at Indian Oil would be revisited. Puri also had to decide which of the existing group of vendors should be brought in to help with the problem without compromising the momentum of the project.

Puri began to consider the factors that pointed to continuing with the implementation while simultaneously trying to resolve the response time issues. The implementation exercise had gained considerable momentum, and the core team was displaying great enthusiasm in the rollout to the remaining sites. Puri knew that in this environment, any diversion would impede the implementation and delay project completion. Additionally, Puri had been feeling pressure from top management to complete the project, which was already in its eighth year. He was also aware that many oil majors in India had followed the IOCL re-engineering exercise and were already in advanced stages of completing their own ERP implementations. Any slowdown would jeopardize the company's readiness to compete with oil majors that had similar tools. Puri wondered, in fact, whether his company's acquiring of SAP R/3 before others would prove to be a sustainable first-mover advantage in the deregulated environment.

The downsides to continuing implementation were also evident. With the added load of new sites going live, the response time problem could worsen. Any further delays in processing transactions could result in poor customer relations and compromise customer service, possibly triggering customer migration to competitors. There was also the risk of antagonizing a fresh set of end-users at the sites where implementation had begun after the response time issues had arisen.

Puri felt that the case for not proceeding and suspending further implementation until the response time issues had been resolved also had merit. The response time problems, which had cropped up in the initial weeks of the previous two months, had been unexpected and had taken the team by surprise. There was uncertainty regarding response times, and it appeared prudent to halt further implementation. He was, however, equally aware that management would expect a plan to regain the time lost in resolving the issue. Whichever path he chose, Puri knew that management expected him to have the answers and to do what was best for IOCL.

Whether or not he decided to proceed with further implementation, Puri knew he had to resolve the poor response time issue and build end-user confidence. Bringing the response times to reasonable levels appeared to be the only way to build back the lost confidence of the end-users.

The sudden occurrence of the response time problem before all 99 Phase I sites had gone live pointed to the possibility that the design team may have — given the unique business process requirements of IOCL — underestimated technological requirements such as server sizing and bandwidth. Puri felt that an in-depth systems study was needed in order to arrive at the optimal system configuration needed to support the full load of about 6,000 users in over 500 sites and to rectify the ongoing response time problem. Here, too, Puri was unsure about which vendors to call on. Project Manthan involved partnerships with several vendors as well as licensing agreements with government agencies. For

example, if Puri and his team wanted to increase the bandwidth available on the VSAT network, IOCL would have to approach the Department of Telecommunication with the help of HCL Comnet, the contact point for any VSAT communication matters. Issues related to the operation and service of leased lines had to be addressed to another public sector organization, Bharat Sanchar Nigam Limited. While the main supplier of servers for the production system was HP India, the database vendor was Oracle India, the ERP supplier was SAP based in Germany, and the project consultant was PwC, whose IT consultancy services had recently been acquired by IBM. PwC had customized SAP R/3 and had implemented the system with the core team from IOCL.

The Future Course

In a related but independent decision, Puri had to make recommendations about the job profile of the IS department and its personnel at various locations. He was aware that with the adoption of a centralized architecture, the roles and responsibilities of the IS department and its personnel at all units and sites would change. Earlier, they had developed and maintained customized standalone legacy systems in decentralized environments, but these systems were now being replaced by the centralized SAP R/3 system. Puri was confident that IS personnel from the various locations could be retrained in the new technology so that IOCL would have the capabilities to roll the system out to the remaining sites under Phase II without the aid of external consultants while supporting end-users and maintaining the entire system centrally. He was, however, uncertain about how the other divisions would respond to giving up their IS personnel. He was also unsure about how IS personnel at the various divisions would respond to their changing roles and responsibilities and to new management expectations.

As Puri pondered the different issues confronting Project Manthan, he realized that poor response time was the biggest issue. Any successful resolution had to address not only the 66 sites currently on SAP R/3 but also had to ensure that events such as the ones they had faced did not occur when the load from the remaining 500+ sites was on the new system. Meanwhile, Puri had to decide how best to proceed with the rest of the implementation.

Exhibit 1

FINANCIAL PERFORMANCE
(all figures in Rs billions)

Financial	2002-03	2001-02	2000-01	1999-00
Turnover	1,198	1,148	1,173	941
Gross Profit #	108	75	58	59
Profit Before Interest & Tax	91	61	46	39
Profit Before Tax	84	45	29	29
Profit After Tax	61	28	27	24
Dividend	22	8	7	5
Retained Earnings	36	20	19	17
Value Added	177	147	129	122
Contribution to Central Exchequer	206	165	161	151
Cumulative Dividend	59	37	28	21

PHYSICAL PERFORMANCE — OPERATIONS
(millions of tonnes per unit)

Operating Performance	2002-03	2001-02	2000-01	1999-00
Product sales	46.46	47.17	47.80	48.79
Refineries throughput	35.29	33.76	33.22	32.42
Pipelines throughput	41.11	40.36	39.44	39.50

 # profit before depreciation, interest, expenditure and tax

Source: Company Web site.

Exhibit 2

PROJECT MANTHAN SCOPE

- To develop a corporate IT strategy, taking the available technology and capability into account.
- To define the "deliverables" from the corporate integrated information system, considering the "best practices" followed worldwide, especially in the petroleum industry.
- To determine the needs for upgrade and addition of hardware and software, identify the common system platforms/environments, and formulate the design parameters for the core integration of functional modules to be used at all the units of the corporation, from the boardrooms of the refineries to the residential offices of upcountry sales officers.
- To examine the availability of in-house skills as well as the current systems set-up and to recommend the structure and the skills required for operating, maintaining, and upgrading the proposed corporate system.
- To design the system with open architecture so that the continuing advancements in technology for hardware, software, and communications can be seamlessly assimilated without disrupting the totality of the process.
- To calculate the capital as well as the recurring costs for implementing such a system, and evaluating the cost-benefit based on clearly defined benchmarks
- To formulate the required training and education scheme in detail and to bring in ideas on best practices in business strategy and organization structure linked to the optimization of the corporate integrated information system.
- To develop the required system architecture, integrating the existing modules (especially the proven "logic") as well as creating new/additional modules as required.
- To carry out trial implementation, de-bugging, and stabilization of the system .
- To standardize, implement, and replicate the integrated system across the organization.
- To continue the association for the purposes of post-implementation system and process maintenance, upgrades, and modification, training, education, and support in general, including continuous updating of the "best practices" database.

PROJECT MANTHAN OBJECTIVES

- Seamless integration of business processes and information flow
- Uniform 'look-feel' of software anywhere in the Corporation
- Centralized control with decentralized customer response
- Standard, accurate, real time data to support decision-making
- Extensive 'drill-down' reporting capabilities for analysis of trends
- High degree of reliability and security
- Communication connectivity across the Corporation

Source: Corporate IT, IOCL.

Exhibit 3

KEY BUSINESS REQUIREMENTS

- Single write, multi-read processing (information consistency)
- Data capture, validation at source
- One process, one owner, one segment methodology
- Integrate business solutions linking islands of information
- Right information to the right people at the right time in the right format
- Provide information wherever and whenever required in a secured environment
- Unified, prompt, reliable, coherent, cost-effective corporate knowledge base
- Global best practices emulation
- Beneficial impact on customer relationship management
- People and process integration across the Corporation
- Robust communication network

Exhibit 4

TARGET SOLUTIONS (ERP AND ADD-ONS)

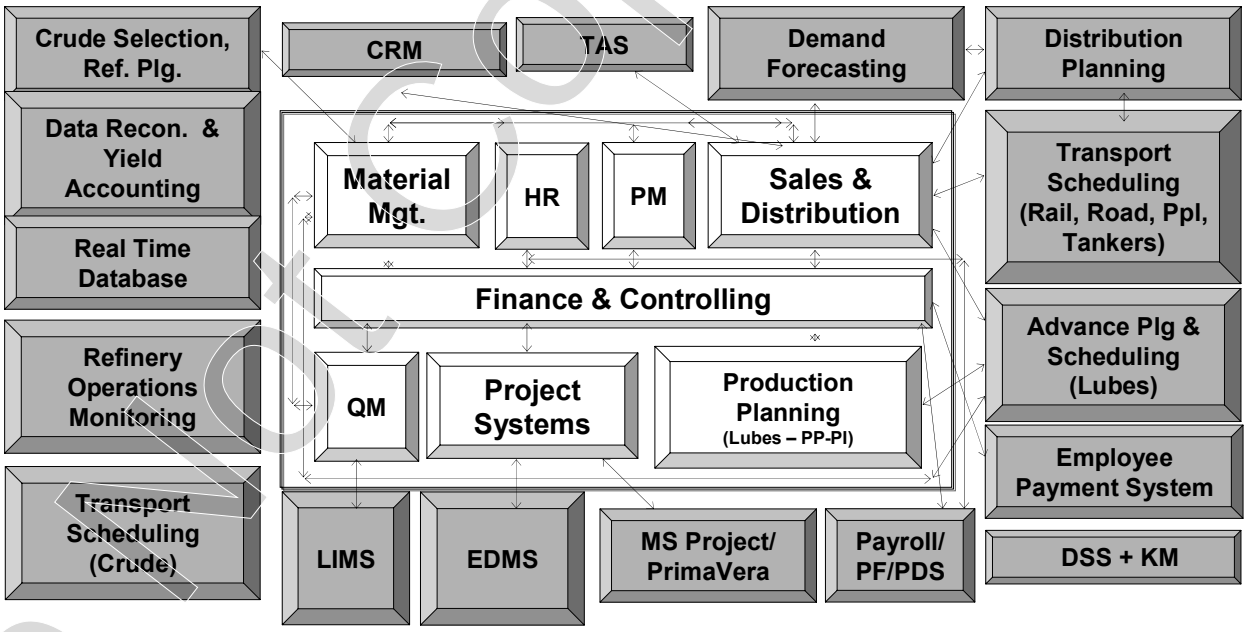

Exhibit 5

PROJECT COSTS

Description	Phase-I Original estimate for Oil related 99 sites*
1. Hardware (ERP, Add-Ons, DW)	460.0
2. Software	555.0
3. Communication Network (LAN, WAN, NIC)	110.0
4. Training	10.0
5. Consultancy	289.5
6. Infrastructure	25.5
Total	**1,450.0**

** All figures in Rs million. Phase I for hydrocarbon activities alone to include approximately 2,000 user licences spread over 99 locations; 4,000 licences for the remaining activities.*

Source: Company files.

Exhibit 6

STAGES OF ERP DEVELOPMENT

STAGE	Target Dates*	Actual Dates
Stage 1: Conceptual Design The "as-is" processes (existing business processes) were reviewed and "to-be" processes drawn up by eliminating redundant practices and benchmarking with the best business practices in the oil industry worldwide.	October 1999 to May 2000	October 1999 to July 2000
Stage 2: Detailed Design Using the results from the conceptual design phase, the SAP software was configured (customized) to create a prototype module best suited to the corporation.	June 2000 to December 2000	August 2000 to April 2001
Stage 3: Construction A working model was constructed using the prototype and the relevant transaction data.	November 2000 to July 2001	January 2001 to October 2001
Stage 4; Implementation After successful testing of the new model, the project was ready for rollout and use in day-to-day operations.	May 2001 to August 2001	August 2001 to November 2001

** 29 months (due to overlap in various stages).*

Exhibit 7

COMPARISON OF SOME OIL COMPANIES

	Imperial Oil	BP	Chevron Texaco	Indian Oil Corporation
Country of origin	Canada	Great Britain	US	India
Nature of main operations	National integrated[1]	Global integrated and chemicals, etc.	Global integrated and chemicals, etc.	National refining and marketing [2]
Annual sales (US$ billions)	17.04	179	98	25.22
Net earnings (US$ billions)	1.21	4.7	1.13	1.28
Refinery capacity (million barrels per day)	0.50	3.5	2.3	0.99
Operational refineries	4	24	23	10
Retail outlets[3] (Resellers' network)	1,283	29,200 (USA 15,000, rest of world 14,200)	24,185	22,000
Refined fuel product sales (million barrels per day)	0.52	6.6	3.8	0.95
Employees (2002)	6,460	115,250	53,014	32,000

All data as of end of 2002. There are differences in accounting periods (IOCL financial year April to March)

Sources:

- *Imperial Oil — www.esso.ca/Canada-English/Files/Investors/2002_AR_IMO.pdf*
- *BP — www.bp.com/company_overview/overview.asp*
- *ChevronTexaco — www.chevrontexaco.com/news/media/docs/chevrontexaco_fact_sheet.pdf*
- *Indian Oil — www.indianoilcorp.com/about_profile.asp*

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[1] *Integrated oil companies undertake exploration and production of crude oil and natural gas (upstream operations) as well as refining and marketing (downstream operations).*
[2] *In the process of becoming an integrated player, IOCL has bought ownership in exploration and production companies.*
[3] *Including company-owned and dealer-owned.*