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Chapter 17

Big-Bang ERP Implementation at a Global Company

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EXECUTIVE SUMMARY

Dead Sea Works is an international multi-firm producer of Potash and other chemicals whose sales for 1998 were about $500 million. In 1996, the Information Systems group convinced top management to pursue a big-bang ERP implementation of SAP R/3. To reduce project risk, risk management was practiced. First, only modules that matched the functionality of the then-existing systems were targeted, avoiding as much as possible software modifications and process reengineering. Second, a steering committee was set up to handle conflict resolution and set priorities throughout the project and top users were given responsibility with implementing modules within their respective functions. R/3 went into production on July 1, 1998, six months ahead of schedule and without exceeding the $4.95 million budget.

BACKGROUND

Dead Sea Works Ltd., one of 15 member companies of Israel Chemicals LTD, is a producer of Potash and other chemical products from the mineral-rich Dead Sea, Israel's greatest natural resource. Situated at the lowest place on earth, it lies in a valley whose southern part is suitable for evaporation pans and enjoys ample sunlight for most of the year. This combination of chemical riches and topography that is amenable to practical use fired the imagination of Theodore Herzl, the father of modern Zionism. After hearing of a plan to extract minerals from the Dead Sea, during his 1896 visit to Palestine, Herzl described in his book, *Alt*

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Neuland, a Jewish State whose economic strength would be derived from the treasures of the Dead Sea.

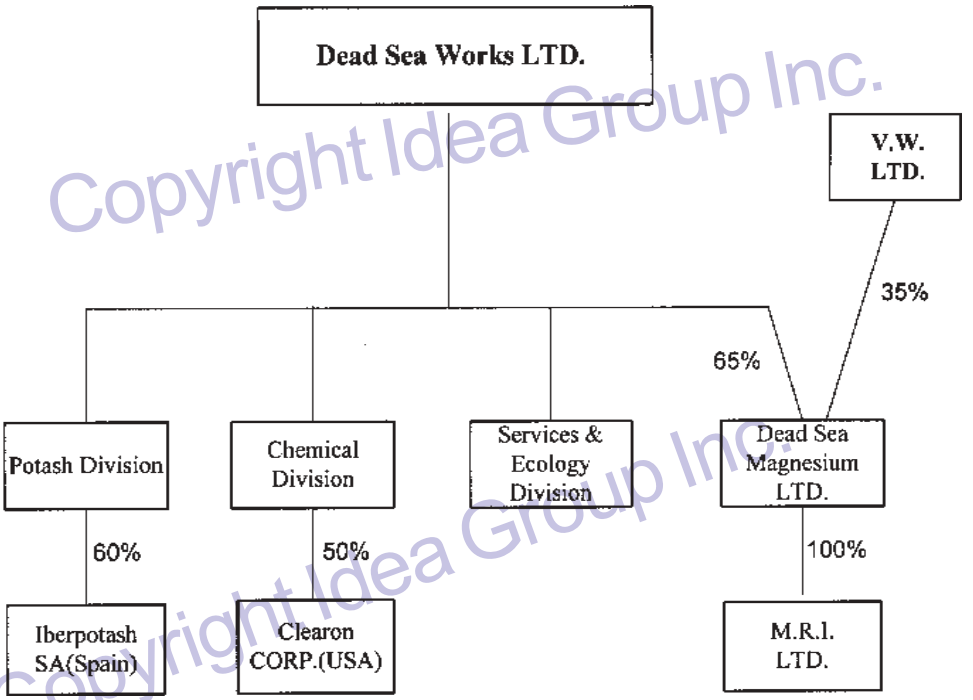
Moshe Novomeisky, chemical engineer, came from Siberia to Palestine at the beginning of the century inspired by *Alt Neuland* to turn this vision into a reality. In 1930, he obtained from the British Mandatory authorities a concession to extract minerals from the Dead Sea, established the Palestine Potash Company LTD, and constructed a plant in the northern part of the Dead Sea. In 1934 evaporation pans and a chemical plant were constructed in Sodom as well. This became the foundation for today's Dead Sea Works (DSW) which, since it was reestablished in the 1950s, has increased production steadily to its current level of close to three million tons of Potash per year. In addition to Potash, DSW produces Magnesium Chloride Flakes and Pellets, Salt, Bath Salts, Magnesium Metal, Chlorine and Bromine.

Instead of mining, as do most of its competitors, DSW extracts Potash from the Dead Sea. The production process begins with the pumping of Dead Sea water to 105 square-kilometer salt pans, where the solution is concentrated. An additional forty square-kilometer pans are then used to crystallize materials, which after settling on the pan floor, are pumped by harvesters directly into refineries. In this process, DSW takes advantage of the energy of the sun, another important natural resource in the region. Artificially, these drying processes would require 10 million tons of oil per year.

Wherever Potash is produced, transportation is a major expense, as was the case for DSW because of the 900-meter altitude difference between the factory at Sodom, the lowest point on earth, and the nearest railway terminal. Since this gradient rules out the possibility of a direct rail link and the remote location makes road transportation expensive, DSW chose to build from Sodom to the railway an 18-km conveyor belt, whose incline at some points reaches 18 degrees. Since its completion in April 1987, DSW's transportation costs have declined substantially.

Currently, the multi-firm DSW Group (see Exhibit 1) is distributed internationally (e.g., Europe, and China) and within Israel (e.g., Sodom, Beer-Sheva, and Eilat). In Europe, DSW has been involved in several joint ventures. In 1996, DSW established Dead Sea Magnesium LTD., investing with Volkswagen (65%, 35%) close to $500 million. Yearly production capacity at the new plant has already reached 25,000 tons and, by the end of 1999, is expected to grow by 50%. In 1998, DSW has partnered with Eurobrom B.V. in Clearon Holding Corporation and acquired from the Spanish-Companies Authority, jointly with two Spanish partners, Grupo Potash, a producer of one million tons of Potash per year sold mainly to the Spanish and French markets. In late 1998, DSW joined the Chinese government in building a Potash production plant that will eventually produce 860

Exhibit 1: DSW Multi-firm Structure



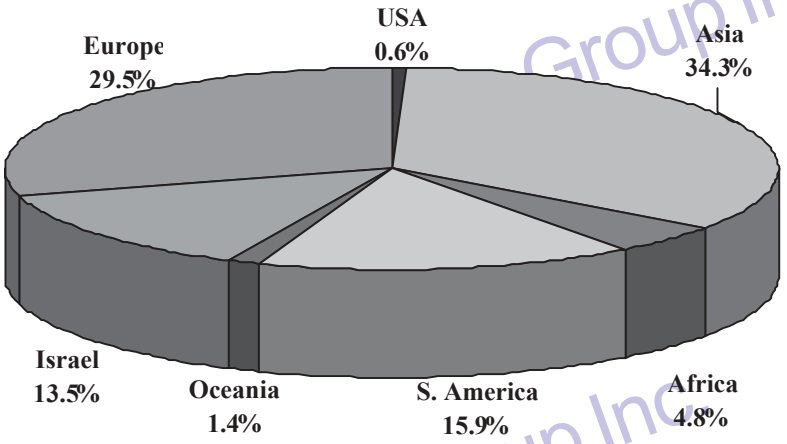
thousand tons every year. This joint venture is expected to increase DSW's sales to China, a market whose Potash consumption per year grows at a rate that exceeds the world's rate.

Due to these expansion activities, the number of DSW employees almost doubled over the last two years, reaching 2,458 at the end of 1998. Potash sales worldwide, which reached about 42 million tons in 1998, are growing at a rate of 3% each year (see Exhibit 2). The American and Asian markets are the biggest Potash consumers and importers, since their own production does not meet the demand. DSW sells to 50 countries on every continent, protecting itself from local market fluctuations, and is expected to increase its share in world Potash production from six to nine percent. Even though 10% of its sales are directed to one of its clients, DSW is not dependent on any one customer. It is also free from dependence on any supplier and any material that is not included in its license from the Israeli government.

Because DSW is a global company, its financial performance depends on trends in the world economy, including the economic conditions in South East Asia, Russia, and changing attitudes toward the environment. Despite periods when

Exhibit 2: World-wide Potash Sales

Total - 2,850 thousand tons



world Potash prices reached record low levels, DSW recorded a profit every year since 1970, while many of its competitors have faced difficulties (see Exhibit 3).

Strategically, DSW is focused on persistent growth by taking the following measures. First, DSW is constantly expanding Potash production in Sodom and elsewhere, while lowering costs. Second, DSW is accelerating business development around the world (e.g., in China and in Spain), including joint ventures in Salt and Chloride Aluminum. Third, DSW is investing in development of power and water resources. Finally, in the marketing arena, DSW is paying attention to widespread distribution of sales, sensing customer needs and responding to them.

SETTING THE STAGE

Information Systems (IS) at DSW were custom-developed specifically for DSW since the early 1970s, when the IS unit consisted of an IS manager, six data-entry clerks, three operators, and four programmers. The first functions to be automated, in batch mode, were accounting, costing, and budgeting. The number of users in those early days was 20. When hardware was upgraded in 1978 to IBM's System 3 Model 15, each functional IS was operating in isolation, using its own removable disk.

A technological turnaround took place in the 1980s in terms of both hardware and software. The IBM 4331 mainframe computer running the VSE operating system was acquired, setting the stage for later upgrading to an IBM 4341 and a 4341-31 that operated in parallel respectively for IS production / operations and

Exhibit 3: DSW Performance Highlights

FINANCIAL FIGURES (in thousands of U.S. dollars)	1993	1994	1995	1996	1997	**1998**
Revenues	245,342	295,910	362,280	357,567	453,185	**493,710**
Net Income	17,852	28,013	35,171	39,840	39,645	**49,901**
Total Assets	526,462	628,092	742,182	934,450	983,598	**1,245,460**
Shareholders' Equity	305,703	320,109	333,005	351,372	368,415	**418,468**
Dividend Paid	21,792	13,907	13,917	21,220	36,808_	**9,680**
Capital Expenditures	134,400	156,400	216,400	306,321	126,460	**57,816**
Earnings $ Per Share of NIS 1 par value (in $ U.S.)	0.06	0.10	0.12	0.13	0.13	**0.17**

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QUANTITY FIGURES (in thousands of Metric Tons)	1993	1994	1995	1996	1997	**1998**
Potash Production	2,182	2,099	2,207	2,492	2,481	**2,860**
Potash Sales	1,968	2,317	2,451	2,178	2,861	**2,916**
Casted Magnesium Production	-	-	-	-	7.2	**24.5**
Casted Magnesium Sales	-	-	-	-	5.4	**15.1**
Table Salt Sales	58	63	80	86	104	**99**
Magnesium Chloride Flaked and Pellets Sales	51	74	81	90	68	**63**
Bath Salts Sales	1.3	2.2	1.9	1.9	2.2	**2.1**
Pan Salts Sales	268	235	178	191	261	**219**
Number of Employees	1,629	1,654	1,670	2,030	2,245	**2,103**

for development/testing. In the software arena, the purchase from Cincom of Total, a hierarchical Data Base Management System (DBMS), and Mantis, the associated development tool, set the stage for upgrading to the Supra DBMS a few years later. With a DBMS in place, DSW recruited a number of systems analysts and expanded its IS group to include ten programmers, adopting a systems approach and building integrated systems that replaced fragmented ones.

Microcomputers also made their way into DSW during that time. Except for the first stand-alone system, all operated in terminal-emulation mode. By the nineties, microcomputers ran applications developed by the IS group, as well as user-developed applications.

Until the early 1990s, the following process was in place for IS renewal and maintenance: The IS group took the initiative by conceiving an idea, and then approached top management for a budget to turn the initiative to reality. This changed considerably when a new manager took charge of the IS group in 1992. Under his leadership, users were encouraged to take IS initiatives and to convince

top management to allocate the needed resources. This approach allowed better budgeting, in advance, according to user requests. Consistent with this approach, the mission of the IS group was redefined as service provision and workshops for IS personnel were conducted to teach how to become high-quality service providers.

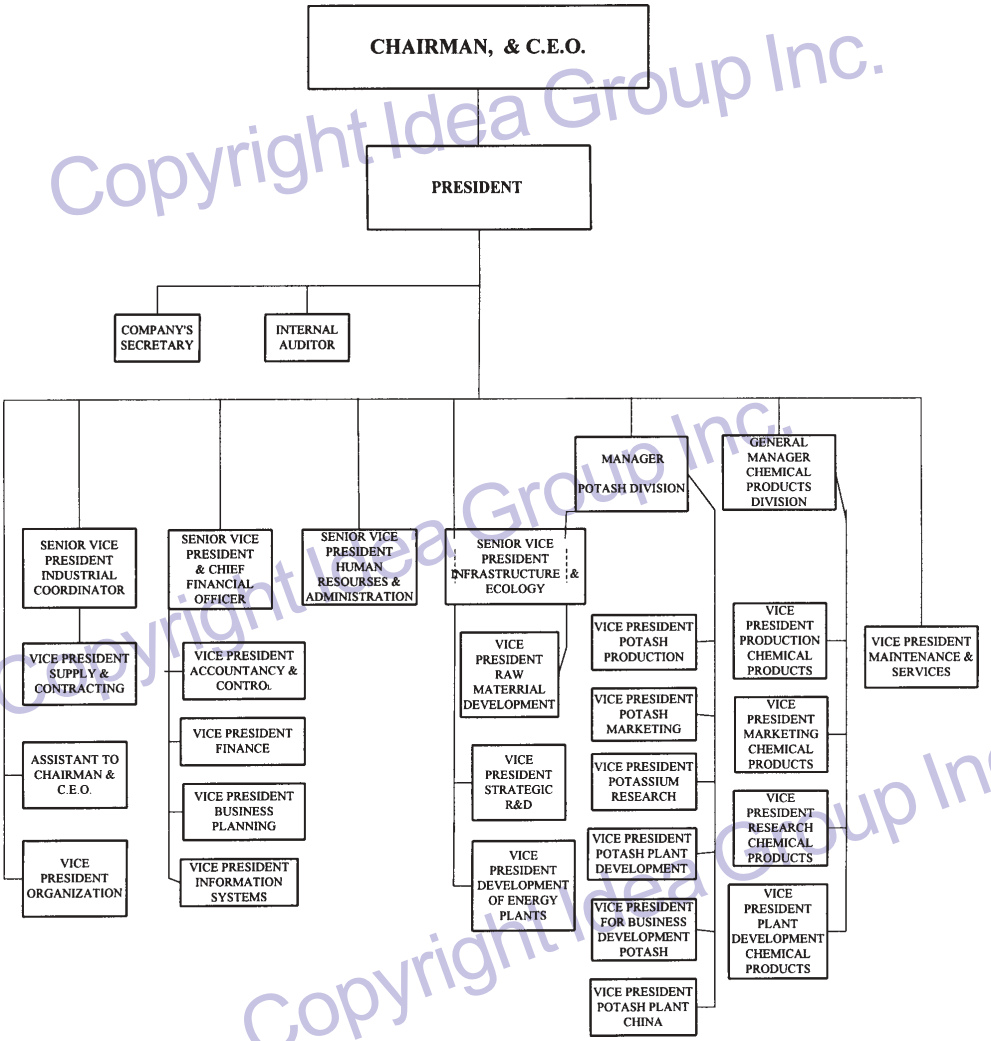
Additional changes, which had a major effect on IS management at DSW, occurred after a new CEO, who perceived the information resource as instrumental to business success, took office in 1993 and restructured DSW (see Exhibit 4). The IS group turned into a division, instead of a department, and its head was promoted to Vice President of Information Systems (VPIS), reporting to the Senior VP and CFO, instead of the VP of Accountancy and Control. A consulting company hired around that time helped DSW in its IS planning processes. For the long term, the consultants helped put together a five-year IS investment plan. For the shorter term, they recommended that users be allowed to seek IS services outside DSW and, at the same time, be charged for IS services that they opt to acquire internally from the IS group.

In 1993 the mainframe hardware was upgraded to ES/9000 with the VSE/VM operating system. In the communication arena, LAN and WAN infrastructures were installed, using Novell and TCP/IP. By 1995, the IS environment at DSW was serving 700 satisfied users (100 used dumb terminals and 600 used microcomputers). Despite the fact that the functional information systems at DSW were consistent with major business processes, it became clear that major IS changes were called for due to technological and organizational reasons. Technologically, the Supra DMBS was no longer being supported and the systems at DSW were not state-of-the-art. Organizationally, the functional systems, which were developed to support the functioning of a single firm, could no longer support a multi-firm enterprise.

By 1995 the CEO and VPIS were well aware of the seriousness of the Year 2000 (Y2K) problem and concluded that for DSW, as for many other firms, resolution of the Y2K problem was critical to survival (Kappleman, 1997; Violino, 1997). Acknowledging that Y2K compliance was more of an organizational than a technical concern, the CEO charged the VPIS and the VP of Strategic R&D with planning how best to invest DSW financial and other resources to meet this challenge.

Like many organizations, DSW sent letters to all its suppliers in order to find out what their response to the Y2K problem was. In parallel, outside consulting services were recruited to help deliver Y2K solutions for embedded systems at a cost of about $0.5M. Both these activities are beyond the scope of this case study, which is focused as a main issue on a big-bang implementation of an Enterprise

Exhibit 4: DSW Structure



Resource Planning (ERP) system at DSW. The ERP implementation resulted from the Pandora's box that was opened following the realization that the information infrastructure and the IS applications at DSW were not Y2K compliant.

CASE DESCRIPTION

Decision Making Leading to ERP Implementation

To assess resource implications of converting all IS applications to comply with Y2K, the IS group prototyped Y2K conversion of one functional application. Based on this prototype, they concluded that Y2K conversion of all existing

applications would cost more than $1.5M and would still leave DSW with legacy systems that revolve around a legacy DBMS.

The VPIS thus began to seriously consider avoiding Y2K conversion altogether and, at the same time, shifting from a "make" strategy to a "buy" strategy (Applegate et al., 1999.) As a subscriber of reports from META Group and GartnerGroup (1994-1996), he had already been exposed for a number of years to the growing popularity of the "buy" strategy, in general, and ERP, in particular. He was well aware that a number of software vendors offer ERP systems that integrate, on the basis modern database-management technology, a collection of modules for managing such functions as production, inventory, procurement, accounting, sales, marketing, and personnel. Although some vendors have originally developed their ERP products for mainframes, most made the transition to state-of-the-art client-server architectures.

The VPIS was also aware that some DSW competitors had already implemented ERP versions adapted to the chemical industry a few years earlier. Yet, until faced with the Y2K problem, he thought that ERP was intended either for larger and more global organizations than DSW was at the time, and/or for organizations whose IS applications, unlike DSW's, were fragmented islands of automation. Although module fragmentation was not one of DSW's problems, DSW could use an ERP package since it grew and became a multi-firm global firm.

Technologically, since none of DSW's existing applications were state-of-the-art, the VPIS expected ERP systems to be significantly superior in terms of speed and reliability. He also was aware that the core database, which was already stretched to the limit in terms of size and response time and was no longer being upgraded or even supported, was not suitable for handling globally distributed databases. Moreover, unlike ERP systems, each of the existing applications at DSW had its own user interface, making it inconvenient for users to move between applications and difficult for IS professionals to maintain data security as the number of users increased.

After becoming aware of ERP technical benefits, including speed, reliability, database distribution, convenience, and data security, the VPIS, VP of Strategic R&D, and their team began to consider the organizational implications of ERP. They soon learned that since ERP encompasses the whole organization at all sites, an ERP implementation can provide an opportunity for reengineering major organizational process and for achieving better business outcomes over time as a result of more informed managerial decision making processes.

Because of the perceived technical and organizational benefits of ERP, the VPIS and the VP of Strategic R&D began to view the turn of the millennium as an opportunity rather than a threat. They thus proposed to top management of DSW

and its parent company, Israel Chemicals LTD, to avoid a Y2K conversion altogether and implement instead a Y2K-compliant ERP system that would facilitate:

1) Renewing the hardware at DSW, from host-centric to network-centric and the software infrastructure at DSW, from outdated to modern;
2) Supporting the transition of DSW from single-firm to multi-firm structure and from local to global operations; and
3) Using the ERP implementation project at DSW as a pilot from which other members in the Israel Chemicals LTD group can learn.

Once top management approved the ERP implementation, a decision was made to abandon all upgrading of existing systems and to put on hold plans for developing new applications. For example, although the need for plant-maintenance automation was already acknowledged prior to the decision to move into an ERP environment, and even though it was already budgeted at $1M, actual analysis, design, and development were suspended.

The search process that followed, for software and hardware, ended in choosing the R/3 ERP software package from SAP, the Oracle DMBS software from Oracle, and the server hardware from HP. The fit between R/3 and DSW's needs was excellent for the following reasons: a) SAP met the main functional requirements of DSW because its chemical-industry version of R/3 had already quite a number of installations worldwide. b) According to reports from META Group and GartnerGroup (1994-1996) that the VPIS has read, the larger and more financially robust SAP was more likely to survive than its competitors. c) SAP was holding the biggest market share in the world, in general, and in Israel, in particular. d) SAP gained considerable experience with and has been considered especially suitable for international multi-firm enterprises. e) SAP was investing more in R&D than competitors. f) R/3 was localized in terms of language, currency, and regulations of many countries, including Israel, where SAP partnered with the ATL LTD, an experienced Israeli vendor with whom DSW has had good relations.

Toward the end of 1996, the resolutions made by top management at DSW guided the implementation project so as to increase the prospects of reaching successful completion of the R/3 implementation by January 1, 1999. Oriented towards thorough project and risk management, these resolutions aimed at carefully controlling project size, technology, and structure (Applegate, et al., 1999.)

In order to put an upper lid on project size, DSW chose to concentrate on implementing the functions which were already automated at DSW (financial accounting, material management (inventory, purchasing and MRP), controlling, treasury and human resources, rather than implement all R/3 modules. The only exception was plant maintenance, whose long-overdue automation was already

budgeted for $1M and then suspended following the decision to implement ERP. About half way into the R/3 implementation project, management decided to implement the R/3 plant-maintenance module as well, having received assurances that this could be done within the deadline for an additional $70,000.

Another critical decision was to avoid parallel implementation and its associated interfacing efforts, opting instead for the more risky "big-bang" transition to R/3. Since IS professionals within DSW were unfamiliar with R/3 technology, management realized that outsourcing the big-bang implementation project could reduce project risk (McFarlan & Nolan, 1995.) By contracting IBM as the implementing vendor, DSW was able to overcome the pressing need for unique R/3 skills and knowledge.

Given the wide organizational scope of the R/3 implementation, including the need to deal with recent mergers and acquisitions, top management was determined to increase the structure of the implementation project and to facilitate smooth upgrades to new R/3 releases in the future (Bancroft, et al., 1998.) To achieve these goals, DSW resolved to avoid as much as possible both customization of R/3 to DSW needs, on the one hand, and process reengineering, on the other. As a rule, management was more willing to abandon old DSW processes and regulations, which could not be supported by R/3 without customization, than to permit modifying R/3 to these processes. Only under such circumstances, even though project policy discouraged process reengineering, there was willingness on the part of management to reengineer new R/3-supported processes and replace the old unsupportable ones.

The SAP/R3 Implementation at DSW

The outsourcing contract with IBM was signed on the last day of 1996 and the implementation project started on April 1, 1997. Since then, the VPIS reported once a month to the board of directors about progress made. The CEO was committed to the implementation project and regularly briefed managers at all levels about his vision and expectations. Members of top management became very involved in the implementation project and each was asked to assume responsibility, as a top user, for implementing modules within their functional area. To make sure that implementation ended on time and within budget, the project was broken up into milestones. Since meeting milestone goals and target dates was deemed critical, any delay needed top management approval.

Measures were taken to facilitate prompt decisive action. A steering committee was formed to set priorities, to handle conflict resolution throughout the project, and to promptly respond to problems. For each functional area, a joint team of three, composed of the respective top user (Pliskin & Shoval, 1989), an R/3 expert

from IBM, and a systems analyst from DSW, was created. The team, assigned with responsibility for part of the implementation project, was put in charge of choosing among R/3 processes and reports and setting priorities. Since a significant portion of top-user time was allotted to the implementation, they developed familiarity with the new environment and, later on, became very effective in providing the initial response to problems that emerged. IS professionals were constantly briefed with respect to progress as well as with respect to difficulties and ways to get around them. They were encouraged to report any concern to the respective top manager to insure a fast solution.

As planned, R/3 modifications were limited to the absolute minimum and permitted under exceptional conditions and only with formal CEO approval. The formal procedure, instituted to discourage R/3 modifications, was practiced throughout the project, despite a number of unsuccessful attempts to eliminate it, especially during transition between CEOs.

Consistent with the initial intention to limit reengineering to a minimum, only a few processes were reengineered. The reengineered service entry process, for example, was perceived by users to be "the right thing to do" because it was dictated by R/3. They thus willingly adopted it before noticing that, because the new more reliable service entry process was 50% to 60% faster, a few jobs had to be eliminated. In any case, none of the employees whose jobs were eliminated was asked to leave DSW. Instead, they were transferred to other departments that were hiring at the time.

It is noteworthy that DSW, which prior to the ERP implementation opted to custom-make IS applications, wished to gain as much as possible from its decision to buy software and, at the same time, increase prospects for success. In other words, DSW was willing to abandon customization as much as it could, putting a lid on modifications and willing to force modification avoidance except under special circumstances. In an organizational culture that values labor relations, a threat of labor unrest in the form of a strike presents such special circumstances. The union was therefore consulted whenever avoiding R/3 modifications impacted compensation. In at least one case, the union's disapproval of modification avoidance forced an R/3 modification and labor relations were not hurt. It is noteworthy however that the union was willing, in most cases, to go along with and accept the implications of modification avoidance.

Additional initiatives paralleled the ERP conversion. Personal computers and terminals were upgraded. The network was stabilized to prevent down times. Data quality was addressed (through conversion, improvement, and creation). Even though time was short, specially-hired trainers joined top users and systems analysts, who participated in the implementation project intensively (Pliskin, 1989),

to train, in four parallel classrooms, 400 trainees, including end users, systems programmers, operators, systems analysts, and programmers. Each trainer was put in charge of specific modules. Trainees were encouraged to come to the classroom for extra practice. A flexible and responsive computerized help-desk was staffed with individuals trained to either respond promptly or to refer swiftly to another person.

R/3 went into production at DSW on July 1, 1998, six months ahead of schedule and without exceeding the $4.95 million budget. In the beginning, the VPIS met with the IS professionals on a daily basis to air out problems. As the need to do so diminished, meeting frequency went down. As of January 1, 1999, all planned modules are working. The number of users, low- and mid-level managers, is 600 and growing.

It is noteworthy that both IS professionals and users cooperated with the ERP implementation and no resistance was observed. Although nobody in the company is willing to bet on the reasons for the lack of resistance, some speculations have been brought up. IS professionals were assured by the VPIS that their skills would be upgraded to state-of-the-art technologies through massive training and none would be fired. Users were led to believe that the R/3 implementation provided an opportunity for DSW to have modern information systems and provided with enough training to alleviate any fears about working with the new software.

As anticipated, the ERP implementation provided DSW with the opportunity to renew the hardware, from host-centric to network-centric, and to modernize its software infrastructure. Gradually, R/3 will be implemented at branches of DSW worldwide, helping DSW with the transition from single-firm to multi-firm structure and from local to global operations. The ERP implementation project at DSW served as a pilot, and the same ERP infrastructure is expected to make its way to other sister companies of DSW in the Israel Chemicals LTD. Implementation of R/3 by another Israel-Chemicals member is already approaching completion faster and cheaper than at DSW, under the leadership of an IS professional from DSW.

In retrospect, SAP R/3 has also provided DSW with some tangible savings: the number of pages printed per month was reduced by 80% from about 25000 to about 5000, because of the better ability to query online instead of printing reports. The number of shifts for server operations has gone down from 3 to 1.5 per day. With all batch processes substituted by on-line ones, information provision has improved in the sense that the raw data is now more up to date. Thus, for example, it is now possible to know in real time (as opposed to twice a week before ERP) what the real inventory levels are and, therefore, DSW is saving money on inventory without hurting production in any way. Because of the uniformity of screens for different modules, it is now possible to easily carry a transaction from one module

to another (e.g., from a costing screen to a contractor screen). Another improvement has to do with the way materials are ordered from the warehouse. Until the ERP implementation, precious time was wasted when workers came to pick up materials without verifying availability beforehand. Under SAP R/3, pickup from the warehouse is permitted only after availability is verified through remote inquiry. DSW's employees accepted the R/3 process without resistance, despite failure to introduce a similar ordering process under the legacy systems in the early 1990s.

On the down size, there has also been some deterioration in information provision, especially for top managers who were accustomed to using the Commander Executive Information System. In some respects, they now have less access to information than before because Information-Center tools are not yet effectively integrated with SAP R/3. Even for lower levels of management, information provision is in some cases poorer than before because the design of several processes and procedures has been proven inappropriate. Some information provision processes now take longer and require navigation among a series of several screens whereas beforehand each of the same processes took only a single screen to complete.

In sum, DSW has already reaped substantial benefits from the strategic move to ERP. The hardware has been renewed. The IS applications and DBMS have been upgraded to Y2K-compliant and fully integrated functional modules, with uniform and smooth transitions among them. The highly needed yet missing plant-maintenance module has been implemented. DSW processes have improved and become more efficient. Having implemented a multi-company solution, organizational learning can now take place at other DSW and Israel Chemicals LTD locations. IS professionals at DSW, whose skills have been upgraded significantly, can rely upon complete documentation and apply the same set of standards and tools, including ad hoc drill-down capability and advanced quality-assurance tools.

CURRENT CHALLENGES/PROBLEMS FACING THE ORGANIZATION

The long list of benefits and the current perception of ERP success within DSW stand in sharp contrast to the growing number of horror stories about failed or out-of-control ERP projects (Davenport, 1998.) Against this contrast, it is of interest to consider the starting conditions, goals, plans, and management practices that may have increased the chances of success at DSW.

Changes in the competitive environment in the 1990s pushed top management at DSW to approve funding for the ERP implementation in order to support company growth and restructuring from single-firm to multi-firm. The ERP implementation served strategic DSW goals such as improvement of business results,

technology replacement, and reduction in the total cost of technology ownership. The ERP implementation has also created a platform for reengineering business processes in the future and for integrating the supply chain. ERP plans were well thought of, arguing a general business case in addition to a technical case. The fact that benefits have been reaped despite the limited scope and minimal modifications suggests that there was, to start with, a good fit between R/3 and the needs of DSW.

Management practices contributed to success as well. Contractual arrangements with vendors worked well and good working relationships were maintained within the implementation teams. Project management adhered to the following principles: the partial scope of the implementation was not changed during the project, except for adding the maintenance module, software modifications were avoided as much as possible; and sufficient investment was made in testing, data conversion, and user training. Even though a change of guard took place in the IS organization a few years prior to the ERP implementation, the fact that the new VPIS was not a newcomer to DSW contributed to the stability of the IS governance and experience. In retrospect, if given the opportunity to rethink management practices, the only thing DSW might have done differently is to let the IS professionals and top users in development teams work full time on the project away from DSW's premises.

It is important to acknowledge that no external events and changing conditions beyond DSW's control worked against the implementation either: financial conditions were good, there was no turnover of key personnel, and vendors neither overstated their expertise nor went out of business.

The IS group is dealing with problems and challenges by working on continuous improvement to the R/3 environment. One problem is that, probably due to the decision to opt for a big-bang implementation with only minimal reengineering and software modifications, some cumbersome and unfriendly work processes exist following the R/3 implementation. To correct this and allow DSW to better take advantage of what the R/3 environment can offer, DSW processes will be gradually reengineered and R/3 software modifications will be permitted. Thus, many efficient and effective processes that R/3 can support, but were not implemented so far, will eventually be introduced to DSW.

Another problem, which has resulted out of the decision to limit the volume of routine reporting, concerns poor design of some routine R/3 reports and user demands for additional reports. Work is ongoing to alleviate this problem—and poorly designed reports, especially those consumed by outside parties, are being redesigned. In addition, new additional reports are being planned, including control reports that are needed to support newly introduced procedural changes.

Finally, some DSW functions are not yet supported by R/3. To meet this challenge, implementation of additional R/3 modules is being planned, including

project management, marketing, and production-planning. Also in the planning are systems to support senior-level decisions, such as a data warehouse and an executive information systems.

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