STANFORD
GRADUATE SCHOOL OF BUSINESS

CASE: GS-46
DATE: 02/17/06

NETAFIM: MIGRATING FROM PRODUCTS TO SOLUTIONS

When I first came to Netafim in 2002 I found a small company (sales were $220 million) with a wide global presence (Netafim sold its products in 112 countries with 30 subsidiaries). One of the main challenges for such a small company was how to create an efficient and agile enough supply chain that would support such a wide and global presence.

—Erez Meltzer, President and CEO of Netafim

In August 2005, Erez Meltzer, the president and CEO of Netafim, was sitting in his Tel-Aviv office finalizing "Netafim 2010," the company's strategic plan for the next five years. While the company's future looked promising, Meltzer knew that in order for Netafim, an Israeli-based irrigation company, to keep its leading position in the micro-irrigation market in 2010 it must first complete the reorganization process initiated three years earlier.

In 2002, when Meltzer became the head of Netafim, he inherited a multinational company struggling to find global synergies. The company also faced financial difficulties, flat sales, and an antiquated supply chain. Over the last three years, with the assistance of Rami Levy, vice president of operations, Netafim made significant investments in transforming itself into a global company with a lean and efficient supply chain capable of supporting the company in its quest to become a billion dollar company in five years.

However, drip irrigation was quickly becoming a commodity. Looking ahead, Meltzer realized that, in order for Netafim to hold its position as the market leader and continue to differentiate itself in an increasingly competitive environment, it needed to migrate from a company that sold products to a company that provided knowledge-based solutions capable taking traditional and innovative irrigation projects from start to finish (e.g., planning, building, and operating a greenhouse).

Meltzer knew that supply chain capabilities would be one of the key factors in determining the success of this transition. He realized that such a move would require a different skill-set and would place new demands on the company's operational arm. After evaluating the company's

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Guy Michlin prepared this case under the supervision of Professor Hau Lee as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

progress in this area, he had to decide if the newly reorganized supply chain was ready for the challenge.

IRRIGATION INDUSTRY BACKGROUND

The irrigation industry was one of the world's most ancient industries, existing as early as the 6th century B.C. in Mesopotamia and ancient Egypt. The use of irrigation in ancient times was limited to agriculture, whereas in modern times irrigation uses were expanded to include public and private landscapes, sport courts (e.g., golf courts, baseball courts), and other facilities.

The irrigation market was generally divided into two segments: low pressure irrigation and high pressure irrigation.

Low pressure irrigation was almost synonymous with flood irrigation, a method that had not changed significantly since ancient times and was based on flooding all or part of a field (as with rice crops or irrigation furrows in between crop rows). Though flood irrigation wasted water and caused soil erosion, it was still widely used around the globe, especially in underdeveloped countries due to its low cost (see **Exhibit 1**).

High pressure irrigation was divided into two main sub-categories based on the volume of the irrigation method (i.e., the amount of water it delivered in a given period of time). The low volume approach involved a flow rate of less than 50 liters per hour, while the high volume approach used a flow rate greater than 50 liters per hour. High volume, high pressure irrigation involved pivots and sprinklers (see **Exhibit 2**). This irrigation method was more precise than flood irrigation and also more efficient in conserving water. Yet it had some major drawbacks, including the potential loss of water due to wind or evaporation, uneven field irrigation, and the potential development of leaf diseases and fungi caused by direct foliage watering. Low volume, high pressure irrigation, originally invented in Israel in the mid-1960s, was based on drip irrigation; Polyethylene pipes laid and installed along crop rows, with drip emitters delivering water directly to plant root zone (see **Exhibit 3**). The greatest advantage offered by drip irrigation was the water savings associated with this method since it was even more precise in delivering water to the plants than sprinklers and pivots. This approach also prevented leaf diseases which were common side effects of other high pressure methods. The main barriers to the adoption of drip irrigation were its relatively high price (drip equipment was more costly than other irrigation products) and the fact it required the farmer to be skilled in installing and operating the equipment to achieve maximum benefit from the system. In some cases, drip irrigation equipment had to be reinstalled at the beginning of each growing season. Since its invention, the drip irrigation market was dominated by Israeli companies and led by Netafim (see **Exhibit 4**).

Despite remarkable advancements in irrigation, in the year 2000, 80 percent of global croplands were still irrigated by rainfall and low pressure flood irrigation, and only 20 percent were irrigated by high pressure methods (15 percent used sprinklers and pivots; only 5 percent used drip irrigation). The irrigation industry had been influenced in recent years by global forces. Population growth, reduction in agricultural land around the globe, and depletion of water

resources[1] all combined to fuel the need for sophisticated and accurate irrigation methods that created greater agricultural yields using less land and water. Major food conglomerates in the western world began going backward in their supply chains, seeking greater control over the way the crops that fed the supply chain were grown. World awareness for the use of fertilizers and other chemicals in agriculture, new regulations that capped the amount of chemicals that could be used by farmers, and increased demand for organic crops created new challenges for the farmers and presented new opportunities to irrigation companies.

NETAFIM: THE START-UP PHASE

On Socialism and Drip Irrigation

Kibbutz Hatzerim was founded in 1946. Similar to all other kibbutzim at that time, Kibbutz Hatzerim was a commune with a few dozen families sharing the values of Socialism. True to those values, the kibbutz members were not allowed to hold private property; instead all assets and income went to the common treasury. These funds were then used to address the needs of the kibbutz members, including housing, education, food, and other basic necessities. The kibbutz motto was: "Each member gives as much as he can, and gets as much as he needs."

In the mid 1960s, Hatzerim members were interested in identifying a small venture that would provide employment for the elderly in the kibbutz. During their search, they met water engineer Simcha Blass who had recently invented drip irrigation, a novel concept at the time. Recognizing the opportunities associated with this promising innovation, Kibbutz Hatzerim founded Netafim in 1965. The new entity signed a licensing agreement with Blass who owned the patent for the new product and received permission to manufacture and sell drippers in return for royalties.[2] The initial products were supplied to Israeli farmers who were highly enthusiastic about the new technology. Farmers who used the products realized significant water and fertilizer savings, as well as crop yields that were reported to increase by hundreds of percent-points with drip irrigation (see **Exhibit 5** for illustrative yield data as of 2002).

While Netafim was the first company to pioneer this new technology, others quickly entered the market, making minor modifications to Blass' design to avoid patent infringement. However, Netafim enjoyed an advantage over its competitors. The company's employees, all of them kibbutz members, were farmers themselves with experience working the arid, salty desert land in the southern part of Israel. Thus, they understood the customers' needs just as well as the customers themselves. Additionally, Netafim recognized that conservative agricultural consumers would purchase the products only if they were provided with agronomic[3] support by consumer-benefit-oriented sales teams. The company therefore invested in building strong sales support for its irrigation systems. It also launched an R&D team that explored the development of innovative irrigation solutions tailored to farmers' requirements.

[1] In 1970, the amount of agricultural land per person in the world was 0.95 acres. In 2000, it was 0.7 acres. World population grew from 3.7 billion in 1970 to 6 billion in 2000 (www.geohive.com).

[2] In recent years, Netafim's R&D department has started to develop and patent new models of drippers.

[3] Agronomic – The science of soil management and crop production.

Achieving remarkable success, Kibbutz Hatzerim soon realized it could not cope alone with the growing demand for drip products. As a result, it offered Kibbutz Magal (in 1974) and Kibbutz Yiftach (in 1978) the opportunity to join the venture, thereby establishing an ownership structure under which each of the kibbutzim operated as an independent entity with its own management under the Netafim brand. The three kibbutzim divided product development responsibilities, with each producing a specific product line. They also created three separate global sales territories, with each kibbutz receiving responsibility for a different territory.

Products, Production, and Plant Network

The process of producing drip irrigation equipment included three stages: injection, assembly, and extrusion. In the first stage, after raw materials were purchased, the plastic parts comprising the drippers were produced. In the second, the drippers (the "brains" behind the product) were assembled with a silicon membrane in between them (the hardness of the membrane determined the dripper's flow rate). In the third stage, drippers were welded into the Polyethylene pipes at predetermined distances that were meant to match the distance between plants in crop rows in order to deliver precise irrigation (see **Exhibit 6** for an overview of the production process).

In an effort to stay ahead of its competition, Netafim continued to invest a great deal in R&D. In 1983, the company developed the Ram Dripper, which sustained a uniform flow rate along the pipe (correcting the fact that pressure naturally decreased the farther the pipe was from the valve). Later, Netafim developed the Uniram Dripper, which was based on a smart mechanism that prevented dripper clogging, even when wastewater was used. Another sophisticated feature introduced by the company was a non-leakage mechanism, which kept the pipe full of water when irrigating in short intervals, resulting in significant water savings.

The Netafim product line included 10 different dripper models. Since research had shown that different crops and growing conditions required different irrigation flow rates, each of the 10 dripper models was manufactured in several variations to produce different flow rates. In addition, Netafim had a wide variety of pipes with varying thickness (thinner pipes being used for seasonal crops, and thicker, more resistant ones used for multi-season crops). However, since farmers planted their crops at different spacing intervals (implying different dripper spacing along the Polyethylene pipes), Netafim's 10 basic product offerings expanded into thousands of SKUs (Stock-Keeping-Units) with different pipe, dripper, and dripper spacing combinations.

For years, all the Netafim drip products were produced in Israel, with the three kibbutzim manufacturing different subsets of the product lines. However, in the 1990s, the kibbutzim realized that lead-times were becoming too long and individually decided to build extrusion plants in their global territories. Kibbutz Magal, for example, built a plant in Australia in 1996. Kibbutz Yiftach built a plant in India in 1998. And Kibbutz Hatzerim built plants in Brazil and South Africa in 1998. Jointly, the three kibbutzim made a strategic decision, namely that dripper production, including injection and assembly of the dripper itself (which provided Netafim with its technological advantage) would remain in Israel and the global production plants would deal exclusively with extrusion. The rationale for this approach was to prevent knowledge-leakage to competitors, assure non-compromised product quality, and prevent interference with the production capacity in Israel (which could potentially cause the dismissal

of kibbutz members from Netafim). By 2004, the combined Netafim entity had a total of 12 globally distributed production plants (see **Exhibit 7** for plant distribution).

While irrigation pipes and drippers made up Netafim's core product base, the company saw the opportunity to augment its offerings with filters, water delivery pipes from water source to field, irrigation controllers, and other related parts and accessories. It therefore collaborated with multiple vendors, in Israel and abroad, to provide farmers with the widest possible product range needed for crop irrigation. In 2000, the Netafim product line included 50,000 items, 40 percent of which were Netafim-made. The remainder came from external vendors.

Meeting the Customer's Needs—Tailoring Solutions and Sharing Knowledge

To Netafim, it was clear that the company's products had to comply with market demand and that the drip concept had to be adapted to meet specific growers' requirements, such as plot size, crop type, financial ability of the farmer, climate conditions, and proximity to energy and water sources. To illustrate this point, the requirements of a poor Afghani farmer, growing tomatoes in a small arid plot without an energy source and with a high dependence on scarce rainfall, were totally different from those of an Italian vintner growing grapes in Tuscany. To meet the diverse requirements of these farmers, Netafim developed a variety of specially tailored solutions for different agricultural sectors and growers. For example, the FDS (Family Drip System) was intended for smallholder plots in regions without energy and external water sources. For growers with vineyards in Europe, Australia, and other countries, Netafim developed the UniWine solution, which supplied high precision irrigation and fertilization to the vines and was much more costly than the FDS (see **Exhibit 8**).

To support customer-oriented product R&D, Netafim managed the process through a two-way communication channel. Applications and ideas were collected from growers in the field via local Netafim dealers. The company's R&D team also initiated contact with farmers through the local dealers by requesting them to test the efficiency of new products in the field before they were released on a widespread basis. Years of experience taught the Netafim agronomists that each crop required different irrigation conditions to produce optimal yields and that these conditions varied according to their geographic locations. Therefore, Netafim established globally distributed research laboratories which, in cooperation with local academic research institutes, worked on identifying the optimal irrigation settings needed to achieve maximal yields and quality based on crop type and the local climate.

To help farmers benefit from the knowledge the company gained through its research efforts, Netafim emphasized to its customers that it did not just sell products, but also offered pre-and-post agronomic sales support, as well as access to innovative irrigation know-how. Additionally, Netafim established a "mobile" Netafim university to train farmers, mainly in developing countries. The university's educational programs focused on topics such as how to increase crop production and optimize the use of irrigation and fertilization equipment.

Global Presence with Local Touch

In the late 1970s, after the Netafim ownership structure was finalized and the three kibbutzim divided the world into three sales territories, the race to distribute the dripper around the world

and capture market share began. Each one of the three kibbutzim acted to increase sales in their own territories via subsidiaries or local dealers with exclusivity for distributing Netafim products. The decision whether to work through a dealer or establish a subsidiary depended on the size of the country and on its market potential.

Because the three kibbutzim were actually three different companies under the same brand name, the priority for each of the kibbutzim sales teams was first to sell the products that were manufactured in their kibbutz, and second to sell the products of the two other kibbutzim. As a result, growers throughout the world with similar growing conditions could use different products depending on the kibbutz responsible for the specific country.

By the late 1990s, Netafim sold its products in 112 countries and had 30 subsidiaries. Each subsidiary was responsible for sales and marketing in the country and in some case, if there was an extrusion plant in the country, the subsidiary was also responsible for manufacturing (see **Exhibit 9** for a list of subsidiaries). Since 80 percent of Netafim's revenues came from 10 primary countries, management often wondered about the logic of operating such a wide-scale distribution network that required high effort and resource investment for its maintenance. However, at the time, the company decided that wide-scale global distribution was necessary in order to maintain Netafim's leading position in the drip irrigation industry and to develop new markets.

Having a physical presence in local markets via its subsidiaries enabled Netafim to more effectively adapt to local needs and better penetrate the market. The subsidiaries studied market conditions and requirements, established ties with government officials and agricultural banks, and were able to identify micro-trends affecting the area. Such was the case for almonds in the U.S. In recent years, almond crops had shown remarkable growth in California. Netafim's presence in Fresno, California enabled the company to identify the trend early enough so that Netafim Israel could come out with a number of unique products specially designed for the almond industry, consequently positioning Netafim as a dominant player in this market.

THE LATE 1990S — CLOGGED DRIPPERS

The late 1990s found Netafim as a conglomerate of three autonomous enterprises without joint management. Each of the kibbutzim independently managed its territory and pushed its products to the markets. Moreover, each of Netafim's 30 subsidiaries abroad operated as an independent entity with different logos, procedures, processes, and information systems. Netafim had become a global company, present in almost every country around the world, yet it had a localized management structure that lacked global synergies and resulted in the inadequate utilization of its widespread geographical distribution and buying power.

Netafim's first 30 years were characterized by continual sales growth, which kept its problematic management and logistic structure on a low boil. By the end of the millennium, however, the rules of the game had changed—sales growth had stopped; competitors had gained power; and billion dollar players in the high-pressure irrigation market had started exploring the latent potential of drip irrigation. Netafim customers had also become more demanding for higher service levels. Due to the availability of competitive, low-cost products in the market, customers

were no longer willing to patiently wait for weeks until orders arrived, and they started demanding more immediate supply, discounts, and unique solutions.

The three kibbutzim had invested almost all of their resources, time, and energy in entering new markets and gaining market share. Meanwhile, they had neglected the logistical arm of the business. As a result, their information systems were locally based and outdated, the forecasting, planning, and procurement processes were inefficient, and lead-times to some parts of the world were close to 100 days. Netafim's ability to face new market challenges was handicapped by its weak, clogged supply chain.

No Common Language

At a time when the Internet was becoming increasingly prevalent, broadband connections to the "global village" were largely accessible, and new information systems were widely implemented, Netafim had no central management structure with the authority to purchase and implement an integrated global information system. Based on the local, decentralized structure of the subsidiaries, each maintained its own information system without integration with the others. Communication between the subsidiaries and headquarters in Israel was maintained by telephone and fax, as the majority of subsidiaries had annual profit too low to afford the purchase of new technology. In addition, each of the subsidiaries held its own product catalog, issuing different catalog numbers to identical SKUs.

In the absence of a global information system and a standard catalog, product ordering had become a tedious and time-consuming manual procedure. The order placement process included the conversion of local catalog numbers into Israeli catalog numbers, which were then forwarded to the relevant plant in Israel via telephone or fax. The person receiving the order would then call the warehouse keeper to check product availability in stock or issue a production order if needed. If parts had to be manufactured, the production manager would be required to provide an estimated supply time for the order, at the end of which an order confirmation finally would be issued to the customer, including the estimated lead time. The differences in working days and hours (Saturday versus Sunday as the rest day) between Israel and the rest of the world also contributed to further extending the already long order confirmation process. As a result, in 1999, the average order processing time, including confirmation, was 10 days.

Forecasting, Planning and Procurement

Traditionally, accurate forecasting in the agricultural market was perceived to be a tough challenge. In some areas of the world, farmers often waited until the last minute to decide which crop to grow which, in turn, determined the type of irrigation system to be used. A farmer's decision was often influenced by recent changes in environmental conditions which could be caused by drought, flood, insect plagues, or price fluctuations in the market, making it extremely hard to predict individual product demand at the beginning of every year or each growing season.

The forecasting process at Netafim was historically "hunch-based" rather than fact-based, without any formal rules. In many countries, the warehouse manager would tour the warehouse on a monthly basis to spot missing products. Using informal observations, he or she would then estimate demand for the following months. Based on these estimates, each subsidiary would

place a monthly order to the office in Israel. There was no regular incoming order flows to the Israeli production sites but rather large periodical orders, which created the "bullwhip effect"[4] and made production planning at the sites extremely difficult. The production sites in Israel found it harder and harder to meet the orders on time.

The procurement process also suffered from problems related to localization. In the absence of a global procurement function, each subsidiary ordered directly from outside vendors. Those vendors supplied the orders to the Netafim warehouse from which they were dispatched with the Netafim products to the subsidiaries. Since each subsidiary negotiated separately with the vendors, it was not uncommon for certain products to be sold at different prices to different subsidiaries with vendors referring to each of the subsidiaries as an independent customer. While the vendors benefited greatly by exercising price discrimination among the subsidiaries, Netafim lost a significant amount of money in the process.

Out-of-Stock and Long Lead-Times

Because drip products were primarily high-volume, low-value goods, they were typically shipped abroad by sea. As a result, the average overall lead-time for shipments from Israel to Europe in the late 1990s was 50 to 60 days. Shipments to the rest of the world took 90 days. Analysis of the components of the total lead-time indicated that average order confirmation time was 10 days, average order production time was 3 weeks, and average order shipment time was 2 to 8 weeks depending on the destination. In total, customers might have to wait 6.5 to 12.5 weeks to receive their orders from Netafim.

The availability of 12 globally-located extrusion plants reduced lead-times but did not fully optimize them, since the extrusion plants had to wait for the drippers to arrive from Israel. In addition, since two-thirds of Netafim's products were provided by external vendors, subsidiaries with extrusion plants that could potentially meet desired lead-times for dripper lines were confronted with delays waiting for the arrival of external vendor products from Israel.

The subsidiaries, which had to deal with demanding customers on one hand, and long lead-times and late shipments on the other, were losing confidence in the ability of Netafim Israel to supply the orders on time. This caused some subsidiaries to "cushion" orders and, hence, increase their safety stocks. An analysis performed in 2002, just as Meltzer stepped into office, indicated a total inventory value in Israel and abroad amounting to 30 percent of the COGS (cost of goods sold) throughout that year.

In the absence of efficient demand forecasting tools and faced with a catalog that contained tens of thousands of products, the subsidiaries struggled to order the right products in the right quantities. Thus, despite the increase in local inventory levels, the number of out-of-stock products at the subsidiary level continued to grow. At the same time, inventory analysis performed at the end of 2003 indicated that 15 percent of the global inventory was slow-moving stock that sat on the shelf for over a year. This assessment reinforced the concern that the wrong products were being ordered.

[4] The bullwhip effect is a phenomenon in which variability in demand is magnified as one moves from the customer to the producer in the supply chain.

With no global information systems, a forecasting process that did not work, increasing inventory levels, and deteriorating product availability and service level to end-customers, it was clear to Netafim that a profound change was needed.

BACK ON TRACK

When sales growth started to flatten and the company's supply chain-related challenges became apparent, the three kibbutzim finally decided to combine forces. In 1999, they merged their companies into one legal entity, Netafim A.C.S, and established a new corporate management structure. In 2002, Erez Meltzer, the first external (non-kibbutz member) was appointed as president and CEO of Netafim. Rami Levy, who until then held the position of Hatzerim production plant manager, was appointed vice president of operations.

Soon after taking office, Meltzer set two primary corporate targets: the doubling of Netafim sales within five years and the reduction of inventory levels by a half. Levy realized that meeting these targets would essentially require a complete reorganization of the supply chain and a conceptual change by all those involved. The first step toward meeting these goals would be to provide the necessary tools for global information visibility and create a uniform language used by all the subsidiaries. The second step would be to reduce lead-times while reassuring the subsidiaries that Netafim could consistently supply the right products, at the right time, to the right place.

To help him plan the reorganization, Levy consulted with Eli Goldratt, author of the influential book *The Goal*. According to Goldratt, the main focus of the supply chain should be on reducing lead-time. Goldratt challenged Netafim to abandon its attempts to forecast demand based on static data of previous sales. Instead, he argued for dynamic inventory management based on real time demand. In addition, Goldratt believed that inventory should be held as close as possible to the manufacturing facilities so that fluctuations in demand in different markets would balance each other and would have less impact on inventory levels and production.

Committed to following Goldratt's advice, Levy had to convert these guiding principles into action. For this purpose, Ossi Tagger was brought in to be in charge of the supply chain.

Creating a Common Language

Tagger's first challenge was to create a uniform language across the different locations. To accomplish this, Netafim initiated a long and tiresome SKU unification process. The project extended over an entire year and, by the end of 2002, all the subsidiaries, local dealers, and production plants held one uniform SKU product guide.

The next project focused on SKU elimination and unification. Since each kibbutz historically had an incentive to manufacture and sell its own products, redundancy had been created within the product catalog, with multiple versions of the same product available with only small differences. For example, historically, Kibbutz Magal sold to Korea and Kibbutz Hatzerim sold to China; Korean farmers used a filter with a small valve attached (produced by Kibbutz Magal), whereas Chinese farmers used the same filter with no valve (produced by Kibbutz Hatzerim).

When Tagger sought to eliminate the filter with no valve, a large outcry came from the Chinese farmers who refused to buy the "new" filter. As a result, in 2005, the unification process was still in its infancy. Netafim was torn between its desire to remain responsive to customers' needs and its desire to rationalize and simplify its product portfolio. Tagger recognized that to be successful, this project would have to occur gradually, require a massive internal and external educational effort, and take a great deal of determination.

Concurrently, Tagger initiated the implementation of a SAP ERP[5] system at Netafim's headquarters and in three of the subsidiaries, automating all business processes beginning with order placement, continuing on to the production line via inventory management procedures, and ending with bookkeeping management. The initial results were promising: the SAP implementation provided Netafim with the transparency the company needed. Overnight, inventory levels in the three subsidiaries (which previously were tracked using MS Excel spreadsheets) were now accessible and visible to corporate management in Israel in real time. This real time information enabled management to analyze and track inventory levels by product and country, a necessary step in trying to reduce inventory levels.

The SAP system also automated order placement and the order confirmation process. Once implemented, each of the subsidiaries could order directly through the SAP system, which reduced the average time per order receipt and confirmation from 10 days to just 1 day. The roll-out of SAP to the rest of the subsidiaries was planned to be completed by 2008.

Regional Logistics

Tagger also recognized that, in order to get the subsidiaries to eliminate or vastly reduce local stocks, she must provide them with ways to supply at least 90 percent of the orders within a few days. However, since the corporate decision to manufacture drippers exclusively in Israel was still valid and because the company's primary vendors were also still located in Israel, there was no other option but to come up with a creative solution to overcome the geographical distance between Israel and the markets abroad. The solution was to establish Regional Logistic Hubs (RLHs) located in five key points around the globe. The idea behind the RLHs was to keep minimal inventory in a central place in close proximity to the end users/countries and to turn this inventory as many times as possible. This would enable lead-times of 7 to 20 days from the RLHs to the local subsidiaries and dealers instead of the 2 to 3 months it took to get the products from Israel. The assumption was that if Netafim could reduce its lead-times by a half, it could correspondingly reduce its local inventory levels by half (see **Exhibit 10**).

The inventory held in the RLHs included both Netafim and vendor products. External vendor products were managed by the VMI (Vendors Managed Inventory) method where the vendors owned the products on the shelves at the RLH. Only after a subsidiary placed an order, the product was then considered to have been purchased by Netafim and dispatched to the appropriate destination. The SAP system enabled any authorized individual at Netafim to see in real time both Netafim and vendor inventory levels available at the RLHs. Additionally, the use of VMI enabled Netafim to considerably reduce inventory levels of all vendor products.

[5] ERP – Enterprise Resource Planning – An information system that integrates all manufacturing and related applications for an entire enterprise.

The first RLH, established in mid-2004 in Singapore, was designed to serve the Asian territory. First-year results of the RLH operation were mixed. In some of the subsidiaries, where the new supply chain principles had been well implemented, inventories went down by a half; whereas in others, where the methodology was not implemented well, inventory levels remained high and unchanged.

Procurement and Planning

During the reorganization process, Netafim also created new supply chain functions under Levy's direction, including a procurement department and a planning department.

Building the procurement department was a result of the company's shift from local to global thinking. The new department was responsible for worldwide procurement. The vendors that were used to negotiate with each subsidiary separately now found themselves negotiating with one large entity with substantial buying power. As a result, the relationship between Netafim and its vendors changed drastically, and vendors were no longer able to price-discriminate among the different subsidiaries.

Within the new procurement department, processes for choosing a new vendor were clearly defined. Standard contracts were also put into place to define the working relationships with each vendor (e.g., prices, discounts, return policies, performance targets and levels of service expected of the vendor).

Levy also directed the creation of a new planning department, which collaborated with the manufacturing sites to plan the production schedule. It was also responsible for planning inventory levels in the RLHs and assisting the subsidiaries in managing their local inventories. Following Goldratt's advice, this department did not attempt to forecast demand based on past sales data. Rather, it sought to plan production and inventory levels based on real-time demand. In order to do so, the company purchased a new software system called Viva Cadena®.

Netafim programmed Viva Cadena® with a preliminary demand forecast for each product. Then these forecasts were automatically compared, on a daily basis, with real-time demand gathered at the subsidiary level. The software immediately generated alarms to the planners in cases where there was sizable variation between the forecasted demand and the actual daily demand and then automatically suggested a new reorder point and desired inventory level.

With clearly defined supply chain-related goals and a series of important operational improvements underway, Netafim was back on track in terms of the company's ability to sustain its leadership position in the industry. Netafim was also better positioned to begin thinking strategically about its future growth opportunities.

OPPORTUNITIES ON THE HORIZON

Three years after he assumed the position as Netafim's president and CEO, Meltzer knew that the battle to stabilize the supply chain and regain the company's growth had been won, but the war was far from over. Meltzer was already looking for ways to achieve the next quantum leap

in growth in a market that was quickly becoming commoditized.[6] In order to survive and continue to grow in the new competitive landscape, Netafim had to differentiate itself from the rest of pack.

Looking five years into the future, Meltzer envisioned a company that would be able to supply farmers with comprehensive knowledge-based solutions for all their needs, rather than just selling irrigation products. According to "Netafim 2010," the company would focus on two primary initiatives to drive its transition to a knowledge-based solution provider: CMT (crop management technology) and project management.

Crop Management Technology (CMT)

Agriculture had traditionally been a low-tech industry. However, in the late 1990s a number of enterprises, including Netafim, began introducing technology into the agricultural industry. As part of the effort, Netafim initiated the development of CMT systems. The first models included a collection of sensors, some of which were soil-installed while others worked in the air. These sensors received regular data input on levels of soil water content, salinity, fertilizer, and meteorological data. Also included was an irrigation computer that controlled irrigation and fertilization frequency, as well as scheduling. The input received was radio-transmitted to a central control system, with figures/graphs made visible on a farmer's computer screen, thus enabling him or her to review the results and make any required modifications. CMT's latest generation device allowed Netafim agronomists stationed in Israel to monitor data over the Internet and guide farmers by phone, mail, or online communications (see **Exhibit 11**).

In 2005, the market for crop management technology was still in its early stages. Meltzer planned to leverage Netafim's global presence and its well-known brand to grow the market and quickly expand the presence of CMT to farmers around the world. Meltzer envisioned CMT as the heart and brain of farming in the future; a system that captured relevant data from the field, analyzed it, and communicated commands to the irrigation system. By positioning Netafim at the center of this vision, all the rest of the players in the market would have to adjust their products to be compatible with the CMT. As part of the system, Netafim was developing a software platform that would be the "Farmer's Windows"—a sort of operating system for farmers that would gain market penetration as more and more farmers began using IT systems to support their farming operations.

As an added benefit, once the Web-based version of the CMT was sold to enough customers, Netafim would receive a direct stream of information from hundreds of thousands of fields around the world. Netafim's agronomists would then use this data for research and would serve as online consultants and as facilitators of information-sharing between farmers. For example, farmers growing similar crops in similar growing conditions around the world, such as Thailand and Brazil, would be able to share best practices through Netafim's portal and help each other with fertilization formulas, pesticide fumigation, irrigation plans, etc.

Project Management

[6] With as little as $2 million one could start a plant for making basic dripper models based on expired patents .

As part of becoming a solution-based company and a "one-stop-shop" that would supply the farmer with all his or her needs from the beginning of the crop cycle to the end, Netafim needed to develop the ability to manage projects, not just sell products. Meltzer decided that Netafim would move toward this goal gradually and start with the growing greenhouse market as a test ground.

As of 2005, more and more farmers were moving to greenhouse growing. This method enabled farmers to maintain full control over growing conditions, starting with water quantities and minerals in the soil (via moisture and temperature control) and ending with irrigation and fertilization levels. Greenhouse technologies increased yield production by tens and often hundreds of percentage points compared to open field growing practices. It also minimized pest and disease incidences. Netafim previously sold its drippers for greenhouses but now, as part of the transition to supplying a solution to farmers, Netafim created a greenhouse division that would give farmers a full range of products and services—to help plan the greenhouse, build it, and supply post-sale agronomic consulting.

Greenhouse construction required a detailed structural plan, as well as a bill of materials comprised of thousands of new products, including metal constructions, heaters and ventilators, cooling and climate control systems, and irrigation and fertilization systems. The value of an irrigation system for a greenhouse was approximately 5 percent of the total value of greenhouse construction. Hence, drip systems constituted a minor value in such projects. However, leveraging the company's deep knowledge and expertise, Netafim could position itself as the solution architect among farmers planning to move into greenhouse farming. In this role, the company would help design and manage the whole project (as architects did on regular construction jobs).

Most greenhouse components were not manufactured at Netafim and were ordered from external vendors. Since Netafim was sourcing 95 percent of the products needed for a greenhouse, the internal inventory levels and the lead-times from Netafim's factories to the customer were often not the critical factors in the success of greenhouse projects. The key issue was the scheduling of production, containerization, and forwarding of the different components to make sure they arrived at the field in time. Greenhouse project construction often included hundreds of containers with the unloading process extending over a month's time, thus making the scheduling of forwarding and unloading a critical factor in the project's success. Given these challenges, it quickly became clear to Meltzer that the company's ability to successfully establish project management capabilities and a sizable greenhouse business would place complicated and unique demands on its supply chain. New competencies from the individuals in charge of supply chain management would be required.

Meltzer was proud of the progress the company had made in terms of building an efficient, global supply chain. Yet, as he considered the challenges ahead, he wondered whether the organization, which had not yet completed the implementation of its RLHs and SAP system in all of its subsidiaries and was still working hard to institutionalize the changes that accompanied its supply chain transformation, was truly prepared to support the transition from a product-based to a solution-based company.

Exhibit 1
Low Pressure Irrigation

Furrow Irrigation

Flood Irrigation

Source: Compiled from publicly available sources.

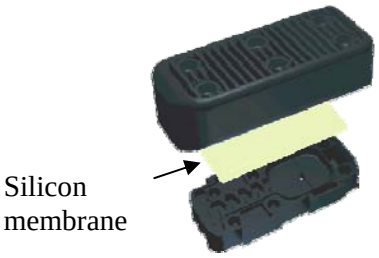
Exhibit 2
High-Pressure High-Volume Irrigation

Pivots

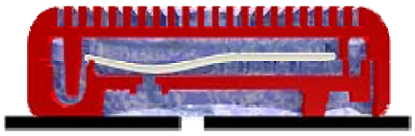
Sprinklers

Source: Information provided by Netafim

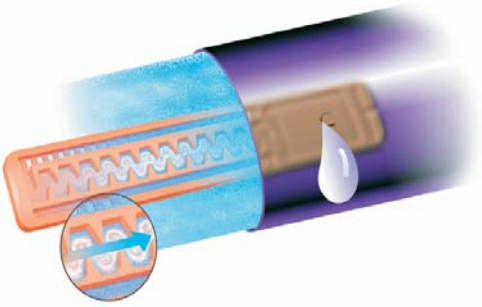
Exhibit 3
High-Pressure Low-Volume Irrigation
(Drip Irrigation)



Dripper before assembly



Water's passage



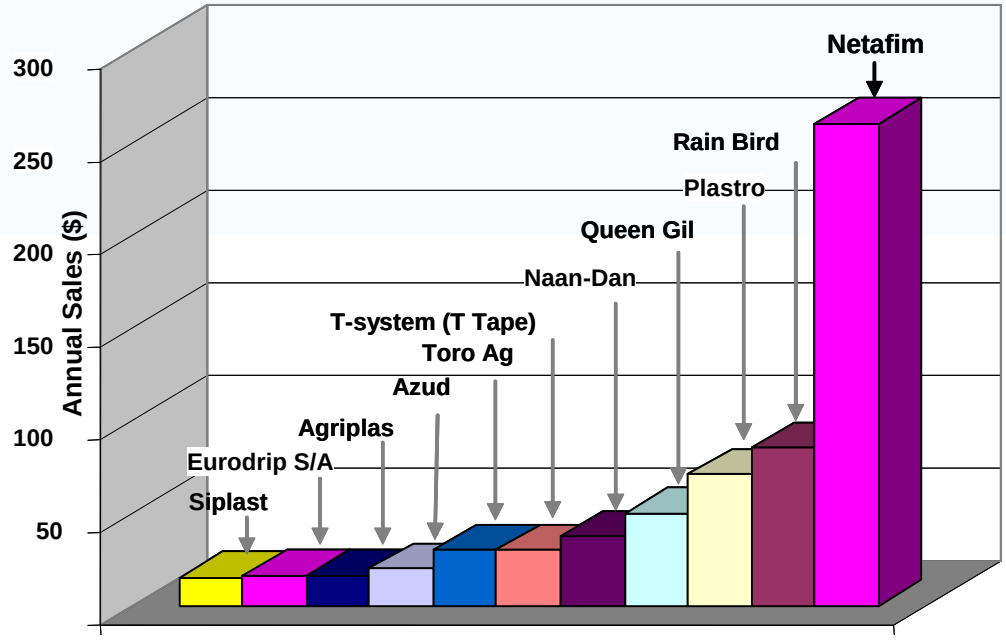
How the dripper works in the pipe

Drip irrigation in action

Farmers deploying the drippers in the field

Source: Information provided by Netafim.

Exhibit 4
Major Players in the Micro-Irrigation Market ($ millions)
For Year 2003



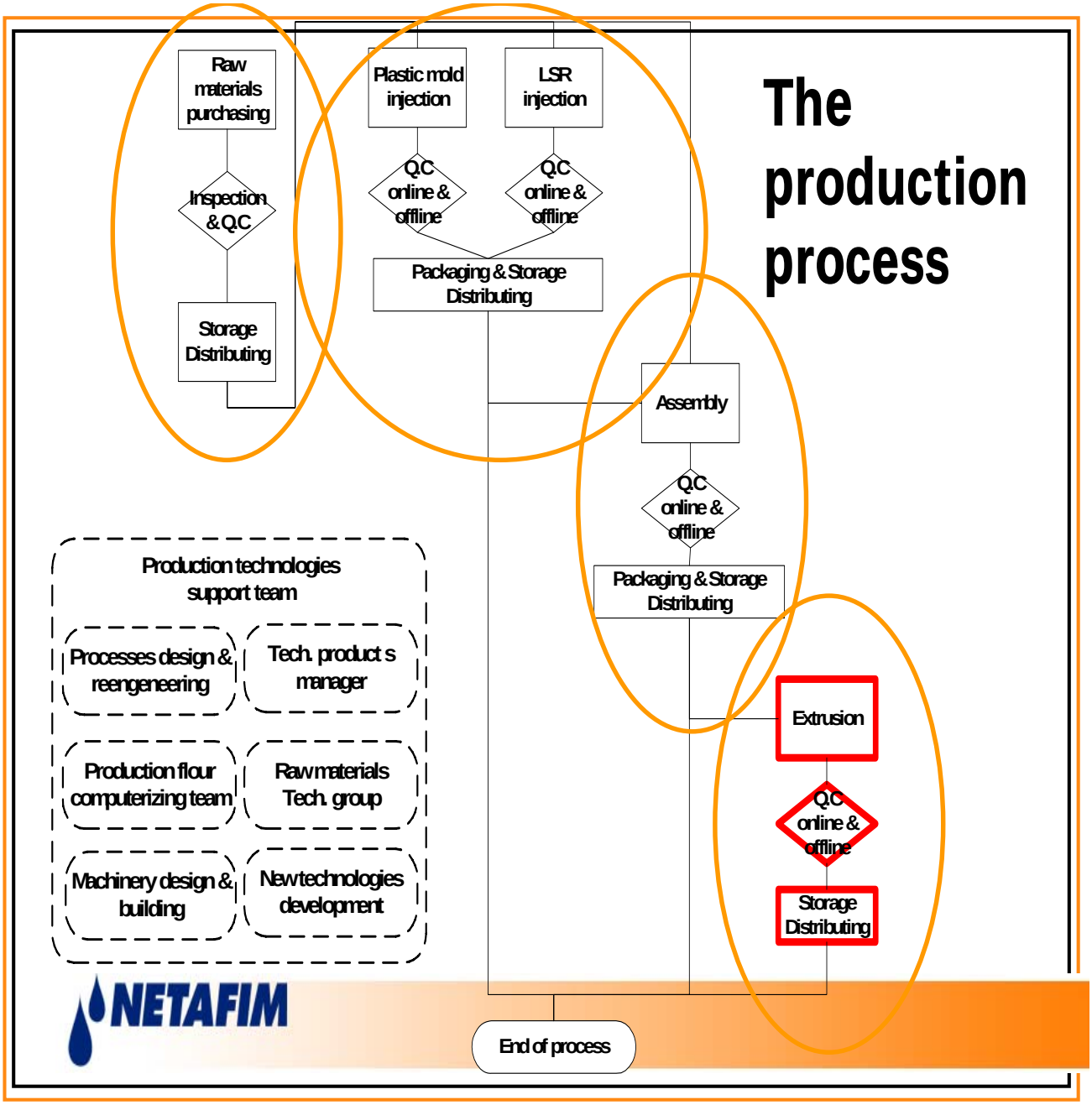
Source: Information provided by Netafim.

Exhibit 5
Traditional Irrigation vs. FDS
(Netafim's Family Drip System)
In Niger 2002-2003

Crop	Conventional		FDS		Revenue Increase	
	Yield (Kg)	Revenue ($)	Yield (Kg)	Revenue (S)	%	$
Tomatoes	2000	1215	7200	6171	**508**	**495**
Melons	2000	999	2950	1685	**167**	**686**
Eggplants	3000	1392	8150	4657	**335**	**3265**
Lettuce	2000	928	7800	5013	**540**	**4085**
Cabbage	3000	1070	11200	4800	**449**	**3730**

Source: Information provided by Netafim.

Exhibit 6
The Production Process



Note: LSR stands for Liquid Silicon Rubber.

Source: Information provided by Netafim.

Exhibit 7
International Manufacturing Plants

△ **Plants worldwide**: Israel (4 plants), USA, India, Australia, South Africa, Brazil, China (2 plants), France

○ **New plants**: Chile, Spain

Source: Information provided by Netafim.

Exhibit 8
Netafim's Tailored Solutions

FDS – Family Drip System

Uniwine – drip system for wineries

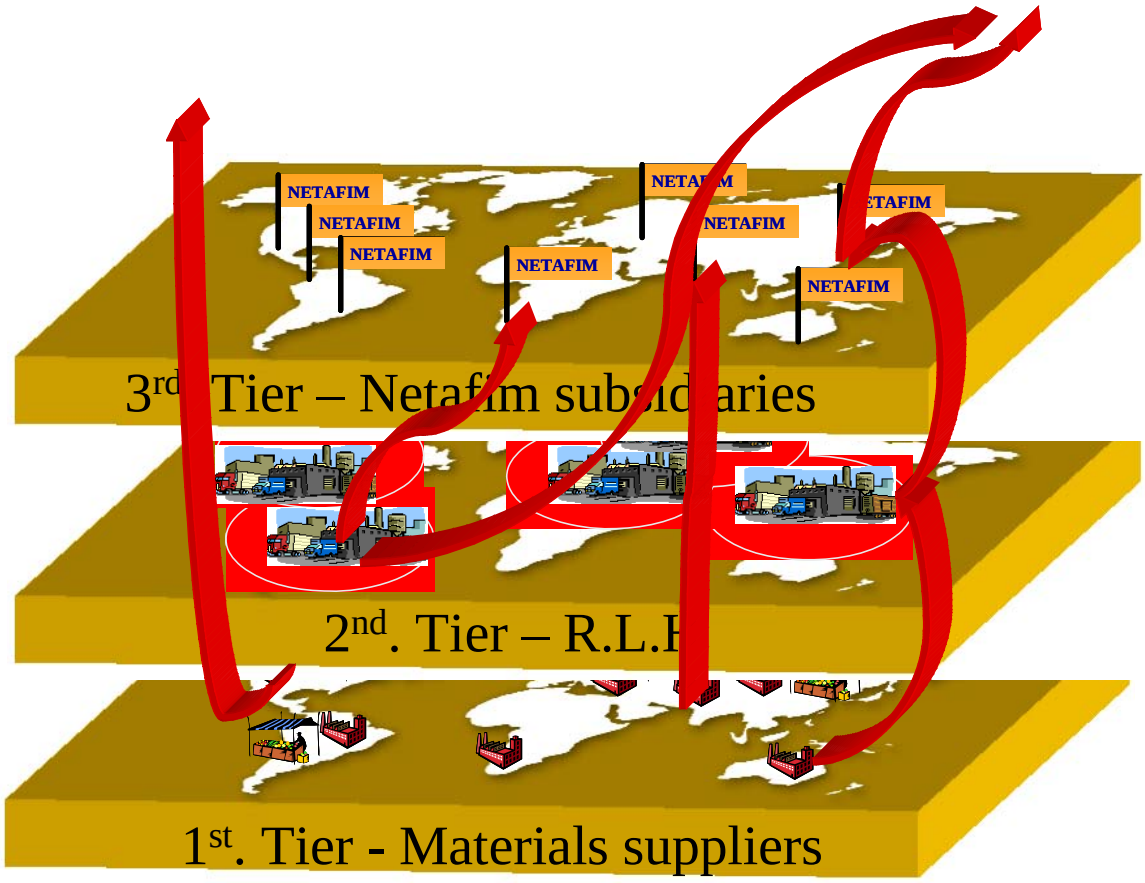
Source: Information provided by Netafim.

Exhibit 9
Netafim's Subsidiaries around the World

Argentina	France	Italy	Liechtenstein	South Africa
Australia	Germany	Indonesia	Morocco	Spain
Brazil	Greece	Israel	Mexico	Turkey
China	Holland	Japan	Philippines	Thailand
Czech Republic	Hungary	Korea	Poland	USA
Cyprus	India	Martinique	Slovakia	Zimbabwe

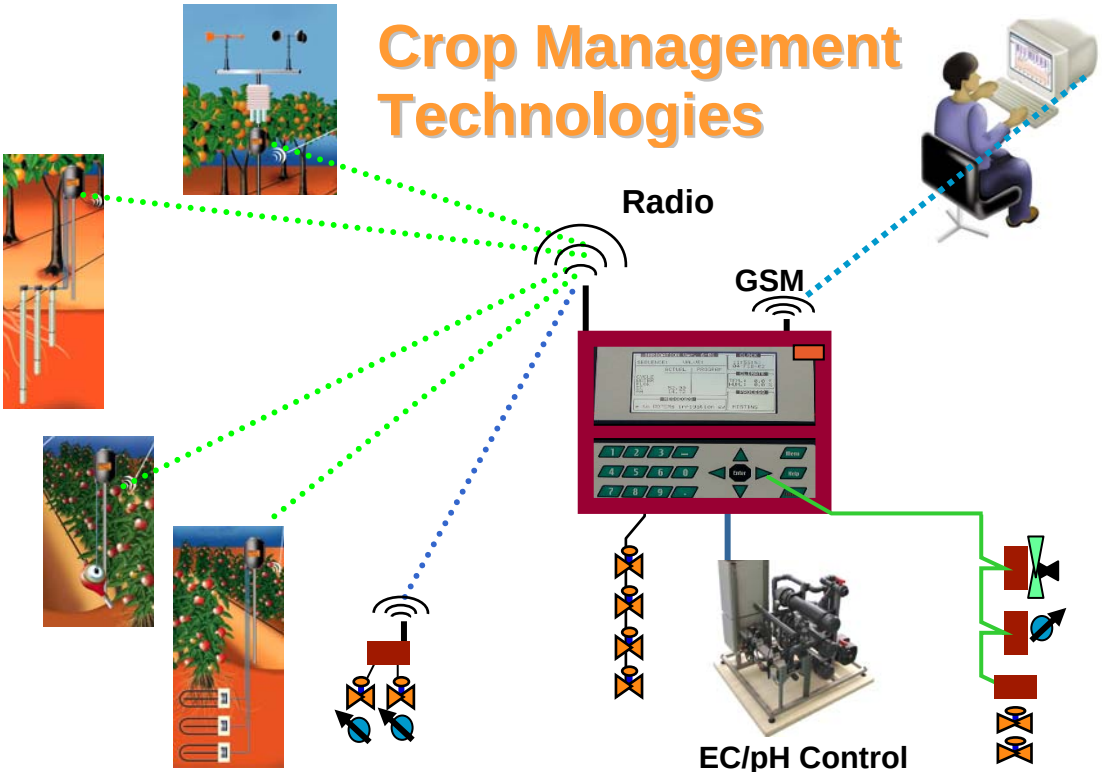
Source: Information provided by Netafim.

Exhibit 10
Netafim's New Supply Chain Structure



Source: Information provided by Netafim.

Exhibit 11
CMT – Crop Management Technology



Source: Information provided by Netafim.