Dripping with Strategy: Lessons from Netafim's Successful Globalization

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Abstract

Netafim's successful globalization, and how it involves capacity-building amongst smallholders, illustrate how to tackle the business potential and risks that underpin the introduction of innovative irrigation technologies into rural, agricultural markets in the developing world. The case study first describes the more general dilemma of how to change from a kibbutz-based, local company to a global corporation, offering a close look at the organizational dynamics of moving beyond the "founders' trap" by drawing on internal strengths and aligning them with external opportunities. The dilemma of how to strategically handle the challenge of moving into the smallholder market in developing countries is then examined, particularly in the context of Netafim's recent activities in India.

Introduction

A pioneer and global leader in drip irrigation, Netafim (literally: dripping, in Hebrew) has developed as the world's largest enterprise designing, manufacturing and distributing micro-irrigation systems. With 28 subsidiaries, 17 manufacturing plants and 4,300 employees worldwide, Netafim delivers its products to growers of all sizes, from smallholders to large-scale agricultural producers, in over 110 countries. Founded in 1965 in kibbutz Hatzerim in the Israeli Negev, Netafim pioneered the drip revolution, creating a paradigm shift in agricultural irrigation. Today, Netafim provides diverse solutions – from driplines to automated nutrigation systems – for agriculture, greenhouses, landscaping and even mining. The company, which holds an over-30% share of the global drip irrigation market, was controlled in recent years by the Permira Fund and had sales of $950 million in 2017, up from $855 million in 2016. In 2017, it was sold to Mexichem (Mexican chemicals group) for $1.5bn. Kibbutz Hatzerim, where the company was founded, sold down part of its stake but retains a minority 20 per cent holding.

This case-study describes Netafim's successful strategy of globalization, and how it involves capacity-building amongst smallholders, illustrating how to tackle the business potential and risks that underpin the introduction of innovative irrigation technologies into rural, agricultural markets in the developing world. The case study centers on two major dilemmas: First, the dilemma of how Netafim had to change in the 1990 from a kibbutz-based, local company to a global corporation. In this context, this case-study offers a close look at the organizational dynamics of moving beyond the "founder's trap"[1] by drawing on internal strengths and aligning them with external opportunities. The case then continues to address how to strategically handle the challenge of moving into the smallholder market in under-developed countries. This second dilemma is examined particularly in the context of Netafim's recent activities in India. The case of Netafim illustrates the merging of successful business strategy and green-tech

[1]The Founder's Trap occurs when the founder refuses to depersonalize policies and institutionalize his/her leadership, that is, to establish workable administrative systems, procedures, and policies that do not require his/her personal management, involvement and judgment. It is a concept termed by I. Adizes in the context of his corporate lifecycle model.

innovation. The company started about 50 years ago as a kibbutz-based, Israeli company, and managed to transform itself into a global leader. Netafim embodies several major strategic transformations: From kibbutz-based socialism to capitalistic management and corporatization; from local to global; and from the dripper product to a one-stop, end-to-end shop for sustainable, green-tech irrigation solutions. The final focus of this case-study will be on Netafim's recent strategic move into the global agricultural market by building on its traditional expertise with smallholders and upscaling it to mega-projects involving third-party stakeholders such as governments, financial institutions and NGOs.

The case main points are:

1. The technologically innovative development of drip systems, from the individual drip to computer-operated drip systems that handle not only irrigation but also liquid fertilization (fertigation and nutrigation) and pest control.

2. The change from a kibbutz-based organization to a multi-national corporation owned by external stakeholders.

3. The business strategy of focusing on developing markets (third world countries) while moving from large agricultural organizations and farms to systems that serve smallholders.

4. Working with governments, banks and NGOs to change the quality of life of smallholders in rural peripheries.

5. The strategy of post-sale, long-term capacity-building for customers.

What is the Drip Revolution?

The benefits of drip, by comparison with flood, furrow or sprinkler irrigation methods, are already well-documented. Drip irrigation – whereby water is emitted directly at the root zone of crops through a network of pipes – allows more uniform and efficient distribution of water, nutrients and fertilizers, improving crop yields and quality with

less water and labor.[2] Drip is about irrigating the plants rather than the soil. According to the Israel Export & International Cooperation Institute,[3] about 75 percent of crops in Israel are irrigated by low pressure drip, which saves up to one-third of required water and enables farmers to double yields using the same amount of water. Additional advantages of drip irrigation include: fertigation and nutrigation (fertilizers and nutrients can be supplied via drippers directly to root system rather than to the total area of field); water volumes optimized to soil type; exploitation of poor quality water (saline / treated effluent); and drippers that can be spaced, adjusted and pressure-compensated to meet the specific needs of crops, soil types and terrain topographies.

Nevertheless, less than 5 percent of the world's irrigated land is equipped with micro-irrigation systems[4] (see exhibit 1). Most farmers around the world still irrigate the way their predecessors did thousands of years ago — by flooding their fields or running water down furrows between their rows of crops. The major barriers facing drip include its high initial cost, required installation and post-service maintenance, training and capacity building, and the need to change persistent traditions. Clearly, the drip revolution still has a long way to go. The most dramatic change has occurred in China and India, the world's top two irrigators, where the area under micro-irrigation expanded 88-fold and 111-fold, respectively, over the last two decades. India now leads the world, with nearly 8 million hectares (about 20 million acres) under micro-irrigation

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[2] For scientific studies of the agricultural benefits of drip irrigation, see: Namara, R. et al. (2007). Economics, adoption determinants, and impacts of micro-irrigation technologies: empirical results from India. *Irrigation Science* 25,3: 1432-1319; Shuning, X. et al. (2015). Influences of Surface Drip Irrigation on the Growth, Yield and Quality of Several New Species of Guitang Sugarcane. *Agricultural Science & Technology*. 16, 8, 1828-1832; Ayars, J. et al. (2015). Subsurface drip irrigation in California—Here to stay? *Agricultural Water Management*, 157, 31, 39-47

[3] https://www.google.co.il/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=0ahUKEwix7qSHorTQAhXDvBQKHeCXDs0QFggmMAI&url=http%3A%2F%2Fembassies.gov.il%2Fspb%2FAboutIsrael%2FSciencTechnology%2FDocuments%2Fwatersolutionlowres.pdf&usg=AFQjCNE_eUXa8f5CrbcMRqd2wszGn1rXHA&cad=rja

[4] The International Commission on Irrigation and Drainage (http://www.icid.org).

methods. The introduction of drip systems can also have far-reaching implications for socio-economic change, particularly among farmers in developing countries, and especially in the context of increasing water saliency. As the world population climbs and water stress spreads around the globe, finding ways of getting more crop per drop to meet our food needs is among the most urgent challenges.

Changing from a kibbutz-based organization to a multi-national corporation

Netafim was founded in 1965 as a joint venture between Simcha Blass, a veteran Israeli water engineer, and Kibbutz Hatzerim – an Israeli community agricultural settlement located close to Beer Sheva. It produced the world's first drip irrigation system in 1966. In 1967, Netafim began supplying drip irrigation equipment for vegetable growing in Israel's Arava desert. Despite the region's hostile growing conditions and limited annual rainfall (as low as 20mm), the project was a great success, enabling the farmers to grow tomatoes, peppers, melons and eggplants. Over time, the partnership between Netafim, the Israeli government, NGOs, the private sector and regional farmers has turned the Arava from an arid wilderness to one of Europe's leading suppliers of winter fruits and vegetables and a world center for agricultural development and innovation. As a result, regional growers have increasingly adopted Netafim's drip solutions for open-field and greenhouse irrigation. Starting in 1975, Netafim supplied drip irrigation solutions to cotton growers in Israel's Jordan Valley, northern Galilee region, and the Negev desert. It then started exporting to major cotton growers in the West – including the US, Spain, Greece and Australia – as well as in China and India.

Throughout this expansion, **technological innovation** has played an important role. The invention of the dripper by Yaacov Motas and its development by Rafi Mehudar in 1965 was the point of departure. To resolve the dripper's clogging problems, Netafim implemented the turbulent water passage patent (1970); later on, pressure-compensated drippers that deliver a uniform flow rate in sloped terrains were introduced (1978), as well as micro-sprinklers and mist emitters (2000-1); nutrigation and fertigation systems combining irrigation with nutrients and fertigation supply (2003-2005); climate controllers

(2009); and integrative solutions such as crop management systems that cover planning, control, monitoring and analysis of precise fertigation and enhanced irrigation scheduling control (2012).

Another related process of on-going transformation focuses on **diversification and the move from irrigation products to irrigation solutions**. Netafim's current CEO Ran Maidan summed up this strategy in the following way: "Think about drip irrigation as a delivery system. It's not only about water. We started with just water, but now it's a delivery system that will take your water, fertilizer and crop protection products directly to the plant's roots in the most efficient manner. In the end, I'll put in the software to automate it. All you have to do is plant your seeds, and you'll get the best yields you ever had, while using 30% less resources. Less crop protection products, less fertilizer, less labor, less water. The dripper is like the engine, and now we're selling the entire car. In fact, we're not even selling you a car, but rather transportation services."[5] The drip irrigation market has already become commoditized, with many manufacturers in India and China joining the competition; in order to survive, Netafim differentiated itself by focusing on providing comprehensive knowledge-based agricultural solutions rather than just selling irrigation products. This meant introducing technology into agriculture, which had traditionally been a low-tech industry. For example, in crop management technology, sensors installed in the soil transmit data on soil water content, salinity, fertilization and so on. The input is transmitted to a local computer that controls irrigation as well as to a central control system, allowing Netafim's agronomists stationed in Israel to monitor global data and guide local farmers. Netafim also developed NetBeat™, the first software systematically controlling automated irrigation, fertigation and crop protection. After supplying from 1990 onwards drip irrigation solutions for greenhouses in the former Soviet Union, China and Mexico, Netafim established its Greenhouse Division in 1997.

[5] http://www.theworldfolio.com/interviews/if-you-have-the-right-product-in-the-right-place-with-the-right-service-then-you-can-grow/3850/. Last accessed 18/11/16

Another important dimension of Netafim's growth was **consolidation and corporatization** (see exhibit 2). As Netafim's business grew, kibbutz Hatzerim (located near Beer Sheva in the southern part of Israel) partnered with two other kibbutzim – Magal (1973) in central Israel and Yiftach (1978) in the Northern part of Israel. Until the 90's, the three kibbutzim divided the world between them; for example, kibbutz Magal sold drippers to Korea and Kibbutz Hatzerim sold to Argentina. Each kibbutz manufactured different products and bought what it needed from the other two kibbutzim. This stage consisted of a "do more" approach, which was not always "do better." Some kibbutzim tried to increase their presence and sales, each in its global territory, by establishing more subsidiaries, which were not always profitable. An efficient central corporate management structure was lacking. In order to achieve the corporate's goals, Netafim had to move beyond its "founders' trap." Only in 1998 did the three kibbutzim merge their companies (which operated under the same brand name) into one legal entity, Netafim A.C.S, and established a new corporate management structure.

The first major dilemma in considering the development of Netafim takes us back to 1999, which was a key junction for the company. The dilemma here is how to proceed ahead while building on the company's key strengths as well as considering the market's opportunities and threats. In 1999 Netafim became incorporated. It was a critical junction for the company. How should it position itself in the market and become an industry leader? The response stems from the company's competitive advantage, focusing mainly on its proprietary technology and know-how.

In 2002, Erez Meltzer was appointed as the first external (non-kibbutz member) CEO of Netafim. To overcome the geographical distance between Israel and its export markets, Netafim planned regional hubs of administration and logistics.[6] So far only one hub was established in 2004 in Singapore, designed to serve Asia. In 2006, Markstone Capital Partners Group and Tene Investment Funds acquired a share of Netafim, injecting capital

[6] Michlin, G. & H. Lee (2006). *Netafim: Migrating from Products to Solutions*. Stanford Graduate School of Business, Case Study GS-46

into the growing business. In 2011, the European Permira Fund acquired 61% of Netafim from Markstone (20% stake), kibbutz Magal (23%) kibbutz Yiftach (8%), and Tene Investment Funds (10%).[7] Kibbutz Hatzerim still owns the rest of Netafim.

Old Wine in New Bottles

The fourth dimension of transformation is that of organizational culture. Within all the above-mentioned changes, several core values have been kept and adjusted to the changing reality. Netafim is striving to maintain a global corporate culture, a process in which some of the original kibbutz-based ideology is being preserved while at the same time making a transition to managerial capitalism. The story about how Netafim's North-American presence began with two kibbutzniks salespersons is not just part of the company folklore; it is still an important element of Netafim's spirit and its contemporary globalization. This is referred to as "Netafim spirit" in which farmers speak directly to farmers (rather than salespersons to customers) – reflecting an underlying belief that straight-forwardness carries universal benefits. Netafim salespersons thus also provide support and long-term follow-up. Global strategy still embodies the cultural code of the original, kibbutz-based Netafim, for example in the crop teams that combine marketing and agricultural support, and in Netafim universities that introduce modern agricultural knowledge and technology (and irrigation solutions) to local farmers worldwide.

The new version of Netafim's vision includes four values (see exhibit 3).[8] The first is "Dare". It embodies the culture of creating an agricultural revolution. It also hinges on the Israeli culture of *'chutzpa'*. The second value is "Make it Happen." At the end of the day you need to get the work done. The third value is "Create an Impact." It's not just about sales but also about social impact, social empowerment and capacity building. The fourth value is "Partner for Success." The partners are the farmers who use the products, the dealers who sell to the farmers, and the company's employees. Like all visions, such values need to be

[7] http://www.globes.co.il/en/article-1000684580. Last accessed 19/11/16

[8] Previously Netafim's vision consisted of three values: "growth", "innovation" and "spirit."

substantiated with practices. The original ethos of straight-forwardness and pragmatism is still echoed in the old-new values of “daring” and “make it happen.” Creating an impact while partnering for success highlights the kibbutz-based ideology of shared, mutual responsibility (*'arvut hadadit*') and participative management (*'nihul meshatef*'). These are now poured into modern-day practices of corporate responsibility as well as knowledge-sharing and empowerment of farmers around the world.

What follows illustrates how the company translated these values into practices through a business strategy of focusing on developing markets (third world countries) while moving from large agricultural organizations and farms to systems that serve smallholders. While this strategy was there from the start, its global drivers of success had to be discovered. It also tells a story of how to work with governments, banks and NGOs to change the quality of life of smallholders in rural peripheries, and the importance of employing a strategy of post-sale, long-term capacity-building with customers.

Working with Smallholders in Mega-Projects of Community Irrigation

Overall, the use of dripping is still largely characteristic of commercial, high-input agriculture, mostly in the developed world, while projects introducing drip irrigation technologies in the developing world have often failed. Another major dilemma that Netafim had to face was finding the right business model for moving into the market of smallholders in under-developed countries. Drip irrigation is an agricultural technology whose unique advantages – water saving, increased crop yield/quality, reduced labor costs and individualized technological control – can lead to social change in agricultural communities, especially among smallholders in developing countries and peripheries, and particularly for women farmers. However, despite its apparent benefits in comparison to traditional (furrow, flooding, rain-fed) irrigation, the global challenge of water scarcity and sustainable agriculture, and the concerted support of NGOs, micro-irrigation has not become the common method in most parts of the world. The current micro-irrigation area in India, for example, remains an insignificant proportion of its potential. In Kenya, the majority of farmers who installed drip irrigation discontinued their use after 1-2 years

mainly due to lack of spare parts.[9] The idea of implementing drip irrigation in developing countries has been criticized in the past since efficient use of drip requires funding, accurate design and installation, effective training and continuing maintenance.

One of the first successful projects that demonstrated the potential of drip irrigation to mobilize socio-economic change among smallholders in developing countries was conducted by Netafim already in the late 70s among Palestinian farmers in the Jordan valley, where crop yields increased 10 times along with water saving of 50% as a result of drip irrigation.[10] The farmers, who leased the lands from Arab landlords for 50% commission of the crop yield, were thus able to buy the land they have been cultivating. Their quality of life increased dramatically, and with it the level of education in the community.[11]

A unique Netafim product - the Family Drip System™ (in India, popularly known as Small Holdings Drip System), was especially designed for smallholders in under-served peripheries (see exhibit 4). This is a comprehensive gravity-based drip irrigation system which requires no additional investment in infrastructure and is designed for all types of crops and for year-round application. Easily attached to any water tank, no pump or electricity is required for water distribution. A project comprising 900 FDS (Family Drip System) units with training and agronomic support was installed in Niger with World Bank cooperation and funding (see exhibit 5). US AID financed additional 20,000 small FDS systems in 2002; the agricultural results were successful yet the project was discontinued

[9] Kuelcho, I. and Weatherhead, E. (2005). Reasons for smallholder farmers discontinuing with low-cost micro-irrigation: A case study from Kenya. *Irrigation and Drainage Systems* 19: 179–188

[10] Or, U. 1989. Jordan valley drip irrigation scheme: a model for developing countries. *Water and irrigation Review* 8-12

[11] Amdur L., Alwan M., Solomonica D., Eshel Y. & Zaban H. 2007. Cooperation Between Israelis and Palestinians in the Agricultural Sector. Ariel: Samaria & Jordan Rift R&D Center

due to political turmoil.[12] Other studies on attempts to introduce drip irrigation in developing countries such as Guatemala, Zimbabwe, South Africa and Vietnam stressed the need of an effective network comprising government subsidies, bank loans, and continuing presence in the field of private micro-irrigation companies that provide installation, training, and after-care service.[13]

Earlier attempts by the Indian government to promote drip irrigation were not successful. In 1993, 66% of India's total drip irrigated area was in Maharashtra. However, despite governmental subsidies of as much as 75% of total drip equipment cost, the rate of adoption in Maharashtra has been very slow and uneven, with technical problems of installation and design including mismatch of pumps with the pressure/discharge requirements of drip systems, inadequate filtration, leakage at joints due to poor installation, and pressure variations owing to inadequate allowance for land slope.[14]

The APMIP: Andhra Pradesh Micro-irrigation Project

The APMIP is a mega-project of US$ 257 million, launched in 2003, aiming at bringing 250,000 hectares under micro-irrigation. It provides a successful model for the strategic, large-scale introduction of drip irrigation into under-served peripheral areas. Andhra Pradesh (undivided AP), the fourth largest state in India in terms of area and fifth largest in terms of population, is an agricultural state, with over 60% of the population working in

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[12] Kolton, I. and Aharoni, A. 2003. Poverty Reduction: Implementation of "Family Drip System" Irrigation and Agricultural Methods for Smallholders in Niger. Netafim internal report

[13] Cornish, G. 1998. Pressurised irrigation technologies for smallholders in developing countries – a review. *Irrigation and Drainage Systems* 12: 185–201

[14] Saksena, R.S. 1995. Micro-irrigation in India – Achievement and perspective. In: Micro-irrigation for a Changing World. Proceedings of the 5th International Micro-irrigation Congress, April 2–6 1995. F.J.R. Lamm (ed.). ASAE. pp. 353–358; Holsambre, D.G. 1995. Status of drip irrigation systems in Maharashtra. In: Microirrigation for a Changing World. Proceedings of the 5th International Microirrigation Congress, April 2–6 1995. F.J.R. Lamm (ed.). ASAE. pp. 497–501

agriculture, ranking second in India in the production and extent of area covered under fruit crops.[15] In launching the APMIP the organizers were aware of previous unsuccessful projects, for example those carried out in Maharashtra during the 1990s, in which "the efforts made to take up large projects based on imported technology from Israel did not succeed because it was not attuned to the needs of Indian farmers. Assistance for micro-irrigation should be treated as investment especially to encourage small and marginal farmers."[16]

The rationale behind the APMIP was quite ambitious: to create a large-scale administrative framework for regulated competition among micro-irrigation companies. The parties involved in this huge project were the farmers, the Government (through the APMIP administration), private micro-irrigation companies, and the banks which financed the non-subsidy part of the costs. Any micro-irrigation company (Netafim, Jain, etc.) could offer its products and services as long as they complied with Bureau of Indian Standards (BIS) certified products, and were committed to supply agro-extension services for two years and performance guarantee for five years. These services were detailed in a list of predefined obligations, such as setting up district-level offices with Telugu-speaking support teams and a representative in every specific allotted mandal (administrative district), to provide farmers with manuals, to establish a 1 hectare demo plot in every district, to organize training programs, to arrange regular field visits of experts to conduct soil and water analysis of farmers' land, to maintain quality control inspections, and to supply spare parts.

16 micro-irrigation companies eventually participated in the APMIP. Independent agencies as well as field officers belonging to the APMIP administration monitored and evaluated

[15] AP Dept. of Agriculture, http://agri.ap.nic.in/wto.html.

[16] Dr. S.K. Goel, Commissioner of Agriculture, Government of Maharashtra, from the minutes of the first meeting, task force on micro-irrigation held at AP Bhavan, New Delhi, 21st August, 2003, available from the Ministry of Agriculture, Government of India at http://agricoop.nic.in/horttaskforce/minutes.htm.

the performance of the micro-irrigation systems and the satisfaction of farmers. Farmers located in a given mandal could choose any one among the companies operating there. The APMIP organizers expected that in the course of time, the more professional companies will stand out in terms of quality and agronomic support.[17]

The strong involvement of the government entailed several benefits for the farmers, including reduced fixed price of drip system, insurance coverage at lower rates and reduced interest rates of bank loans. Farmers had to invest 50% of their own funds in addition to government subsidy, and could also rely on 50% bank loan. This impressive work serving as the basis for standardized introduction of drip systems, as well as on-site field training to officials and farmers in the various districts was no doubt crucial to the success of the project.[18] Most importantly, farmers were entitled to a subsidy of at least 50% of the drip systems cost to the maximum ceiling of 50,000 Rupees per family, while negotiating with the participating companies a reduction of micro-irrigation costs by 30%, the government also exempted them of sales tax and paid the VAT on the equipment.

Netafim has performed exceptionally well in the APMIP (see exhibit 6). Independent evaluations have shown that the use of Netafim's drip technologies resulted in significant productivity and economic gains over the traditional surface irrigation methods.[19] Farmers who adopted drip irrigation experienced improvements in yields and could expand their

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[17] There were 16 micro-irrigation companies, both local (India-based) and global, participating in the APMIP: Jain, EPC, Parixit, Premier, Haritha, Kumar, Nagarjuna Palma, Nandi, Netafim, Plastro Plasson, Rungta, Sudhakar, Swati Storewel, Godavari, Greenfield, and Satya Sai. The major three drip irrigation companies were from India and Israel: Jain (approximately 30% in terms of area covered in 2006-7), Netafim (~10%) and Plastro (~9%). See http://www.aphorticulture.com/actionplan_2008/137.html.

[18] Project guidelines, documentation and initial training were overseen and conducted by Dr. V. Praveen Rao, then Professor of Agronomy in the College of Agriculture, A.N.G.R. Agriculture University, Hyderabad, AP, and later Netafim's Chief of Agro-marketing.

[19] Raz, A. 2014. "Successful Implementation of Large-Scale Drip Irrigation Projects," *Acta Horticulturae* 1015: 283-295

plots further. Their free income went up and many were financially able to upgrade their quality of life. Additional jobs were created for harvesting, transportation, packing, food processing, etc. With the same amount of water used previously for flood irrigation, more area was cultivated using drip systems.

The APMIP presents a unique synergy created by the government, banks, farmers and private micro-irrigation companies. The ability of Netafim-India to successfully participate in this project has paved the way for additional initiatives. In 2010, Netafim-India was contracted to set up a nutrigation system in Gotkhindi, Maharashtra, after traditional use of flood irrigation led to inadequate water supply and increased land salinity (see exhibit 7).[20] In Telengana, Netafim operates the Erravalli Project with two complete villages creating a "model village" that utilizes 100% drip irrigation.

In 2014, the government of Karnataka contracted Netafim-India & Jain Irrigation to undertake massive drip irrigation in the state, with a plan to bring a parched area of 24,000 hectares under drip irrigation. The project, estimated at about $60 million, is based at Ramthal Marol, and is subsidized by the state government with assistance from the Asian Development Bank.[21] Netafim will build for this project (for West side package of 11,700 hectares) an automated water pipeline network, "our largest in India," according to Avinash Thakur, Netafim-India's head of Marketing and Business Development.[22]

The Family Drip System (FDS) is also making an impressive comeback in India. In 2015, Netafim sold more than $100 million in India. For over 80% of these sales, the average

[20] https://www.youtube.com/watch?v=r8Fl_Tegb90

[21] http://www.business-standard.com/article/economy-policy/karnataka-plans-to-bring-sugarcane-area-under-drip-irrigation-115011501017_1.html. Last accessed 18/11/16.

[22] http://www.bloomberg.com/news/articles/2014-01-23/netafim-to-build-largest-india-s-drip-irrigation-project. Last accessed 18/11/16.

value was $1,000.[23] That's how much a very small system costs for a farmer with half a hectare or one hectare. In Jharkhand, an East Indian state which is one of the most impoverished states in India, with many smallholders lacking electricity, Netafim-India started setting up in 2010 FDS units that cost 30,000 Rupees, of which 50 percent is funded by a grant from the state government. The farmers are expected to earn between 25,000 Rupees to 40,000 Rupees from the first crop. With a crop cycle of three months (for vegetables), farmers now earn a steadier cash flow, helping them earn more than enough to repay the loans taken for the drip system within one or (a maximum of) two crops. As a result of this successful pilot, the state of Jharkhand has decided to cover 100,000 farms, and Netafim's agronomists are helping the state's officials to mark out each field with GPS locators, so that the spot can be identified on a GPS grid, optimizing the number of acres to be covered by drip irrigation.[24]

The Way Forward: The Business of Sustainability and Capacity Building

Despite the reported significant economic advantages, the global challenge of water scarcity and sustainable agriculture, and the efforts of NGOs, micro-irrigation has not become the common method in most parts of the world. The current micro-irrigation area in India, for example, remains an insignificant proportion of its potential.[25] Moreover, because of various requirements – such as the financial investment required for installation, training, and maintenance – previous initiatives to introduce drip irrigation in developing countries have not always been successful. It therefore

[23] Interview with Netafim's CEO Ran Maidan. http://www.theworldfolio.com/interviews/if-you-have-the-right-product-in-the-right-place-with-the-right-service-then-you-can-grow/3850/

[24] http://www.forbesindia.com/article/breakpoint/the-indian-drip-irrigation-jugaad/17302/1 (last accessed 18/11/16).

[25] Namara, R.E., Nagar, R.K. and Upadhyay, B. 2007. Economics, adoption determinants, and impacts of micro-irrigation technologies: empirical results from India. *Irrigation Science* 25,3: 1432-1319

transpires that in addition to the technological efficiency of the system, successful implementation also hinges on an efficient administrative framework, inter-connecting the government, banks, farmers and micro-irrigation companies in order to assure that financial investments can be made, that training is provided and is being followed in the field, and that after-sale service is continually available and accessible. Such a socialized model of water management has indeed been developed in Israel in a way that could serve as a model.[26] Netafim, whose business culture was shaped within this national model and by founders who strongly believed in it, has taken up this model and became one of its foremost ambassadors.

Netafim's work with smallholders, either in the Jordan Valley or in India, on an individual basis or in mega-projects, demonstrates that an integrated approach is essential. First, the integration of technology and knowledge. Netafim takes the lead in showing that micro-irrigation companies should also train and guide the farmers in adopting suitable agronomic practices and not just sell micro-irrigation equipment. This represents, for all large micro-irrigation companies, a necessary integration of products and solutions, as well as sales and post-service. Second, the efficient introduction of drip into under-served rural peripheries requires the administrative integration of micro-irrigation with a loan scheme. Netafim's experience has shown that micro-irrigation companies need to understand and work not only with farmers but also with governments and banks. Social change is always a concerted effort. The irrigation business highlights how financial return on investment is inter-dependent with capacity building, and that is one of the most important lessons that Netafim can teach us. As Naty Barak, who currently serves as Chief Sustainability Officer at Netafim[27], says: "sustainability through capacity-building is not only Netafim's commitment, but also our business."

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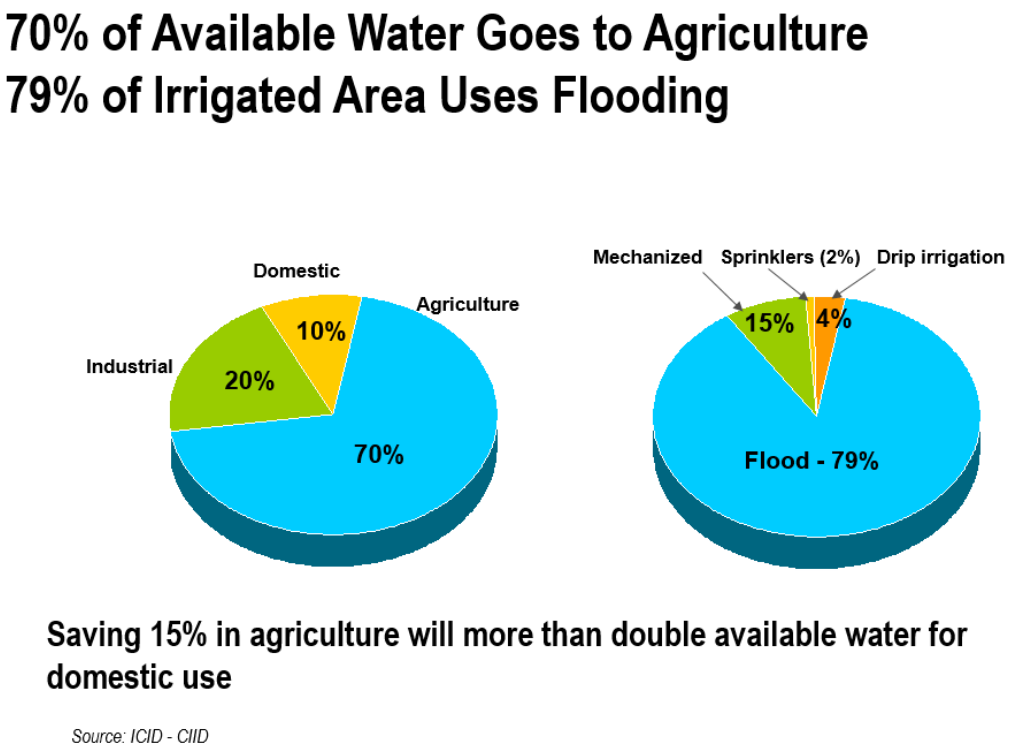
[26] Siegel, S. (2015). *Let There Be Water: Israel's Solution for a Water-Starved World*. St. Martin's Press

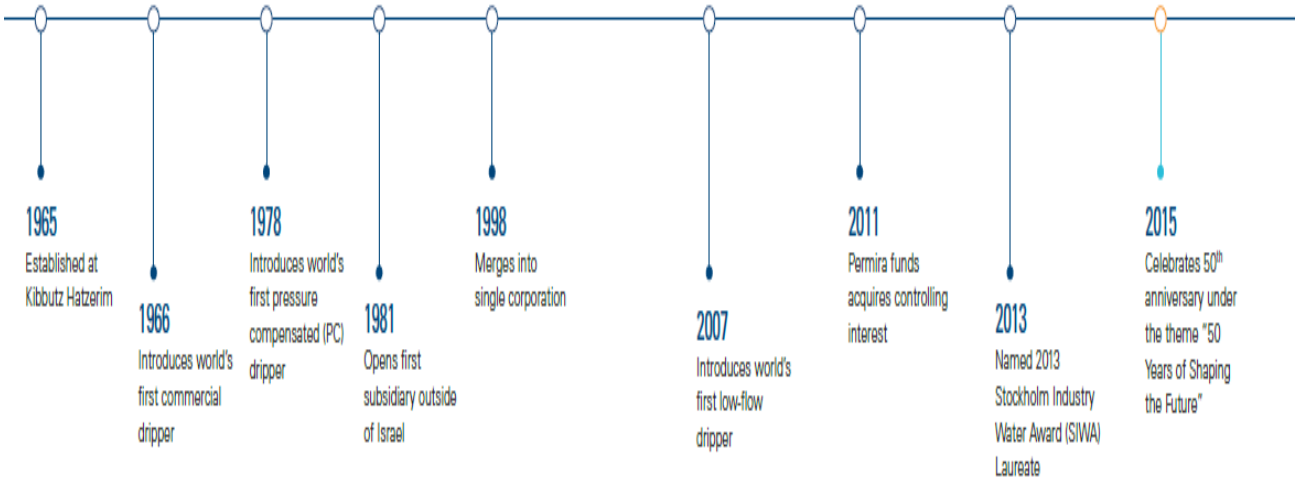
[27] Naty Barak, an active member of Kibbutz Hatzerim, has been with Netafim since 1975. Previous to his present position he held various positions at Netafim, including Director

Exhibit 1: Global Irrigation Usage



of Marketing, Executive VP of Netafim USA, President of Netafim South Africa, and Treasurer.

Exhibit 2: Netafim's time line



Source: http://www.netafim.com

Exhibit 3: Netafim's Vision. Source: http://www.netafim.com

DARE
MAKE IT HAPPEN
CREATE AN IMPACT
PARTNER FOR SUCCESS

FDS -- NETAFIM Family Drip System

FDS is a drip irrigation system especially developed for smallholder farmers, being both sufficient and affordable to them. This system is modern, yet easy and simple to install, operate and maintain.

FDS being gravity operated does not require any outside energy source for operation. All you need to do is fill the raised *(min.* one *meter)* water tank.

FDS can be used throughout the year. It is durable, suitable to most crops, and is adaptable to any water source, to a variety of soil types and weather conditions, open field or small-scale greenhouse and it is friendly to the environment.

FDS usually provides irrigation to a planted area ranging from 100 m² to 2000 m², but can also be adapted to smaller and larger plots.

FDS user does not require any initial experience with irrigation.

FDS consists of the following components:

. Water tank
. Manual valve
. Filter
. Distribution pipe (main and secondary, if needed)
. Start connectors
. Drip Lines 8 mm diameter 0.3 m dripper spacing

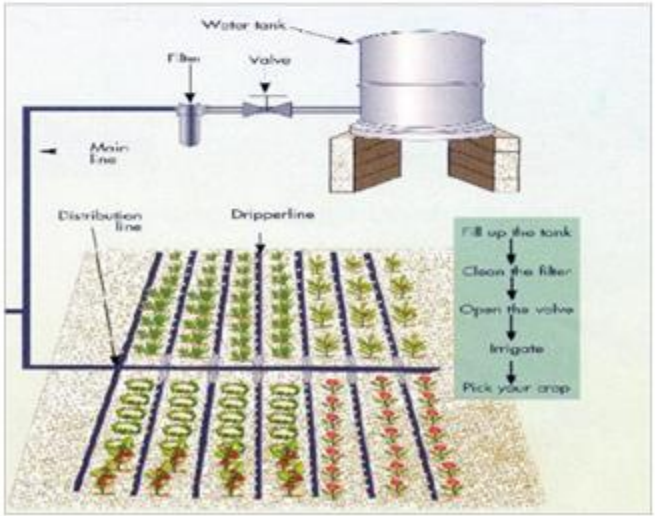


Exhibit 4: The Family Drip System (source: Netafim)

Netafim issued the AMG (African Market Garden) I
of the system to participant farmers and to provid
etc.

Exhibit 5: FDS booklet by Netafim

Exhibit 6: APMIP performance evaluations (data provided by Dr. V. Praveen Rao).

NETAFIM™

Responses of Crops to Drip Irrigation in India

Technology developed for	50 crops
Water saving over surface irrigation	40 – 80%
Yield increase over surface irrigation	16 – 150%
Saving in weed control expenses	15 – 20%
Saving in labour expenses	20 – 40%
Saving in fertilizer over soil application	5 – 15%
Pay back period	0.5 – 3 years

(Source: MOA, New Delhi)

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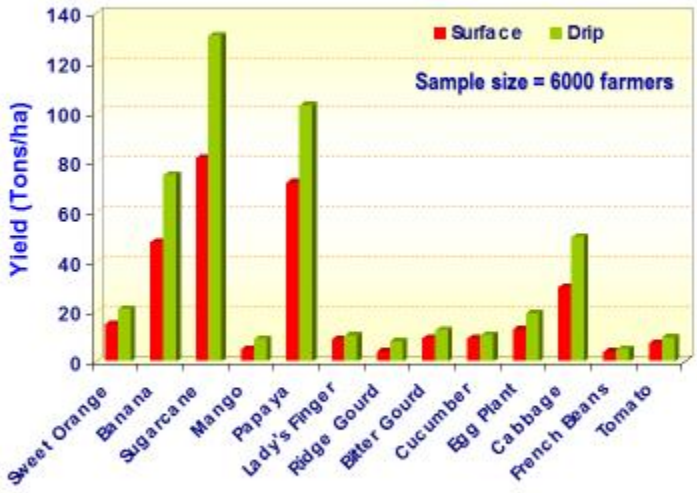
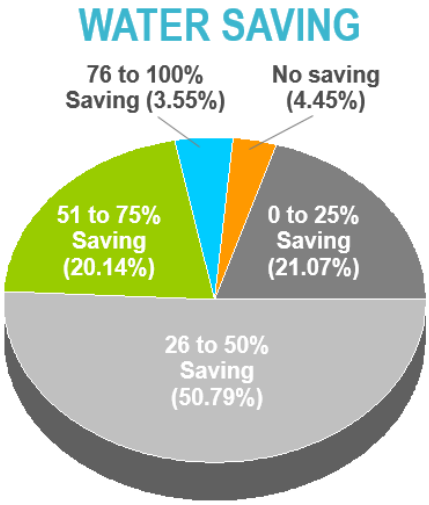


APMIP – Yield improvement by Crops

APMIP – Impact



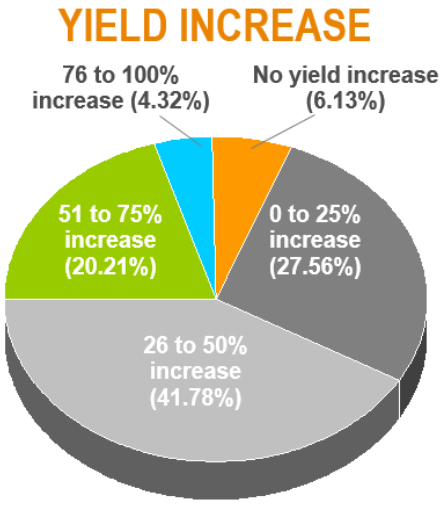


Exhibit 7. Gotkhindi Project. Source: Netafim-India