INDIA-ISRAEL:

GROWING CHALLENGES AND AGRITECH SOLUTIONS
India, the world's second most populated country, is an agricultural giant, ranked second in global farm output, having exported over $26 billion worth of agricultural products in 2016. In addition to being the largest producer, consumer and exporter of spices and spice products, India is also the largest producer of millet, with an estimated output of 10.5 million tons in 2016, and is the world's third largest producer of wheat, producing 88 million more tons in 2016 than in 2015.

Agriculture plays a major role in India's economy and social fabric. The sector accounts for 17% of the country's GDP, with more than 58% of the country's rural households dependent on agriculture as their principal means of livelihood. More than 263 million Indians, over half of all workers in the country, are employed in the sector. Rapid industrialization, global population growth and changing eating habits are resulting in increased demand world-wide for nutrient-rich food, such as fruits, vegetables and meat.

While India's global dominance in agriculture presents a vast opportunity, there are also many challenges. Because of more and more fragmented land holdings, aggressive use of chemicals, inefficient use of water or lack of it, obsolete farming technology, rising input costs, limited access to credit and insurance, supply-chain problems and outdated marketing, the majority of India's 140 million farmers are restricted to using traditional methods that limit crop yields and productivity, thus ultimately impairing farmers' welfare, prosperity, and security. The magnitude and nature of the challenges confronting India's agriculture sector provide an opportunity for growth and development.

At the same time, the complexities and unique characteristics of the Indian market must be taken into account in order to ensure success. Introducing innovation and technology is the only way to tackle the rising food insecurity in India.
In a region rife with challenges, Israelis have honed the art of problem solving. In the process, they have transformed their small desert nation into a powerhouse of innovation and an incomparable ecosystem of creativity and resourcefulness.

Israel’s special mix of people and cultures has created a unique environment. It is a land of immigration, with populations arriving from all over the globe, bringing with them a wide variety of skills and an abundance of academic knowledge. Israel boasts an open culture and a strong entrepreneurial drive mixed with a multi-disciplined approach. People shift from one sector of activity to another all the time; after building a career in cyber security, an individual might move and open an AgriTech start-up.

Since Israel’s founding, much of the country’s focus, allocation of resources and expertise have been devoted to agriculture. Because of its shortage of natural resources, Israel has developed innovative methods and technologies for “growing more with less” under difficult conditions, long before increasing agricultural productivity became one of the world’s most acute issues. In the process, Israel gained deep insights and know-how, which, together with its record of accomplishments in agriculture, positioned it as a leader in several areas of AgriTech. Israel’s expertise in arid climate agriculture, efficient dairy farms, resilient seeds, drip irrigation, as well as novel plants, such as cherry tomatoes and collagen-producing tobacco plants, induced many leading multi-national agriculture corporations, including Monsanto, Bayer, BASF, Dupont and Syngenta, to collaborate with Israel’s AgriTech sector, and sometimes to acquire an Israeli start-up or establish an R&D branch in Israel. Numerous Israeli AgriTech firms are considered leaders in the global market, among them Netafim and Naan, both drip irrigation companies, Adama with its line of crop protection products, ICL for fertilizers, seed companies Hazera and Zeraim Gedera, and RMH Lachish Industries, SCR and Afimilk, specializing in dairy-farm management. Precision agriculture is also particularly promising in Israel, as the country is recognized for its strong expertise in such technologies as sensors, big-data, computer-vision and drones. In addition, Israel’s academic institutions, the Agriculture Research Organization (ARO), The Hebrew University, the Weizmann Institute of Science, the Technion, Ben-Gurion University and Tel-Aviv University, are well known for their outstanding knowledge and know-how in agriculture as well as in biotech and IT, areas which are becoming ever more meaningful for the agriculture and food industry.
Start-Up Nation Central is an Israeli non-profit organization inspired by the best-selling book, Start-Up Nation. We build on our extensive knowledge of Israel’s innovation ecosystem to help it grow and expand. Our activities include connecting businesses, NGOs and government leaders throughout the world with the people and technologies that can help them meet their most pressing challenges.

In the past year, Start-Up Nation Central has chosen the AgriTech sector for strategic focus, initiating projects to help Israeli start-ups in this area best realize their potential. We have specifically aimed at creating stronger connections between India and Israel in the AgriTech sector, leveraging Israeli innovation to help address some of India’s critical issues and needs.

During March 2017, Wikistrat and Start-Up Nation Central ran an online, interactive simulation on agriculture in India. Over 40 experts on India’s agriculture sector and Israeli Agri-technology examined and identified areas of agriculture where there are favorable opportunities for India and Israel to collaborate in efforts to improve India’s food security and agriculture sector. We are excited to share with you some key insights that have emerged, organized by:

- Areas of agriculture in India ripe to benefit from Israeli innovation, and a few examples of Israeli start-ups involved in those areas.
- Key factors to be considered for successful implementation of AgriTech solutions in this amazing and challenging market.
HYBRID SEEDS

High quality seeds are the most basic and critical input for sustainable agriculture, and their quality determines the efficiency of all other inputs. It is estimated that the direct contribution of quality seeds to the total yield is about 15–20%, depending on the crop, and can reach 45% with efficient management of the other inputs.

India's hybrid seed market is growing rapidly. It is estimated that the $4 billion market will grow 15% annually in the period of 2016-2020, with farmers' awareness of the benefits associated with hybrid seeds increasing. The industry has been adopting scientific methods in seed variety development and in quality seed production, mostly for non-vegetable seeds, such as cotton and wheat. Corporations controlling a large proportion of the market, including Nuziveedu Seeds, Mahyco seeds, Monsanto, Rasi Seeds, Bayer India, Pioneer Seeds, Syngenta, Dupont and Kaveri Seeds, are engaged in R&D, and produce many hybrid varieties for all seasons for both field and horticultural crops. However, there are still many supply gaps. While drought-resistant seed varieties are available for crops like cotton, maize, tomatoes and okra, there are still crops facing shortages and requiring further advances in seed production, such as hot peppers, cauliflower, and early Nantes carrots. Seed varieties suitable for flat land and hill topography, as well as heat tolerant seeds for cereal, pulses and millet have yet to be developed. There is also a gap in the supply of seeds for high nutrient foods, for which demand is increasing significantly, but which are currently not grown in India, such as oats, kiwi, strawberries, sweet peppers, pickling cucumbers and color capsicums.

Furthermore, there are still remote areas where both hybrid seeds and the high inputs needed for them, such as irrigation facilities, recommended fertilizer uses, appropriate nurseries, proper spacing, line sowing using seed drills, weedicides and pesticides, are not distributed or utilized, thus limiting the capacity of quality seeds to enhance crop yield. Availability of certain hybrids is sometimes restricted by the companies themselves. For example, Dupont Pioneer sells a hybrid variety of corn at a price of $13 for 4 kilogram in India's southern states but does not sell the same variety in northern states like Bihar and Maharashtra. As a result, farmers in these areas cannot try these hybrid and other low-cost seed varieties. Although these varieties have begun to be sold in more regions in India, this process is taking place at a rather slow pace for row and field crops. Supply shortages and imbalances in the regional distributions of certain seeds are obstacles in ensuring a steady supply of quality hybrid seeds throughout the country.

Israel is well known for its expertise in hybrid seeds, especially ones suitable for wide climatic conditions, including desert conditions, and which have an extended shelf life. Israeli start-ups and companies working in the area of breeding, developing and producing improved seed varieties include Agreen Seeds, OriGene Seeds, Top Seeds, NRGene as well as Hazera, Kaiima and Evogene.
There are also fundamental gaps between supply and demand in the field of biopesticides. Biopesticide demand is trending upward due to greater demand for organic farming, public health concerns related to aggressive use of highly toxic pesticides, such as endosulfan, and the rising need to comply with maximum residue limits for produce exports. India is one of the largest producers and consumers of chemical pesticides, using them on a wide range of food and cash crops due to their subsidized cost and ready availability. Across the world, the public is increasingly concerned about the health effects of these pesticides, thus boosting the demand for biological pesticides. Currently there are more than 140 biopesticide production units in India, able to meet the demand of less than 1% of its farmed area. Moreover, many indigenous methods and products available in India are minimally effective against a myriad of diseases. The challenge is to find efficient and effective productivity-enhancing alternatives that can reduce India’s chemical pesticide dependency.

Israeli biopesticide solutions with strong potential for use in India include Stockton Group’s Timorex Gold, Bio Bee, Botanocap, BioFeed, Agro Shelef and ARO’s Tamar Tech.
The scarcity, distribution and management of water are all elements of a growing water problem in India. India has about 18% of the world's population, but only 4% of world's renewable usable water resources. An ever-expanding population is putting tremendous pressure on Indian water resources, without which food production is impossible. Heavy dependence on rainfall, climate change, lack of irrigation facilities, irrigation inefficiency and groundwater depletion present difficulties that increasingly plague most of India's cultivated areas. Despite the high subsidy for micro-irrigation in India, its rate of adoption has been slow, except in a few areas. This is the case both for farmers who invest in the technology and then claim the subsidy, and for companies that receive a government subsidy to install the technology. It is estimated that the micro-irrigation potential of the country is 40 million hectares, of which only 10% is currently micro-irrigated. Although the irrigation technology industry is crowded with about 200 players, only a few offer comprehensive solutions that include irrigation, fertigation and chemigation, due to the technological complexity and cost of these products. New players seeking to enter this market need to offer attractive packages that include credit and insurance. They also must adapt their technology to local conditions, such as volatility in electricity costs, lack of access to the grid, etc. Marketing budgets should be devoted to supporting field tests, like the one conducted by Netafim, and encourage farmers to invest jointly with them in integrated irrigation systems.

Although Israel is a leader in drip and integrated irrigation systems, India's Jain Irrigation Systems Ltd. dominates the sector, with a 55% market share. Four Israeli irrigation firms, Netafim, NaanDan which is fully owned by Jain Irrigation, Rivulis and Metzerplas are present in India in the drip and micro-emitter segment and they currently market peripheral equipment. These firms have already tested their marketing strategies. Other than that, Israeli start-ups like I-dripper, Tevatronic, Amiad, Inplant and Tal-Ya can also be interesting and relevant.
The area of farm machinery in India suffers from a lack of products as well as from poorly-performing existing products. Most farmers use basic traditional equipment, which is not economical, especially for small and marginal farmers. This has a significant impact on farm productivity, farming costs and the ability to grow labor-intensive crops such as paddy, wheat, cotton, sugarcane and groundnut. Furthermore, the existing distribution networks for farm machinery offer only a limited supply of items, especially in the area of machinery and tools for small farmers, leading farmers to rely on ad-hoc distribution networks, local manufacturers for hand tools, and custom-hiring centers, or shared capacity centers for renting tractors. Timely and economical use of farm machinery, such as inter-cultivation tools, proper land levelers and planting implements can greatly improve productivity and maximize yield and profits. Other equipment that could be introduced to help raise productivity and profitability include: blade harrows for tilling the soil where crops are to be planted and for chopping up unwanted weeds or crop remainders; broad bed furrows (BBF) and inter-row cultivators to cultivate in-between plants like chickpeas, ground nuts, etc., at 30 cm spacing; rolling cultivators for wide-spaced row-planted crops like hybrid red gram, maize, etc.; vacuum planters for precision planting; mechanical planters and more.

The overall farm machinery market is expected to grow 8% annually in the period of 2015–2019, due to low interest rates and government subsidies, making this sector even more attractive.

While at present not many Israeli companies offer inexpensive farm machinery and tools, the large gaps between supply and demand in the realm of eco-friendly and effective farm implements, harvesters and crop residue management could create significant opportunities to penetrate this large untapped market. Israeli start-ups offering solutions for this space include Etgar and Yung-Etgar, Hishtil and even Virentes, with its grafting technology. Furthermore, as drones become a more popular method for automating agricultural tasks, Israel’s expertise in this field can prove advantageous as well. A start-up like Skyx, with its autonomous agriculture spraying and asset monitoring, holds great promise for this area of the market.
5 ADVICE AND KNOWLEDGE SHARING

Small farmers’ lack of knowledge, distance from distributors and need for extension services and other critical support for crop yield optimization emphasize the importance of information technology in helping farmers bridge the information gap that traps them in an economy of near-subsistence. At the same time, large and medium farmers need information technology in order to make productive use of the immense amount of data with which they are inundated from all directions, including their own cultivated fields. Despite having an abundance of computer engineers in city centers, in the countryside, India is deficient in its use of smart-phones, internet and software. Overall, India ranks 138th in the ICT Development Index, after countries like Zimbabwe and Cuba. One farmer out of ten in India has internet access, and smartphone penetration, which is higher in urban areas, can fall as low as 20% elsewhere. However, the situation is changing. Smart-phone and broadband costs are falling rapidly and it may not be long before farmers become better connected and able to take advantage of new opportunities.

Cultivu, Agriculture Knowledge on-line (AKOL) and AgriTask are a few Israeli software offering solutions very relevant to this sector.

6 RESOURCE MANAGEMENT AND PRECISION AGRICULTURE

Proper application of fertilizers or herbicides, integrated pest management and accurate weather forecasts can all help increase crop yields. Using information communication technologies (ICT) and decision support system (DSS) sensors to control irrigation based on soil humidity and receive accurate weather forecasts, soil and plant health diagnostics and pest and disease recognition, as well as SMS based alerts prescribing preventive measures can greatly contribute to India’s agriculture productivity. Finding ways to provide low-cost, easy-to-use precision technologies can greatly benefit the sector.

Israel has over 50 start-ups in this area, some of which can be very relevant for India. A few examples include Sol Chip, with its solar energy sensor, CropX, Manna Irrigation, and Saturas for smart irrigation, Taranis and ATP labs for farm monitoring and management, and Farmdog and Fieldin for integrated pest management.
Post-harvest losses involve food loss across the entire food supply chain, from harvest to consumer. These losses have major economic consequences, such as lost opportunity costs and lower price realizations, result in harm to natural resources, including waste of water, land, and energy used in the production of agricultural goods, and deplete available vitamins and minerals. Conservative estimates from the Indian Ministry of Food Processing Industries estimate post-harvest losses of agricultural produce at $13 billion, almost three times the government of India's 2016-17 budget for the agricultural sector.

Many factors contribute to post-harvest food loss: spillage; consumption by pests, mites, rodents and birds; fungus; use of insecticides or pesticides; changes in physical properties due to high temperatures; and exposure to rain and water. One of the biggest concerns for farmers is the lack of warehouse and storage infrastructure, which often leaves the produce vulnerable to damage. Insufficient drying or over-drying of grains cause spoilage and increased grain breakage during threshing. The lack of appropriate storage drives many farmers to sell their produce immediately after the harvest when the supply is at its peak, thus resulting in low prices. Other key issues are logistics, transportation and the lack of an efficient and comprehensive method for tracking the produce as it traverses the supply chain. As warehouses are commonly located at railway stations near major urban centers, the transport of produce to warehouses takes time and requires driving on unpaved roads. Harvesting usually takes place in the heat, and after harvesting, the produce is not moved to cold storage at any stage of the supply chain. By the time the produce reaches the nearest market yard the night of the harvest or the following day, it loses its freshness. If the process takes even more time, the produce spoils. Excessive handling in the market yard leads to further damage.

Some of the key technologies for post-harvest management include: washing and drying machines; sorters and graders; sanitary and phytosanitary practices such as hot water treatment; storage bags; packaging, especially corrugated fiber board (CFB), modified atmosphere packaging (MAP), ethylene removing packaging and edible films and coating, the latter commonly used to improve the appearance and conservation of fruits and vegetables; mobile cool chambers (MCC) for short-distance transportation; and end-to-end real-time cold chain management (CCM). These technologies often are inaccessible or too expensive for small and marginal farmers. In addition, they require skilled manpower often lacking among such growers.

Israeli technology ventures tackling some of these issues include: Amaizz and Pimi Agro, offering storage solutions preventing spoilage and the sprouting of diseases; BT9, providing real-time cold chain management; Aclartech, which monitors and analyzes fruit quality and ripeness; Yarok, providing improved food safety testing; and Stepac and R.O.P, which offer examples of some of Israel's modified atmosphere and humidity packaging technologies.
FIVE KEY FACTORS TO CONSIDER ABOUT AGRICULTURE IN INDIA:

INDIA

MAJOR CROPS & ISSUES PER REGION

JAMMU & KASHMIR
- Major Crops: Barley, oats, spicas, cherries, peaches, pears
- Major Issues: Unfavorable agro-climate and predilection for horticulture dependence on monsoon

HIMACHAL PRADESH
- Major Crops: Apples, seed potatoes, ginger, vegetables, mushrooms, cherry, olives, and figs
- Major Issues: Agro-climate conditions suitable for cash crops, poor imports, supply chain/distribution systems

UTTARAKHAND
- Major Crops: Barley, rice, wheat, soybeans, grasses, pulses, peanuts, and millets
- Major Issues: Slow agricultural development due to upland, poor rainfall, high levels of chemical, and labor-intensive systems

UTTAR PRADESH
- Major Crops: Barley, rice, wheat, soybeans, peanuts, and millets
- Major Issues: Largely dependent on weather, high levels of chemicals, labor-intensive systems, and inadequate infrastructure for post-harvest management
- Second-most irrigated Indian state

BIHAR
- Major Crops: Barley, rice, wheat, soybeans, peanuts, and millets
- Major Issues: Low levels of agricultural infrastructure, inadequate farm mechanization, lack of irrigation, and labor-intensive systems

JHARKHAND
- Major Crops: Barley, rice, wheat, soybeans, peanuts, and millets
- Major Issues: Poor pest management, inadequate farm mechanization, lack of irrigation, and labor-intensive systems

WEST BENGAL
- Major Crops: Rice, paddy, maize, other vegetables, jute, sugar cane, tea, and jute
- Major Issues: Soil degradation, soil salinity, poor fertilization practices, lack of irrigation, inadequate cold storage facilities, and labor-intensive systems

NORTHEAST
- Major Crops (in Assam): Tea, jute, rice, fruits, pulses
- Major Issues (in the northeast): Lack of extension services, lack of input and product supply chains, inadequate post-harvest management infrastructure
- Other: Sikkim is India's first fully organic state

GUJARAT
- Major Crops: Rice, groundnuts, vegetables, and pulses
- Major Issues: Poor investment and agricultural marketing, labor-intensive systems
- Other: Primarily for contract farming and processed agricultural products

GUJARAT
- Major Crops: Rice, groundnuts, vegetables, and pulses
- Major Issues: Poor investment and agricultural marketing, labor-intensive systems
- Other: Primarily for contract farming and processed agricultural products

MAHARASHTRA
- Major Crops: Rice, wheat, sugar, turmeric, soybeans, green peas, sugar cane, rice, and cotton
- Major Issues: Less labor-intensive management, labor-intensive management, significant labor migration, and labor-intensive systems
- Other: Potential for processing contract farming, highest output under certified organic farming

MADHYA PRADESH
- Major Crops: Rice, wheat, soybeans, green peas, sugar cane, and cotton
- Major Issues: Lack of irrigation, labor-intensive management, inadequate infrastructure, and labor-intensive management
- Other: One of the largest agricultural states, largest producer of cold storage, and second-largest producer of vegetables

CHHATTISGARH
- Major Crops: Rice, wheat, maize, olives, peanuts, groundnuts, and pulses
- Major Issues: High levels of water stress, heavy dependence on rainfall, water-intensive cropping patterns, and water-intensive systems

OTHERS
- Major Crops: Peppers, cashews, cocoa, coffee, sugarcane, oilseeds
- Major Issues: Labor shortage, high degree of land fragmentation due to population
- Other: Major spice exporter

ANDHRA PRADESH
- Major Crops: Rice, millet, and cotton
- Major Issues: Absence of adequate storage, poor soil health management, and labor-intensive systems

KARNATAKA
- Major Crops: Rice, sunflower seeds, sugar (sugarcane), coffee, cardamom, rice, arachis, and soybean
- Major Issues: Lack of farm mechanization and irrigation, water stress, land degradation, lack of investment in water conservation and irrigation infrastructure, and labor-intensive systems

ODISHA
- Major Crops: Rice, pulses, olives, millets, and sugarcane
- Major Issues: Poor investment in irrigation and technology, low credit and insurance facilities, labor-intensive systems, and labor-intensive systems

TAMIL NADU
- Major Crops: Rice, millet, sugarcane, and cotton
- Major Issues: Water stress, drought, and water-intensive cropping patterns, labor-intensive systems, labor-intensive systems, and labor-intensive systems

MAHARASHTRA
- Major Crops: Rice, wheat, sugar, turmeric, soybeans, green peas, sugar cane, rice, and cotton
- Major Issues: Less labor-intensive management, labor-intensive management, significant labor migration, and labor-intensive systems
- Other: Potential for processing contract farming, highest output under certified organic farming

TAMIL NADU
- Major Crops: Rice, millet, sugarcane, and cotton
- Major Issues: Water stress, drought, and water-intensive cropping patterns, labor-intensive systems, labor-intensive systems, and labor-intensive systems

KARNATAKA
- Major Crops: Rice, sunflower seeds, sugar (sugarcane), coffee, cardamom, rice, arachis, and soybean
- Major Issues: Lack of farm mechanization and irrigation, water stress, land degradation, lack of investment in water conservation and irrigation infrastructure, and labor-intensive systems

ODISHA
- Major Crops: Rice, pulses, olives, millets, and sugarcane
- Major Issues: Poor investment in irrigation and technology, low credit and insurance facilities, labor-intensive systems, and labor-intensive systems

TAMIL NADU
- Major Crops: Rice, millet, sugarcane, and cotton
- Major Issues: Water stress, drought, and water-intensive cropping patterns, labor-intensive systems, labor-intensive systems, and labor-intensive systems

KARNATAKA
- Major Crops: Rice, sunflower seeds, sugar (sugarcane), coffee, cardamom, rice, arachis, and soybean
- Major Issues: Lack of farm mechanization and irrigation, water stress, land degradation, lack of investment in water conservation and irrigation infrastructure, and labor-intensive systems

ODISHA
- Major Crops: Rice, pulses, olives, millets, and sugarcane
- Major Issues: Poor investment in irrigation and technology, low credit and insurance facilities, labor-intensive systems, and labor-intensive systems

TAMIL NADU
- Major Crops: Rice, millet, sugarcane, and cotton
- Major Issues: Water stress, drought, and water-intensive cropping patterns, labor-intensive systems, labor-intensive systems, and labor-intensive systems
India is a vast, diverse subcontinent. India is a huge country consisting of many semi-independent states. Just as in Europe, where France is different from Italy and Spain is different from Poland, states in India vary widely: Punjab is different from West Bengal, and Maharashtra is not Goa. States differ in food, language, economic development, and their approaches to foreign investments, as well as in soil, climate and the crops that are grown. The following map indicates the relative strengths of various states. According to our analysis, the leading candidates for conducting Ari-Tech business in India include the states of: Gujrat, Maharastra, Chattisgarh, Andhra Pradesh, Odisha, Karnataka and Punjab. The information contained in the following graphic highlights the diversity of the different states.

India’s supply chain is fragmented and complex. The distribution of agricultural inputs is accomplished through an archaic multi-level distribution network in which the producers sell to the farmers through distributors and retailers. The large geographic distances between farmers and distributors, the lack of transparency regarding distributors’ pricing and lack of information about distributors’ available inventory prevent farmers from sourcing directly from distributors, leaving them to rely on their local retailers. The retailer is often not only the farmers’ agronomist, but also the main source for credit or the main buyer of the farmers’ produce, exacerbating the dependency of farmers on their retailers.

It is advisable for those interested in distributing their products in India to form partnerships with established players with nationwide distribution networks. Leading Indian agrochemical companies with widespread distribution networks and strong recognition among farmers include: United Phosphorus, Rallis India, Gharda Chemicals, Indofil Industries, Excel Crop Care, Dhanuka Agritech, PI Industries, Nagarjuna Agrichem, Punjab Chemicals & Crop Protection, and Insecticides India.

The following chart portrays the Indian supply chain, with a few examples for key players in each of the different areas.

PARTNERS ARE CRITICAL

The information contained in the following graphic highlights the diversity of the different states.
India has one of the most fragmented land ownership systems in the world, with smallholder and marginal farmers dominating the market. Only 1% of India’s farmland is in larger holdings of 10 or more hectares. Farm size is a major issue, as small farmers cannot afford to invest in machinery, seeds or fertilizers. Because these small farmers’ access to official credit and insurance is limited, they mostly rely on their own savings or on the informal sector for funding. Expensive technologies, such as drip irrigation, penetrate the market only when they are heavily subsidized. Furthermore, the small farmers’ ability to adopt and deal with precision tools is often quite limited. The lack of efficient agronomic knowledge-dissemination tools, training and capacity-building all hinder farmers’ ability to adopt and implement technology. Improving the connectivity of small holder farmers to agricultural advisory networks is essential for addressing India’s productivity gap. Succeeding in the Indian agricultural sector requires:

- reducing cost to affordable limits;
- establishing relations with cooperative models of ownership - community agricultural projects in which thousands of farmers share equipment;
- ensuring that products are compatible with existing equipment, such as tractors of 35–50 HP, which are common among small farmers;
- providing solutions that are simple and quickly set up, with a simple user interface, minimum requirements for support and maintenance and minimal dependence on special communication infrastructures and in-field hardware, like sensors;
- providing comprehensive and flexible solutions that address a range of problems.

Although often overlooked, women are an important part of India’s agricultural labor force. As men migrate to big cities for higher wages and employment, more and more of farming households at the bottom of the pyramid are headed by women. The female proportion of the agricultural labor force in India is just over 30%. Despite their pivotal role in the agricultural sector, especially in seeding and weeding, these women suffer from poor access to various resources, tools and services. They use traditional tools and equipment, resulting in very low productivity. The prevalence of gender stereotypes, social restrictions and traditional role expectations hamper women’s access to technical knowledge and improved technologies. Only 1% of women attend farm-training programs. Providing women access to simple technologies, tools and equipment like a power weeder can improve resource efficiency and agricultural productivity.
In India the importance of the first adaptors cannot be overestimated. Proven efficacy and demonstrable results are key to succeeding in India. Most Indian farmers choose what seeds and inputs to purchase based on their performance history and the advice of fellow farmers. Generally speaking, early adaptors willing to invest in the newest technologies and implement them in their farms will be large farmers or corporations with investment capabilities. Therefore, proof of concept at larger farms is a useful if not essential step that will subsequently influence others to invest in these innovations.

Furthermore, Prime Minister Modi’s “Make in India” policy is not only a slogan; it is accompanied by high customs duties and does bode well for manufacturers exporting goods to India and hoping for favorable treatment. Thus, concentrating on exporting goods to India is not a viable long-term option. Foreign companies understand that without a real presence in the local market, including local manufacturing, competition will be harsh. The government of India is pushing everyone to understand that its first priority is to attract high-end manufacturing capabilities. This is especially relevant for Israeli companies, as the Free Trade Agreement between Israel and India has yet to be concluded and it is not clear when duties will be reduced. Setting up a joint venture in India will not only increase the chances for business success in every commercial aspect, but will also offer a wide range of advantages, including the ability to react to the price sensitivity of the market. Joint ventures with Indian partners can also expand exporting capabilities to additional countries in South Asia, the Persian Gulf and Africa that have better access to India than to Israel.

Collaboration with a knowledgeable local partner, from the design phase, not only can advance local production, but can also help tailor solutions for India’s farmers. Joint development of agriculture-technologies will also ease the challenges faced when importing to India: regulation, pricing, usability of the product, etc.
In India, marketing strategies rely mostly on traditional channels, such as farmers’ markets, print advertising, and local retailers. Farmers’ limited access to information provides short-term opportunities for favorable product pricing, but also forces firms to rely on a broad group of public and private entities to convey their message. As most Indian farmers choose what seeds and inputs to purchase based on their performance history and the advice of fellow farmers, most seed companies and retailers convince the farmers to purchase new seeds through field performance demonstrations, which are normally carried out during the previous season. Additional activities undertaken include showcasing products, followed by advertisements and promotional activities before the sales season at trade counters and village meetings. Information on products and their benefits are shared via print and other media, such as television advertisements, mobile ads, etc., to attract the farmers. Word-of-mouth promotion of positive experiences of progressive and influential farmers is usually very effective. Finally, trade or distribution partners have their own networks of farmers and can influence farmers to promote products of their choice based on the seed’s performance, company history of product performances or the business or trade benefits, based on the margins the farmers receive and the confidence the farmers have about companies’ product availability, quality and ease of financial transactions.

Regarding marketing strategies, it is important to distinguish between high-end, sophisticated solutions, demand for which is constrained by farmers’ limited ability to pay and which is highly dependent on subsidies; and low-end solutions, which have wider potential market demand, but are also more exposed to local competition. Other common issues that have been identified are the need for trustworthy local distribution partners, product adaptation and local production, as already discussed above.

There are several central government organizations that are involved in agricultural marketing in India, such as the Commission of Agricultural Costs and Prices, the Food Corporation of India (FCI), and the Cotton Corporation of India. There are also specialized marketing organizations for rubber, jute, tea, coffee, spices and vegetables.

5 MARKETING STRATEGIES