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Network-based business model in the agri-food sector: A case study of Green Fingers

*Sagit Barel-Shaked**

Western Galilee College, Acre, Israel

**Corresponding author: SagitB@wgalil.ac.il; sagitbarelshaked@gmail.com*

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Abstract: Globalisation and reduced trade barriers have created a competitive business environment, requiring agri-food firms to adopt a new innovative perspective. This research study examines a network-based business model of a new venture offering services to avocado farmers and its potential impact on customer performance. A theoretical framework of a network-based business model in the agri-food sector was developed and implemented in the production of avocados. The Israeli agri-food firm, Green Fingers, was selected as the case study to analyse the value drivers of the network-based business model. The proposed business model can serve as a benchmark in evaluating other business models and developing practical strategies in the agri-food sector. The model is flexible, adaptable in meeting the evolving needs of customers and farmers, and applicable to other sectors. The model's building blocks emphasise the importance of networking and diffusing knowledge among key stakeholders, adapting to changing environments, maintaining environmental sustainability, collaborating with policymakers, and supporting farmers. The extended business model canvas may enhance the currently limited research on network-based business models in the agri-food sector from theoretical and empirical perspectives.

Keywords: agri-food entrepreneurship; avocado crop farming; entrepreneurial strategy; networking

As the world's population grows and urbanises, traditional agricultural methods are insufficient to supply the increasing demand without depleting natural resources and causing severe environmental damage. The scarcity and poor use of natural resources, climate change, economic and institutional reforms in the agricultural sector, and market globalisation have affected agri-food production processes and systems and have led to a more market-oriented agriculture system (Pinstrup-Andersen and Pandya-Lorch 1998; Lobley and Potter 2004; Giannakis and Bruggeman 2015; Yu and Wu 2018). The liberalisation of agricultural trade and reforms in the Common Agricultural Policy (CAP) has created a competitive business environment (Brinkman et al. 2014) while increasing the competitive pressure on farmers by forcing them to improve their entrepreneurial orientation and entrepreneurial skills to remain economically viable or to leave the sector otherwise (Phillipson et al. 2004; Vesala and Vesala 2010; Dias et al. 2019).

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Most firms in the European Union (EU) agri-food sector are micro-sized enterprises, often small, family-owned businesses. Faced with internal and external pressure to become more sustainable, they must adopt new innovative ideas and approaches and enhance their entrepreneurial behaviour to become more profitable (Pindado and Sánchez 2017; Ulvenblad et al. 2019). Their small size and lack of management skills limit their ability to create the necessary business strategies (Scozzi et al. 2005; Brinkman et al. 2014). Thus, agri-food firms require a new innovative perspective if they are to develop and implement new strategies for creating, delivering, and capturing value (Tell 2016), i.e. they have to adopt an entrepreneurial strategy such as the development of new products and innovations in the business process, distribution, and marketing (Pindado and Sánchez 2017).

Agricultural entrepreneurs have adopted diverse strategies. One is Entrepreneurial Orientation (EO), which examines entrepreneurial strategy-making processes that decision-makers use to adopt organisational goals, sustain their vision, and create a competitive advantage (Rauch et al. 2009). Few EO design studies have focused on the agricultural sector (Dias et al. 2019). However, these studies conclude that EO positively contributes to the organisation's performance (Hosseini and Eskandari 2013; Veidal and Flaten 2014; Gellynck et al. 2015; Micheels and Boecker 2017) as well as to marketing innovations (Micheels and Boecker 2017) and innovation capabilities.

Another strategy is the growth of agri-entrepreneurs with a specialised managerial and professional approach who have adopted new business models based on a networking approach (Lawson et al. 2008; Brinkmann et al. 2014). Agri-food networks focus on environmental sustainability and community involvement while maintaining the advantages of being small, independent producers. Business models using networks can improve agri-food firms' long-term profitability (Brinkman et al. 2014).

Developments in the global economy, new communications and technologies have underscored the need to capture value from new products and services. Innovators require a well-designed business model that defines how a firm creates and delivers value to its customers and how it captures value for itself. The business model must be adaptable and capable of responding to changing conditions (Osterwalder et al. 2005; Teece 2010; Frankenberger et al. 2013).

One of the most cited business model frameworks is that of Osterwalder et al. (2005). They identify nine elements that could address how a firm analysis, creates and offers value. Zott and Amit (2009) stated that business models emphasise the inclusion of components such as purpose, acceptance, fairness, coherence, and viability that enable the firm to create value in harmony with its partners. The business model establishes a value creation 'core' based on the interaction of a generic building block (Ostewalder and Pigneur 2010) embedded in a network of partners and alliances that contribute to value creation through supplying resources or performing activities. In the network-based setting, the stakeholders' characteristics and strategies design the business model Develop, Nurture and Advance (DNA) that makes up the core company's business model (Lund and Nielsen 2014; Huggins and Thompson 2015; Shams and Kaufmann 2016). Thus, creating network-perspective business models based on the total value in a network can provide significant insights into the context of business model theory and practice. George and Bock (2011) link the business model to entrepreneurial cognition and offer new paths for theory development and empirical studies in entrepreneurship. Since the mid-1990s, there has been a growing interest among academia and practitioners in business model innovation to use business models as descriptive and analytical constructs (Tell 2016). However, limited attention in research has been paid to innovative business models, particularly network-based business models in the agri-food sector (Teece 2010; Markowska et al. 2011; Beuchelt and Zeller 2013; Short et al. 2014). The following studies demonstrate the application of the network perspective in the agri-food sector: McAdam et al. (2016) explored how regional horizontal networks within the small- and medium-sized enterprise (SME) agri-food sector develop innovative capability and outcomes by adopting the combined innovation and social network perspective. Masoomi and Zamani (2020) investigated determinants of entrepreneurial opportunity recognition by agricultural entrepreneurs. They found that 'social networks' were the most important determinant of entrepreneurial opportunity recognition. Bustos and Moors (2018) explored a typology of structural inefficiencies that lead to post-harvest losses in avocado supply chains. They analysed how innovative collaboration leads to more sustainable global food supply chains by creating inter-organisational relationships through which participants can exchange information, align incentives, engage in effective partnerships, and improve their use of technology. Ulvenblad et al. (2019) examined how Swedish food producers use sustainable business models based

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on a network perspective to innovate their businesses. Their results showed that many agri-food companies focus on organisational transformation and building systems; the value intention of the entrepreneurs is an important building block in sustainable business models regarding innovation. Markowska et al. (2011) illustrated that understanding the motives, conditions, and processes is essential in explaining what drives the entrepreneur to design a venture in a particular way and why the business model evolves or remains the same. The changing perception of the values inherent in food allows enterprising individuals to adopt new values or extract value from the environment.

Few studies explore business models based on a networking approach in the agricultural entrepreneurship literature. This study aims to enrich the limited research in this field by analysing the value drivers of a network-based business model and its effect on business performance within the agricultural sector.

The research focuses on a case study of an Israeli agri-food firm called Green Fingers, which specialises in sub-tropical crop farming. Its innovative approach involves consulting, supervising, and managing farmers and cooperatives domestically and globally. The firm's innovative operation and production strategies demonstrate a new form of agri-food entrepreneurship and value chain. The study's goal is two-fold: first, to represent a new form of agri-food entrepreneurship and value chain. Second, to suggest a theoretical network-based business model in the agri-food sector and to demonstrate its implementation in Israeli avocado farming.

MATERIAL AND METHODS

In the last few years, the demand for avocados has rapidly increased, the per capita consumption has increased worldwide, and prices have risen, making avocados one of the leading crops to be traded**.** Along with the business opportunities created, the Israeli avocado industry faces considerable challenges regarding climate change, soil properties, water scarcity, large-scale displacements due to real estate considerations, and inappropriate rootstocks.

Along with the physical and agricultural challenges, the human factor and the lack of professional and managerial skills among farmers are considered the limiting factors in the success of avocado farming. Israeli avocado farmers lack entrepreneurial orientation and business strategy experience. Due to globalisation and the emergence of a competitive business environment, the farmers' need for professional training and understanding of business management has increased. These conditions and the lack of government support policies have promoted the creation of new private entrepreneurship firms, i.e. Green Fingers.

The methodological approach. To investigate how an agri-food system deals with challenges and obstacles in a way that positions it as a model for development and entrepreneurship, we conducted a qualitative case study of one agri-food firm. Adopting this approach is warranted when using a case study as an exemplar (Yin 2014). The case of Green Fingers was chosen due to its innovative business model for exploiting the opportunities and potential in farming and sharing them with other farmers to improve their performance by upgrading their strategic awareness capabilities, entrepreneurial skills, professional knowledge, and economic profitability.

To gather the information, the researcher interviewed the firm's founding partners, its Research & Development (R & D) agronomist and its crop consultant, using semi-structured, face-to-face interviews between December 2020 and February 2021. Moreover, the participant observation method was used in this research. The author engaged in informal observations and discussions to learn more about the firm's business, activities, and strategic perceptions.

The methodology used in this research uses a holistic theoretical framework that describes the business model of the agri-food system. The generic and specific questions were developed with the research goals in mind. The questions aim to examine: *i*) the process through which the firm succeeded in exploiting opportunities; *ii*) the skills involved in the process; *iii*) the key actions of the firm leading to the development of the innovative business model; and *iv*) the novel technological, organisational, and managerial approaches adopted by the firm.

The first generic set of questions addressed the farmers' obstacles and challenges that led to the firm's creation. The second set of questions dealt with the functional aspects of the firm. The third set of questions addressed the firm's novelty and innovative model compared to its competitors. The extensive interviews lasted over two hours per person. The respondents provided detailed information concerning the evolution of the firm and their extensive agricultural experience and skills. After briefly describing the firm's evolution and functions, the interviews focused on key themes: the firm's managerial strategies, entrepreneurial orientation, innovation, networks, a novel method

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of operation, and the inclusion of environmental sustainability in the firm's activities.

RESULTS AND DISCUSSION

Background. Green Fingers is a private firm that was established in 2015. The firm grew from the vision of three partners with decades of experience and knowledge in developing, researching, and managing sub-tropical crop farming. Green Fingers was founded to respond to the local farmers' demand for high-quality consulting and management services. Since the 2000s, the professional training provided by the Israeli Ministry of Agriculture has declined alongside globalisation and the emergence of a competitive business environment. Therefore, the farmers' need for professional consulting and business management services has increased. In addition, many kibbutzim have established industrial plants, moved away from their traditional reliance on agriculture, and moved towards industry. The new labour force employed in agriculture needed professional and experienced supervision. These opportunities prompted the founding of Green Fingers.

The firm advises, supervises, and manages over 50 farms and cooperatives domestically and globally. The major customers are kibbutzim, which constitute the largest crop farmers in Israel. The kibbutz is a collective community in Israel that was established in the early 20th on communal living, mutual aid, and social justice. Its members equally shared all the resources and labour. Some kibbutzim continue to operate communally today, while others have adopted more modern business models, with the members owning their businesses and property. The kibbutzim remain an important part of Israeli society and continue to play a significant role in the country's agricultural, economic, and cultural development (Abramitzky 2018).

The consulting team works with the farmer from the initial stage, including plot planning, soil, water and climate analysis, selection of appropriate crop varieties, and pre-planting plot preparations, to the growing, harvesting and market analysis of each farmer's yield. The firm is involved in strategic planning, agronomic consulting, supervising, managing, administrative planning, and research.

The ever-growing need for a solution to the alternating fruit tree planting trends and the low quality of seedlings prompted Green Fingers to develop its fruit tree nursery. Through it, the firm added value to the value chain of agricultural crop farming by offering its customers a 'one-stop shop from nursery to planting and from day-to-day growing to harvesting and even post-harvest services. This approach has increased the farmers' profitability and helped them capture value. The company's rapid economic development is evident due to its remarkable success and its customers' increasing profitability. The company's turnover was 500 000 EUR in 2015 and it reached to 3 000 000 EUR in 2022.

Theoretical framework. This study offers a theoretical framework to analyse the value drivers of network-based business models and their effect on business performance within the agricultural sector, based on the studies of Osterwalder et al. (2005) and Osterwalder and Pigneur (2010). The suggested theoretical framework is established on a network perspective, i.e. expanding the component value proposition to the total value that can be created by all the stakeholders linked with the network: customers, network actors, partners, and the external environment. Table 1 presents the components of the extended business model canvas and their implementation regarding agri-food networks.

Business model implementation. Following the theoretical framework suggested above, Figure 1 illustrates the schematic business model implemented by Green Fingers' firm in avocado crop farming.

Green Fingers' business model has five phases. In the first step, it examines the target. It conducts soil and water tests. It compiles data about the climate and the infrastructure, including information about water, electricity, roads, distances from airports and seaports, equipment availability, and logistics. Green Fingers also gathers information about manpower, potential markets, and the customers' financial capabilities. It integrates all the information in a database about the farm's performance.

After analysing the previous phase's aspects, Green Fingers presents alternatives and strategies to the customer to realise the farm's potential. The firm's consultants discuss each option with the farm's owners until decisions are made. Detailed plans for the chosen alternative are prepared in the third phase. Green Fingers helps the farm explore agronomic and agrotechnical programmes, develop financial and business strategies, review providers, and sign a contract to implement the plans. The fourth phase of the process involves the management and supervision of the programme's implementation. In the final stage, the firm re-examines the business programme and makes any necessary adjustments.

The novelty of Green Fingers is twofold: first, the flexibility of its business model, and second, creating

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Table 1. Extended business model canvas for agri-food networks

Pillar	Component	Green Fingers
Value proposition	total value	customers: economic benefits, improved yield (quality), exposure to new markets (access) network actors: economic benefits, efficiency, cost saving, knowledge sharing, improved agri-food products (quality), legitimacy partners: knowledge sharing, improved agricultural professionality (solving problems and obstacles) external environment: improved agri-food product (quality, access); environmental sustainability and community involvement
Customer interface	customer segments	farmers in rural and peripheral areas, agricultural cooperatives (i.e. kibbutzim)
	customer relationships	agricultural consulting services and strategic managing services for avocado farmers
	channels	face to face guiding; video conference; WhatsApp
Infrastructure management	key activities	network management, provision of agricultural professional services; provision of nursery services; training, supervising, and monitoring; data analysis and quality management; strategic management; marketing distribution consulting
	key resources	crop farming infrastructure; land; technologies and agro-tech; human capital
	key partners	the firm owners; commercial consultants; agronomists; R & D consultants; institutional bodies (training and professional service at the Israeli Ministry of Agriculture); research institutes
Networking	network actors	agricultural products and technologies providers; agronomists; agricultural consultants
	network relationships	co-creation, joint provision of agricultural consulting via WhatsApp groups; personal meetings and personal monitoring
Financial aspects	cost structure	production costs, operating costs, QA, and QC to achieve operational ISO managing costs
	revenue streams	equity, no government funding

agro-tech – agricultural technology; QA – quality assurance; QC – quality control
Source: Own processing based on Green Fingers' firm data

a business model based on a networking approach within the production of avocados.

The dynamic agricultural conditions, the great diversity in the farms and customers, the volatility of the climate, the increasing demands, and the customers' performance require the firm to adopt innovative solutions and alternatives that differ from one customer to another. The firm's business model has proven successful even in areas where the conditions for farming are challenging. For example, Green Fingers' experience in agriculture has helped farmers use rootstocks that are limestone resistant in soils containing high levels of limestone or rootstocks that are resistant to fungi in areas plagued by them. Using these methods, Green Fingers has helped the kibbutzim to increase their plantation areas by 30%.

The innovation of Green Fingers is evident in its flexible adaption to its customer's needs and its abil-

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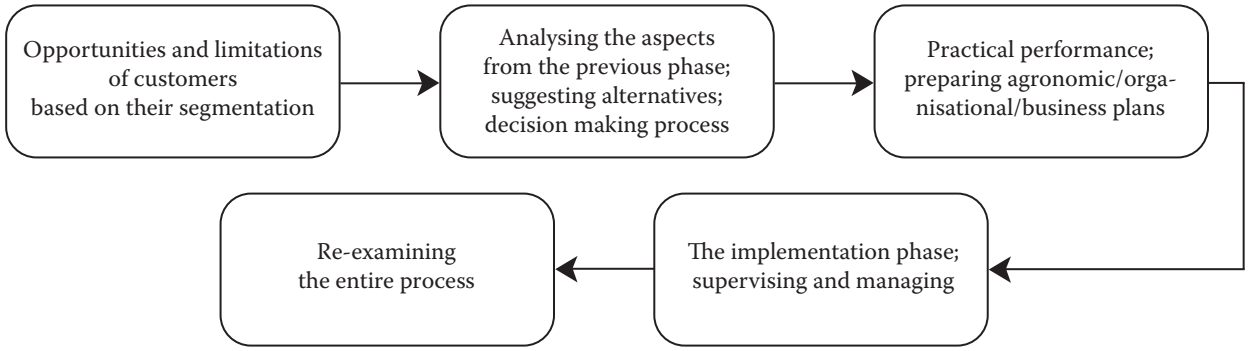

Figure 1. The schematic model

Source: Own processing based on Green Fingers' firm data

ity to offer solutions tailored to the specific situation. The proof of its business model is that it has increased the profitability of the kibbutzim using its services. Figures 2 and 3 illustrate the economic performance of the avocado orchards in two different kibbutz farms. The figures present the avocado yield and economic performance indicators in the kibbutzim in the Haifa and Galilee regions, respectively. Figures 2 and 3 provide a representative sample of two prototype farms (kibbutzim) managed and supervised by Green Fingers. Figure 2 represents a mature avocado orchard planted between 1964 to 1980, where fluctuations in yield are expected due to the plantation's age. The kibbutz faces budgetary and agronomic limitations, restricting the company from making massive investments, implementing technological innovations, or changing the avocado varieties. Hence, the company needs to maximise its profits and output under the current

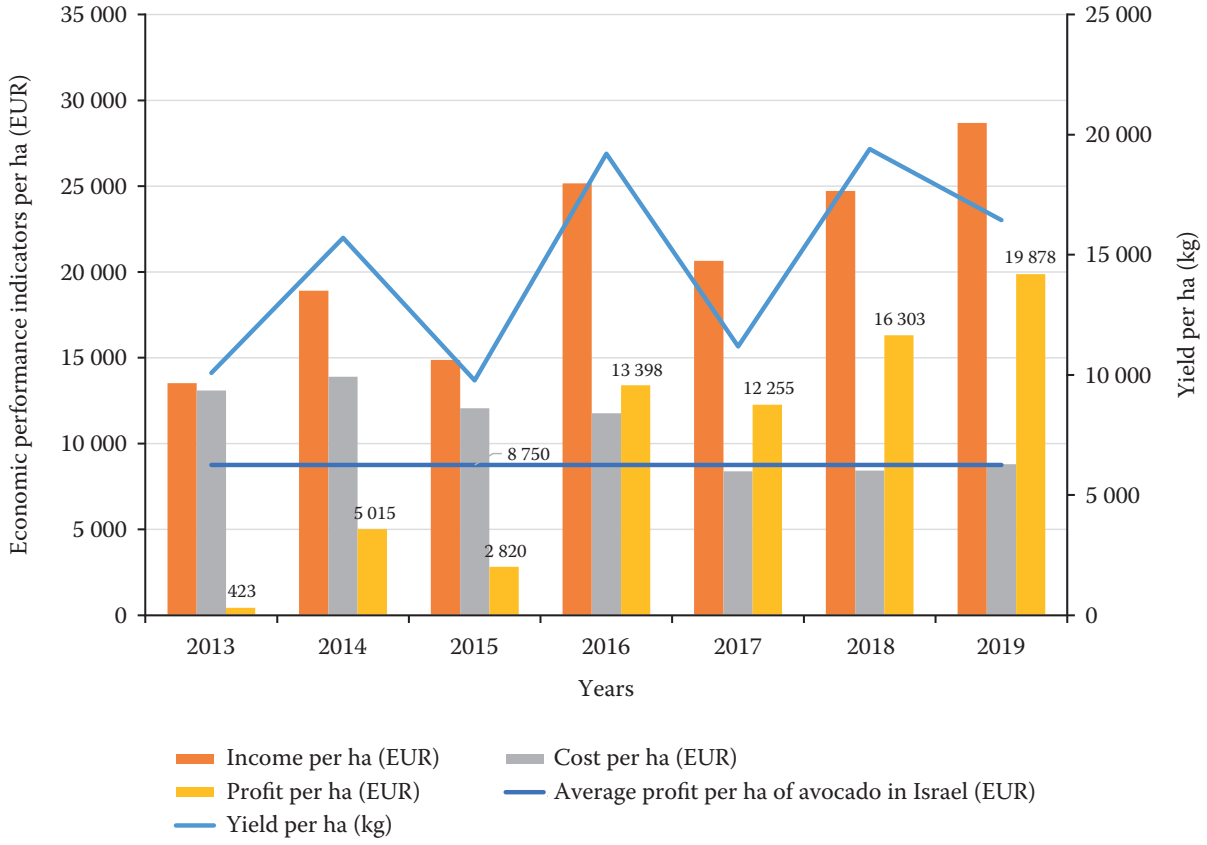

Figure 2. Economic indicators in an avocado farm – Haifa region

Source: Own processing based on the kibbutz's accounting report

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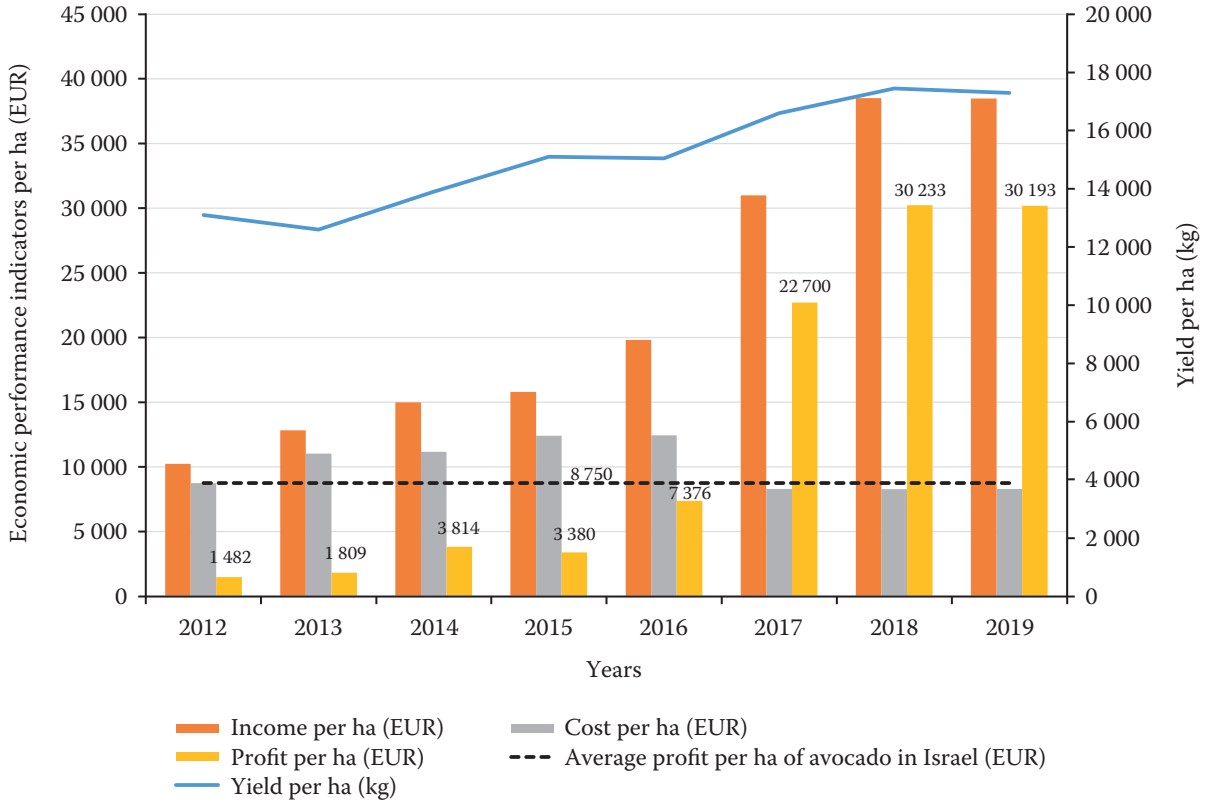

Figure 3. Economic indicators in an avocado farm – Galilee region

Source: Own processing based on the kibbutz's accounting report

limiting conditions. Figure 3 displays a representative example of a modern avocado orchard where the kibbutz has no budget limitations. Thus, the company can implement technological improvements, make massive investments, plant various avocado varieties, and maximise the kibbutz's profits and performance.

As the figures illustrate, after Green Fingers' involvement in 2015, the kibbutzim showed better performance and increased profits. According to the economic calculations from the Israeli Ministry of Agriculture and Rural Development, Israel's average profit (per ha of avocado) is 8 750 EUR. The data show that the average profit per ha in the company's managed farms is almost double the average profit in Israeli avocado plantations. While external factors, such as global market fluctuations, price changes and weather conditions, may affect the profitability and output, they should be considered fixed effect factors as the comparison is within the same region. Thus, the increase in profitability can be attributed to the improvements in the agronomic and organisational interventions implemented by Green Fingers.

In addition to improving their customers' businesses, Green Fingers has two other important goals. One is preserving environmental sustainability. According to Yaron Wissmark, founding partner and operational manager, 'the seedlings produced in the Green Fingers' nursery are planted in biodegradable corn fabric bags; no plastic bags are used. The seedlings are planted together with the bags. This method benefits the seedlings' quality as well as the sustainability of the environment. The firm uses precise agricultural methods, including measurement, monitoring, and calculating technologies and encourages biological pesticides over chemical pesticides.

The second goal is to strengthen the farming community by creating a network of farmers and consultants sharing professional knowledge, training, challenges, and solutions. Moreover, this supportive farming community helps to create the next generation of farmers.

CONCLUSION

The global health and economic emergency caused by COVID-19 has highlighted the issue of food security, underscored the role of the agri-food sector, and led to the worldwide recognition of the enormous importance of independent agricultural production.

The changing environment in the agriculture sector and the increasing number of food consumers de-

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mand have increased the competitive pressures forcing farmers to act as entrepreneurs and for new forms of value creation to flourish within the sector requiring innovations in the agri-food system to respond to these challenges (Phillipson et al. 2004; Pindado and Sanchez 2017; Dias et al. 2019).

The study argues that market conditions in the agri-food sector promote the creation of new ventures adopting network-based business models. Private ventures and creative business models have emerged without agricultural policies to support farmers. Most research on business models has focused on identifying and analysing their components in isolation from their actual application. Few studies have explored the development of the business model itself (Osterwalder et al. 2005). Moreover, limited attention has been paid to the business models, particularly the network-based business model within the agri-food sector and their practical implementation.

This study aims to bridge the gap in the research literature by offering a theoretical framework of a network-based business model within the agri-food sector and demonstrating its application in avocado crop farming.

The firm's business model illustrates a dynamic management strategy integrating networking, innovation, flexibility, and creativity. The firm's involvement in avocado crop farming is reflected in cost-effective production processes and more environmentally sustainable processes in the agri-food sector. Moreover, the firm encourages community involvement and networking to improve customers' long-term profitability (Brinkman et al. 2014).

The novel business model proposed in this study can serve as a benchmark for policymakers, practitioners, and scholars to evaluate other business models and develop practical strategies in agri-food systems. The model adopts flexible and dynamic approaches to meet the evolving needs of customers and farmers in the agri-food sector and can also be adapted for other sectors. The building blocks of the model generate the following implications: *i*) the importance of networking and diffusing knowledge among key stakeholders-customers, consultants, managers, and policymakers to enhance performance, overcome challenges, and achieve improved outcomes; *ii*) adapting to changing environments – macroeconomic, institutional, and external shocks that affect agricultural activities, as well as microeconomic changes that affect customer preferences; *iii*) maintaining environmental sustainability; *iv*) collaborating with policymakers and advising them on how to bridge the gap between dynamic agricultural changes and the emerging needs of farmers. Policymakers should be aware of the changing conditions in the agri-food sector and provide farmers with appropriate education, guidance, training, and financial incentives; *v*) for scholars, the extended business model canvas for agri-food networks proposed in this study may contribute to enriching the limited research in the domain of network-based business models in the agri-food sector from both theoretical and empirical perspectives. Future research should apply the suggested framework to other ventures and applications in the agri-food sector.

However, the study has its limitations. The study focuses on introducing a comprehensive framework of a network-based business model and evaluating the effectiveness of interventions implemented domestically. It may be important to compare and evaluate the effectiveness of these interventions globally. Moreover, the study does not consider the impacts of macroeconomic, institutional, and external shocks over time, such as price fluctuations, consumers' worldwide purchasing power, political instability and weather conditions on agricultural activities and production. Including indicators on time trends to capture these aspects would require additional research.

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