Leverage Triple Helix Model to Upgrade the Medical and Aromatic Plants Value Chain

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Abstract

Purpose

The purpose of this paper is to assess the readiness of the Palestinian agricultural sector to triple helix model (THM) and leverage triple helix to upgrade the agricultural value chains.

Design/ methodology/ approach

One of the case study strategies was chosen; nine semi-structured interviews have been conducted with participants from the three spheres of the THM related to the agricultural sector. The critical discourse analysis was used; the value chain approach had been adopted.

Findings

Palestinian agricultural sector is driven by traditional products and over-reliance on the domestic market. This is an indication of a significant lack of competitiveness that prevents firms from competition in international markets. THM could be a powerful way to catalyze the innovation needed. Collaborations among THM partners takes place but moderately. These tend to be bilateral, short term and opportunistic. There is still much to be done before true THM be in place. The THM requires developing trust, shared vision and coordination mechanism. The value chain can also provide a pathway for building the THM.

Practical implications

Applying THM in the Palestinian agricultural sector leads the local resources for sustainable and equitable local economic development to harness; employment generation is no difference.

Originality/ value

The paper discusses the relationships between university-industry-government in the framework of an emerging economy.

Keywords

Triple Helix Model; Innovation; Agricultural Sector; Value Chain; Palestine

INTRODUCTION

Innovation is essential for sustainable growth and economic development (Leydesdorff, 2012). As well, it is crucial for value creation, employment and innovation processes, and could take place at the enterprise, regional and national level (Porter, 1998). As innovation leads to new businesses, it also increases the competitiveness of the existing enterprises. Traditionally industry and government have been the prime movers of this processes (Etzkowitz, 2003a). However, as society has shifted from an industrial society to a knowledge society, the role of knowledge and thus the university has become more crucial. The mission of the university has been expanded from teaching and research to encompass a more direct role in socio-economic development (Etzkowitz and Leydesdorff, 2000). The university, the industry, and the government are now the core drivers of development in a knowledge economy. Thus a knowledge creation sector, a vibrant industry, and a well-functioning government are the key ingredients of sustainable development (Etzkowitz and Leydesdorff, 2000).

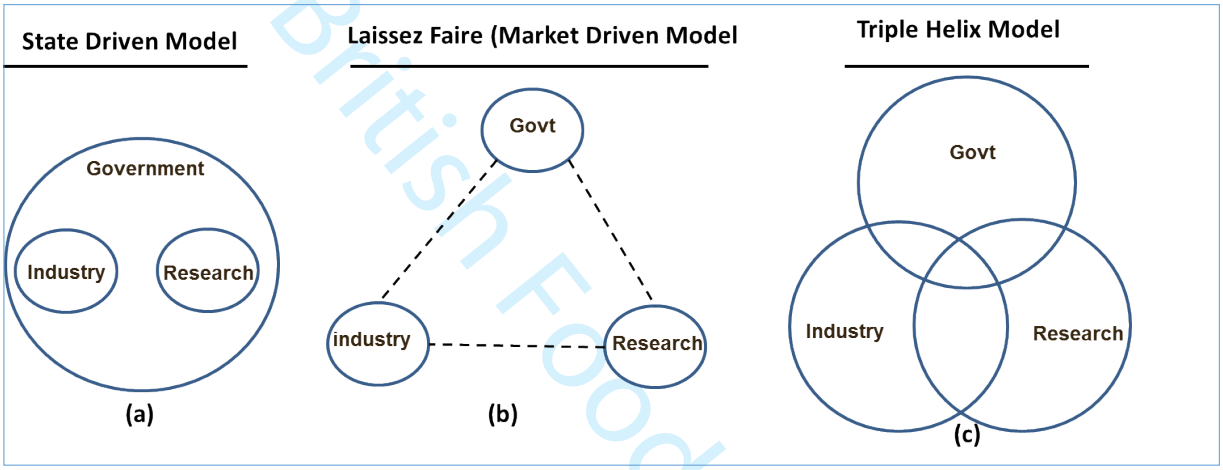
How these core enablers of innovation work together are crucial in determining the dynamism of any economy and its resilience? The formal recognition of the need for the three actors and potential synergies that can be derived through deliberate and purposeful bringing the three spheres together so that they can act in concert is known as the triple helix model (THM) approach (Leydesdorff, 2018). The haziness of boundaries between government-industry-research/knowledge institutions with institutions that assume some roles of the other is central to the THM approach (Zhou, 2014). In this way the relationships within the university institutional spheres, industry and government relationships are continuously and endlessly reshaped thus coming up with new technologies, firms and types of relationships in a sustained and systemic effort (Etzkowitz, 2003b).

Questions may be asked as to whether or not developing countries in general are prepared at all in social, economic and technological terms for triple helix to take root (Saad and Zawdie, 2011). There is no doubt that making the THM work in developing countries is a daunting policy challenge. The discussion of triple helix in Palestine, as a developing economy, has increased within the last few years, aligned with global trends in this field (Abu Hanieh et al., 2015; Morrar & Abdelhadi, 2016). Till now, the discussion is taking place at an abstract level rather than assessing the THM readiness in a specific sector such as agriculture or a specific value chain.

THEORITICAL BACKGROUND

Innovation, particularly the technological, is a structural element in the current competitive system, contributing to the growth of production and to the material wealth of the countries (OECD, 1991). The convergence of three realities (actors), university, industry and government, has become a transition model of the society based upon knowledge as it has been articulated as triple-helix model (THM). Figure 1 shows various arrangements between university-industry-government.

Figure 1: Configurations of University-Industry-Government collaboration



Source: Etzkowitz and Leydesdorff (2000)

Figure 1 (a) shows the arrangement where government sets the agenda, and the industry and university follows suit. This model has the least dynamism and largely explains the failure of central planning as an economic organizing paradigm. Figure 1(b) shows the more common arrangement in a laissez-faire model. Here each does their task independently with some weak communication and coordination; each is guided by its mission. While this market driven economic model is now widely accepted as sensible economic model, it has some weaknesses as lack of coordination means market failure do occasionally occur. Innovations are also seen as the domain of the industry with university mainly acting as a producer of research and a provider of human capital and government as regulator. The best innovative environment is created at the intersection of the three spheres.

This model was originally derived from the survey of the industrial reconstruction of Boston, Massachusetts, in the 1930s, by commercializing the research results achieved from the collaboration between university, industry and government (Etzkowitz, Klofsten, 2005). Today, it is considered to be a useful tool for the research of regional socio-economic systems in Europe (Viale, Ghiglione, 1998), in Nordic countries, and a back-up tool for the development of innovation centers providing support to small and medium enterprises in Italy (Cariola, 1999), in contemporary Russia and the like.

THM implies the development of a trilateral network of organizational links between university, government and industry (Etzkowitz, 2002), in which university (and similar research and educational institutions) should be regarded as the main source where knowledge is being generated and from which it is being spread. In order to be able to commercialize the results of research activities, to link up with industrial processes and to support the growth of new firms, it is necessary to develop an entrepreneurial spirit of the university (Etzkowitz and Zhou, 2007). The role of the universities should become more distinct and influential as an indirect source of knowledge for development of industrial innovation and entrepreneurship (Etzkowitz, Klofsten, 2005). Application of new information and technologies and incorporate them into individuals as well as organizations have turned out to be progressively critical for entrepreneurship (Friedman, 2007). In this regard, universities in a country are helping entrepreneurial activities by setting up spin-offs firms, technology transfer office (Harman &Harman, 2004) along with initial goal of knowledge creation (Etzkowitz, 2003b).

Enabling Triple Helix Model

The ultimate goal of THM is to create strong clusters (Porter, 2014). Innovation occurs more easily when geographical concentration and proximity are present. The goal is to create a “Commons”. The “Commons” in order for companies and communities to be productive, shared resources should be included. Successful companies and regions begin with certain foundations: an educated populace, strong infrastructure, pools of skilled labor, vibrant networks of suppliers, basic research that can be commercialized (Fuller et al., 2015). The “Commons” is crucial for shared prosperity that is at the heart of a successful economic development strategy. The commons form the basis for emergence of clusters, and the engines of local economic development. Clusters enhance firms’ competitiveness through agglomeration economies (Sultan and van Dijk, 2017). This is due to the

presence of high skills, specialized suppliers and service provides, improved market access and circulation of information.

The THM affords the potential for tighter collaboration that is key to regular and sustained problem solving needed to build competitive clusters (Rodrigues and Melo, 2012). The key determinants of success (Boja, 2011) include:(i) leadership; (ii) shared vision, (iii) Trust, (iv) governance model, (v) consensus space and (vi) support partners.

Leveraging Triple Helix Model

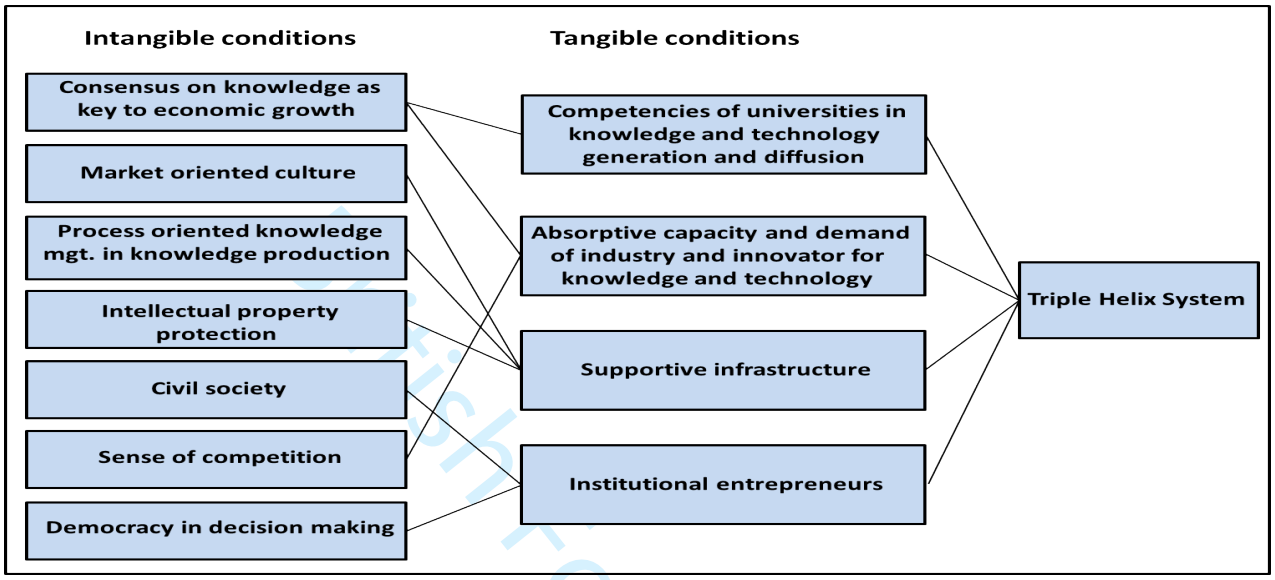
THM requires a prime mover. Note that the driver of the triple helix can be any of the three nodes. When government leads the process, then this is a top down model. Policy drives the process. When industry or academia drives, then a bottom up process happens. But the two processes are not distinct as government can initiate the process say through encouraging industry, and then industry leaders can takeover. This dual track process is more productive than any single path (Ektowitz, 2014).

Cai et. al. (2015) address that political and social context might affect the THM. Drawing from institutional theory, the triple helix development is treated as a process of institutionalization which involves four stages: (i) realization of needs; (ii) intra-organizational transformation; (iii) inter-organizational interactions and (iv) institutionalization. Using this institutional logic, they develop seven enabling intangible conditions that focus on the more general contextual factors, and four tangible conditions elaborated by Ranga and Etzkowitz (2015) that focus on specific performance (see figure 2). They argue that the role of innovation policy in a regional innovation system is through its influence in the enabling conditions.

The value chain analysis, within a specific sector, results in the identification of all players, processes and linkages. This process has served as the basis for the analysis of the value chain performance and for deliberating on options for the sector's prospective development. The analysis charts the key stages included from inputs sourcing to the distribution process in market segments, followed by the identification of main stakeholders including the primary players (e.g. producers, processors, distributors etc.), in addition to those fulfilling support functions with direct linkages to key players. The support services used include (among others) input providers (seed suppliers,

equipment suppliers etc.), transportation service providers, packaging houses, and financial service providers (Porter, 1985).

Fig 2: Enabling Conditions for a Triple Helix System



Source: Cai et. al. 2015

RESEARCH SETTING, PROBLEM AND QUESTIONS

According to the latest World Bank annual ratings, among 190 economies, Palestine is ranked 116 in the ease of doing business. The Palestinian economy suffers political and economic restrictions. These complex and inattentive conditions have badly affected local economic development. Almost 99 percent of the industrial firms in Palestine are micro, small to medium-sized enterprises (MSMEs) that solely compete based on price, and very few of these enterprises have direct access to foreign markets (Sultan, 2014). As most of these enterprises are agricultural, the capacity of local government to stimulate the Palestinian MSME development makes the theme of ensuring food security an important one. The majority of these MSME are family owned businesses, and suffer from many obstacles such as access to market, access to finance, and entrepreneurial behavior (Sultan and van Dijk, 2017).

What characterizes small and weak agricultural exports sector is its low value added, low technological content, in addition to the weak forward and backward linkages it has with other economic sectors. Furthermore, production and transaction costs have increased drastically and

consumed the competitiveness and profits of the Palestinian producers who find it (to greater extent) difficult to compete with products originating in other areas in the region (Sultan, 2014). Producers in other regional countries managed to develop technologies and unconstrained access to water and markets at normal costs and in many cases at reduced costs due to different types of subsidies (Fallah, 2018).

The Palestinian Territories counts five public faculties of agriculture in An-Najah University, Hebron University, Palestine Technical University (Khadoury), Al Quds Open University, and Al-Quds. University. They offer bachelor and master degrees in some disciplines related to agriculture``. Each university has developed niche specializations in which they should play a leadership role. The Palestinian Ministry of Agriculture (MoA) leads the agricultural development process. The MoA runs the Palestine National Agricultural Research Centre (NARC) which is responsible for conducting agricultural research through its five research units and seven agricultural experiment stations, five of which are located in the West Bank and two in the Gaza Strip. The NARC has relatively large areas of land, experiment stations, as well as basic and some modern equipment that facilitate access to externally funded projects.

Building independent knowledge and technology centers inside universities is crucial to identify and coordinate knowledge and technology transfer processes. Khatib et al. (2013) compared the innovation performance of two main Palestinian industrial sectors, namely quarrying and stone fabrication and the food and beverages sector, confirming that the weak interaction between the industrial sector, higher education and R&D institutions is a key problem that should be handled in order to strengthen the ability of enterprises to innovate.

Enhancing the prospects of growth for the Palestinians require university-industry-government collaboration to work jointly, harness local resources for sustainable and equitable economic growth and employment generation, and hence to improve their own specific strategy towards local economic development (LED). In this context, THM can play a vital role in improving the Palestinian economy. THM shows the university-industry-government relationships as relatively equal and interdependent ones, overlapping with each other and changing each other's roles (Etzkowitz, 2002). However, in reality, the relationships between university, industry and government are quite different regarding the institutional frame of the country and an achieved level of strategy transition in the society.

Innovation is at the core of Palestine's development strategy as outlined in the National Development Plan (2017-2022), National Agricultural Sector Strategy (2017-2022), Local Economic Development National Policy, and Cluster National Policy. It is clear that innovation will play a crucial role in Palestine; thus, the THM fits very well with Palestine's vision of development. THM seeks to move the traditional economy to a knowledge based economy by making innovation the key driver of the development. For Palestine, this is a crucial key to transforming agricultures using innovation across the whole value chain.

Medicinal and Aromatic Plants (MAPs) Value Chain

This section gives an overview of the Medicinal and Aromatic Plants (MAPs) value chain in Palestine and analyzes the main actors.

a) Input suppliers

The use of agricultural inputs is low; choices made in terms of the right input for the right product are not optimal. Earlier studies and interviews with sector supporters (NGOs, governments) are pointed to limited availability, low quality and high costs of inputs as a constraint to increasing the production of high quality, and cultivated raw materials. This, especially, concerns fertilizers. The main causes identified were:

- Local production of inputs is very limited due to the small market size, low capital availability and import restrictions for key chemicals. Some critical inputs are classified by the Israeli Authorities as "dual-use" (civilian and military), including pesticides and fertilizers. These require a permit from the Government of Israel, and imports of certain chemicals are severely restricted. These issues result in delays and increase costs. Effective irrigation is affected as piping (metal and concrete) can also be subject to import permissions.
- There is a lack of quality control on the agricultural inputs imported, particularly those from Israel; this is due to weak monitoring and compliance mechanisms allowing low quality imports.

b) Fresh herb growers

Fresh herb growers are mostly located in Tubas area and the Jordan Valley. These are companies that have the entire value chain for their fresh herbs in-house. They own or rent farm land, produce, process and export fresh herbs. Several companies also produce their own seedlings. Some fresh herb growers export part of their products through Israeli exporters.

There is about 3,000 tons of fresh herbs are grown in Palestinian greenhouses for the export market. Fresh herb companies produce a similar range of products: Chives, Tarragon, Dill, Rosemary, Coriander, Chervil, Parsley, Rocolla, Thyme, Lemon Thyme, Marjoram, Oregano, Basil, Red Basil, Sorrel, Red Sorrel, Mint, Pepper Mint, Lovage, Melissa, Sage and Lemon Grass. The companies export these products directly or through the Israeli exporting companies.

Companies have a relatively high percentage of waste products, either due to product standards or because of demand cycles. For example, 70% of chives production is waste material, due to the product standard for fresh chives (length, tips). Moreover, growers have adjusted their production volumes to supply their buyers during periods of top demand for specific herbs. This means that during certain seasons growers produce too much, for which they cannot find a market. Excess supply is commonly used as animal fodder, although some companies also consider using excess/waste materials for processing; for example, in sauces or by drying raw materials.

c) Cooperatives

Farmer cooperatives play a relatively small role in the MAPs value chain. Most farmers work outside of cooperatives. Some cooperatives are active in the supply of final products based on dried MAPs. There appears to be a reluctance among cooperatives to produce raw materials. There is a strong drive for processing MAPs into final products with equipment funded by international donors. However, cooperatives lack access to markets for these final products. As a result, some have ceased their operations.

d) Processors/Exporters

As opposed to the fresh herbs value chain, where companies control the entire value chain from start to finish, most MAPs processors focus purely on processing and exporting activities. They rely on farmers and cooperatives to supply raw materials and process these into MAP derivatives, such as essential oils or vegetable oils. Very few processors also produce raw materials. If they do,

this is mainly used to supplement raw materials they source from Palestinian farmers. Some processors/exporters supply farmers with seedlings to produce the needed raw materials.

Most processors/exporters source their raw materials from local farmers, whereas some import raw materials if these are not available from Palestinian farmers. As many farmers are small holders, processors need to source their raw materials from a wide producer network. Some processors struggle in finding farmers with the know-how and ability to produce the right quality medicinal and aromatic herbs. Sourcing is especially difficult during summer as water is scarce. Attempts to grow the plants out of season have not been successful. Thus, there is always a challenge to find producers with access to water that can produce the right quality products.

Processors indicate that their main challenges to procure raw materials are: high costs of materials, quality issues, and limited quantity and seasonality of raw materials - especially from local sources. There are few processors of MAPs active in Palestine. Processing activities are limited to: essential oil extraction (often combined with vegetable oil production), and drying of MAPs.

Palestinian processors commonly lack in meeting requirements on international markets when it comes to product documentation or proof of testing. Most processors outsource testing of their products. Few companies conduct their own tests, such as chemical residues, microbe testing, and hydrogen peroxide test. Most processors use ISO 22000 as a quality management system. There are 19 operators as certified organic. Exporting activities are commonly outsourced to marketing companies or Israeli exporters, especially for smaller or newly started companies. Exporters face problems in marketing and don not commonly work with contracts for their buyers, instead they rely on spot buying.

This paper discusses the university-industry-government relationship in Palestine, as a developing society, where the interior development structure of each segment of the model as well as the interactions between the segments of THM are assessed. Therefore, the main research questions are the following:

RQ1: To what extent is the Palestinian agricultural sector ready for THM?

RQ2: How can leverage triple helix upgrades the value chain of the Palestinian Medical and Aromatic Plants?

RESEARCH METHODOLOGY

The research design is based on literature review, secondary data, and interview results. Following the characterization of research techniques given by Saunders et al. (2009), this study is considered to be recognized as qualitative, in light of the fact that it is mostly in view of semi-structured interview investigation. Due to the fact that the nature of the question is to fully understand the phenomena, to acquire the needed experiences of participants in real situation, and to discover the variables rather than testing it, the used qualitative research paradigm is justified.

Different research strategies need different designs to better collect and analyze the empirical evidence; this is why the choice of research design is important (Yin, 1993). A case study strategy was chosen as our study focuses on the assessment and exploration of the dynamics and application of the THM in the Palestinian agricultural sector. Yin (1993) defined the case study research method as an empirical inquiry that investigates a contemporary phenomenon within its real-life context when the boundaries between phenomenon and context are not clearly evident, and in which multiple sources of evidence are used.

The data for this research was generated by face-to-face interviews between May 2019 and June 2019. Nine semi-structured interviews were conducted with participants representing the three components of the THM, namely university- industry, government, and development partners. Key points were summarized from each answer. The used keywords presented the respondent's actual meaning, and they were highlighted in transcripts. Responses were then categorized as sharing common points (agreed by all), or partially shared points (agreed between two or more respondents).

The next step comes data analysis. With an interpretive study, the research findings rely heavily on the researcher's own interpretation of the circumstance. Shah and Corley (2006) stated that interpretive research implicitly assumes that every person who conducts a research study will have his own specific interpretation of the results; one cannot judge on whether or not the results of data analysis are replicable by another researcher. In order to provide reasonable and plausible insight into a phenomenon, interpretive data analysis is assessed in accordance with its ability such that a deeper understanding of the phenomenon can be gained. Jiang and Carpenter (2013) assert that

"qualitative data analysis requires the data to be presented in ways which enable others to interpret, analyze, evaluate and draw conclusions".

Two data analysis strategies were adopted: Content Analysis and Critical Discourse Analysis (CDA). It is acknowledged that networks in the THM form are more dynamic than the relatively stable forms; thus, the CDA is considered. The CDA makes the opportunity available to recognize the denotative meaning and to give an interpretation to the underlying connotative meaning. According to Fairclough (2005), it gives the ability to one to incorporate elements of 'context' into the analysis of texts, to show the interaction between concrete occasional events and more durable and applicable social practices, and also to show innovation and change in texts. The CDA focuses on the message of texts within a historical and social context. It allows no truth assertions nor does it confirm the validity of any research method.

Above all, the value chain approach is being adopted to more effectively link producers to consumers. Value chains refer to the sequence of steps and participants that link the process of production to the end consumer. A value chain approach enables the identification of opportunities for innovation and value addition across different stages in the chain. Moreover, it enables the implementation of interventions targeting the inclusion of marginalized groups. Specifically, a value chain approach enables a focus on particular elements and interventions aimed at a reduction in the cost of doing business, increasing revenues, improving access to technology, information, and capital. By doing so, we innovate production and marketing processes to gain higher value and provide better quality to customers. Furthermore, this approach affords an opportunity to identify specific challenges of stakeholders along the value chain (Porter, 1985). The THM was applied on the value chain of the Medical and Aromatic Plants (MAPs) as one of the promising agricultural sectors in Palestine.

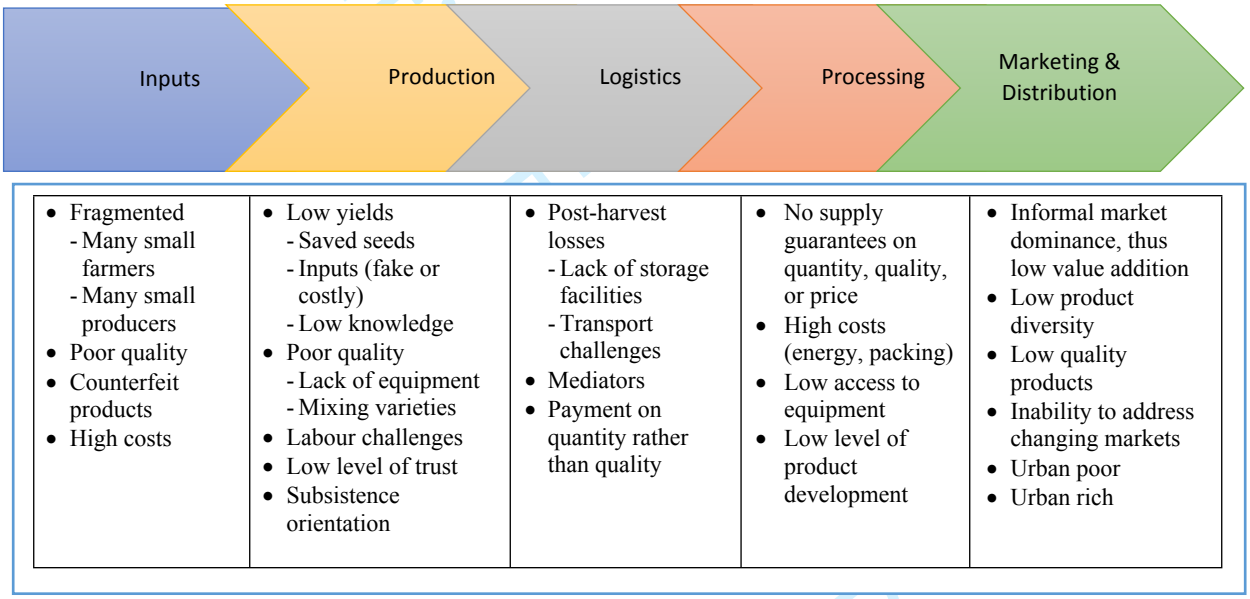
RESULTS AND DISCUSSIONS

The development challenge for Palestine is job creation. In 2018, the figures of Palestine Central Bureau of Statistics show that the unemployment rate was 49.1% in Gaza Strip compared to 18.3% in the West Bank; the unemployment rate for males in Palestine was 25.0% compared to 48.9% for females. Palestinian industries, especially agricultural sector, are largely depending on

commodities exploitation with little value addition. Many value chains are largely under-developed and thus few jobs are created downstream.

THM can be leveraged to bring forth the needed innovations. To demonstrate the utility of THM in upgrading value chains, as an example, Gatune et al. (2019) looked at potential for upgrading the rice value chain in Kenya and Sesame value chain in Ethiopia and found that THM can play a crucial role in upgrading the value chains. As figure 3 shows, currently Palestinian agricultural value chains are characterized by many challenges across all parts of the value chain. Thus innovations are needed across all the sector of the agricultural chains.

Figure 3. Palestinian Agricultural Value Chain Challenges



The private sector and farmers' organizations play a key role in the agricultural production value chain, as well as in investing in the agricultural sector and providing various business services needed by farmers in the production and post-harvest processes. The private sector is the only player in the food processing sector, as well as in the local and external marketing. Thus, coordination with and involvement of the private sector and farmers' organizations, as well as their encouragement to invest in the agricultural sector are key pillars in the Palestinian agricultural development efforts.

The main constraints the agricultural sector face are: the unavailability of land and water, no access to external markets, the lack of use of value chain approaches in crop production and institutional

capacity. There are serious limitations in terms of the access to land and water due to the division of Area A/B/C of the West Bank. Therefore, farmers have great difficulty in getting the Israeli permits to reach their lands (being under the Israeli control) in Area C and develop it; Area C represents over 60% of the West Bank territory. Additionally, since 2007 the citizens of Gaza have limited access to what so-called Buffer Zone (the strip of land at the Gaza side along the border with Israel).

Palestinian Agricultural Sector Readiness for THM

Results of the semi-structured interviews indicate that collaborations are happening across the triple helix actors. However, the collaboration tends to be on short-term, an ad-hoc, and opportunistic. The key ingredients of strong triple helix model, trust, shared vision and an institution structure for co-ordination of activities are missing. The level of readiness across the various actors is from moderate to low.

The government should provide some strategic guidelines for development of a sectorial and a regional economy of the country, by implementing a number of direct and indirect economic measures, and by ensuring financing sources of R&D activities. The government should also be responsible for launching of the R&D projects of special importance for the agricultural sector, particularly when their high financial standards cannot be met without financial help of the government (Rodrigues and Melo, 2013). The role of the private sector should be to concentrate their resources on the commercial part of the R&D activity, to develop new products or technologies, and to provide universities and R&D institutions with feedback information on some new potential research areas (Shinn, 2002).

A summary of the readiness of the key actors is presented below:

a) Government

The level of readiness of the Palestinian government can be assessed as moderate to low in terms of role of innovation in national strategies. Although, all national plans call for collaboration between the existence of Higher Council for Innovation and Excellence (HCIE) and National Agricultural Research Center (NARC), what happens on the ground is completely different. The Government misses the proper role of innovation which is seen as a sectoral rather than a cross-

cutting activity. Funding research and development is also much lower than that mandated by their policies.

The role of local governments remains traditional and limited. The only sole example of tri-partnership in Palestine is the Palestine Center for Stone and Marble which is a partnership between the Ministry of National Economy, Palestine Polytechnic University, and Union of Stone and Marble. These experiences started in 2010 but the collaboration is still limited.

Abu Hanieh et al. (2015) indicate that the government role is very important to provide a unified system to govern and encourage the innovation in (MSMEs) in Palestine, and to provide an institutional framework to protect innovation-related intellectual property rights and patents.

b) University

The universities show an enthusiasm for collaboration with the government and industry but this is driven mostly by a desire to close fiscal gaps as the universities are grossly underfunded. There have been many interesting collaborations with universities, government and private sector which is an indicator that universities are still relevant. However, these tend to be short term consultancies whereas university true calling in research and development calls for engaging in solving challenges for longer time horizons.

There is also an emergence of an entrepreneurial university which seeks to solve local development problems and creates opportunities for its students as the example of Palestine Polytechnic University in the southern part of West Bank. The main challenge of Palestinian universities is the significant mismatch between skills produced and skills demanded.

Morrar and Abdel Hadi (2016) studied the development of R&D key performance indicators (KPIs) in Palestine, noting that the national R&D has gradually become more visible between researchers and policy makers which is consistent with the increasing debate at the regional and international levels over the innovation development in developing countries facing tight competition from international companies due to globalization and open trade operations. They found a disconnection between R&D mainly from universities and innovation output; for example, only nine patents were registered as a result of all R&D activities in Palestine in 2011.

Many of the R&D research studies at the universities are not market-oriented or tailored to the needs of the business sector, but are undertaken for individual academic objectives such as career progression. Hence, important recommendations were made to develop R&D or innovation networks including different actors (universities, industry, government and non-government institutions) of the R&D system, which makes the flow of knowledge among them easy, minimizes the R&D risk, and ensures a market-based R&D strategy.

Abu Hanieh et al. (2015) recommend the academic institutions to improve curricula by including sustainability concepts as well as including new teaching methods necessary to bridge the gap between industry and academia.

c) The Industry

The industries are not very competitive and tend to seek local rather than international markets, and also utilize connections rather than innovate and compete. Industries also mistrust each other as well as other parties, and tend to shy away from collaborations. All the same, there are industries working with universities and increase skills of the employees and also produce more relevant graduates. MSMEs are rarely use universities' R&D and other training services. Recently, Palestine Investment Fund established a National Agricultural Investment Company (NAIC) aims to strengthen the agricultural value chains.

Morrar and Abdelhadi (2016) found that 53% of knowledge-intensive business firms in Palestine reported a difficulty in finding partners of cooperation for innovation as the main obstacles of innovation for their firms. Also, the lack of access to capital and finance is the greatest negative impact factor on product and process innovation in addition to the organizational and marketing innovation.

Abu Hanieh et al. (2015) discussed the current status of government-industry-academia partnership with relevance to engineering education, confirming that the existing partnership situation in Palestine is weak. As such, it is very important to strengthen the linkages between these three elements in order to develop the Palestinian industrial sector which suffers from a lack of R&D centers, low labor skills and the absence of technical and financial support customarily available.

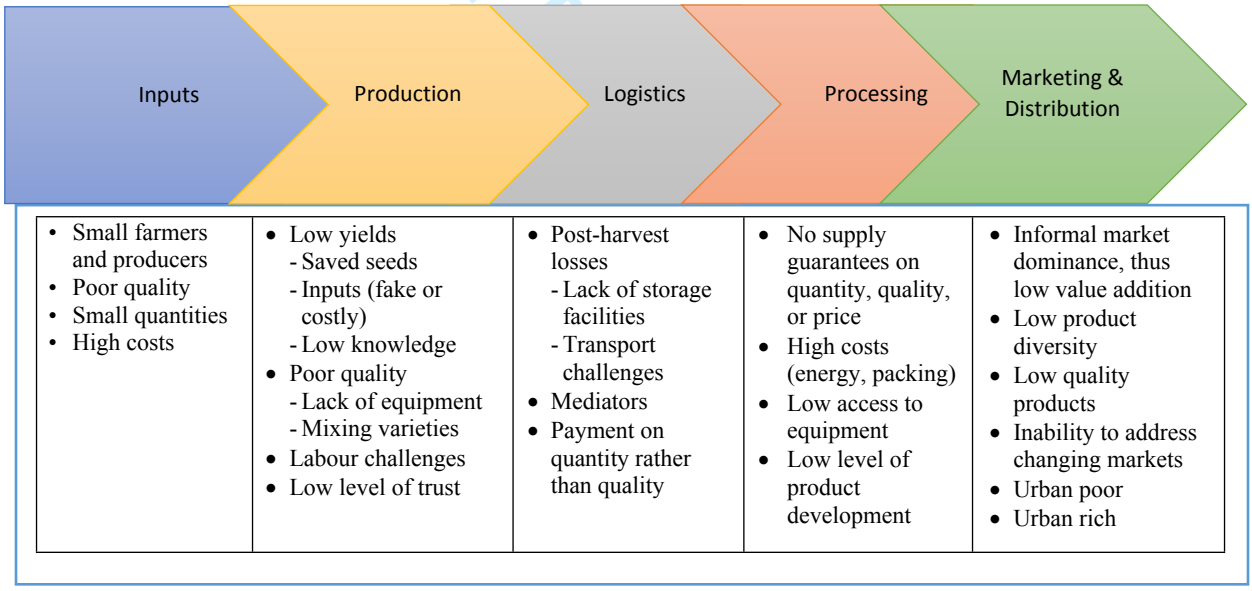
d) Development Partners

Indeed, the development partners such as NGOs, CBOs, INGOs and UN agencies, are key players in building the nascent THM partnerships. An example of the local NGOs is the Agricultural Development Association (PARC) which was launched by a small group of pioneer agronomists and farmers that emerged from the Palestinian voluntary movement in the late 1970s as an initiative. PARC is active in delivering vocational trainings for farmers.

Leveraging Triple Helix To upgrade Agricultural Value Chains

Figure 4 is a summary of the potential innovations for MAPs value chains. The key innovations are technological and business model innovations. The value chain need to be re-organized to allow emergence of stronger players that create the ecosystems needed to drive innovations and also support the formation of a strong cluster.

Fig 4. Innovations needed to upgrade MAPs Value Chain



How can THM help in leveraging the MAPs value chain?

a) Empowering the Farmer: From Survival to Business Orientation

Diversifying farmers' income can help farmers change risk perceptions and see them move towards more risk taking, and thus to high inputs-high output production regime. The THM model can play a big role in catalyzing this business model:

- Universities can do R&D for the whole value chain and TVETs can develop the needed extension skills
- Government can strengthen this symbiotic model by routing support it provides to farmers through the model and thus strengthen it. This can be a more efficient way of distributing subsidies
- NAIC can help farmers with fertilizers, know-how, and buy and export their products.

b) Building a Better Cooperative

Cooperatives can play a much larger role than they do and they can indeed be the key vehicle for upgrading the value chains. However, the cooperative model has been tainted by a history of poor performance and also exploitation to farmers. Part of this challenge stems from the multi-purpose cooperative that seeks to develop a wide range of services while at the same time lacking the capacity to run a complex business.

The business model needs to shift from providing a general array of services to being mostly focused on just one or two aspect and specialize in that. Using this approach, skills and governance system will be easier to build and their limited resources better utilized. The THM can play a big role in catalyzing this model

- Universities and TVET can do capacity building to develop needed skills.
- Government can provide funding to facilitate cooperative re-engineering

c) Improving Farming Systems Efficiency- Inputs-as-a-Service Franchise Business Model

Inputs are costly, and still people may not apply them properly. Some inputs require investments in equipment to apply. Additionally, the presence of fake inputs might deter some from investing in high-quality inputs. A business model that can solve this challenge for farmers is to buy a service rather than input. This business model has several advantages especially if the service provider is part of a bigger franchise that the good controls; farmers need not be experts on the right herbicide, as a service provider has expertise. Indeed, with their expertise, the service providers can also provide extension service. The THM can catalyse this model through:

- Universities can develop innvations to expand the range of services the franchises can provide. TVET can develop the incubation platform and train young people in needed skills
- Private sectors can develop a franchise model to and put the trained people into franchises
- Government can provide seed funding to help entreprenurs buy franschises

d) Upgrading Middlemen to Logistic Service Providers

It is clear that middlemen capture the high share. The fact that there are many traders means that long-running relationships are not built; in fact, many of the traders could be part-timers coming to the market only during the trading season. What lacks in the value chain is the strong traders who can offer many services especially storage and drying services in addition to credit. This is the kind of traders who can upgrade the value chain. Also given that these are normal businesses with long-run outlook, the predatory tendencies are limited and see farmers as partners. Consolidation of the trading sector may thus help in improving the value chain. The THM helix can be leverage here.

- Government can provide incentives (e.g. cheap finance) and mandates (expected services) to help in the consolidation of the sector.
- Universities can work to build the business skills and also technologies e.g. grading, drying etc. TVETs can develop the skills needed
- NAIC can be the strategic partner for the farmers.

e) Building Hybrid Processing Models

The MAPs sector suffers from unreliable and low-quality supplies and lacks the resources to develop new products and get the required equipment to bring such products to market. SME food manufacturers have all the skills needed in market, product development and in managing regulations, though still have difficulties in sourcing consistent supply.

As pointed out, there is a need for significant product development to capture a whole range of products. These will require entrepreneurs to engage in product development. Given that many have limited resources and new markets, will certainly need to develop a business model that can help budding entrepreneurs having the breathing space to incubate ideas, develop products and hence market products is needed.

A potential approach is to develop a campus that provides many shared services e.g. testing, manufacturing facilities, space etc. Entrepreneurs pay for services offered as needed. This type of facilities can provide incubation, acceleration services for starting entrepreneurs and thus provide business mentorship and capacity development. The role of THM in developing a cluster include:

- University help in product development and marketing development. TVET can develop skills and entrepreneurs for the clusters
- The government can come as a facilitator.
- NAIC essentially runs a campus of shared facilities. Significant R&D will be needed and part of this maybe farmed to universities.

CONCLUSIONS

THM states that the industry hybridization of elements, and generating new institutional and social formats (university and government) are important for the production, assimilation and application of knowledge needed for innovation output in knowledge-based economies. Etzkowitz and Leydesdroff (1998) define the THM as a "spiral model of innovation", having the ability to hold multi-reciprocal linkages at different stages of the capitalization of knowledge, including between three main actors: universities, industry and government. The overlaps between them are vital to generate new ideas, information and knowledge.

The power of the THM has been demonstrated in driving local economic development. Success will require developing strong ecosystems. One ecosystem that has had good success is the THM which brings the university, the industry and the government in a joint collaborative effort in catalyzing and commercializing innovations.

THM requires developing trust, shared vision and a coordinating mechanism. Readiness also requires right policies, strong and entrepreneurial universities and TVET system. Beyond these, a consensus space - where key actors can interact, develop trust and ideas- is key underscoring to the critical role, civil society and development as they are key in catalyzing and funding networks.

Though collaborations among THM partners are happening in the agricultural sector in Palestine. These collaborations tend to be bilateral, short term and opportunistic. There is still much to be

done before true THM can be in place. All the same, there are good examples of collaborating that can provide the building blocks for building the THM.

The paper also shows that THM can be a powerful way to catalyze innovation needed to upgrade MAPs value chain. The value chain provides a pathway for building this model as there are quick win opportunities that are easy to implement and can have good impact on the local economic development.

RECOMMENDATIONS

In order to put the THM in place, there is a need for:

a) Sequencing actions

Building the THM can be jumpstarted by picking on some quick win projects that have little investment overhead and risk for the parties involved. This can then help on building confidence and trust. More and more projects can be undertaken as medium to longer term. The sequencing is as below:

Short Term- Quick Win Projects

Improving quality of the product is the low hanging fruit as interventions needed are simple and pay-off is quite high. The key interventions are drying and also removing dirt and other materials. Also efforts to increase awareness and reduce risk aversion and make farmers more business oriented

Medium Term – Re-Engineering the Value Chain

The input-as-a-service franchising business model can be developed. The private sector and the government can set-up a fund to develop the technologies needed. The TVET can develop the needed skills to equip youth to be franchisees. The other key re-engineering is the development of a symbiotic contract farming system.

Long term: Building A Cluster:

In the longer terms the focus should be on developing shared space for development, incubation and manufacturing various products. The campus should be a joint venture between the regional government, private sector and the university.

b) Governance Model

The THM is a partnership, and as such the ideal model for governance is to have separate organization running the triple helix and have members as part of the board. That way, no partner has undue influence as the lead.

FUTURE RESEARCH

It will be interesting to investigate the influence of Palestinian informal family businesses on the success of the THM as well as the influence of the Arab context on the implementation of the THM.

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