

**ECONOMIC AND SOCIAL COMMISSION FOR WESTERN ASIA**

**TECHNOLOGY TRANSFER TO SMALL- AND MEDIUM-SIZED ENTERPRISES  
AND IDENTIFYING OPPORTUNITIES FOR DOMESTIC AND FOREIGN  
DIRECT INVESTMENT IN SELECTED SECTORS**

**THE CASE OF SME CLUSTERS IN THE AGRO-FOOD  
AND APPAREL INDUSTRIES**

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## **Preface**

This report synthesizes the results of capacity-building activities conducted by the Economic and Social Commission for Western Asia (ESCWA) for the development of clusters of small- and medium-sized enterprises (SMEs) operating in the agro-food and apparel manufacturing sectors in Jordan, Lebanon and Morocco. The report is the result of work undertaken by researchers, national consultants, Government officials and project staff. Moreover, the success of the programme on which the case studies of the report are based owes greatly to the enthusiastic participation of many of the private sector stakeholders and business service providers working in local clusters.



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## Executive summary

In a progressively integrated global economy driven by the increasing liberalization of markets for goods, services and capital, the business environment of large and small enterprises is continuously changing. While these changes affect firms in the world's major market economies, small- and medium-sized enterprises (SMEs) in developing countries, including those in the ESCWA region, are particularly sensitive to these dynamics. Firms have to adjust to changes in national policies as countries pursue broad structural reforms to support their growing participation in the global economy. In parallel, manufacturers need to be attentive and responsive to changing conditions and consumer preferences in the marketplace. New rules and responsibilities established by the multilateral trading system and a widening array of bilateral and regional economic integration agreements have created new requirements for managing these changes. While this has opened new markets, it has also increased competitive pressures for SMEs exporting abroad or selling at home. Consequently, there is a vital need to improve the productivity and competitiveness of SMEs, thereby helping to overcome the challenges posed by globalization, through mechanisms that enhance technology transfer and that channel investment towards SMEs.

Technology transfer involves the acquisition and assimilation of technology in order to improve the capabilities and efficiency of production processes. This includes hard and soft technologies associated with the transfer of machinery and capital equipment, production and process methods, management systems, procedures, services, knowledge and know-how. This transfer occurs usually on commercial terms between private-sector suppliers, and can be financed by foreign direct investment (FDI). However, technology transfer does not necessarily have to occur between developed and developing countries; it can equally occur among countries that are economically similar, within countries, and between countries and companies experienced in different areas of specialization or scales of production. Such mechanisms aimed at financing technology transfer must therefore look towards domestic as well as foreign arrangements and instruments to facilitate the process.

The Plan of Implementation of the World Summit on Sustainable Development, which was adopted in Johannesburg in 2002, identified technology transfer as one of the major instruments for assisting developing countries to move towards sustainable development and to take advantage of the opportunities presented by globalization. The Plan acknowledged a number of specific measures for enhancing the transfer of technology, including the following:

- (a) Improving collaboration and networking among stakeholder groups, including universities, research institutions, Government agencies and the private sector;
- (b) Developing and strengthening networking among institutional support structures;
- (c) Creating partnerships that can encourage investment and technology transfer, including the development and diffusion of technology;
- (d) Improving access to knowledge, know-how and expertise available in the public domain;
- (e) Supporting or establishing mechanisms for facilitating the transfer of environmentally sound technologies to developing countries.

These mechanisms for encouraging technology transfer to developing countries highlight the importance of networking, partnerships and cooperative relationships. This study endorses these commitments and elaborates on how collaborative arrangements can enhance technology transfer and investment opportunities, particularly for SMEs.

Lessons from clustering experiences across the world demonstrate that clusters and networks of SMEs can facilitate access to technology, mobilize financial and human resources, and strengthen the competitiveness of SMEs in an increasingly global and technologically-sophisticated global economy. There are many ways in which clusters can help member SMEs achieve these objectives. These include facilitating joint purchases of raw materials and technologies needed for production, sharing common administrative and



marketing operations, and forming consortia aimed at attracting both domestic and foreign investment. Additionally, clusters allow SMEs to enhance significantly their ability to export by facilitating inter-firm collaboration that can meet the demands of large purchase orders from abroad and that would otherwise exceed the production capacity of a single firm. Moreover, clusters can increase the rate and intensity of inter-linkages among firms, thereby enhancing the transfer of knowledge and expertise.

In recent years, ESCWA has organized various seminars and workshops aimed at increasing awareness among policymakers and private sector decision-makers in the Arab region with regard to the challenges and opportunities facing SMEs in the rapidly liberalizing global marketplace. In cooperation with such international organizations as the World Bank, the United Nations Industrial Development Organization (UNIDO), the International Labour Organization (ILO) and numerous bilateral development assistance agencies, ESCWA has sought to assess and expose the benefits of public-private dialogue, coordination, collaboration and cooperation as mechanisms for assisting SMEs in the Arab region. These capacity-building activities have focused on raising awareness relating to conformity with environmental, health and safety requirements; training and technical assistance to strengthen industrial clusters, particularly in the agro-food and apparel sectors that are major sources of employment and income generation in the Arab region; and diagnostics studies to identify and assess the needs and opportunities of clusters and networks in the region, including capacities and constraints associated with technology transfers and investment.

Within that context, this report synthesizes the results of a series of activities aimed at assessing and strengthening the development of SME clusters in three Arab countries, namely, Jordan, Lebanon and Morocco. Special focus has been given to issues that influence the ability of SMEs to acquire and assimilate new technologies. Moreover, by presenting these illustrative case studies, this report aims to increase awareness of public and private sector decision-makers and, consequently, to encourage their participation in and active support for the development of SME clusters and networks. While the scope of the case studies is varied, basic information on opportunities and challenges facing SMEs in the cluster is provided, in addition to their technological needs, availability of financing and level of inter-firm cooperation with other co-located SMEs. Taken together, these data reveal general limitations and needs of SMEs in the region, as well as promising ways to address them.

The case studies elaborate on the challenges facing SMEs in the agro-food and apparel manufacturing sectors and the ways in which clusters and networks have assisted SMEs to benefit from technology transfer and improve competitiveness collectively. As supportive environments, clusters and networks can provide appropriate frameworks for generating economies of scale as well as interventions by business support service providers and technical advisors.

While these case studies expose the potential areas where SMEs can work together to access technology transfer and investment opportunities, they also show that the actions of firms alone are not sufficient to advance cluster development and maximize benefits to SMEs. Specifically, Governments across the Arab region need to play a more proactive role in terms of creating an enabling environment that facilitates cluster development, including as follows: (a) designing supportive policies and adequate incentives; (b) providing better access to infrastructure; and (c) streamlining administrative procedures. Furthermore, there is an important role for cluster development agents, associated stakeholders and service providers to support cluster development, particularly through financial, educational and business institutions that can serve as partners in technology transfer.

This report is therefore expected to be of particular interest to decision-makers in the public and private sectors; to academic officials seeking to enhance coordination between the private sector and technical schools and universities in order to enhance human capacity for technology transfer in national industries; and to the financial community searching for loan and credit instruments that are better able to meet the needs of SMEs. Furthermore, business associations and networks are likely to draw lessons from the assessments and experiences of emerging clusters in the region.

## ABBREVIATIONS AND EXPLANATORY NOTES

ADR	Association for Rural Development
AMITH	Association marocaine des industries du textile et de l'habillement
BOD	biological oxygen demand
CAD	computer-aided design
CAM	computer-aided manufacturing
CDA	cluster development agent
CMT	cutting, making and trimming
CNRS	National Council for Scientific Research
€	euro
EU	European Union
FDI	foreign direct investment
FODEP	Fonds de Dépollution Industriel
FTA	free trade agreement
GDP	gross domestic product
GGT	Gerber Garment Technology
GMP	good manufacturing practice
HACCP	Hazard Analysis and Critical Control Point System
ICU	Istituto per la Cooperazione Universitaria
IHC	International Honey Commission
ILO	International Labour Organization
IOOC	International Olive Oil Council
IPR	intellectual property right
IRI	Industrial Research Institute
kg/h	kilogram per hour
LARI	Lebanese Agricultural Research Institute
LIBNOR	Lebanese Standards Institution
LIPSOS	Lebanese Inter-Professional Syndicate for the Olive Sector
m <sup>3</sup>	cubic metres
NGO	non-governmental organization
QIZ	qualifying industrial zone
SAMNL	Syndicate of Apparel Manufactures in North Lebanon
SLFI	Syndicate of Lebanese Food Industries
SME	small- and medium-sized enterprise
TFP	total factor productivity
TNC	Transnational corporation
UNIDO	United Nations Industrial Development Organization

References to dollars (\$) are to United States dollars, unless otherwise specified.

## Introduction

Structural reforms, which are being undertaken by Arab countries to support regional and global integration agreements, are steadily dismantling national economic borders. Integration provides Arab firms extended access to global markets offering opportunities to expand production and sales, while capturing new economies of scale. Moreover, the opening of national services and financial markets provides access to foreign investment and potential sources of financing for technological upgrading. At the same time, globalization exposes Arab firms to increased competition in their traditional foreign and previously sheltered domestic markets for goods and services. Competition with other developing countries for foreign investment is equally heightened in an increasingly open and efficient global capital market whereby foreign direct investment (FDI) flows seek the world's most politically stable, financially secure and industrially competitive host country economies.

Given advances in globalization, market forces have had immediate impacts on the business activities of transnational corporations (TNCs), thereby prompting them to revise their business strategies and to upgrade their production capabilities in order to maintain their competitiveness in global markets. New markets and sub-contracting arrangements have therefore emerged for larger-scale producers able to adjust to these changes. Furthermore, benefits to SMEs in the Arab region continue to be less readily perceived, particularly for those producing mainly for domestic markets. This is because many SMEs engaged in manufacturing have been unable to identify and take advantage of opportunities presented by the global marketplace. Consequently, SMEs that have not successfully adapted their businesses to new global market forces are confronted by declining demand and shrinking profit margins.

Indeed, despite changes in the business environment, many SMEs continue to conduct business as usual and are experiencing adverse effects generated by increased competition. Unable to enhance their productivity and competitiveness, many are losing their capacity to export and retain their market share in their own domestic markets. Some SMEs indicate that they have been caught unaware of the changes taking place around them, while others are averse to changing traditional ways of doing business given the potential risks involved. Furthermore, for the many proactive SMEs seeking to adapt to new global market exigencies, the necessary financial, human, informational and technological resources for enhancing competitiveness continue to remain largely out of reach. Technology transfer and investment mechanisms tailored to the needs and characteristics of SMEs in the region are therefore urgently needed to address these gaps. The dominant role played by SMEs in regional employment and economic development amplifies the importance of realizing new business paradigms to this end.

Chapter I reviews the conceptual framework, elaborating on the constraints and opportunities facing SMEs, including the benefits reaped from clustering and networking for enhancing technology transfers and investment opportunities. The salient economic features and trends in the agro-food and apparel manufacturing sector in the Arab region are summarized in chapter II, with a focus on Jordan, Lebanon and Morocco.

Chapter III presents findings from case studies of the agro-food sector in Lebanon and focuses on two clusters in that sector, namely, olive oil and honey. Within the context of the former, various issues are raised, including challenges posed by the production capacity of mills, quality control, food safety, marketing and wastewater management. This chapter highlights the benefits to productivity that can be reaped from collective action through technology transfer arrangements and shared knowledge and expertise. The second case study on the honey sector demonstrates the success achieved by beekeepers after their establishment of a cooperative arrangement, measured in terms of building trust, adopting innovative production and process methods, integrating new management techniques, enhancing product quality, and improving awareness and compliance with food safety requirements. This arrangement was made possible with the technical assistance of cluster development agent (CDA), who was recruited by ESCWA.

Chapter IV reviews the findings and recommendations from the case studies on the apparel sectors in Jordan, Lebanon and Morocco and concentrates on three clusters of firms, namely: Marka-Zarka near Amman; Jebel Mohsen in Tripoli, Lebanon; and a cluster of small manufacturers in Casablanca, Morocco. These three clusters reveal many of the structural, organizational and technological challenges facing apparel

manufacturing SMEs, in addition to the major constraints and problems faced in the areas of marketing, production and technological capacity. The importance of a CDA as a facilitator of change and technology transfer is also exposed in the case of apparel manufacturing in Jebel Mohsen. This chapter underscores the need for economies of scale among SME clusters operating in the garment sector through joint investments in shared computer-aided technologies, more formalized out-sourcing relationships between large and specialized firms, increased use of information technologies, and collective marketing arrangements to improve access to domestic and foreign clients.

The case studies in chapters III and IV were prepared based on information collected from extended interviews with producers of agro-food in Lebanon and apparel manufacturing in Lebanon, Jordan and Morocco. Interviews and consultations were also conducted with relevant ministries, national experts and business support service providers, including syndicates, associations and non-governmental organizations (NGOs). Efforts were made to target senior decision-makers, who were able to offer detailed information relating to their firms, including as follows: main products, technical capacity, markets and marketing channels, production facilities and technologies, workforce, training programmes and technical skills, quality systems, raw materials, access to financing, Government policies and regulations, participation in associations and examples of inter-firm collaboration.

Chapter V analyses the lessons and implications drawn from the case studies for directing technology transfer and investment to SMEs in the region; and chapter VI provides some conclusions and recommendations for enhancing the competitiveness of SMEs, and proposes areas for further examination and assistance. The lessons drawn from the case studies illustrate that technology transfer and opportunities for investment can be enhanced by clustering and networking arrangements among SMEs facilitated by a CDA. Specifically, such arrangements achieve the following: (a) reduce production costs associated with the purchase of inputs and the management of resources; (b) improve the quality of outputs through shared production and process technologies; (c) improve access to business support services, including conformity assessment service providers; (d) promote efforts aimed at penetrating wider markets, securing larger and more value-added orders, and complying with new market requirements; and (e) expand financial capacity and the ability to secure domestic and foreign financing to invest in new technologies.

## I. CONCEPTUAL FRAMEWORK

Traditional neoclassical economic theory focuses on the relationship between land, labour and capital, and assumes that all firms have equal access to technology and are able to equally take advantage of new technologies and technological developments. Economic theorists also argue that knowledge is a non-rival good that can be used by two or more actors simultaneously. In practice, however, access to technology occurs in an imperfect market whereby technology can be costly, time-consuming and difficult to secure. Access to new knowledge is limited by research and development constraints; and by intellectual property rights (IPRs), which, while encouraging innovation, can impede opportunities for the transfer and adaptation of new technologies. Consequently, companies in developing countries, particularly SMEs, face challenges in terms of securing technology transfer arrangements and of accessing the investment needed to improve their productivity and competitiveness. An examination of these challenges and constraints is therefore a necessary first step towards identifying mechanisms and modalities for facilitating technology transfer and investment opportunities for SMEs. Access to technology transfer and investment opportunities that are suitable for the Arab region can be facilitated by strengthening clusters and networks of SMEs, which in turn can strengthen the competitiveness of SMEs in an increasingly global and technologically-sophisticated global economy.

### A. CHALLENGES AND CONSTRAINTS FACING SMEs

In a perfect market economy, countries and companies enjoy equal access to and development of technology. However, there are barriers to the transfer of knowledge and technology between economic actors that can be attributed to differences in the legal, regulatory, political and social environments of countries.<sup>1</sup> These and other constraints to technology transfer faced by SMEs in manufacturing sectors can be divided into four main categories, namely: (a) human capacity and technical constraints; (b) production and conformity assessment constraints; (c) legal and institutional constraints; and (d) financial and investment constraints.

#### 1. *Human capacity and technical constraints*

Technology transfer has often focused on the acquisition of machinery. However, technology transfer goes well beyond the sale of capital goods and equally involves the transfer of soft goods from one party to another, including knowledge, know-how and management systems that accommodate technological change. While knowledge can include sophisticated information aimed at creating or developing new technologies through innovation or adaptation, know-how usually refers to technical knowledge and other related technical information needed to use a specific technology. This can include familiarity with technology-specific data, indices, calculation formulas and design specifications, in addition to methods of assembly, installation and maintenance. As such, technology transfer requires a degree of “technology intelligence” and an openness to technological change in the recipient firm for the transfer to be effective.

However, assimilating new knowledge and know-how and, subsequently, adapting it at the firm-level can pose challenges for small businesses with limited human resources, particularly for family-owned businesses that have used traditional processes and production methods over generations. To some extent, change and the adoption of new technologies depend on the entrepreneurial spirit of the chief decision-maker and on a willingness to take risks associated with technological upgrading and modernization. Such change can compel business owners to consider new ways of doing business, including adopting collaborative business approaches based on trust and mutual responsibility. While such transformations in perception are possible, they are not always self-evident.

Moreover, the uncertain economic and political environments in which many SMEs operate in developing countries increase the risk involved in investing in new technologies. This risk is amplified when firms are not staffed with a sufficiently skilled labour force, which is unable or unwilling to assimilate and

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<sup>1</sup> S. Lall, “Strengthening SMEs for international competitiveness”, Working paper No. 44 (The Egyptian Centre for Economic Studies (ECES), October 2000), p. 6.

adapt new knowledge, know-how and technologies to local conditions. Indeed, technological mastery is often harder in developing countries, particularly when it involves the transfer of new skills, including management and marketing skills, as well as access to methods and materials that entail additional costs.<sup>2</sup>

Another related challenge faced by SMEs during technology transfer arrangements is that limited human resources often result in the business owner or a close advisor being trained for managing or using a given technology. If that individual is not also engaged in the practical aspects of production at the firm level, the transfer of the know-how needed to adopt or adapt the technology at the firm level can be misplaced. As such, business owners need to encourage open lines of communication and a favourable learning environment between managers and labourers during the process of adopting and adapting new technologies if the transfer is to be successful. Business associations and syndicates can provide a mechanism for facilitating the transfer of knowledge and know-how to specialized groups of employees. Such a mechanism is demonstrated in the case study on apparel manufacturing in Morocco in chapter IV.

## *2. Production and conformity assessment constraints*

The majority of manufacturing SMEs operating in the Arab region are either family-owned businesses or outgrowths of family businesses passed on across generations. Traditional production methods tend to be used, and the machinery is often old and outdated. Information on more modern equipment and production methods is often gained by word of mouth from others in the sector or by visiting trade fairs. Moreover, there is limited trust among entrepreneurs working in the same sector, which impedes exchanges and learning opportunities between competitors; and the ability to participate in trade fairs is usually limited for SMEs if sector-specific fairs are held outside the country. Furthermore, access to sector-specific trade journals and the Internet still remain limited in most developing countries.

Additionally, quality control during the production process of SMEs tends to be limited to physical tests, unless otherwise required by a specific client. However, in an increasingly global and competitive marketplace, testing for compliance with quality standards and with health and safety regulations has become a regular element of mainstream businesses. Consequently, in addition to considering technological changes associated with the production process, export-oriented SMEs must secure access to instruments and facilities that can demonstrate their conformity with product and process requirements in foreign markets, and possess the management systems necessary to do so. Certification of conformity with local standards can also be beneficial for companies seeking to differentiate themselves in the local marketplace or access niche consumers. For example, access to accredited testing facilities is a necessity for organic food producers who must certify their compliance with a specific set of voluntary standards and associated conformity assessment requirements in order to use an organic label. Testing is a particularly sensitive matter in the food processing industry whereby food safety requirements can require testing of both the end product and the entire production process.

Despite its importance, access to conformity assessment infrastructure remains limited in most developing countries. In-house testing infrastructure is rarely affordable for SMEs and, consequently, smaller firms must depend on service providers to conduct these tests, which can be costly and time-consuming. Alternatively, SMEs can rely on the testing facilities and analysis of larger client firms when a sub-contracting relationship is in place.<sup>3</sup>

## *3. Legal and institutional constraints*

In traditional economic theory, information and knowledge are often considered free, non-rival goods that can be used by several actors simultaneously or consecutively without incurring loss to such knowledge. However, more recently several economists have argued that there are costs associated with the transfer of

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<sup>2</sup> Ibid., p. 12.

<sup>3</sup> These points are elaborated in chapter III in the case studies on the agro-food sector in Lebanon.

knowledge between persons and firms.<sup>4</sup> Consequently, those willing to access new knowledge and technologies must often be willing to pay the cost of accessing or applying that innovation or technology. In order to ensure that these costs are paid, IPRs have emerged as the legal instrument to ensure that innovators can secure compensation for knowledge they have created.

The transfer of technology often has a contractual nature, which implies that such transfer depends on the consent of the parties concerned and an allocation of responsibilities. SMEs that obtain a technology do not necessarily have the in-house absorptive capacity to review the contractual terms associated with a purchase contract and, therefore, are often compelled to secure the services of a lawyer to assist them. This is particularly important when arranging for the purchase of technologies that involve proprietary knowledge, liability and risks, and/or the inclusion of training and maintenance arrangement aimed at ensuring the proper functioning of the subject technology. Such technology contracts need to be well defined and carefully drawn to avoid any undesired legal consequences on either party.

Rights and responsibilities associated with a technology contract often address issues related to technology development, knowledge transfer, technical services and proprietary rights. The arrangements can accelerate the development or commercialization of a new product created by an SME; or, on the receiving side, they can save SMEs the cost of investment in research and development when purchasing a technology tailored to their business operations. For this reason, some technology agreements aim principally at facilitating joint action, sharing expertise and moderating relative costs. Ownership and maintenance of confidentiality of technical information and materials is often a main condition in technology contracts. Methods for settlement of disputes are usually envisaged and planned in these contracts.

The legal framework at the national level helps to ensure effective protection of intellectual property in a manner that balances the interests of innovators and consumers of new technologies in developed and developing countries. Different types of IPRs include patents, trademarks, industrial designs, copyrights and related rights, and trade secrets. The use of geographic indicators is another component in the system, given that it can afford producers proprietary rights over the use of the names of products associated with a certain town or region from where the product originated. Additionally, labelling, packaging and different types of standards have implications for intellectual property. IPR regulations that are structured and enforced effectively can facilitate the transfer of newer technologies to developing countries, and promote FDI in sectors where investment could otherwise be at risk of forgery. As such, IPRs can influence both the flow of FDI and the composition of technology transfer to certain industries and firms.<sup>5</sup>

Given these legal issues, technology transfer can take the form of licensing arrangements, joint ventures or the establishment of wholly-owned subsidiaries. However, SMEs in the Arab region tend to be general partnerships, which allocate liability and financial risk to business owners, rather than to the company. Furthermore, financial constraints often limit the capacity of SMEs to change their legal form that is more amenable to technology transfer and FDI.

#### 4. *Financial and investment constraints*

There are significant opportunities to support investment in new equipment, production methods and conformity assessment infrastructure to improve the productivity, efficiency and competitiveness of SMEs. However, the transfer of know-how requires commitments in terms of time and cost of training for the proper operation and management of a new equipment or production system. As such, the cost, risk and investment associated with technological modernization is often greater for a small entrepreneur still using traditional methods than for one who has already implemented or pursued some degree of technological change.

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<sup>4</sup> K. Saggi, "Trade, foreign direct investment, and international technology transfer: a survey", which was a background paper for a research project by the World Bank, entitled "Microfoundations of International Technology Diffusion".

<sup>5</sup> Ibid.

While various types of legal agreements exist to facilitate the transfer of technology from technology providers to SMEs, small and medium size business owners remain constrained by their financial resources and their ability to establish sufficient equity or capital to secure the loans and financial arrangements needed for the acquisition of new technologies. As mentioned above, there are certain legal forms that favour the transfer of technology to firms, particularly those involving limited liability or joint ventures. However, the financial obligations for maintaining such a company can be beyond the financial resources of some SMEs in the Arab region.

For example, the financial obligations associated with establishing a company in Lebanon varies among commercial entities. Most SMEs tend to be registered as general partnerships and cost approximately \$1,000 to establish. Partnerships are taxed on a progressive basis according to the net profits of each partner at a rate that is in the range of 4-21 per cent. By contrast, a limited liability company can be formed with a minimum set-up charge of \$4,333, comprising three to 20 partners, and with 15 per cent of corporate net profits going towards taxation in addition to a withholding on dividends amounting to 10 per cent. A joint stock corporation costs a minimum of \$21,533 to be established and has the same taxation obligations as a limited liability company. This provides opportunities for SMEs to work together to access new markets and access new technologies provided that, collectively, they can satisfy the necessary financial obligations. Furthermore, both limited liability companies and joint stock corporations must maintain a lawyer on retainer, which costs some \$4,000 per year and represents a comparatively expensive burden on SMEs in the region.

Furthermore, given that the transfer and mastery of new technology and know-how require time and effort, owners of SMEs are often forced to commit themselves to long-term development objectives and possible short-term losses of income. This can be problematic for micro and small entrepreneurs who depend on revenue flows generated from currently productive activities. Accordingly, switching to new production practices and technologies involves risk and, moreover, requires spending against savings in the short term in anticipation of efficiency gains and increased revenue streams in the long term. Lessons learned from a cluster of apiculturists in South Lebanon demonstrate this constraint and indicate ways in which clustering can help to overcome this challenge, as elaborated in chapter III. Accordingly, countries and business associations must proactively seek to identify mechanisms for the transfer of technology that are tailored to the needs and characteristics of SMEs in the region.

#### B. CLUSTERING AND NETWORKING AS MECHANISMS FOR FACILITATING TECHNOLOGY TRANSFER

Given the abovementioned constraints, countries and companies are not equally endowed with access to technology. Moreover, they are not equally endowed with the resources or equity that can foster technology transfer, investment, innovation or research and development. It is therefore important to consider mechanisms and modalities that can create an enabling environment for technology transfer towards SMEs in the Arab region, particularly in the light of their significant contribution to the generation of income and employment.

Different approaches exist for facilitating access to technology and investment opportunities for SMEs. The induced innovation model by Y. Hayami and V. Ruttan argues that countries can leapfrog to higher levels of productivity and efficiency by learning and benefiting from technologies that were developed elsewhere in a more conducive policy environment.<sup>6</sup> Additionally, a theory of economic development advocated by J.A. Schumpeter suggests that while entrepreneurs are the forces of economic development, policy planning is still needed to foster innovation.<sup>7</sup> Schumpeter also argues that a greater interaction between a variety of actors can generate an enabling environment for the creation of technology and its use; and that a more intense relationship between firms and economic actors can lead to an

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<sup>6</sup> Y. Hayami and V. Ruttan, "Induced innovation model of agricultural development" in *Agricultural Development in the Third World*, Eicher, C.K. and Staatz J.M. eds. (John Hopkins University (JHU) Press, 1985); and Y. Hayami and V. Ruttan, "Agricultural development: an international perspective" (JHU Press, 1985).

<sup>7</sup> J.A. Schumpeter, *The Theory of Economic Development* (Harvard Economic Studies, English edition 1934).



environment that is more conducive for innovation and technological growth.<sup>8</sup> Fostering inter-firm linkages as a means to facilitate growth, efficiency and technological change lies at the heart of development models aimed at strengthening clusters and networks among firms, particularly among SMEs.

SME clusters are groups of geographically co-located firms producing similar or related products, and include suppliers of goods and services that support those industries. Empirical evidence indicates that clustering can be fundamental to the success of SMEs in most economic sectors. Given their inherently small size and limited resources, SMEs can reap several benefits from cooperating with neighbouring firms active in similar or closely-related sectors and that would otherwise be unattainable to individual SMEs. Accordingly, rather than simply viewing their peers as competitors, SMEs in clusters are encouraged to collaborate with their peers as partners in a wide range of business functions to reduce costs collectively, improve efficiency, attract investment and access new and wider markets.

There are many ways in which clusters can help member SMEs achieve these objectives, including by facilitating joint purchases of raw materials and technologies needed for production, by sharing common administrative and marketing operations, and by forming consortia to attract both domestic and foreign investment. Additionally, clusters allow SMEs to enhance significantly their export capacities by encouraging inter-firm collaboration in response to large foreign orders that would otherwise exceed the production capacity of any one member. The case studies presented in this report provide various examples of how cooperation among SMEs in a cluster can provide substantial economic benefits. They also show that clusters allow firms to learn from each other through mutual exchanges of sector-specific information and trends relating to production techniques, financing mechanisms and consumer demands in foreign markets. Inter-firm learning generates collective learning curves that are significantly faster than those achievable by individual firms.

From the perspective of an SME considering its participation in a given cluster, the benefits of clustering are not immediately self-evident. Indeed, there is often considerable reluctance to engage actively in cooperative approaches. Negative perceptions include the potential loss of trade secrets, the loss of resource persons and clients to other cluster members, and the need to ensure a level of trust and mutual responsibility among members of the group. The case studies show that formative clusters in the apparel industry are largely self-limited in their functionality, and that increased consultation among member firms is needed to develop further and unleash the full potential of these clusters.

By contrast, a small cluster of entrepreneurs operating in the honey sector in Southern Lebanon were willing to divest some autonomy and build trust among the group, thereby resulting in significant productivity gains and increased profitability. Indeed, an underlying reason for limited cluster development in the region arises from the fact that most SMEs are family-run businesses that remain suspicious of cooperating outside a “trusted” family association. Clusters as informal social institutions must therefore operate within a network of customs and norms that can influence the ability of firms to reap benefits from policy changes and new learning opportunities.<sup>9</sup> Experience shows that trust fostered at the level of the cluster can subsequently sustain inter-firm relations and enhance the ability of a cluster or network to reap rewards for its members through cooperative relationships.

### 1. *Clustering as an approach for SME development*

The traditional form of industrial organization has focused on the development of large companies that control networks of smaller suppliers. Sub-contracting arrangements are solicited by SMEs as means to regularize workflow and revenues. However, smaller SMEs sometimes face difficulty securing these agreements on a recurring basis given their constraints in size or efficiency associated with different sub-contracting needs. Accordingly, SMEs operating within a cluster through cooperative agreements can pool resources and generate economies of scale that can allow them to access larger and more profitable sub-contracting arrangements, which they could not secure by operating independently. This is because clusters

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<sup>8</sup> B. Carlsson, “Public policy as a form of design”, which is available at: <http://design.case.edu/2002workshop/Positions/Carlsson.doc>.

<sup>9</sup> V. Mazzucato, “Population growth and the environment in Africa: local informal institutions, the missing link”, *Economic Geography* (April 2002).

and networks can allow smaller sized companies to benefit from collective efficiency, which is made possible through joint action and economies of scale.<sup>10</sup> Competitiveness can subsequently be improved by lower production costs or joint efforts to identify and access new markets.

Alternatively, industrial clusters and networks can allow business owners of SMEs to overcome dependency on sub-contracting arrangements and, potentially, to specialize in productive arrangements that enhance competitiveness. Clustering can also encourage specialization and foster greater value-added in certain areas, in addition to encouraging complementarities between firms. Specialization can initially emerge from opportunities for using excess capacity, which can become the focus of business operations once a firm becomes increasingly experienced in a certain area of production. This can reduce operating costs and increase productivity. Moreover, efficiency can be enhanced through enhanced allocation and transfer of skilled and unskilled labour once areas of specialization develop.

By pooling financial and human resources, industrial SME clusters can also jointly support the acquisition of equipment or the recruitment of personnel needed for specialized services that are unavailable in the cluster and that can be shared among the firms. Furthermore, as clusters become stronger, they can attract more sophisticated business support services to their vicinity. The migration of service providers towards clusters, including banks, financial managers and suppliers, provides benefits to all members of the cluster and can reduce operating costs for individual firms.

## *2. Clusters as a means to encourage technological spillover effects*

Clusters can increase the rate and intensity of inter-linkages among firms. By doing so, the transfer of knowledge and know-how is enhanced as business owners learn from the experiences of others. Technological spillover effects can also be realized through entrepreneurship, spin-offs from larger firms and turnover of labour. For example, an employee leaving a company to establish his or her own company or to work for another company transfers knowledge with regard to best practices and technological applications between companies and countries. Total factor productivity (TFP) can be significantly improved in SMEs that benefit from the return of expatriate labour, which has gained knowledge in terms of new technologies and management techniques from work experience abroad.

In developing countries, including those in the Arab region, where SMEs are mostly family-owned businesses that are passed on across generations, technological spillovers can also be facilitated by the return of heirs to family businesses after gaining work experience abroad, or the return of expatriates the family businesses from higher education or from valuable in situ work experience relating to new techniques and production processes. The subsequent transfer of technology and knowledge is enhanced if those expatriates have worked for innovative firms or companies that have experienced technological changes or management restructuring during their tenure. An example of this can be seen in the case study of a network of SMEs in a garment cluster in northern Lebanon, which is elaborated in chapter IV.

While spin-offs are less common in the Arab region, they can arise when employees leave a given parent company to establish their own corporate entity with initial support provided by the parent company in terms of the transfer of hard and soft technologies.<sup>11</sup> Lowering barriers to entry for the establishment of new companies, including streamlining administrative requirements and reducing initial capital investment costs, can encourage the development of spin-offs or new start-ups, which in turn can be more open to pursuing technology transfer arrangements and investments as a means to accelerate their development process. This is particularly suitable in cases of spin-offs from TNCs or the spin-off of specialized services from larger companies. However, experience shows that while strengthening weak clusters provide opportunities for SME growth and expansion, creating clusters from scratch can be risky. Consequently, policymakers need to foster clusters after some degree of entrepreneurial spirit and willingness to pursue technological change is exhibited.

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<sup>10</sup> For more information on collective efficiency and industrial cluster development, see H. Schmitz and K. Nadvi, "Clustering and industrialization: introduction", *World Development*, vol. 27, No. 9 (Elsevier Science Ltd., 1999), pp. 1503-1514.

<sup>11</sup> S. Campodall'Orto and N. Sandri, "High-tech spin-offs: a new route for innovation", which is available at: [www.jrc.es/pages/iptsreport/vol68/english/ITP1E686.html](http://www.jrc.es/pages/iptsreport/vol68/english/ITP1E686.html).

### 3. *Clusters as a means of facilitating FDI and domestic investment for technology transfer*

Lessons from clustering experiences throughout the world demonstrate that clustering can facilitate the mobilization of financial and human resources and, through collaborative action, can reduce the size and cost of investment into small, less risky steps.<sup>12</sup> Opportunities for foreign and domestic investment can then arise when investment priorities are established based on local needs and capacities for assimilating additional financial resources. Identifying the various types of investments that are available is an important part of ensuring appropriate synergies sought between investment needs and existing financial instruments.

FDI may take many forms, including: (a) natural resource-seeking, which is the largest type of FDI in Arab countries given the rich oil, gas and mineral resources of the region; (b) market-seeking for the purpose of local manufacturing, thereby accessing domestic and neighbouring markets, which is an increasing form of FDI in the region owing to the signing of numerous free trade agreements (FTAs) in the region; (c) efficiency-seeking, which is directed towards enhancing value-added changes by improving process or product specialization; and (d) strategic and asset-seeking, which seeks to acquire assets and innovation associated with technological development and organization management.<sup>13</sup> Technology transfer to manufacturing SMEs through clustering seeks mostly to secure FDI for the purpose of generating efficiency gains and accessing new export markets. However, opportunities exist for channelling FDI towards supporting innovation by SMEs if an enabling environment is created aimed at encouraging the transfer of knowledge and at supporting the pursuit of technological innovation and adaptation in the region. For example, asymmetrical cooperative arrangements or joint ventures could be forged between large and small firms to facilitate the transfer of technology towards SMEs in developing countries in return for services or goods that could be redirected to the technology provider or investor by the SME as an in-kind return on investment.

Furthermore, FDI can create opportunities for technological spillovers in the Arab world in the following ways: (a) through the turnover of skilled labour from multinational to domestic enterprises; (b) through the provision of technical assistance by large firms to their suppliers and consumers in developing countries; and (c) by direct and indirect learning from other firms based on their experience in securing investment and technology from abroad.<sup>14</sup>

Similar benefits of FDI for technology transfer are witnessed in other regions of the world, particularly when associated with clustering and networking. For example, evidence from the garment manufacturing sector in China demonstrates that the geographic clustering of the industry in Hong Kong has been particularly attractive for foreign investors who have sought to access the Chinese market. In this case, the technology transfer in the sector was greater in Hong Kong than in other, more geographically dispersed garment producing centres in China. This transfer was exhibited in both hard and soft technologies from TNCs to local production facilities. Moreover, while the type of investment directed towards the cluster was mostly efficiency seeking, it was equally strategic in terms of its intention to improve the operational management of production facilities. Technology was transferred both formally through contractual channels, and informally through the transfer of managerial know-how and enhanced opportunities for on-the-job learning and exposure to international ways of doing business. A multiplier effect resulted with the experience gained being transferred informally to other firms in the cluster. The availability of business support services in the cluster was another attractive feature for TNCs and foreign investors, who subsequently found themselves in a better position to access and negotiate with suppliers serving local facilities.<sup>15</sup> It may be possible to transfer lessons from this experience to the Arab region, for example, to

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<sup>12</sup> H. Schmitz and K. Nadvi, "Clustering and industrialization: introduction", *World Development*, vol. 27, No. 9 (Elsevier Science Ltd., 1999), p. 1506.

<sup>13</sup> For more information on these points, see J.H. Dunning, "Re-evaluating the benefits of foreign direct investment," in *Companies without Borders: Transnational Corporations in the 1990s* (UNCTAD, 1996), p. 84.

<sup>14</sup> A. Sadik and A. Bolbol, "Capital flows, FDI and technology spillovers: evidence from Arab countries", *World Development*, vol. 29, No. 12 (Elsevier Science Ltd., 2001), pp. 111-112.

<sup>15</sup> For a full analysis on this topic, see E.R. Thompson, "Clustering of foreign direct investment and enhanced technology transfer: evidence from Hong Kong garment firms in China", *World Development*, vol. 30, issue 5 (Elsevier Science Ltd., 2002), pp. 873-889.

production centres in Egypt or Morocco, where both the potential for expanding production and local consumption in the garment sector is large.

Consequently, the benefits that clustering can provide for attracting FDI and technology transfer rest with the capacity of firms to assimilate new investments and exchange lessons learned among firms operating in the industry; and with the ability of clusters to attract suppliers and business support services to their vicinity, which in turn can increase financial returns for foreign and domestic investors.

#### 4. *Policies for strengthening clusters and networks*

The transfer of technologies to SMEs in developing countries can therefore be facilitated by strengthening clusters and promoting foreign investment opportunities. However, active and appropriate policies are needed to strengthen clusters and networks in a manner that allows them to assist SMEs to this end. In fact, the development of a cluster and the establishment of a network is a slow process, given that building trust and acting collectively takes time to materialize. Different types of SME clusters could be developed and promoted, including, for example, artisanal, rural, urban and technology-intensive clusters, which require different support policy orientations. Within that context, support to firms that are knowledge-based can focus on innovation and design of new products and processes, while assistance to firms in traditional sectors, including apparel and agro-food processing, can concentrate on collective purchasing of raw materials, marketing, higher standards and specifications, quality improvement and technology upgrading.

For countries in the ESCWA region, the development of local SME clusters is a strong argument for industrial policies. Such development can lead to an efficient upgrading of competitiveness of the manufacturing sector, and can contribute to the growth of the domestic markets as well as to the integration in the regional and international markets. ESCWA member countries can benefit from other experiences in cluster development initiatives, where there is increasing evidence of success. In a cluster, firms are better able to grow rapidly, develop product niches, access export markets and offer new employment opportunities. The objective of an initiative of a clustering programme could therefore be to empower groups of firms to work together with less time, effort and energy to overcome the above constraints.<sup>16</sup>

Research on clustering and industrialization conducted at the University of Sussex with support provided by the United Nations Industrial Development Organization (UNIDO) indicates that the following approaches must equally be considered when fostering a cluster development policy:<sup>17</sup>

- (a) Joint activities need to be selective;
- (b) Cooperation has to be positively correlated with improved performance for all firms in the cluster;
- (c) Cooperation in backwards ties with suppliers has to be high or increasing;
- (d) Horizontal cooperation is comparatively low;
- (e) Increasing differentiation and specialization is needed of individual firms in the cluster;
- (f) Public agencies can serve as catalysts or mediators of the process.

These and other mechanisms for enhancing technology transfer and investment opportunities through clustering and networking are elaborated in the analysis and case studies on the agro-food and apparel manufacturing sectors in chapters II, III and IV.

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<sup>16</sup> ESCWA, "Enhancing the productivity and competitiveness of small and medium-sized enterprises through clusters and networks: case study - apparel manufacturing in Lebanon" (E/ESCWA/SDPD/2003/10).

<sup>17</sup> H. Schmitz and K. Nadvi, "Clustering and industrialization: introduction", *World Development*, vol. 27, No. 9 (Elsevier Science Ltd., 1999), pp. 1503-1514.

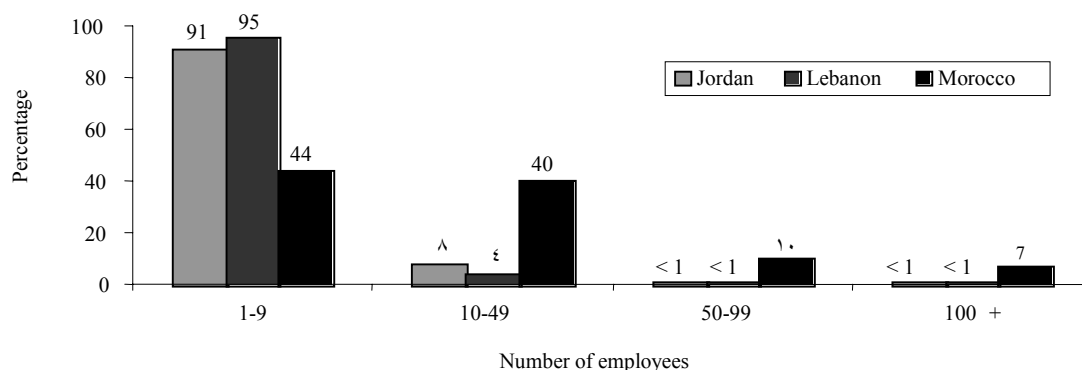
## II. ECONOMIC FEATURES AND TRENDS IN THE AGRO-FOOD AND APPAREL SECTORS ACROSS THE ARAB REGION

### A. THE SIZE OF SMES IN SELECTED COUNTRIES

Outside of the minerals and fuel sector, there are relatively few large enterprises with production activities in the Arab region; rather, it is SMEs that dominate the economic landscape of Arab countries. Owing to an enduring tradition of family businesses, the vast majority of Arab firms comprise fewer than 10 employees, making the average size of Arab SMEs smaller than their counterparts in many other parts of the world.<sup>18</sup>

The most recently available industrial survey data from Jordan, Lebanon and Morocco demonstrate both the dominant economic presence of SMEs in those three economies, and the prevalence of smaller SMEs with fewer than 10 employees in the cases of Jordan and Lebanon (see figure I). Additionally, the data indicate that in Morocco firms are generally larger than their counterparts in Jordan and Lebanon in most industrial sectors, thereby reflecting differences in business traditions and national industrial policies. Indeed, the definition of an SME in Jordan and Lebanon tends to encompass businesses with fewer than 50 employees, while in Morocco a company can be considered an SME even if it has up to 250 employees. The average number of employees per manufacturing firm also differs between the three countries, and is elaborated in the figure below.

**Figure I. Percentage of the total number of manufacturing firms in the formal economies of Jordan, Lebanon and Morocco according to firm size**



Sources: Department of Statistics in Jordan, *Industrial Survey: Mining, Quarrying & Electricity - 2003*; Ministry of Industry in Lebanon, *Industrial Survey (1998)*; and Ministry of Commerce and Industry in Morocco, *National Industrial Survey of 2003*.

While the data in figure I are for the manufacturing sector as a whole, the case studies elaborated in the following chapters reveal a similar pattern in the agro-food and apparel sectors. The number of employees working in the apparel manufacturing sector in Jordan, Lebanon and Morocco averaged at 7, 3 and 154, respectively. These figures in Lebanon and Jordan suggest that SMEs in those countries have generally remained small firms, owned and operated by families. By contrast, the significantly larger size of firms operating in the sector in Morocco indicates that companies in that country have moved beyond the model of a traditional family-operated business, and tend to have evolved into sophisticated management, manufacturing and marketing structures. The presence of larger SMEs in Morocco is also suggestive of firm ownership extending beyond a single family or individual.

As with the apparel manufacturing sector, firm sizes tend to be small in the agro-food industry in Lebanon. A significant 92 per cent of Lebanese food and beverage manufacturing firms have fewer than 10

<sup>18</sup> ESCWA, "Small and medium enterprises: strategies, policies and support institutions" (E/ESCWA/ID/1999/5).

employees; 6 per cent comprise 10-49 employees; and a very modest 2 two per cent of firms consist of more than 50 employees. Similarly, the average agro-food company in Jordan tends to be a small operation, with an average of seven employees. By contrast, agro-food firms in Morocco comprise an average of 57 employees.

## B. CONTRIBUTION OF SMES TO THE NATIONAL ECONOMY

Despite their small size, the substantial number of SMEs in the apparel and agro-food industries in the region represents major engines of employment and growth in Arab countries. Within that context, the apparel sector accounts for 17, 11 and 34 per cent of manufacturing employment in Jordan, Lebanon and Morocco, respectively; and the agro-food industry accounts for 21, 24 and 21 per cent of manufacturing employment in Jordan, Lebanon and Morocco, respectively. Moreover, SMEs contribute strongly to national industrial output. The clothing sector accounts for 5, 7 and 8 per cent of manufacturing output in Jordan, Lebanon and Morocco, while the agro-food sector represents 19, 26 and 31 per cent respectively (see table 1).

TABLE 1. ECONOMIC CONTRIBUTIONS OF THE AGRO-FOOD AND APPAREL MANUFACTURING SECTORS IN JORDAN, LEBANON AND MOROCCO

Manufacturing sector	Country	Employment (percentage of total manufacturing employment)	Output (percentage of total manufacturing output)
Agro-food	Jordan	21	19
	Lebanon	24	26
	Morocco	15	31
Apparel	Jordan	17	5
	Lebanon	11	7
	Morocco	34	8

Sources: Department of Statistics in Jordan, *Industrial Survey: Mining, Quarrying & Electricity – 2003*; Ministry of Industry in Lebanon, *Industrial Survey* (1998); and Ministry of Commerce and Industry in Morocco, *National Industrial Survey of 2003*.

While table 1 demonstrates the importance of SMEs in the agro-food and apparel industry for only three Arab countries, official data for many other countries in the region reveal equally important economic contributions for these sectors, particularly in Egypt, the Syrian Arab Republic and Tunisia. Moreover, official figures only report on activities in the formal sector. Many micro-scale agro-food and apparel operations are not registered and produce only for local markets through limited sub-contracting arrangements. Accordingly, the economic contribution of these sectors is likely to be higher than inferred from official data. Recent research by the World Bank reveals that the contribution of the informal economy to national gross domestic product (GDP) is in the range of 20-35 per cent for Arab countries and, moreover, that most informal activity takes place in micro-enterprises.<sup>19</sup> This increases the challenge of transferring technology and knowledge to these companies, and exposes the need to pursue alternative mechanisms for reaching these small producers, including clustering and networking.

### 1. Agro-food and apparel goods as sources of export earnings

One of the most significant developments in the trade performance of developing countries has been their substantial progress in enhancing export diversification over the past two decades, with a move away from exports of raw commodities to exports of manufactured goods. Their share of higher value-added exports, which comprises manufacturers employing medium- to high-level skill and technology inputs, increased from 20 to nearly 50 per cent over this period. This is related to an overall increase in the

<sup>19</sup> F. Schneider, "Size and measurement of the informal economy in 110 countries around the world", Working Paper No. 220730 (the World Bank, July 2002).

proportion of manufactured goods exported from developing countries, which has climbed continuously from a modest 20 per cent in 1980 to 75 per cent in 2003.

To various degrees, Arab countries have participated in this marked increase in manufactured exports from developing countries. Within the agro-food and apparel manufacturing sectors, Jordan, Lebanon and Morocco are successful exporters to regional and global markets. Furthermore, exports of agro-food and apparel goods comprise substantial shares of both manufacturing exports and total exports of these countries (see table 2).

TABLE 2. CONTRIBUTIONS OF THE AGRO-FOOD AND APPAREL MANUFACTURE EXPORTS TO MANUFACTURING AND TOTAL MERCHANDISE EXPORTS OF JORDAN, LEBANON AND MOROCCO, 2002  
(Percentages)

Goods	Country	Share of manufactured exports	Share of merchandise exports
Agro-food	Jordan	15	12
	Lebanon	20	16
	Morocco	32	24
Apparel	Jordan	29	23
	Lebanon	6	4
	Morocco	48	36

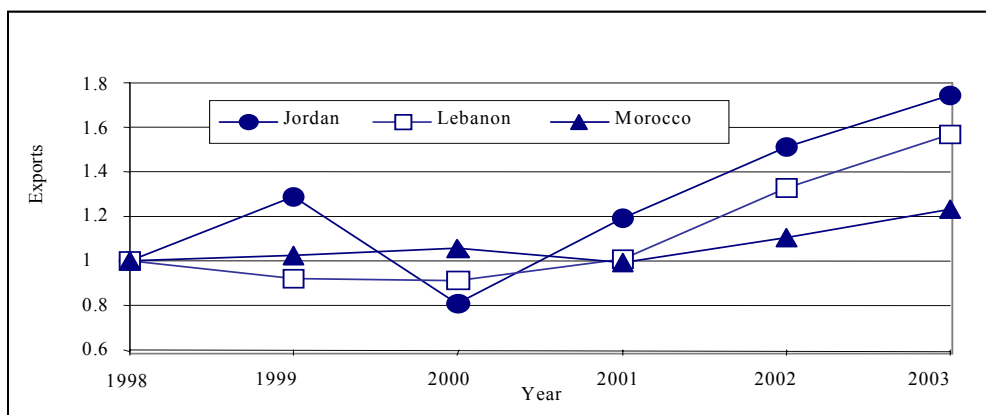
Source: United Nations Commodity Trade Statistics Database (UN Comtrade), which is available at: <http://unstats.un.org/unsd/comtrade>.

Trade data indicate that agro-foods are among the principal exports of Lebanon and Morocco, accounting for more than 15 per cent of total exports; and that apparel goods are principal exports of Jordan and Morocco. Time-series data demonstrate that exports in these sectors have been stable to moderately increasing in recent years, except in the case of apparel where exports from Lebanon have fallen considerably and exports from Jordan have increased dramatically (see figure II). Within the context of the latter, the apparel export boom in Jordan can be largely attributed to increased exports of textile and apparel products to the United States, at almost 30 per cent of total Jordanian exports to the United States.

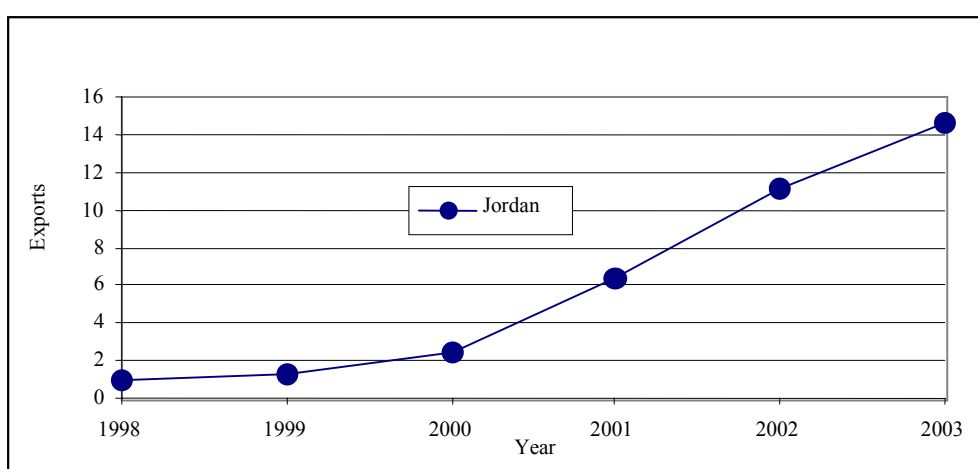
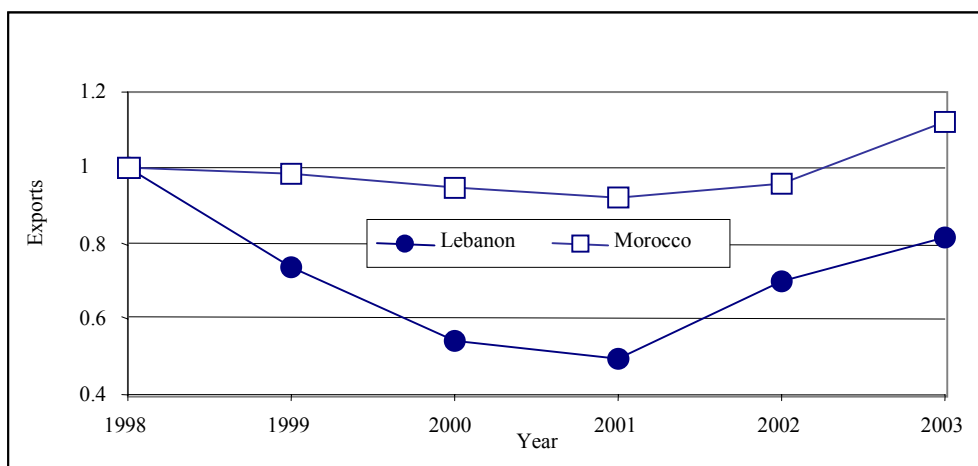
A major limitation of available trade data is that they do not indicate the relationship between the size of firms and their participation in trade. For example, while agro-food products comprise some 20 per cent of Lebanon's manufacture exports, the bulk of such exports are known to derive from its two largest agro-food enterprises, namely, Al wadi al akhdar and Cortas. Similarly the bulk of Jordanian apparel exports are known to be associated with its largest apparel manufacturing firms located in export processing zones, which often employ more than 250 workers.

Figure II. Total agro-food and apparel exports from Jordan, Lebanon and Morocco, 1998-2003

A. Agro-food exports



## B. Apparel exports



Source: United Nations Commodity Trade Statistics Database (UN Comtrade), which is available at: <http://unstats.un.org/unsd/comtrad>.

Note: Exports are plotted relative to 1998 export levels.

### 2. Varied destinations for growing exports

Trade data for 2002 show that the relative importance of major export markets for the three countries are markedly different. In the agro-food sector, the European Union (EU) was the main export market for Morocco, accounting for 62 per cent of its agro-food exports. For both Jordan and Lebanon, 93 and 73 per cent, respectively, of their agro-food exports flowed to other ESCWA member countries. However, in 2002, less than 1 per cent of Jordan's agro-food exports flowed to the EU and the United States compared to some 15 per cent of Lebanon's agro-food exports that flowed to those two markets.

In the area of apparel exports, in 2002, 96 per cent of Morocco's clothing exports were to the EU, and 79 per cent of Jordan's clothing exports were to the United States. The principal destination of Lebanon's apparel exports was the ESCWA region, accounting for some 50 per cent exports; while a comparatively modest 27 and 11 per cent of Lebanese clothing exports were to the EU and the United States, respectively. These trade patterns reflect the fact that apparel manufacturing sector in Lebanon is weakly linked to consumer markets in major developed country regions, compared to those in Jordan and Morocco. This is mostly owing to large firms and larger SMEs in Jordan and Morocco that have successfully integrated into production chains and distribution networks of the apparel industries in the United States and the EU, thereby benefiting from associated FDI, technology transfer and information flow needed to meet the



demand requirements of commercial partners in those developed markets. By contrast, Lebanese firms have generally been slower to integrate into major developed country production and distribution networks, with notable exceptions in such niche markets as children's clothing and haute couture where some Lebanese firms have been successful.

Tariffs in importing countries are one of the major factors influencing the direction and volume of exports from these countries. The trade-weighted ad-valorem tariff rate applied to agro-food and apparel imports from Jordan, Lebanon and Morocco in 2002 was in the range of 14-27 per cent. Tariffs applied by these countries to agro-food and apparel exports to other developing countries are moderately high. Conversely, applied tariffs on their goods exported to markets in developed countries are comparatively lower, particularly for apparel exports to the EU, where all three countries benefit from duty-free access; and to the United States, where Jordanian apparel exports from qualifying industrial zones (QIZs) receive full-duty exemptions.

Moreover, the tariff data in 2002 demonstrate that tariff protection for domestic firms in the agro-food and apparel sectors was higher in Morocco and Jordan, with applied rates in the ranges of 30-50 per cent and 15-30 per cent, respectively; and lower in Lebanon, with a range of 6-19 per cent. However, the rates applied by Lebanon and Jordan on their respective exports were exceptionally high, and probably aimed at discouraging cheaper imports from neighbouring countries. In Morocco, rates applied to imports from Jordan and Lebanon appeared uniformly fixed at an ad-valorem level of 50 per cent.<sup>20</sup> More recent tariff data are needed to examine how the tariff rates have evolved over the past three years.

### C. PRODUCTIVITY AND INVESTMENT

Higher levels of international competitiveness of a country, national industrial sector or individual enterprise are closely related to superior productivity performance and to an ability to shift output to higher productivity activities.<sup>21</sup> There are, however, many other factors that determine international competitiveness, including governance, business environment, logistics and infrastructure, enterprise management, human capital, research and development, and investment in new production technologies. Nevertheless, productivity is a principal driver of international competitiveness, which can be readily assessed from available data. Using data from national industrial surveys reported to UNIDO, two measures of productivity are elaborated below for the agro-food and apparel manufacturing sectors of Jordan, Lebanon and Morocco, namely: (a) labour productivity; and (b) technology and investment.<sup>22</sup>

#### 1. *Labour productivity*

Output per worker in both the agro-food and apparel industries is relatively low in Jordan, Lebanon and Morocco compared to the output in more advanced developing and developed economies (see figure III). Some of these differences arise from the higher sophistication and, consequently, the higher market prices of goods produced in industrialized countries for their own markets. They can also arise from higher costs of inputs to production in industrialized economies. However, the lower output per worker levels of Jordan, Lebanon and Morocco relative to neighbouring developing countries that produce goods of similar sophistication and quality, including, for example, Tunisia and Turkey, is likely to result from absolute differences in labour productivity.

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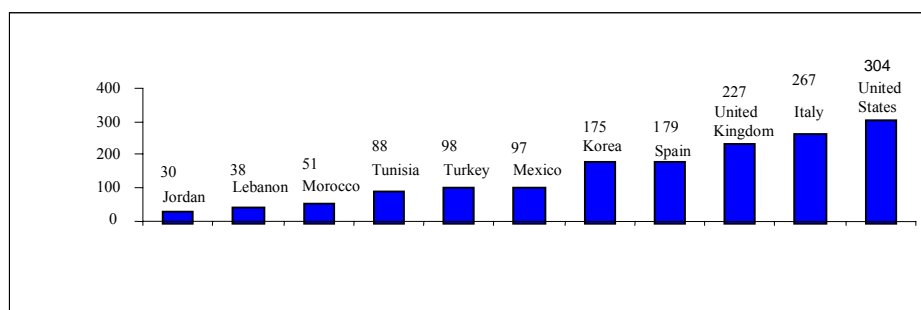
<sup>20</sup> These figures are from the UNCTAD database, namely, the Trade Analysis Information System (TRAINS).

<sup>21</sup> ESCWA, "Methodology for the assessment of competitiveness of selected existing industries" (E/ESCWA/ID/2001/7).

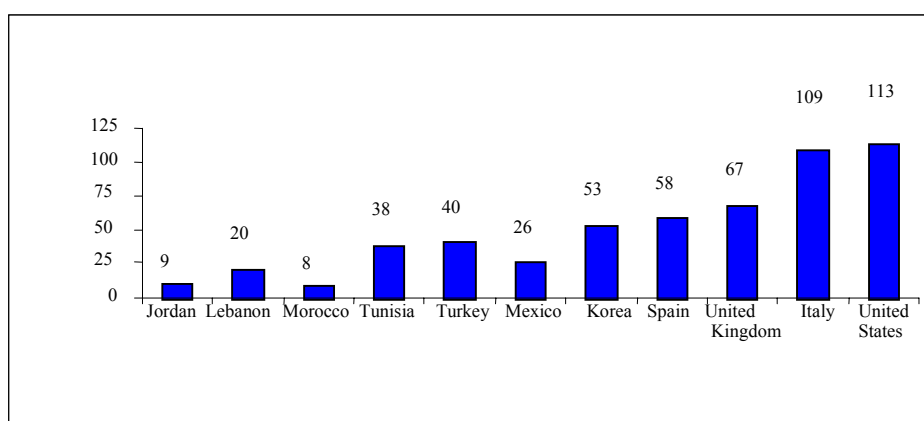
<sup>22</sup> United Nations Industrial Development Organization (UNIDO), *The International Yearbook of Industrial Statistics 2005* (UNIDO, 2005).

**Figure III. Annual gross output per worker in the agro-food and apparel sectors of selected countries**  
(Thousands of United States dollars)

**A. Agro-food sector**



**B. Apparel sector**



Sources: United Nations Industrial Development Organization (UNIDO), *The International Yearbook of Industrial Statistics 2005* (UNIDO, 2005); and Ministry of Industry in Lebanon, *Industrial Survey* (1998).

Note: Data are average values for the period 1998-2002, except for Lebanon where values are for 1998.

However, differences in producer prices can equally contribute to the gap between value added per worker across countries. Prices for similar goods vary owing to differences in prevailing prices, which characterize diverse consumer markets and differences in wage levels in producing countries. Producer prices therefore depend on the income levels of consumers and on the wage rates in domestic markets, and on the income levels of consumers in export markets. From the perspective of producers in developing countries who export goods to higher-income developed country markets, the pricing power is directly affected by the number of intermediaries present in distribution channels and by the presence of monopolistic international market structures. For these reasons, both demand conditions in consumer markets and supporting industry conditions in home and foreign markets are also important factors in determining international competitiveness.<sup>23</sup>

In order to eliminate productivity differences arising from differences in the cost of inputs, productivity can equally be measured in terms of value added per worker. This measure excludes such intermediate inputs as materials, energy and services used in the process of production, all of which are included in estimating output per worker productivity. Consequently, relative differences in value-added

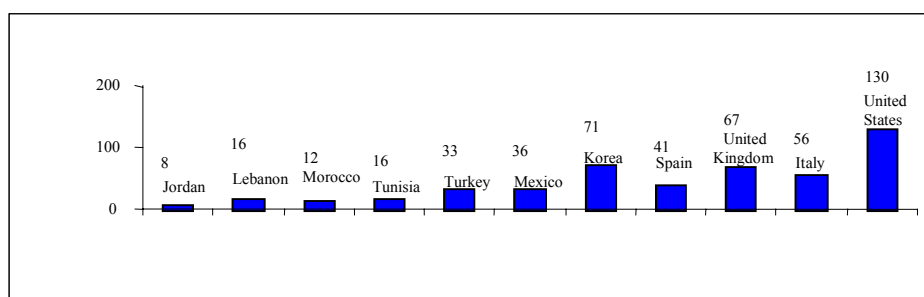
<sup>23</sup> M. Porter, *Competition in Global Industries* (Harvard Business School Press, 1986).

labour productivity for a particular good arise strictly due to differences in production efficiency and producer prices.

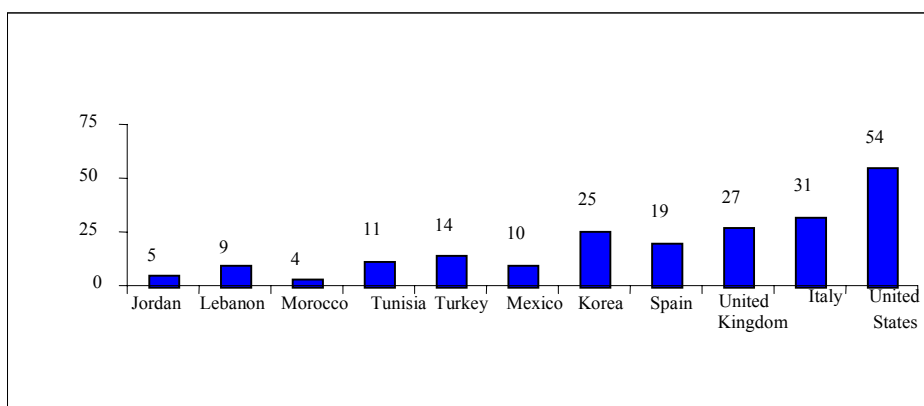
Value added per worker in both the agro-food and apparel industries in Jordan, Lebanon and Morocco is relatively low compared to the value added in more advanced developing and developed economies (see figure IV). These differences can be largely attributed to different levels of production efficiency across countries. Given that production efficiency is directly, albeit not exclusively, related to the application of production technologies, the data are in agreement with known differences in the sophistication of production technologies that exist between developing and developed countries.

**Figure IV. Value added per worker in the agro-food and apparel sectors of selected countries**  
(Thousands of United States dollars)

**A. Agro-food sector**



**B. Apparel sector**



Sources: United Nations Industrial Development Organization (UNIDO), *The International Yearbook of Industrial Statistics 2005* (UNIDO, 2005); and Ministry of Industry in Lebanon, *Industrial Survey* (1998).

Note: Data are average values for the period 1998-2002, except for Lebanon where values are for 1998.

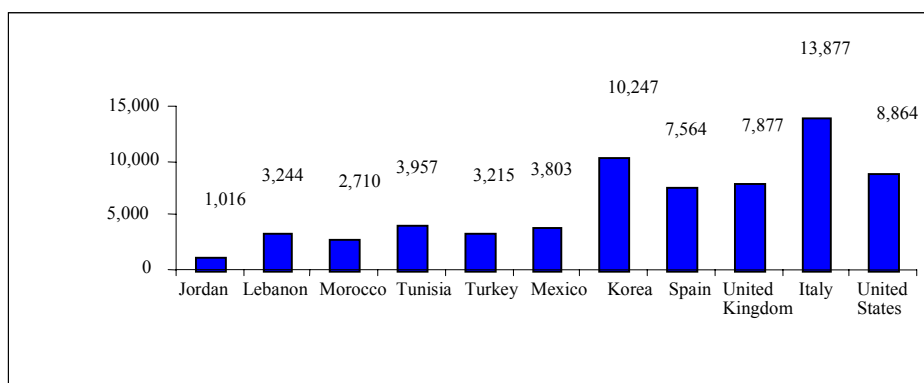
**2. Technology and investment**

In order to examine the role of technology in explaining the differences among countries in value added per worker in the agro-food and apparel industries, it is necessary to look at typical investment rates in capital and equipment used in production. Figure V shows the annual value of investment per worker in these sectors for selected countries. The data demonstrate that investment in production technologies is significantly lower in Jordan, Lebanon and Morocco than in countries with higher levels of productivity, except in the agro-food sector where investment in Lebanon and Morocco are comparable to those of Tunisia and Turkey. Moreover, the data suggest that the level of investment in the agro-food industry is generally

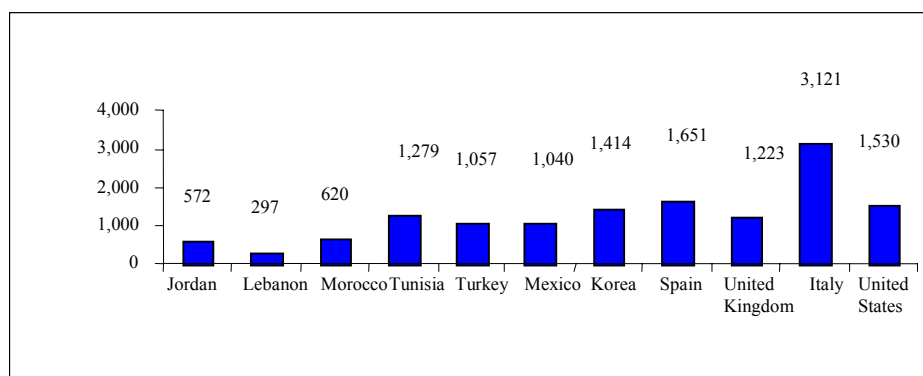
higher than that in the apparel sector where labour tends to represent a larger factor input than capital in the industry.

**Figure V. Annual investment per worker in the agro-food and apparel sectors of selected countries (United States dollars)**

**A. Agro-food sector**



**B. Apparel sector**



Sources: United Nations Industrial Development Organization (UNIDO), *The International Yearbook of Industrial Statistics 2005* (UNIDO, 2005); and Ministry of Industry in Lebanon, *Industrial Survey* (1998).

Notes: Data are average values for the period 1998-2002, except for Lebanon where values are for 1998. Investment is measured as gross fixed capital formation.

**D. TECHNOLOGICAL UPGRADING AND FINANCING FOR TECHNOLOGY TRANSFER**

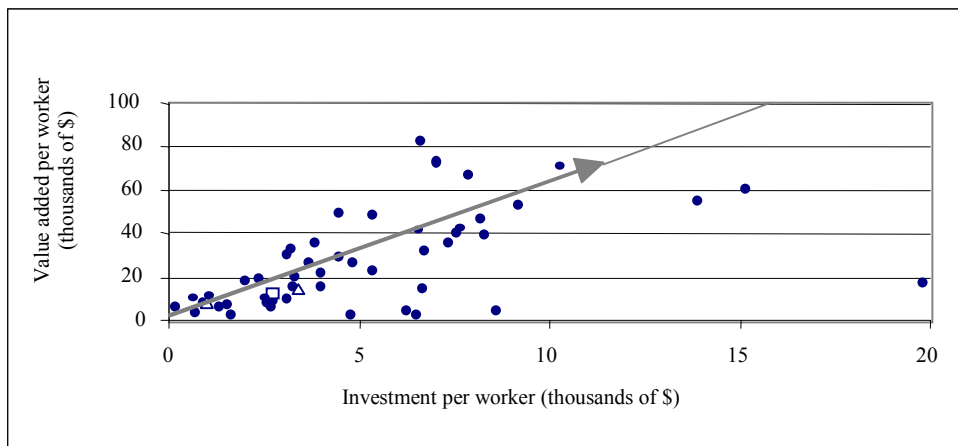
Data on productivity and investment indicate that increased investment in new production technologies needs be one of the principal actions taken to boost the productivity of SMEs in the agro-food and apparel manufacturing industries of Jordan, Lebanon and Morocco. Empirical cross-country analyses support this finding. Specifically, higher rates of investment in production technologies are positively correlated with higher levels of productivity in both the agro-food and apparel industries for a broad sample of countries (see figure VI). By increasing levels of investment in production technologies, firms in the agro-food and apparel sectors are able to move up the productivity curve (shown as diagonal lines in figure VI), thereby achieving higher levels of value added.

Improved production technologies raise value added in one of two ways, namely: (a) producers can employ such technologies to improve production efficiency, while keeping the level of product quality and

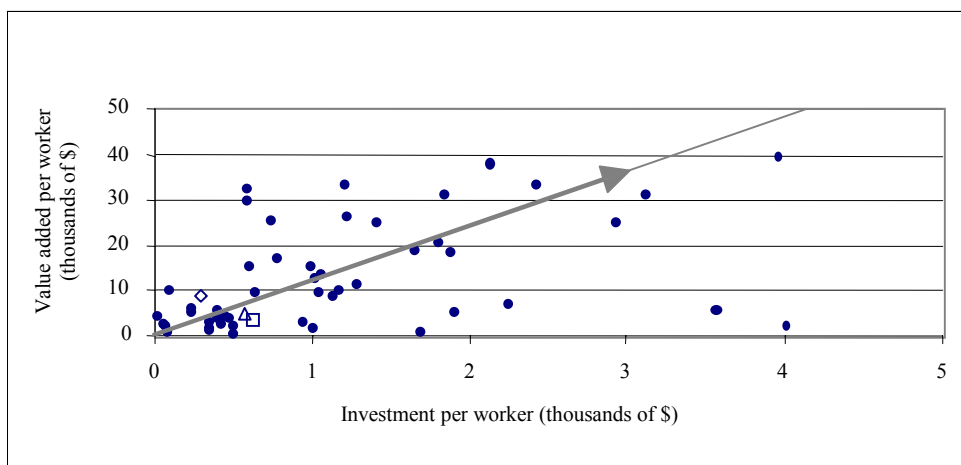
functionality unchanged;<sup>24</sup> and (b) improved technologies allow producers to increase the quality and/or functionality of their products. Within the context of the latter, the willingness of consumers to pay for improved quality and/or functionality increases producer prices. Generally, under such a scenario, unit prices rise by an amount that is greater than the increase in unit production costs, thereby resulting in greater value added per unit.

**Figure VI. The relationship between investment per worker and productivity in the agro-food and apparel sectors of selected countries**  
(Thousands of United States dollars)

**A. Agro-food sector**



**B. Apparel sector**



Sources: United Nations Industrial Development Organization (UNIDO), *The International Yearbook of Industrial Statistics 2005* (UNIDO, 2005); and Ministry of Industry in Lebanon, *Industrial Survey* (1998).

Notes: Data are average annual sectoral values for the period 1998-2002 for 53 countries for which both sectoral value added and investment data were available, except for Lebanon where values are for 1998.

Data points for Jordan, Lebanon and Morocco are denoted by the symbols  $\triangle$ ,  $\diamond$  and  $\square$ , respectively.

SMEs need to identify and access channels of investment needed to support their acquisition of new production technologies that can help them to raise value added. However, investments in capital-intensive

<sup>24</sup> Under such a scenario, while producer prices remain unchanged, unit production costs are lowered, thereby raising value added per unit.

technologies must be complemented by the transfer of knowledge and know-how that can enhance the human capacities required to assimilate these new technologies effectively into production processes.

Access to consumption markets can be improved by expanding export capacities and by better exploiting market access concessions offered by new multilateral and bilateral trade agreements. Moreover, collective actions within SME clusters or networks can be undertaken to establish more efficient marketing and distribution channels that increase the pricing power of SMEs in an increasingly competitive market. Through collective representation and action, clusters can equally increase access to investment and new technologies for member SMEs, and increase their pricing power for produced goods in domestic and foreign markets.

Chapters III and IV present case studies aimed at the following: (a) elaborating on the challenges facing SMEs in the agro-food and apparel manufacturing sectors; (b) reviewing the ways that clusters and networks have assisted SMEs to benefit from technology transfer; and (c) demonstrating how collective competitiveness of SMEs can be improved by establishing and developing clusters and networks. As supportive environments, clusters and networks can provide appropriate frameworks for generating economies of scale as well as appropriate interventions by business support service providers and technical advisors that can facilitate cluster development.

### III. CASE STUDIES OF AGRO-FOOD MANUFACTURING CLUSTERS IN LEBANON

The agro-food industry in Lebanon is a major employer and a major contributor to GDP. The industry is dominated by SMEs with firms of fewer than 10 employees, which represents 92 per cent of all firms active in that sector. Out of a total of 26,300 employees working in the processed food and beverage sector in 1998, 14 per cent were women.<sup>25</sup> Moreover, statistics compiled by the Ministry of Industry in Lebanon reveal that the food sector represents 20 per cent of all industrial firms and 25 per cent of the total manufacturing value added.<sup>26</sup> The total value of the agro-food sector production is currently estimated at some \$1 billion. However, in a new environment defined by globalization and competition, SMEs operating in the sector are facing major challenges to their survival in both local and international markets.

The survival of the agro-food industry in Lebanon has become a continuous uphill struggle, particularly for SMEs. A number of factors have negatively impacted on the operational costs in that sector, including agricultural tariffs and subsidies in export markets, technical barriers to trade, and more stringent enforcement of regulations and requirements regarding health and food safety. These costs are higher for small individual producers who do not have access to the technologies and information needed to comply with stricter quality control and inspection procedures. Concern with regard to food safety has intensified the challenge for local SMEs, particularly given that these rigorous safety standards and testing requirements currently encompass both the end product and the entire manufacturing process.

Despite these obstacles, some of the larger agro-food producers in Lebanon, comprising more than 50 employees, have been successful at satisfying international requirements and at penetrating new markets. For example, Dove Processing, which markets a variety of food products under the widely recognized brand name of Al wadi al akhdar, has made investments in their processing facility in Beirut, thereby meeting consumer demand for high product quality in developed countries and enabling it to export its products to the EU and the United States by adhering to the stricter safety standards. As a result, some 60 per cent of the company's output is now destined for export markets, and value added in production is high. Moreover, Dove Processing and other major agro-business firms in Lebanon, including Cortas, source up to half of their branded products from small specialized agro-food firms that are able to meet high food quality and safety standards. These small-scale suppliers constitute an informal network of SMEs that are able to benefit from the lessons and experience gained by larger producers, and to transfer that knowledge to their individual production processes through various sub-contracting arrangements. Associated SMEs have therefore been able to improve their quality, expand sales and pursue investments in modern production technologies to satisfy market demands.

However, while these larger Lebanese companies have been able to satisfy conformity assessment requirements in foreign markets, many smaller agro-food manufacturers in Lebanon have been unwilling or unable to make the additional investments in production and process technologies in order to improve productivity, quality and food safety. These firms need assistance in meeting product and process requirements in foreign markets, in addition to training and access to associated conformity assessment instruments, particularly in the area of food safety.

This chapter presents the findings from two case studies of agro-food clusters in Lebanon, namely: olive oil and honey. Within the context of the former, various issues are raised, including challenges posed by the production capacity of mills, quality control, food safety, marketing and wastewater management; and benefits to productivity that can be reaped from collective action through technology transfer arrangements and shared knowledge and expertise. The second case study on the honey sector demonstrates the success achieved by beekeepers after their establishment of a cooperative arrangement, measured in terms of building trust, adopting innovative production and process methods, integrating new management

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<sup>25</sup> Women represent a larger share of employment in the formal and informal agricultural sector.

<sup>26</sup> Ministry of Industry in Lebanon, *Industrial Survey* (1998), which is available at: [www.industry.gov.lb/statistics/result.htm](http://www.industry.gov.lb/statistics/result.htm).

techniques, enhancing product quality, and improving awareness and compliance with food safety requirements.

These two case studies reveal many of the structural, organizational and technological challenges facing agro-food SMEs in Lebanon. Moreover, they expose a number of areas where inter-firm cooperation among SMEs can provide mechanisms for improving productivity, value added and marketability of their products.

## A. THE OLIVE OIL SECTOR

This case study was prepared based on information collected from extended interviews with producers of olives and olive oil across Lebanon and along the value chain. Interviews and consultations were also conducted with relevant ministries, national experts and business support service providers, including syndicates, associations and non-governmental organizations (NGOs). Efforts were made to target senior decision-makers, who were able to offer basic information relating to their firms, including as follows: main products, technical capacity, markets and marketing channels, production facilities and technologies, workforce, training programmes and technical skills, quality systems, raw materials, access to financing, Government policies and regulations, participation in associations and examples of inter-firm collaboration.

### 1. Characteristics of olive and olive oil production

According to the Ministry of Agriculture in Lebanon, there are approximately 195,000 farmers in Lebanon cultivating a total area of 248,000 hectares.<sup>27</sup> The average field size for 53 per cent of farmers and growers is less than 0.5 hectares, which collectively represents less than 9 per cent of the total cultivated area in Lebanon. In recent years, the Government has encouraged the cultivation of olives and has subsidized the distribution of some 1 million olive seedlings per year. Currently, olive groves occupy some 52,500 hectares, which represents approximately 20 per cent of all cultivated land, and contribute to the livelihoods of some 110,000 families.

In terms of the olive oil production, total production was estimated at 27,309 tons in 2002 and was distributed as follows: (a) 2,730 tons of extra virgin olive oil; (b) 8,192 tons of virgin olive oil; (c) 3,000 tons of table olive oil; and (d) 13,387 tons of lampante oil, refined and bottled as olive oil.

The main olive-producing regions are located around the towns of Batroun, where the number of olive oil producers is estimated at 31 per cent of all such firms; Bint Jbeil, at 22 per cent; Jezzine, at 13 per cent; and Akkar, at 10 per cent.

Moreover, the estimated average annual consumption of olive oil in Lebanon is 4.8 kilograms per capita, which, given a population of some 3.5 million, translates into a national consumption level of 16,800 tons per year. This implies that, excluding competition from imports, Lebanon has a production surplus of approximately 10,000 tons of olive oil per year. The principal export markets are Australia, Canada, the United States and ESCWA member countries in the Gulf sub-region (see table 3).

TABLE 3. VOLUME OF LEBANESE VIRGIN AND EXTRA VIRGIN OLIVE OIL EXPORTS, 1999-2003  
(tons)

Type	1999	2000	2001	2002	2003
Virgin oil	242	269	468	661	362
Extra virgin oil	153	66	169	226	83
Total	395	335	637	887	445

Source: Lebanese Customs Administration in the Ministry of Finance in Lebanon, "Trade statistics", which is available at [www.customs.gov.lb](http://www.customs.gov.lb).

<sup>27</sup> Ministry of Agriculture in Lebanon, *Resultat globaux du recensement agricole*, June 2000, revised edition, p. 21.



(a) *Technological capacity*

The olive oil industry in Lebanon mostly operates under traditional modes of production. There are approximately 544 olive presses in operation, of which only 370 were registered with the Ministry of Industry in 2003.<sup>28</sup> While most oil presses are located in the north of the country, a significant number are present in South Lebanon. A very modest 3 per cent of national mills operate using an automatic continuous system, 15 per cent are semi-automatic, and the remaining 82 per cent are traditional mills that depend on manual labour.

Technical support to the sector is limited mostly to the international donor community. Independent advisory assistance on the latest machines and process capability is usually solicited only prior to capital acquisitions. This demonstrates limited strategic planning in the sector. Lebanese mill purchasing contracts typically do not include provisions related to mill performance; and mills tend to be equipped with relatively low unit capacity at an average of 600 kilograms per hour (kg/h). This is a handicap both in terms of yield and productivity. This is compounded by a mill capacity that is commonly underused or poorly managed, with effective capacity typically running at less than 150 kg/h.

(b) *Management capacity*

Production planning for many SMEs remains insufficient owing to the low level of coordination between olive producers and olive oil processors ahead of harvest seasons. Typically, the process involves millers waiting for farmers to bring their harvest to the mill for pressing at a fee of approximately \$0.13 per kilogram of raw milled olives, regardless of the olive variety, yield or quality. According to millers, 30 per cent of farmers are serviced within 24 hours of harvest, 60 per cent within 48-72 hours; and the remaining 10 per cent can experience delays of up to ten days. These delays in scheduling, which can be largely attributed to improper forward planning and queuing, are particularly discouraging given that lengthy delays between harvesting and pressing increases the acidity of the resulting oil.

Additionally, monitoring and maintenance of olive oil mills is inadequate. In the late 1990s, the EU supported an aggressive programme aimed at supporting the olive oil sector in the Chouf district of Mount Lebanon in collaboration with the Ministry of Displaced in order to encourage the return of refugees to that district. The effort was implemented with technical assistance provided by an Italian NGO, namely, Istituto per la Cooperazione Universitaria (ICU), and resulted in the upgrading of 51 traditional mills. Unfortunately, only three of these facilities have kept up with maintenance programmes and are currently in good operating condition.

(c) *Human capacity and technical expertise*

In general, farmers and mill labourers of olive oil possess only a basic level of educational and technical awareness, given that very few graduates of technical schools and university are active in the industry. According to the Lebanese Inter-Professional Syndicate for the Olive Sector (LIPSOS), the average age of an olive farmer is 59 years, and 63 per cent of olive farmers are currently aged over 55 years. Consequently, there is a greater tendency for this age group to rely on traditional methods, and to be averse to both technological change and the upgrading of skills.

While significant international assistance is being directed towards supporting the olive oil industry, efforts are sporadic and uncoordinated. Most of this assistance is aimed at capital equipment, which leaves limited resources for human capacity-building and for the transfer of sector-specific knowledge and know-how. Of the little in-depth specialized training that is directed to farmers, virtually none targets olive oil millers or their suppliers. Consequently, millers appear unaware of modern models of collaboration between farmers, industrialists and their suppliers in order to achieve efficiency gains. Furthermore, Lebanese agents of olive oil mills are mainly interested in recuperating their investments by selling new equipment and spare parts. They are therefore less predisposed to advise local stakeholders on appropriate opportunities for technology transfer and upgrading based on existing technical capacity. Business support services normally provided by mill retailers is in need of strengthening, particularly those related to maintenance, seasonal diagnosis and tune-ups of machinery.

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<sup>28</sup> Prior to that year, registration was not mandatory.

Additionally, the Ministry of Agriculture provides agricultural extension services to the sector, mainly in terms of disease prevention and mitigation. For example, the disease that affects olive leaves, peacock eye (*cycloconium oleaginum*), is a widespread problem in the olive sector, particularly for trees that grow at altitudes below 600 metres and where the humidity is at 80 per cent. The contagion produces weak trees and prevents new burgeoning. Treatment is undertaken using copper oxychloride, which is supplied by the Ministry of Agriculture twice per year.

(d) *Inter-firm relationships*

There are several olive and olive oil cooperatives operating across Lebanon. These membership-based institutions generally provide individual farmers and small-scale producers access to various services, including olive oil mills, testing and quality guarantees, and agricultural extension services. However, cooperatives operate at different levels of capacity. While some provide exceptional services and technical assistance to their members, others have become political entities or exist in name only. Very few cooperatives have sought to foster linkages or opportunities for collaboration between their constituent members. The few that have been successful tend to be managed by NGOs that have local development objectives and that have contributed technical expertise and marketing support to assist local producers.

Sub-contracting and leasing arrangements between large agro-food companies and smaller producers exist in the sector. For example, a large olive oil producer with more than 100 employees based in the north of the country rents out its olive groves to local farmers and subsequently purchases the oil they produce. The company also purchases olive oil from other producers, based on quality testing conducted on its premises. This arrangement allows the larger firm to specialize in testing, quality control, grading, bottling, storage and marketing, while leaving cultivation to local farmers and small-scale olive oil producers. The result is a functioning cluster that allows producers skilled in different stages of the production process to focus on their respective areas of expertise, without risking diversification in new areas. Technological improvements and technology transfer are accordingly directed towards improving productivity and efficiency at certain stages of production in accordance with different needs. Interestingly, while the company conducts in-house testing of its products and is able to export to the EU, the lack of accredited testing facilities in Lebanon forces it to send its oil for testing in Europe in order to comply with the conformity assessment requirements of the EU.

## 2. *Challenges facing the sector*

Despite the high levels of olive production and the potential for profitability given strong local and international demand for olive oil, the sector in Lebanon continues to face various challenges. Some of these are elaborated below.

(a) *Regional and international competition*

While profits can be made in the sector, regional competition increasingly threatens returns for the olive oil production in Lebanon. For example, it is estimated that the Syrian Arab Republic produces 135,000 tons of olive oil per year, which places it as the fourth largest producer in the world. Syrian olive oil is highly competitive as a result of subsidized agricultural inputs and low labour costs. Extra virgin olive oil in the Syrian Arab Republic is produced at \$1.92 per kilogram, which is 35 per cent below average Lebanese production costs; and virgin olive oil is processed at approximately \$1.20 per kilogram, or 50 per cent of the average Lebanese production cost. Additionally, Syrian olive oil was known to enter the Lebanese market illegally prior to early 2004, thereby lowering the potential value added for Lebanese producers. However, with full implementation of the Lebanese-Syrian Free Trade Area (FTA) in October 2004, Syrian olive oil now receives duty-free treatment in Lebanon and is in direct competition with local producers. Lebanese producers exporting abroad must compete with large European producers, particularly in Greece and Spain, who also benefit from substantial subsidies.

(b) *Inconsistencies in olive oil quality*

Olive cultivation is differentiated within and across regions in Lebanon, and is concentrated in the five types of olives. This diversity complicates olive oil production, given the difficulty in differentiating and monitoring different batches of olives during the harvesting, pressing and processing phases. As a result, there are often significant inconsistencies in the taste and quality of olive oil produced by a given cooperative or farm.

Moreover, given the possible delays of 1-10 days mentioned above in terms of pressing olives at the mills, bottlenecks tend to emerge during processing, which reduce the quality of oil. Some cooperatives were unaware of the negative impact of such delays on the quality of the oil, while others were conscious of the link but did not consider the loss of quality to be significant. Additionally, surveys have revealed that there is a practice among some farmers to reduce the acidity levels of previous oils by admixing them with fresh batches of a current harvest. This practice increases the peroxide levels of the resulting olive oil, thereby reducing the shelf life of the final product. The result is the rapid degradation of the mixed oil and the lost potential to add value through consumer confidence and quality consistency.

The quality of olive oil is further affected by the fact that, upon pressing, the oil is often stored in plastic containers. Some oil is kept in galvanized iron tanks; and only a minority of producers use stainless steel tanks or vitrified clay jars, which are more suitable for olive oil storage. However, the most adequate containers for storing olive oil are made of glass.

In the past few years, there has been a growing concern regarding a chemical component in olives, identified as delta-7-stigmastanol. In spectral analyses, the International Olive Oil Council (IOOC) puts upper limits for delta-7 in olive oil at 0.5 per cent. However, new hybrids planted in Lebanon and the Syrian Arab Republic produce oil with an amount of delta-7 that is consistently higher than 0.7 per cent. Other vegetable oils produce amounts of delta-7 at much higher levels, typically in excess of 20 times that found in olive oil. Consequently, this suggests that the threshold is probably based on preferred quality standards, rather than on actual food safety concerns. Some producers have urged the IOOC to revise the international standard, thereby allowing for higher delta-7 levels. The issue remains unresolved and presents a potential trade barrier for regional exports to EU markets that have adopted the IOOC standard and a means to protect the European olive oil producers from imports.

Moreover, the industry suffers from poor regulation and enforcement of olive oil standards, grading schemes, species variety certification and phytosanitary protections. While the Lebanese Standards Institution (LIBNOR) has issued quality standards for olive oil, these standards are voluntary. This is creating a situation whereby high quality olive oil is not distinguished from sub-standard oil, which removes the financial incentive for producing high quality products.

(c) *Inadequate food safety standards and conformity assessment infrastructure*

Many Lebanese producers face difficulty in satisfying health and food safety regulations in export markets, as well as quality requirements. Changing food preferences and cultural differences add other dimensions to the issue; and producers are compelled to keep abreast of new dynamics and requirements in the market in order to remain competitive. This requires access to information concerning foreign and domestic market standards, in addition to mechanisms for monitoring and managing such information. This can be challenging for small-scale producers in the agricultural and agro-industrial sectors, particularly those with limited computer literacy.

The agro-food industry has recognized the importance of quality assurance procedures and control mechanisms as a means of penetrating foreign markets and capturing a larger share of the local market. However, the control and prevention of food-borne diseases at manufacturing sites can be difficult given that each stage of the production process has its part in the overall quality control process. In addition, most small- and medium-sized producers do not have in-house testing facilities to monitor their production processes for food safety or quality standards owing to the prohibitive cost of investing in the needed capital and personnel needed to conduct such tests. Laboratories are expensive to install, operate and maintain. SMEs simply do not have the financial or human resources to manage such facilities. Moreover, many SMEs are not subject to regular on-site inspections to ascertain compliance with product and process safety requirements. Consequently, producers are often unaware of problems in their production process that could impact the quality or safety of their final goods.

The Hazard Analysis and Critical Control Point (HACCP) System has become a global system for ensuring food safety. Firms that are compliant with HACCP address biological, chemical and physical risks to food safety that can emerge during food processing by anticipating and preventing potential threats, rather than through end-production inspection.<sup>29</sup> The approach has been accepted by the food industry as a means

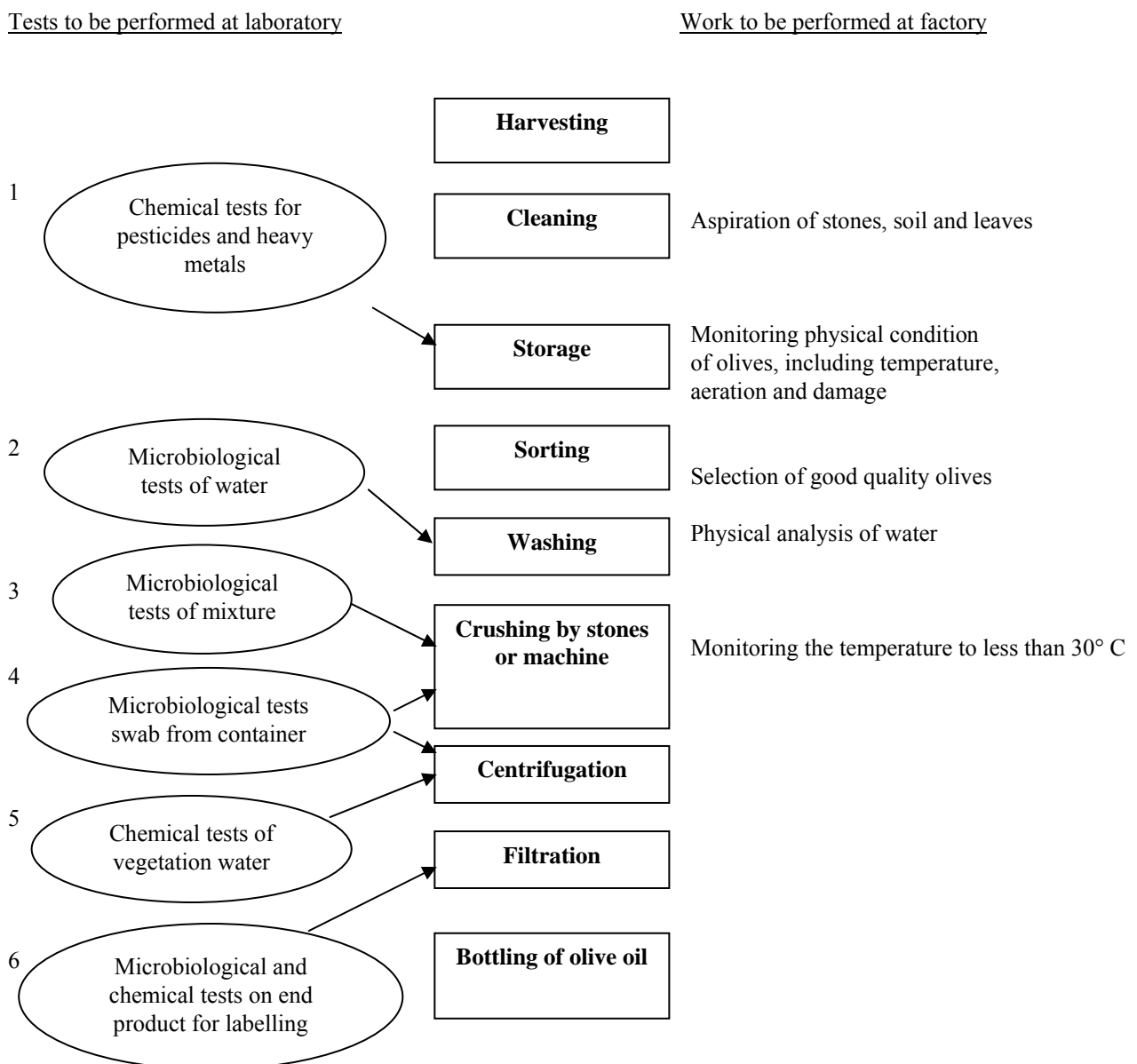
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<sup>29</sup> Food and Agricultural Organization (FAO), *Food quality and safety systems - a training manual on food hygiene and the Hazard Analysis and Critical Control Point (HACCP) System* (FAO, 1998).

to ensure the suitability of food for human consumption. Figure VII provides a flowchart of the olive oil production process and indicates what tests are necessary at different stages of the production process in order to be HACCP compliant.

While the application of HACCP to all segments and sectors of the food chain is possible, only a handful of companies in Lebanon are certified as HACCP compliant, and fewer have committed themselves to following good manufacturing practices (GMPs) or have incorporated the Codex General Principles of Food Hygiene into their production processes. This can be attributed to limited, albeit growing, awareness among SMEs regarding the components of these various food safety systems. While some cooperatives are seeking to adopt GMPs and the Codex Principles into their regular business practices, none of the olive oil mills in Lebanon has adopted such manufacturing practices and processes. This limits the ability of mills to render good quality oil. Consequently, the upgrading of mills requires both technological upgrading and capacity building and training aimed at improving technical expertise from the olive fields to the presses and the bottling facility. The adoption of HACCP and GMPs is particularly important for farmers and millers looking to generate new sources of income through exports.

**Figure VII. Flowchart of olive oil processing and associated testing and handling related to the Hazard Analysis and Critical Control Point (HACCP) System**



At \$765 per batch, the cost of regularly testing olive oil samples at the level of the farmer or the mill operator is significantly high for typical SMEs (see table 4). As such, many producers go without testing and are unaware of the composition of their outputs. This can pose risks to health and safety if the resulting oil is contaminated, and also reduces opportunities for improving product quality based on information gained from the tests.

An important challenge facing the industry is the lack of accredited laboratories specialized in the testing of olive and olive oil products in Lebanon. This increases the cost of production in the sector and presents a technical barrier for exports. Some producers have underscored the need for access to certified testing facilities, and to improved accessibility and proximity to laboratory facilities and extension services in order to help them improve product quality and provide them with technical support.

TABLE 4. TESTS REQUIRED DURING OLIVE OIL PROCESSING TO BE HACCP COMPLIANT

Type	Tests at Laboratory Level	Unit price <sup>b/</sup> (United States dollars)
1	Chemical tests of olives at storage	
	Pesticides residues	60
	Heavy metals: lead, copper and iron	90
2	Microbiology tests for water	
	Total count and coliforms	30
3 <sup>a/</sup>	Swabs for microbiology tests from containers of:	
	Crushing	30
	Centrifugation	30
4	Microbiological tests of mixture	
	Total count and coliforms	30
	Yeast and moulds	30
5	Chemical tests of vegetation water	
	Acidity	25
	Polyphenols	30
6	End products	
	Impurities (centrifugation)	30
	Acidity	25
	Peroxide value	30
	Iodine value	30
	Fatty acid composition	60
	Pesticide residues	60
	Moisture and volatile matter	15
	Refractive index	20
	Saponification number	30
	Specific gravity	20
	Heavy metals: lead, copper and iron	90
	<b>Total cost per batch</b>	<b>765</b>

Source: Compiled by ESCWA.

Notes: <sup>a/</sup> These tests are performed at least once per month. Consequently, the maximum cost of testing per batch is \$765 and the minimum cost is \$705.

<sup>b/</sup> The unit prices are at cost.

In the absence of local alternatives, the creation and extension of a network of service providers comprised of relevant institutions, including the Industrial Research Institute (IRI), the Lebanese Agricultural Research Institute (LARI) and the Central Health Laboratory at the Ministry of Public Health, could be a means to improve access to testing service for the sector. However, interviews with industrialists revealed difficulties faced by the private sector in accessing the services of public institutions. Some

mentioned the prohibitive costs of testing at IRI, while others noted the chronic shortages of vital reagents and chemicals at LARI, and the lengthy delays in issuing documents and test results by the Central Health Laboratory. Most of these facilities are also located in or near Beirut, which increases the cost of conformity assessment with respect to the transportation of samples for testing. Furthermore, the capacity to accredit testing facilities is limited in Lebanon, which brings into question the reliability of test results. This has reduced confidence in the ability of public authorities to provide adequate infrastructure for food safety.

The National Council for Scientific Research (CNRS) in Lebanon finances research activities in the general field of agriculture as part of its mandate. However, its work is not always oriented towards the economic requirements of the local food sector, and its investment in research and development is limited.

Alternatively, several local universities have private laboratories that offer testing services that are recognized for their reliability. However, the price of these tests is often beyond the financial resources of smaller manufacturers, particularly if the tests are to be conducted regularly and in accordance with HACCP requirements. This increases operational costs for SMEs, particularly those seeking to be in compliance with international requirements necessary to access more lucrative foreign markets.

The prevailing economic conditions in the country are also contributing factors to the overall difficulty in setting up a comprehensive system for food safety control and associated regulatory mechanisms nationwide. The promulgation of the Consumer Protection Law in 2005, in addition to efforts aimed at food safety, could help to mitigate these problems.

(d) *High transaction costs, administrative requirements and marketing*

Olive oil millers often complain regarding the difficulties and the high costs of industrial licensing of olive oil presses, which includes back taxes to the Government from the date of establishment. This impediment is preventing very old traditional mills from entering the industrial registration system. Consequently, this prevents them from soliciting technical assistance and technology transfer support from the Ministry of Industry through various projects funded by foreign donors.

New regulations in the EU and the United States on traceability currently require that the names and origins of inputs contained in the food product be declared prior to importation. This monitoring and reporting can be a complicated matter for olive oil producers, particularly given that farmers often do not keep records of their production, and that millers are not always rigorous in ensuring that different types of olives from different farms are not mixed in production batches. Moreover, collecting, reporting and storing this information requires a knowledge management system, which could be facilitated by information technologies or collective reporting arrangements.

In addition to complying with new food safety and transparency regulations, SMEs find difficulty in marketing their oil outside traditional channels. While some subcontracting arrangements have emerged between large and small firms that have enhanced technology transfer along the production chain, direct sales to retail outlets and large commercial consumers can be challenging. This can be partly attributed to costs associated with branding, quality control and cost competitiveness with regard to marketing products on an individual basis.

(e) *Environmental challenges*

Olive oil mills in Lebanon do not control the wastewater oil content and do not generally possess modern systems for managing or recycling solid waste streams. Disposing of mill wastewater is a major challenge given that Lebanese law prohibits uncontrolled dumping of pressed olive residues, which can raise the levels of biological oxygen demand (BOD) in neighbouring waterways. Within that context, there are cases of internal security forces being called upon to shut down olive oil presses for environmental or health reasons in the middle of the milling season. This situation frustrates millers who complain that modern waste disposal technologies are not available, thereby leaving them with few alternatives for the disposal of organic waste during the milling seasons.

While NGOs have sought to address this issue with the assistance of the international donor community, the transfer of environmentally-friendly technologies to developing countries can be a complicated process. As such, business support service providers, including non-profit organizations, can benefit from technology transfer assistance to support the effective implementation and monitoring of local initiatives through international advisory services, training and lessons learned from other regions.

### *3. Opportunities for technology transfer and investment through inter-firm cooperation*

In view of their small size and the challenges noted above, SME producers of olive oil face difficulties overcoming the problems of production capacity of mills, quality control, food safety, marketing and wastewater management on an individual basis. The strengthening of producer clusters and development of networks between producers and services provides along the value-added chain can help SMEs to overcome these challenges. Technical support and technology transfer to olive oil producers could therefore become more cost-effective and reach larger numbers when producers enhance their cooperation among themselves. For example, such arrangements offer the following advantages:

(a) Stronger networking between olive farmers and olive oil mills fosters better coordination and planning of existing olive presses;

(b) Improved scheduling reduces the length of time between olive harvest and milling, thereby improving the quality of olive oil, regularizing workflows at the olive presses and making better use of existing capacity. This provides better returns on investment in mills and bottling facilities;

(c) Capital investment for new mills needs to be complemented by the transfer of knowledge and know-how regarding the maintenance of new machinery and equipment. Training directed towards mill owners and operators in this area can improve the management and operations; and the provision of maintenance services to other mills can create a secondary line of business of mill operators, or create a new generation of business service providers;

(d) Olive oil cooperatives can provide mechanisms for better integration of production lines of different farmers and olive oil producers, thereby reducing the cost of testing and quality control for individual producers;<sup>30</sup>

(e) Olive oil cooperatives can serve as clearinghouses for grading and aggregating similar types of olives from different producers and, subsequently, facilitating arrangements for these producers to press their olives collectively.<sup>31</sup> Such collective arrangements for pressing and testing could equally facilitate compliance with traceability requirements in the export markets of the United States and EU;

(f) Clusters of olive and olive oil producers seeking to work individually can still reap benefits from working collectively by soliciting testing facilities to better serve their communities. As demand increases and requests are made for testing services, private companies and technical experts are likely to seek out areas where they can allocate investments in testing technologies and related services for food safety and quality control, which can further reduce the cost of testing;<sup>32</sup>

(g) A network of olive oil producers operating in the same cluster or regional vicinity can solicit Government approval for the right to create a geographic indication for olive oil in their region as a way to

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<sup>30</sup> Within the framework of such a mechanism, all the olives produced by members of the cooperative are pressed, sampled and tested as a single batch, thereby generating economies of scale and reducing the cost of testing at the individual level.

<sup>31</sup> Resulting olive oil batches can then be sampled and tested collectively, which helps to standardize inputs, improves olive oil quality, and reduces the cost of testing at the individual level.

<sup>32</sup> Olive oil industrialists represented by LIPSOS feel that it is important to invest in specialized facilities that are accredited to conduct tests specific to the olive oil industry. This promotes soil and foliar analyses and allows qualified personnel to assess acidity, peroxide, sterols and the several other standard tests in accordance with those required by the IOOC and other international standardization bodies.

differentiate their products from other local and international productions.<sup>33</sup> Securing a right to a geographic indication can increase marketing opportunities for large and small producers, particularly in regions known for their superior quality products. The procedure for securing such a right demands concerted efforts from producers in the same area and, consequently, networking and cooperation aimed at establishing a common label;

(h) Environmental challenges related to olive oil production can be overcome by collective action and by the appropriate use of technologies. Olive residues can be handled and managed in a way to produce high quality organic fertilizer for the agricultural sector. While a single olive press does not necessarily possess the economies of scale to secure profits for handling and marketing waste residues, given investment in appropriate technologies and management, the processing of waste can generate a secondary industry for the sector that can prove lucrative as consumer demand increases for organic agricultural produce;

(i) Better networking and relay of information between producers and research institutions can raise awareness regarding diseases and new pathogens facing the sector. Collaboration on joint research project among national research institutions is also recommended.<sup>34</sup> Creating a network for sharing information about these problems and establishing a database for collecting and monitoring the data can support research and development on olive production that could benefit the sector as a whole.

The principal objectives of SLFI are the development of food safety standards, certification infrastructure and accreditation policies. The implementation of these objectives fits within national public policy objectives to implement a framework law on food safety. The law supports previous policy objectives to provide training in the area of food safety. Moreover, SLFI and the Ministry of Education and Higher Education have agreed on the need to establish vocational education and training school for food industries. As such, agrarian communities could solicit the Government and financial institutions to invest in specialized educational facilities for the food sector, thereby enhancing and widening opportunities for technology transfer to the agro-food industry.

## B. THE HONEY SECTOR IN SOUTH LEBANON

This case study examines a cluster of beekeepers in South Lebanon who are beneficiaries of a technical assistance project that is being implemented by ESCWA with the financial support of the International Labour Organization (ILO), entitled “Employment Creation and Income Generation through the Development of Micro and Small Agro-industries in South Lebanon”. This project, which is coordinated in consultation with the Government of Lebanon, UNIDO and other United Nations entities, seeks to enhance the productivity and competitiveness of the agro-industries in the formerly occupied territory of South Lebanon.

The first phase of the project entailed the preparation of a need assessment to identify the specific sectors and cluster of villages that would be targeted for technical assistance. The assessment was conducted based on a series of consultations with local producers, public and private institutions and experts. A survey of local farmers, agro-industrial business owners and business support service providers was conducted with the support of the Association for Rural Development (ADR). This resulted in a mapping of local resources, human and technical capacities and needs. A preliminary assessment based on a set of agreed criteria among the partner agencies identified honey and herbs as potential sectors to target. Two feasibility studies were

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<sup>33</sup> Within that context, the Ministry of Economy and Trade, the Chambers of Commerce, Industry and Agriculture and the Syndicate of Lebanese Food Industries (SLFI) are working to identify and list certain Lebanese products that could be designated with geographic indications. A cluster of olive oil producers could submit their proposal to be included in such a list.

<sup>34</sup> Within that context, several farmers and cooperatives have expressed difficulties overcoming certain maladies facing olive trees in the region, and the limited technical assistance to help them with these problems.



subsequently prepared on the potential for developing the production in South Lebanon of honey and/or thyme, referred to as *zaatar* in Arabic.<sup>35</sup>

Based on these assessments and consultations among the implementing partners, the second phase of the project has focused on developing the honey sector in a cluster of villages in the administrative district of Bint Jbeil in the south of the country. Given that productivity improvements in the honey sector and opportunities for increased income generation can be better achieved by enhancing synergies between the honey and *zaatar* sectors, the project directs complementary efforts towards improving the cultivation of *zaatar*. That cultivation also generates secondary benefits, namely, combating land degradation and enhancing employment opportunities for women. This case study on honey is based on the project assessments and the results achieved by a cluster of beekeepers that was part of a pilot project.

### 1. *Characteristics of the sector in South Lebanon*

In 1999, the High Relief Committee in Lebanon declared that the formerly occupied area of South Lebanon was the most socio-economically deprived area in the country. Since then, employment and income generation opportunities remain limited. Agriculture continues to be the dominant sector in the region and employs nearly half of the working population, while employment in value-added agro-industries remains limited representing only one-fifth of manufacturing employment. Local governments and residents in South Lebanon are therefore seeking to capitalize on the natural synergy between the agriculture and agro-food industries by enhancing development of agro-food manufacturing clusters in South Lebanon.

Most workers in that region are employed as artisans or in agricultural forms of employment. However, it is common for workers to be engaged in several economic sectors, with agriculture representing only a portion of household income. The contribution of women to the agricultural workforce tends to be underreported given that farming in South Lebanon is predominantly a family business and that the work of women constitutes an informal arrangement. Nevertheless, the potential exists to build downstream linkages between agricultural production and the value-added agro-food manufacturing sector, as well as related services, including testing, packaging, printing and labelling, in order to enhance the competitiveness of the sector.

#### (a) *Family business*

Honey production, or apiculture, is a widespread and loosely clustered economic activity in Lebanon. Most Lebanese beekeepers are not specialized producers of honey, and beekeeping is a secondary occupation. Many beekeepers work primarily as farmers, teachers, merchants or civil servants. For farmers, apiculture tends to be a traditional family activity that is practised to satisfy household needs for honey consumption and to generate additional household income through the sale of excess production in the local market.

#### (b) *Production and process technologies and methods*

While apiculture is not a capital-intensive process, it involves technical knowledge with regard to the management of bee communities in order to achieve higher levels of output. The average annual production of honey is in the range of 5-20 kilogram per hive; however, Lebanese beekeepers report output levels at the lower end of this range. Moreover, while beekeepers in the south tend to harvest honey twice a year, the potential to increase bee productivity is much higher given the rich variety of flora in the country, which is available at different altitudes throughout the year. Accordingly, while most beekeepers in Lebanon produce honey twice a year, with appropriate planning, training and transfer of technical know-how, it would be possible to extract honey in Lebanon four times a year.

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<sup>35</sup> *Zaatar* is the common term used in the Middle East to refer to *origanum syriacum* and, additionally, describes a mix of spices that combines dried *origanum syriacum* with sumac, sesame seeds and salt. The term *zaatar* is used in this chapter to refer to the plant in its various processed forms, including fresh, dried, mixed and distilled.

Most apiculturists in Lebanon do not breed for high productivity queens, as local breeds are mixed and are not necessarily of high quality. High quality queens are imported, particularly from Australia and Italy; and while the incorporation of foreign queens into existing bee colonies is a sensitive process, it can bring significant rewards if properly managed. Local beekeepers have faced some difficulties with this assimilation process, which has limited their capacity to expand their number of colonies and increase production.

The processing of honey generally entails extraction, filtering, testing and packaging. Processing of honey from the hive to the bottle is traditionally done manually in South Lebanon. However, the process can be significantly improved with mechanization. For example, repeated filtration of honey extracted from the hive prior to bottling can remove impurities from the final product and reduce the risk of crystallization, thereby improving the quality of the final product. However, beekeepers tend to filter only once and sometimes do so in the open air directly after extraction from the hive. There is also limited awareness and application of basic hygiene practices; and testing is rarely conducted.

There are three centres that can serve honey producers in South Lebanon and that house the equipment and services needed for the extraction, filtration and bottling of the honey. The fee for these services is approximately \$1 per kilogram of honey. While this fee is affordable, very few farmers have made use of these centres given their preferences for traditional methods and family labour. Furthermore, while compliance with certain food quality and safety requirements could be improved by processing honey at these facilities, none of the centres in South Lebanon is a certified service supplier.<sup>36</sup>

#### (c) *Testing and quality standards*

Currently, only large producers of honey appear to be conducting formal testing of their products on a regular basis. Some of these larger producers in South Lebanon have indicated that they conduct some quality testing themselves, while others have access to testing facilities in agricultural vocational schools. The basic quality tests required for international standards include, among others, moisture content, electrical conductivity, acidity, hydroxymethylfurfural content and sugar levels. While most of these analyses have to be performed chemically, some affordable tests can be performed at the production sites and, therefore, can be part of the beekeeping supplies for large and small producers.

Nevertheless, commitment to quality control and testing of honey products is not evident. Some beekeepers have limited confidence that the results of a quality test will not be kept confidential and fear that the results could be used as a competitive edge against them by other producers, given that local sales are often generated by word of mouth and the reputations of producers. Building trust among producers and local institutions is therefore needed if conformity assessment is to improve in the area. This problem can be overcome through networking and confidence-building measures between producers and local service providers.

Additionally, it is unclear whether local producers differentiate between testing for quality and testing for microbiological contaminants, which require significantly different types of tests and testing equipment. While honey has the advantage of having a long-shelf life and resistance to most bacteria, food safety testing is a necessary component of the production process, which is commonly overlooked by local producers.

#### (d) *Demand and marketing of honey*

Lebanon runs a large trade deficit in honey. Typically, Lebanon imports 20-40 times more honey than domestic production levels (see table 5). The data also indicate a variable, albeit increasing, trend in the export price of honey in recent years. Export levels have also been sensitive to fluctuations in local production and demand.

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<sup>36</sup> Moreover, at least one of those three centres lacks the physical infrastructure to certify processed honey as compliant with basic food safety and sanitation requirements.

TABLE 5. LEBANON'S TRADE IN HONEY, 1997-2002

Year	Imports		Exports		Export price ( <i>United States dollars per kg</i> )
	Quantity ( <i>tons</i> )	Value ( <i>millions of Lebanese pounds</i> )	Quantity ( <i>tons</i> )	Value ( <i>millions of Lebanese pounds</i> )	
1997	415	2 183	12	39	2.2
1998	361	1 958	12	71	3.9
1999	393	1 892	7	52	5.0
2000	138	806	2	14	4.7
2001	141	737	13	104	5.3
2002	119	717	4	54	9.0

Source: Ministry of Agriculture in Lebanon, *Agricultural Census* (2004).

Good quality of honey can be sold at \$15-20 per kilogram and can generate a reasonable profit on the local market. Moreover, income opportunities exist in the export of honey, despite growing competition from China, Egypt and Turkey. There is a potential to fill a gap in the market in the aftermath of the decimation of the honeybee population in North America in 2004.<sup>37</sup> Furthermore, the quality of Lebanese honey, particularly from South Lebanon, is recognized by consumers as being of high quality and nutritional value. Consequently, the development and diversification of honey production could lead to increased sales and income opportunities.

The sale of honey from South Lebanon is usually conducted through informal networks of relatives and friends, without labelling and branding. Consumers trust producers or those recommended by relations and, consequently, the network expands by word of mouth. A few, larger producers have labels on their product that include appellations of origin, weight, production date and other information. These producers sell to supermarkets across the country and some are able to export. While producers do not generally complain about market demand constraints, they do seek assistance for accessing larger markets.

## 2. Challenges facing honey production

### (a) Ensuring bee colony health

Given that bees are subject to pests and pathogens, the health of the hive is therefore a priority concern for beekeepers. While medicines are available to fight against diseases, residues could affect honey quality if not properly administered. For example, Lebanon faced a battle with the Varroa mite in the late-1980s, which drastically reduced the local bee population. The population is slowly recovering as a result of improved breeding and management techniques.

### (b) Environmental conditions

Honey production can be affected by adverse weather conditions. Several apiculturists in South Lebanon move their hives from the interior to low-lying coastal areas during winter. Those who are not able to find alternative locations for their hives during cold seasons feed bees sugar, which can negatively affect the purity and quality of honey during the following harvest season. Moreover, the lack of rain during dry periods of the year weakens the growth and diversity of flora available to maintain bee populations. Simple production and management improvements associated with locating hives in areas rich in flora during different seasons can significantly improve hive productivity.<sup>38</sup>

There are many environmental factors that are outside the control of beekeepers, including, for example, the indiscriminate use of pesticides by farmers, which has a drastic impact on the well-being of the

<sup>37</sup> It is estimated that up to half of the honeybees in North America died in 2004 owing to the Varroa parasite. *Associated Press*, "Research may help fight tiny bee pests" (1 March 2005).

<sup>38</sup> Within that context, appropriate locations include areas where there are rich sources of sumac and/or *zaatar*.

bee colonies foraging on treated crops and fruit trees. Unfortunately, pesticides are used across Lebanon and can result in bees releasing chemical residues into the honey. There is therefore a greater need for chemical testing of extracted honey in order to ensure food safety.

(c) *Marketing*

Typically, Lebanese consumers do not trust the product on the supermarket shelf even when there is a label, which presents a marketing challenge in the local market. They prefer to secure honey, *zaatar* and other traditional products through informal networks based on word of mouth and reputation. Furthermore, Lebanese consumers are selective consumers concerning the purity, taste and medicinal properties of honey.<sup>39</sup> Consequently, it takes time and effort for SMEs to widen their client base, particularly given that most sales are made on an individual basis and for small quantities at a time. Increased awareness among Lebanese consumers with regard to the characteristics of a good quality honey could improve marketing efforts.

Moreover, there is a lack of attractive and effective packaging of honey products in South Lebanon. Producers of honey in other parts of the country have advanced marketing and packaging strategies that can provide lessons and best practices for adaptation in the south. Improvements in branding and packaging can lead to better marketability and profitability of honey production.

(d) *Human resources*

Educational opportunities to build the capacity of the local workforce are limited. Recently, the Government of Lebanon has supported the establishment and strengthening of training centres in the areas of agricultural management, food processing and food testing in the southern towns of Bint Jbeil and Marjeyoun. However, these centres do not provide specialized training for beekeepers. Consequently, there are limited opportunities for enhancing skills in the sector.

### 3. *Opportunities for development*

Honey presents significant opportunities for development in South Lebanon based on the experience of local production, the availability of inputs and infrastructure, consumer demand and high opportunities for income generation. South Lebanon has considerable unexploited potential for the production of two types of honey, namely: (a) flower honey, which is produced by honeybees from the nectar of blossoms; and (b) honeydew honey, which is produced from secretions of plants transported by other insects to the surfaces of plants. Honey produced from *zaatar* flower blossoms is an example for the former type, while the second type of honey can occur with oak and pine trees found in the forests of Lebanon.

Managing the mobility of hives during different seasons could require the development of communication channels and, possibly, of a network between beekeepers and farmers in various regions that could accommodate the relocation of bee colonies according to local agricultural conditions.

Additionally, process methods can be easily improved with basic training on sanitation and hygiene, which are low-cost techniques for improving the quality of the final product. However, larger investment opportunities exist within the area of quality and food safety infrastructure, particularly in machinery and management systems that can provide for adequate filtration, testing and quality control of honey and its by-products.

Quality standards and methods of analysis need to be tested against international standards, particularly those prepared by the International Honey Commission (IHC) and Codex Alimentarius. The presence or absence of appropriate honey components must be verified through batch testing on a regular basis, thereby maintaining quality standards over different harvesting seasons. Accessibility to laboratories

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<sup>39</sup> There is a perception among Lebanese consumers that crystallized honey is comparatively inferior and decayed, despite one of the chief selling features of honey, namely, that it does not decompose.

for chemical analysis can also be organized through testing laboratories based in Beirut or elsewhere on a collective basis whereby technicians take samples from numerous honey producers simultaneously and then report on results on a confidential and individual basis. This could provide local beekeepers with more manageable and cost-effective testing approaches in their vicinity.

Moreover, there is potential for product diversification of honey both vertically and horizontally. Honey can be produced in various flavours and fragrances. Hive by-products include beeswax and royal jelly, which can be processed following investment in basic technologies. Value-added, honey-based products include candles, cosmetics and candied desserts. However, improving the quality, packaging and marketing of pure honey could be the most profitable for local SMEs in the short term, pending access to larger financial resources and investment opportunities.

Beyond its direct economic benefits derived from the marketing of honey, beekeeping can also yield a number of spillover benefits, including, most prominently, the improvement of environmental sustainability in the region. Within that context, bees, which assist in the pollination of flowers and fruit trees, can contribute to the growth of local species of flora, including economically important crop species, in an environmentally sustainable manner that conserves the biodiversity of the region. Additionally, farmers could solicit the assistance of beekeepers to help expand their crop potential; and beekeepers could cooperate with farmers to identify optimal locations for the placement of colonies.

Locating bee colonies in areas that are less dependent upon pesticides becomes an important consideration within the context of food safety. *Zaatar* is a non-water intensive perennial plant that does not require the use of chemical pesticides or herbicides. It is also an environmentally-friendly crop that can enhance the productivity of bees, which could draw upon the nectar provided by *zaatar* flower blossoms prior to the harvesting by farmers of the *zaatar* shoots. This synergy provides a low-technology option for enhancing bee productivity that offers an important lesson for technology transfer, namely, that there are benefits to be reaped from local knowledge and know-how concerning indigenous plant species. Indeed, rather than pursuing capital-intensive investments for improving productivity, small-scale investments and the use of appropriate technologies that build on the existing local knowledge base can provide important resources aimed at enhancing productivity and competitiveness in agricultural sectors.

#### *4. Enhancing technology transfer to a honey cluster: lessons learned from a pilot project in the administrative district of Bint Jbeil*

Within the framework of the abovementioned project, which is being supported financially by ILO, ESCWA identified 12 beekeepers in a cluster of villages in the administrative district of Bint Jbeil. These beekeepers were willing to work collectively to establish a pilot aimed at producing and selling honey as a group. The initiative brought together approximately 150 bee colonies and was made possible by in-kind contributions by local beekeepers of colonies from their own apiculture operations, in addition to their commitment to contribute jointly to the management of shared colonies.

The hives were complemented by queen bees and gentle bees imported from abroad, which were provided by the project to improve the race and productivity of the colonies. Moreover, members of the cluster contributed towards providing the land and premises to act as a base for the endeavour. ESCWA provided coordination support and technical assistance by recruiting an expert, as a cluster development agent (CDA), whose functions included the following: (a) transferring technical knowledge and know-how with regard to apiculture to local stakeholders; (b) overseeing the management and operations of the pilot project; and (c) facilitating communication and coordination among members of the group regarding their respective roles and responsibilities. Additionally, training was provided to 20 other beekeepers in the area who benefited, albeit not as direct participants in the pilot project, from the pilot initiative as a demonstration project.

Beekeepers in Bint Jbeil were supportive of the initiative, which enabled them to draw upon increased learning opportunities and a greater pool of experience available among local counterparts. It also allowed them to benefit from personalized training and technical assistance from the CDA on ways to improve bee productivity and reduce production costs through joint action. Moreover, members of the cluster benefited

from shared responsibility and liability, which has enhanced the professionalism of their business operations and helped them to achieve economies of scale generated from joint production, handling, processing, testing and marketing arrangements. Beekeepers in the pilot project have also been offered the potential to expand the capacity of their individual and collective operations by contributing to the creation of new colonies from queen bees that are propagated during the course of the project.

(a) *Technical assistance for facilitating technology transfer*

While the pilot project brought together both seasoned and comparatively novice beekeepers, an assessment determined that a variety of technical support services were needed. To that end, theoretical, technical and practical training sessions were arranged on a weekly basis over a six-month period. Sessions ranged from reviewing the fundamental principles of beekeeping to providing step-by-step training on advanced techniques for incorporating new queen bees into colonies. Training on financial aspects of business management and marketing was also provided. In addition, a full day of technical assistance was provided on a weekly to bi-weekly basis to guide the project beneficiaries through work needed to care for the bee colonies being jointly managed by the group. Given the regularity and consistency of the training sessions and fieldwork activities, trust was built between the project staff and local beneficiaries, and between members of the pilot project, which increased their commitment to the success of the project success, their willingness to take on project responsibilities and their readiness to seek out consensus on issues related to the management and operations of the pilot initiative.

Additionally, the pilot initiative provided a local demonstration project for the proper handling of bee colonies, which was used to support training for other beekeepers in the area who were not part of the pilot project. These beneficiaries attended the classroom training sessions and were invited to participate in fieldwork involving the harvesting, processing and packaging of honey resulting from the pilot project. As such, the pilot provided a venue for on-site training and field experience for a larger number of beekeepers in the cluster. Consequently, trust was built among members of the cluster who were only involved in the training component of the project. This promoted frank exchanges related to challenges faced in individual colonies, and facilitated the acceptance and assimilation of new operating practices and business methods by members of the cluster.

Some of the earliest technology transfers successes of the project occurred after members of the cluster agreed by consensus to relocate a portion of the hives to another region where alternative flora was available at a higher altitude. This resulted in an additional harvest of honey, with a yield of approximately 300 kilograms, of a different flavour of honey that could be sold at a higher price. This represented a tangible learning experience regarding the benefits of moving bees during each season to take advantage of different environments aimed at enhancing bee productivity and at increasing product variety. This transfer of knowledge was apparent among members of the group who were responsible for managing the bees and throughout the wider cluster.<sup>40</sup>

Another success was realized when beneficiaries of the pilot project were introduced to a new technology for combating the Varroa mite. Information on the new technology was transferred to the cluster by the ESCWA expert after learning of the new approach during an international conference on beekeeping. The rapidity with which the transfer of knowledge took place demonstrates the benefits of recruiting a cluster facilitator with technical expertise and exposure to international forums in the area of production. The real success of the situation, however, was that rather than adopting and importing the technology from abroad, the CDA was able to work with project beneficiaries to adapt the technology to meet local needs and hive specifications by using materials and workmanship readily available in the local community. This resulted in the fabrication of a local, low-cost solution for increasing the effectiveness of remedies for the Varroa parasite, which could be replicated by the pilot project beneficiaries, all project beneficiaries and, potentially, all the beekeepers in the region. The transfer was therefore made possible thanks to the innovative thinking and assimilative capacity of local beekeepers in the cluster in terms of understanding and adapting new

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<sup>40</sup> This was made evident when one of the larger beekeepers in the region, who was not a member of the pilot project, asked to move his bee colonies to the alternative location used by the group in order to secure an additional harvest.

approaches to local circumstances; and of the cluster facilitator in terms of disseminating information on new technologies and seeking out opportunities for adapting the technology to local circumstances.

(b) *Marketing support and financial arrangements*

Improved marketing arrangements for outputs of the project required that the outputs of the project be subject to higher standards for processing and packaging. As such, modern technologies and methods were used during harvesting, filtering, testing and bottling, which were imparted to project beneficiaries during hands-on training sessions.

The honey produced by the pilot project subsequently received marketing support through specialized assistance. Assistance was provided in the areas of, among others, market analysis regarding potential clients, consumer preferences, packaging alternatives and purchasing arrangements. By managing production collectively and benefiting from economies of scale, new marketing options were opened to the pilot project beneficiaries that were not considered cost-effective for individual producers. This included more sophisticated branding and labelling of different honey outputs, and the development of more structured distribution channels. Additionally, producers became aware of the benefits of certifying their outputs, and expressed interest in investing in a private facility that met international food safety standards and that could be used for filtering, testing, bottling and labelling goods produced by the members of the pilot project and by others in the cluster in the future.

Income generated by the sale of honey was used to cover most operating expenses, with remaining profits redistributed among the beekeepers. However, in working with small producers in the cluster, efforts aimed at developing an appreciation for long-term planning versus short-term production horizons. As in the case of most small producers, securing an immediate revenue stream by marketing and selling outputs is an immediate priority. However, the introduction of strategic decision-making in the management of the cluster helped members of the group to realize the importance of reinvestment and financial responsibility with regard to the production process. For example, one of the advantages of honey compared to other food products is its long shelf life. Accordingly, marketing opportunities and economies of scale can be created by retailing a variety of honey products produced over various seasons at the same time, rather than seeking to sell all honey outputs only on a seasonal basis. While the latter approach is possible when output is limited and harvesting occurs only once or twice a year, longer and more strategic planning horizons are necessary as output is increased and harvesting occurs more frequently. Furthermore, investment opportunities emerge once a portion of revenues is reallocated towards improving production, rather than merely distributed as profit. Consequently, small producers began to appreciate the need for better business planning and management of their marketing operations and revenue streams.

(c) *Institutional arrangement*

In order to structure the working relationships of cluster members, an informal contract was signed by the pilot partners which stipulated the roles, responsibilities, commitments and benefits of each partner. The technical expert was responsible for coordinating the work of the cluster and also provided technical assistance to that end.

Depending on the results of the pilot initiative and the trust built among the beekeepers, the beneficiaries could consider institutionalizing their informal arrangement in the form of a cooperative or company. This is possible given the experience the beekeepers have gained from this collective approach, particularly in terms of enhanced learning, productivity and marketing. Moreover, the beekeepers in the group have recognized that they are unlikely to achieve this higher level of output and profitability working independently as small-scale honey producers. However, any eventual cooperative depends on the interests and relative capacities of the beekeepers. Within that context, the cooperative could establish collective arrangements for production and honey processing; or it could focus exclusively on technological upgrading, quality control and marketing and, ultimately, expand to involve all small-scale honey producers in South Lebanon.

(d) *Lessons learned*

The lessons learned from the pilot project are being shared with other small-scale beekeepers in the cluster of villages targeted in the south as a means of expanding the local knowledge base regarding small-scale beekeeping. This promotes the dissemination of best practices gathered from the pilot project and encourages an exchange concerning the opportunities and challenges facing honey production under local conditions. This exchange among local producers is also helping to create a network of small-scale honey producers, which can subsequently be drawn upon given local interest to expand the membership or beneficiaries of the pilot project.

Accordingly, based on project experiences to date, the cluster arrangement appears to be a favourable tool for the transfer of technology to beekeepers. It has encouraged trust-building and increased networking among producers, which in turn has provided the basis for technical support and technology transfer to the cluster. Such support would not have been cost-effective and would have been difficult to render on an individual basis.

In this connection, the success of this experience can be largely attributed to the CDA who was able to achieve the following: (a) build trust among honey producers from different villages; (b) transfer personal technical expertise and know-how to cluster members; (c) commit the members to contribute jointly to the management of the shared colonies by participating in the harvesting, processing, sampling, testing and packaging of honey; (d) facilitate communication and coordination among members of the group regarding their respective roles and responsibilities; (e) promote economies of scale generated from collective production, handling, testing and marketing; and (f) encourage efforts aimed at institutionalizing collaborative arrangements.

The CDA could not have been able to perform this role successfully without great motivation for the pilot project, sincere commitment towards members of the cluster, strong communication and negotiating skills, and capacity for solving problems and conflicts between members of the group. In addition, the CDA combined theoretical and practical skills in honey production process, and skills in business management and law, which significantly assisted honey producers in the technical aspects of production, marketing and contractual arrangements.

As a result of the appropriate placement and contribution of the CDA, the pilot project achieved the following: (a) established an institutional arrangement between members of the cluster; (b) encouraged the adoption and adaptation by cluster members of new production process and pest control methods; (c) promoted the acceptance of non-traditional business operations, including the relocation of hives during different seasons; (d) introduced new marketing approaches and lines of distribution; (e) integrated new business techniques, including accounting and resource management; (f) increased the awareness of and the ability to comply with food safety requirements; and (g) improved the product quality relative to national and international standards.



#### IV. CASE STUDIES OF APPAREL MANUFACTURING CLUSTERS IN JORDAN, LEBANON AND MOROCCO

The textile and garment sector in Arab countries has historically captured a favourable level of FDI compared to other manufacturing sectors in the region. Financial relationships with foreign firms have been forged through joint ventures and subcontracting arrangements. However, the technology transfer experienced by most SMEs operating in the sector has been limited to the transfer of knowledge, rather than of capital. This results from the reality that apparel manufacturing is generally a low-technology intensive industry whose competitiveness rests with efficiency gains often secured through competitive pressures on wages and delivery time. As such, efforts aimed at increasing output have largely focused on expanding the workforce, rather than on upgrading capital resources. This ultimately results in diminishing returns on labour when the optimal relationship between labour and existing capital is exceeded. Significant opportunities therefore exist for improving the quantity and quality of investments in the region that enable technology transfer to SMEs.

Three clusters of apparel manufacturing firms are presented as case studies, namely: Marka-Zarka near Amman; Jebel Mohsen in Tripoli, Lebanon; and a cluster of small manufacturers in Casablanca, Morocco. These three case studies aim at the following: (a) reviewing the existing structures of the sector-based SME groupings; (b) identifying the main features of apparel manufacturing in the three countries, including major constraints and problems faced in the areas of marketing, production and technological capacity; (c) mapping out existing inter-firm relationships along the value chain; and (d) examining existing business operating practices. Suggestions are then provided on ways to improve performance and enhance competitiveness through collective initiatives, in addition to recommendations for technological improvements that can benefit all the members of the clusters.

##### A. APPAREL MANUFACTURERS IN MARKA-ZARKA NEAR AMMAN

The industrial sector in Jordan comprises manufacturing and mining, and contributes some 26 per cent to national GDP; and the agricultural sector contributes a modest 2 per cent, while services account for 72 per cent. The industrial sector employs approximately 10 per cent of the national workforce and generates much needed foreign exchange, accounting for nearly 70 percent of Jordan's merchandise exports.

In 2001, more than 16,000 workers were employed in some 3,000 manufacturing firms in the textile and clothing sector of Jordan.<sup>41</sup> Of these firms, 25 per cent were engaged in textile manufacturing and 75 per cent were in apparel manufacturing. The sector benefits from a high proportion of highly qualified and trained workers, 41 per cent of whom are women. The apparel sub-sector employs 17 per cent of Jordan's manufacturing workforce and accounts for 5 per cent of national manufacturing output. The dominant contributors to manufacturing output are phosphate and potash, for which Jordan is a major world supplier.

In recent years, two major agreements, namely, the EU-Jordan Partnership Agreement and the United States-Jordan Free Trade Agreement (FTA), have enabled Jordan to orient the textiles and clothing sector towards export. The signing of the FTA with the United States was a boon to Jordanian exports, largely due to the duty-free treatment of apparel imports into United States from qualifying industrial zones (QIZs) in Jordan.

Within that context, apparel manufacturing firms in four export-oriented QIZs benefit from supplier contracts with major distributors and retailers in the United States, including Walmart, Target, Van Heusen and Calvin Klein. These contracts have played a dominant role in the significant increase of Jordan's apparel exports to the United States, which rose from a modest \$44 million in 2000 to more than \$900 million in 2004.<sup>42</sup> In addition to increasing the level of investment of United States firms in the sector, the

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<sup>41</sup> The national sectoral information presented here are from the following sources: Jordan Investment Board, which is available at: [www.jib.com.jo](http://www.jib.com.jo); Jordan Enterprise Development Corporation, which is available at: [www.jedco.gov.jo](http://www.jedco.gov.jo); and Department of Statistics in Jordan, *Industrial Survey* (2001).

<sup>42</sup> In 2004, more than 90 per cent of Jordan's apparel exports were to the United States.

favourable duty-free status of this FTA has attracted a number of Asian investors, who have established apparel production facilities in the QIZs often through joint ventures, thereby avoiding import quotas applied to apparel exports from their home countries. Both investment channels have brought with them new technologies and production methods. However, those firms in the QIZs that have been targeted for FDI are typically large and often employ in excess of 250 employees.

As such, the success of the Jordanian apparel industry is not evenly spread across the country. While many larger firms in the QIZs have benefited from greater market access and investment flows, various smaller firms located outside those QIZs have not. Certainly, the QIZs have helped Jordan to enter the global apparel manufacturing industry, particularly the United States market, by rapidly developing the country's export capacity and by attracting foreign investment and technologies. However, SMEs operating outside the QIZs have been negatively affected and are facing increased domestic competition presented by firms operating in the QIZs.

Despite their focus on production orders destined for foreign markets, these large firms in the QIZs still flood the domestic market with quality leftovers, which reduces the market share of local SMEs. While Jordan enjoys a young, skilled workforce, labour markets also tend to be skewed towards QIZs. At the same time, SMEs outside the QIZs lack the knowledge, technologies and skills needed to reorient their businesses towards exports. Many are therefore facing closure unless they can revive their businesses by meeting the new competitive challenges confronting them.

The following case study identifies the current features and challenges facing apparel manufacturing SMEs located outside the QIZs near Amman. The findings are based on primary data, which were collected from completed questionnaires and interviews conducted with 18 firms in the Marka-Zarka textile and garment cluster; site visits; and information gathered during meetings with local business associations and Government officials. The case study explores the main features of the cluster and how existing and potential inter-firm cooperation can enhance technology transfer and investment opportunities for firms as they seek to increase their competitiveness in the international marketplace.<sup>43</sup>

### 1. *Main features*

In the north-eastern suburbs of Amman, the cities of Marka and Zarka are connected by a highway that is home to a cluster of apparel manufacturing firms. These firms were established in response to growing local demand for clothing and textiles, 30 per cent of which were established before 1980, 40 per cent in the 1980s and the remaining 30 per cent in the 1990s. Most of the firms in this Marka-Zarka corridor are traditional family-owned businesses that produce goods of low and moderate quality. Thriving initially on a captive local market, most of these firms produced exclusively for the Amman metropolitan area. Consequently, most did not have the need or ambition to penetrate export markets, nor the incentive to improve quality to international standards. However, this situation has since changed given the competition from large-scale producers in Jordan and the influx of low-cost products from abroad.

While most of the SMEs in this cluster are managed by the owner or family relatives, the younger managers generally have a higher level of education, often at tertiary level, than their predecessors and older counterparts. This translates into a driving momentum for increasing modernization in the cluster. Moreover, the average number of employees in the surveyed firms was 75. Consequently, while most are SMEs according to Jordanian standards, some larger size firms still operate in the area.

Firms in the cluster produce a wide variety of goods, including acrylic yarn, polyester fabric, tricot and other synthetic fabrics. These, in turn, are used as inputs for other firms in the cluster for the manufacture of shirts, trousers, uniforms, coats, gowns, dresses, scarves and stockings. The SMEs in the cluster can be categorized as follows: (a) 40 per cent are engaged in garment production; (b) 30 per cent focus on flat-knit items; (c) 15 per cent are specialized in various fabrics; (d) 10 per cent concentrate on sock and piece

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<sup>43</sup> A. Abdelqader, "Diagnostic analysis of the garments and textile industry in the Marka/Zarka area - Jordan", which was an unpublished study prepared for ESCWA in 2005.

knitting; and (e) 5 per cent produce yarn. However, more than 70 per cent of workers employed by the 18 firms in the cluster are concentrated on garment production. A substantial portion of that production is focused on tailoring to local consumer preferences in the traditional Islamic clothing market.

Many of these SMEs have financial liquidity problems. Their orders are based on long-term credit, with payments arriving 90-120 days after delivery of goods. This is because the buyers are often middlemen who purchase garments and subsequently try to sell them to retail outlets. The fulfilment of order payments is therefore contingent on the realization of consumer demand. While this is a risky arrangement for manufacturers, it is an accepted practice based on the trust and reputation of the buyers. Nevertheless, the resulting liquidity problems negatively affect the ability of firms to satisfy delivery schedules, given that cash-flow shortages can prevent those firms from purchasing fabrics and other raw materials used as inputs for production.

(a) *Production and process methods*

Production in the cluster is heavily biased towards labour-intensive production methods that require significant handling of materials during the production process. Given a shortage of modern technologies and seasonal fluctuations of production volumes, most workers in Marka-Zarka SMEs are not always engaged in specialized production functions. Instead, workers often perform several functions in addition to sewing, including cutting, trimming, finishing and packing operations. Garment manufacturers generate patterns manually and then trace the marker on top of the last fabric in the layer prior to cutting. Initial cuts are made manually; and the cut fabric is then spread manually, after which an electric cutter is used to cut up the various parts of the pattern to prepare them for stitching. While sewing machines are subsequently used, there tends to be an insufficient number of specific machines available for finishing a given type of garment. Investment in single-needle sewing technologies could reduce the number of operations needed to complete a certain garment and improve product quality and production efficiency.

In recent years, underused production capacity owing to the fluctuating size of orders and decreasing production levels has left insufficient financial resources available for new capital investments. Consequently, local suppliers of new machinery and production technologies seldom organize presentations of their newer products for firms in the cluster and offer little support in terms of facilitating payments by firms interested in the purchase of new equipment. However, without automated technologies required for improved quality control, most of these SMEs are not producing in accordance with international quality systems. While they follow basic post-production garment inspection procedures, they do not monitor quality in-line during the production process. Inspection of raw material and implementation of in-line inspections could lower costs associated with large production batch defects. Additionally, such inspections could detect and correct minor quality defects, thereby increasing opportunities for sub-contracting by making their output more acceptable to larger firms that outsource.

(b) *Technological capacity and labour constraints*

Most of the production facilities in Marka-Zarka employ out-dated machinery. Newer technologies are needed to provide for increased flexibility, input efficiencies and worker productivity in cutting and stitching operations. With such technologies, improved and more varied designs of higher quality could be produced to attract a wider base of customers in domestic markets who are increasingly turning to such goods now being offered by the firms in the QIZs and by imported goods. Within the context of the latter, competition arises from imports from the United States, the EU and developing countries.

As such, the long-term business strategy of many firms in Marka-Zarka, which is based on the comparative advantage afforded by low labour costs, has progressively become ineffective, given increasing local wage rates, labour market regulations and investments made by local competitors, which have promoted the production of higher quality goods at lower costs. There is therefore a need to raise awareness for these SMEs of the potential to increase profit margins and market demand by shifting operations to new generation production facilities. Moreover, as in any industry that bases its production on low labour costs, there are market implications associated with dependency on labour-intensive production processes,

including compliance with sticky Government labour laws and high employee turnover rates among skilled personnel.

The need for technology upgrading is both an issue of productivity and quality, and of design. Firms in Marka-Zarka produce a limited set of patterns that their workers are familiar with in terms of layout, cutting and stitching operations. New generation technologies based on computer-aided design (CAD) tools and computer-aided manufacturing (CAM) systems are increasingly required to diversify production lines, thereby creating new apparel designs that respond to consumer fashion trends. These designs allow for more value-added production and better-quality products that can secure significantly higher selling prices and profits in local and foreign markets.

(c) *Competition and marketing constraints*

While firms in Marka-Zarka produce mostly for the domestic market, some export their goods. Out of the 18 firms surveyed, exports constituted less than 15 per cent of output for 15 of these SMEs; one firm was mainly engaged in export activities; and the remaining two SMEs did not export at all. Two of these SMEs are exporting to catalogue companies in Germany through a mail-order system. However, while orders grew for several years as a result of repeat demand, export volumes have recently dropped owing to increasing international competition and changing fashion trends, which require finer grades of knit fabric than the firms are capable of producing using their current machines.

The firms in Marka-Zarka use various marketing methods. A large share of production is driven by Government procurement of uniforms for military personnel and civil servants. Most firms also supply goods to clothing stores in Amman, and some market directly to consumers through their own retail outlets in the area. Additionally, some SMEs in the cluster have succeeded in attracting subcontracts from larger Jordanian apparel firms and orders from international traders. However, many of these marketing channels, which were secure in the past, are currently less reliable with the emergence of competition in the local market from firms in the QIZs that sell low-cost, leftover products. SMEs are equally facing import competition from low-cost producers in China and the Syrian Arab Republic. As a result, this quality and price competition is forcing firms in the Marka-Zarka cluster to rethink their business models and marketing strategies.

In confronting heightened competition in local markets, many of these SMEs have resorted to reducing their prices in order to secure orders. However, given that most firms do not maintain financial accounts, they are unaware of the impact of lower prices on their profits. There are a number of cases where firms have unwittingly undercut their own production costs. Most surveyed firms could not cite the production costs associated with different operations and production lines, even for their mainstream items.

## *2. Inter-firm cooperation in the cluster*

There are some areas of cooperation between firms in the Marka-Zarka cluster. These are witnessed in contract bidding; order sharing; outsourcing; borrowing of materials, equipment and spare parts; and promotional marketing.

Strong inter-firm relationships exist in the bidding for tenders. Firms generally coordinate their response to large tenders by electing one firm to represent various cluster partners in a consolidated bid. Larger firms take the lead in bidding with the prior knowledge that they can rely on smaller firms in the cluster for subcontracting purposes, particularly for the production of specialized items that cannot be economically produced by the larger firms. Subsequent to a successful bidding exercise, these larger firms outsource the manufacture of particular clothing articles to smaller firms and, moreover, outsource various jobs in order to meet tight delivery deadlines associated with large contracts.

Order sharing occurs comparatively frequently through outsourcing to smaller and specialized firms. For example, in a recent order from Royal Jordanian Airlines for uniforms that included jackets, pullovers, hats, trousers, shirts and skirts, the contracted firm sourced various finished products from other firms in the cluster. Subcontracting to downstream firms for embroidery, printing and washing is also a frequent form of

inter-firm cooperation in the Marka-Zarka cluster, and is essential for the majority of firms given that most do not have their own printing, embroidery or washing facilities.

Equally, exchanges of raw materials and equipment between firms are very common. Typically, if one firm is in need of a special colour or yarn, it checks with other firms for availability before placing an order with suppliers, which entails additional costs in terms of time and delivery. When available, firms either purchase or exchange raw materials locally. Spare parts and accessories are also commonly exchanged between firms. For example, in the area of tricot apparel production, such items as needles, machine oil and fine sewing threads are needed occasionally and factories contact each other for availability. Sometimes, firms even exchange production equipment in order to achieve daily production targets needed to complete orders on time.

Cooperative marketing arrangements to access the consumer market are rare. However, while this does not occur usually in the domestic market, firms sometimes coordinate collective marketing missions when seeking to participate in trade fairs abroad. This can be attributed to the comparatively high cost of maintaining individual exhibition booths. Within that context, Government assistance has traditionally covered 50-70 per cent of the participation cost of firms in trade fairs.<sup>44</sup>

Furthermore, firms collaborate on labour matters. In order to avoid competing for skilled workers employed by firms in the cluster, an informal agreement exists between the SMEs whereby jobs are only offered to employees in other firms within the cluster with the approval from current employers. However, given that many large firms have been established recently in a nearby QIZ, namely, Dalil Industrial Zone, there is some debate concerning the effectiveness of such informal agreements.

Inter-firm cooperation in the Marka-Zarka cluster is not limited to arrangements among apparel manufacturing firms. Considerable networking equally exists between apparel manufacturing firms and both upstream and downstream suppliers of goods and services. Some of these relationships are made possible through secondary industries generated by business from the QIZs. For example, as fabric manufacturing in Jordan is limited, apparel manufacturing firms previously relied on the import of various fabrics that were not produced locally. However, subsequent to the establishment of the QIZs, many local fabric suppliers are able to buy previously imported fabrics sold to them by QIZ firms as leftovers. As such, many apparel manufacturers in Marka-Zarka are currently purchasing excess fabrics at a significantly lower price than similar fabrics imported from abroad, thereby allowing them to create new styles and product types that can be sold in the local market.

However, in most other areas, apparel manufacturing firms in Marka-Zarka do not benefit from relationships with upstream manufacturers for the purchase of equipment and accessories that are not produced locally. Machinery and other equipment and supplies are mostly imported from Europe and East Asia. Most accessories, including elastics, draw cords, zippers, printed labels and buttons, are equally imported, primarily from China and Korea. Moreover, given the lack of producers of woven labels in Jordan, most such labels are imported on an individual basis from the Syrian Arab Republic or Turkey. By contrast, there are established relationships with downstream industries. For example, there is a well-established garment packaging industry in Jordan. Suppliers of cartons, polyester bags, cardboard, collar bands and tag pins are readily available in the local market. Hangers represent a notable exception. These are not produced in Jordan and are therefore imported from Turkey, the United Arab Emirates or from countries in East Asia.

### *3. Opportunities*

The discussion above highlights many of the structural, organizational and technological challenges facing apparel manufacturing SMEs in the Marka-Zarka cluster. Moreover, it also describes various fields

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<sup>44</sup> This assistance programme was recently extended after an evaluation showed the positive impact on business generated by the participation of firms in these expositions.

where inter-firm cooperation exists, which points to areas where productivity and value-added production activities of these firms could be enhanced.

For example, CAM systems that are currently available on the market offer alternatives to labour-based production and provide opportunities to expand design capabilities. Computerized cutting machines can perform the work of several workers in a fraction of the time. Consequently, workers could be trained to ensure quality control or provide specialized value-added services, including embroidery. Moreover, new machines can be used to manufacture innovative styles and designs, whose quality cannot be ensured with manual cutting tools. Such innovations could also help to expand the number of different sizes that could be offered by local producers.

As a first step towards taking advantage of these computer-aided technologies, members of the cluster have indicated their willingness to pool their resources in order to invest in a computer-enabled system, namely, the Gerber Garment Technology (GGT), aimed at creating digitalized patterns and at facilitating the marking of fabrics. Given that such a system is not normally used on a daily basis, its use could be shared by all the firms in the cluster to expand their range of products and sizes. However, external investment assistance is needed to support that effort. Additionally, computer-based training is required to ensure adequate operation of the software and hardware components of the system, as well as specialized training on programming and maintaining the system.

Manufacturers in the cluster have also expressed interest in establishing a laboratory in the cluster that can be used for testing yarns, fabrics and garments to determine and demonstrate their conformity with regulations and standards required in export markets. Enhancing conformity assessment infrastructure in the cluster could equally be beneficial for other textile and garment manufacturers in Jordan, and help to reduce the cost of testing and quality assurance prior to export.

As such, these and other more formal cooperative arrangements among firms in the Marka-Zarka cluster could allow them to access technologies, thereby enhancing their market opportunities.

#### B. APPAREL MANUFACTURERS IN JEBEL MOHSEN NEAR TRIPOLI, LEBANON

While apparel manufacturing contributes proportionately less to the economy than during the pre-war period, it continues to play an important role in the economy of Lebanon. The apparel manufacturing industry is concentrated mainly in the regions of Greater Beirut, Mount Lebanon and Tripoli; and produces a variety of items from basic clothing items, including a range of clothing accessories, to high fashion and branded garments. However, many long-established SMEs in the sector are becoming increasingly uncompetitive compared to firms in other developing countries, which have been able to attract the investments needed to re-engineer the technological underpinnings of their production facilities and to reorient their client base to access world export markets.

The apparel manufacturing sector in Lebanon is dominated by family-owned businesses. The industry is largely run by an ageing generation of managers accustomed to traditional operating practices. However, control is increasingly being handed down to a second generation of family members with a higher level of education, which translates into a potential for the introduction of new ideas and technologies to the sector. Moreover, in the post-war era, many well-educated entrepreneurs have been attracted to the industry owing to comparatively low start-up costs. Newly-established firms remain small, specialized and focused on quality output for niche markets and, consequently, have become viable businesses. Many of the micro-businesses have also emerged following the closure in recent years of many larger factories. With each such closure, a number of smaller businesses have been established by former employees who take the knowledge and experience they have gained in order to meet the niche market needs that the larger unit was unable to satisfy. Most of these smaller businesses tend to secure work through subcontracting arrangements for services, and focus on cut, make and trim (CMT) operations.

However, apparel manufacturing SMEs, particularly these smaller made-to-order workshops, are still facing stiff competition from larger domestic firms and imports. Local ready-to-wear producers are not able to offer the wide variety of styles and sizes available from larger manufacturers, which, in addition, are able

to produce higher quality products and provide new seasonal collections. As such, SME apparel manufacturing capacity remains underused, which is resulting in a corresponding reduction in the size of its workforce.

The case study presented below summarizes the findings of a diagnostic study conducted of an apparel manufacturing cluster of SMEs in Jebel Mohsen. The assessment of the cluster was conducted in collaboration with the Syndicate of Apparel Manufacturers in North Lebanon (SAMNL) following a series of consultations with owners and business support service providers in the area. The findings are based on data collected from a detailed questionnaire that was prepared in collaboration with members of SAMNL and completed by 37 firms in the cluster. These survey results were subsequently elaborated during focus group discussions with firms in the cluster and by visits to a number of local workshops.<sup>45</sup>

The case study examines the characteristics of the cluster, the main challenges being faced, and how existing and potential inter-firm cooperation through clusters can support technology transfer and generate investment opportunities, thereby increasing competitiveness in the local and international marketplace.

### 1. *Main features*

Jebel Mohsen is located a few kilometres northeast of Tripoli, Lebanon, in a traditional residential area that has become home to a number of apparel manufacturing SMEs. Of the 55 apparel manufacturers in Jebel Mohsen, nearly all are concentrated in a two-kilometre radius. The firms specialize in the manufacture of jeans and trousers for men, women and children.

Most firms in the cluster were established in the 1980s and 1990s, creating a vibrant economic sector in the Tripoli area that flourished as a very successful industry serving the domestic market until the mid-1990s. Since then, increasing liberalization of the Lebanese market has resulted in a rising surge of cheaper and, in some cases, superior quality ready-made garments from countries in East Asia. Manufacturers in Jebel Mohsen are currently confronted with a situation whereby they must compete successfully with imports in the domestic market and expand exports, or otherwise risk closure.

Out of the 37 firms surveyed in the cluster, 23 are involved in the manufacture of jeans and 14 in the manufacture of trousers. The firms tend to be similar in terms of size, product range, location, plant modernity, retail channels, and relative dependence on exports to domestic market sales. The largest firm surveyed employs more than 35 people, while the smallest has three employees.

Most apparel manufacturing SMEs in Jebel Mohsen are small, family-owned businesses registered as sole proprietorships or partnerships, and managed either by the owner(s) or family relatives. Five of the firms surveyed are owned by women, four of which are equally managed by women. Most business owners have completed secondary school education and have developed their technical competence and basic business skills from on-the-job training. Young family members entering the business are beginning to introduce new skills and perspectives to the firms in the cluster, which is likely to enhance local capabilities in such areas as accounting and business planning.

All surveyed firms are members of SAMNL, which was established in Tripoli in October 1998, and is aimed primarily at protecting, encouraging and upgrading the industry in the region. Moreover, SAMNL seeks to offer professional and financial assistance to its members within the limits of its resources. The Syndicate comprises a total of 73 members, almost all of whom are manufacturers of jeans and trousers, including 55 members in Jebel Mohsen and 14 members located in the neighbouring cities of Tripoli and el-Mina. Initially, SAMNL consisted of more than 100 members. However, some 30 firms have temporarily or permanently closed for business owing to current economic conditions.

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<sup>45</sup> B. Kreitem, "Technology transfer and networking in garment and textiles: case study - Jabal Mohsen apparel cluster", which was an unpublished study prepared for ESCWA in 2005.

In the light of these dire circumstances, firms in Jebel Mohsen are seeking to benefit from their membership in SAMNL, which in turn has recognized the need to generate opportunities by enhancing the organization of those firms. Technological spillover effects have also been transferred from SAMNL to its members owing, in large part, to the president of the Syndicate who has been exposed to international business practices and organizational models in the course of work experience gained outside Lebanon. The lessons learned abroad are therefore being transferred to local business owners and are helping to encourage efforts aimed at modernizing and restructuring business practices in the cluster. For example, SAMNL currently serves as the conduit through which members can solicit the assistance of other firms for outsourcing contracts. Information on firms with areas of specialization or underused capacity is maintained by the Syndicate in order to facilitate this process. Additionally, the Syndicate is seeking to offer other business-related services to its members.

(a) *Production and process methods*

Production in Jebel Mohsen is largely labour-intensive and relies on the skills and productivity of workers. As such, the work schedule of factory workers varies according to fluctuating production volumes. There is some evidence in Jebel Mohsen of workers performing their work slowly and relatively unproductively during slow periods in order to ensure a full work week. From a management perspective, it is also often preferable to let machinery and equipment lay idle during slow periods rather than reducing the work schedule of workers, particularly given that such reductions can have lasting adverse effects on the morale on the factory floor and, consequently, on worker loyalty and productivity.

Some owners maintain that the labour-intensive nature of their production processes actually distinguishes the cluster, given that it can serve the niche market for low-cost, traditional production methods. This is possible because labour costs in the area tend to be less than in other parts of the country. Productivity levels depend on the high, medium or low quality demanded by the client and by the targeted end-customer, namely, whether a given item is designed for a man, woman or child.

Given that most work is procured through wholesalers and subcontracting agreements, the firms in the cluster have limited opportunities to design finished products. However, eight manufacturers of jeans and three producers of trousers indicated that they had design capabilities; and 25 and 30 per cent of jeans and trouser producers, respectively, reported that they produced items for sale in retail outlets under their own brand names. However, there was a general consensus among firms that designing is among the most time-consuming component of the production process.

In the area of diversification, some producers have responded to customer orders to manufacture jeans or suit jackets for men. Moreover, two producers of jeans reportedly possess washing facilities for specialized treatments of jeans after CMT operations. However, in most cases, firms in the cluster are not required to wash, iron or transport finished products by their clients. Consequently, local manufacturers do not benefit from revenues that could be generated from these value-added services. The packing of items in cardboard containers is typically included in contracts and is done on a manual basis. Within that context, producers of jeans considered packing and quality control among the fastest components of the production process; by stark contrast, producers of trousers considered packing among the most time-consuming part of satisfying orders.

(b) *Existing technological capacity*

Manufacturing in Jebel Mohsen relies mainly on simple machinery and equipment. These typically include manual cutters and electric sewing machines of all types and capacities that are used for cutting and stitching operations and that are part of the apparel assembly process. Technology used in the cluster is mostly a mixture of old machinery. The age of this machinery varied from the oldest in operation, which was older than 20 years, to more modern equipment found in some factories. Consequently, the latter firms are able to produce higher quality products, compared to those operating with more archaic tools.

While the apparel manufacturing process in Jebel Mohsen remains labour-intensive, some firms are aware of and receptive to prospects for technological upgrading. The vast majority of surveyed firms



acknowledged that a major constraint in terms of improving international competitiveness was the lack of capital investment. Moreover, they recognized that modern factory equipment could help to significantly increase labour productivity and raise quality, while reducing per unit production costs. Equally, business owners stressed that investments in new machinery could only arise if effective marketing strategies were implemented and a stable flow of high volume orders were maintained. Some firms also noted the difficulty in securing loans aimed at purchasing such equipment as machines to clean jeans and, moreover, that they would be ready to share equipment between firms if an appropriate intervention were made by an investor or by SAMNL.

Within that context, a major concern of many manufacturers is the potential maintenance problems that are associated with investments in more sophisticated equipment. Machinery is imported through local agents; and there have been difficulties in the past in terms of securing spare parts for some equipment. Service support is based in Beirut or abroad. Consequently, the lack of technical service support in Jebel Mohsen or in neighbouring Tripoli can cripple the ability of a local producer to deliver an order on time. However, while poor technical support remains a major deterrent to investment for some SMEs, the cost of acquiring more modern technologies is the major prohibitive factor for nearly all the firms in Jebel Mohsen.

Another challenge associated with the adoption of new technologies in the cluster arises from a lack of familiarity with regard to computers and computer-aided machinery. A very modest 2 out of the 37 surveyed firms make use of computers in their business operations; and only 3 report using the Internet. Most firms in Jebel Mohsen still use handwritten templates to organize orders from clients, schedules, production lines and customer delivery. Such administrative operations as payroll, billing, inventory and basic accounting are also done manually. This limits the ability of business owners and managers to track effectively orders, materials, suppliers and customers, and to identify opportunities for reducing costs and improving efficiency.

#### (c) *Sales and marketing*

While firms in Jebel Mohsen sell mostly through wholesalers, some equally sell directly to retail chain stores and independent shops. Each firm typically has only one to five buyers. Cheap labour, easy communications and fast delivery of raw materials and end products are all factors conducive to this type of business for SMEs. Moreover, they are characteristic of firms with a limited number of traditionally secure buyer-manufacturer relationships. However, in recent years, declining orders and the loss of clients has driven some manufacturers to be proactive in seeking out new clients, or to maintain a fragile equilibrium in their business operations with their dwindling clients.

Direct marketing to consumers is not pursued by firms in the cluster, particularly given that established retailers in Lebanon hold substantial control over the local market. This means that manufacturers in the cluster are removed from market dynamics and changes in consumer preferences, thereby depending on their clients to signal design requirements or to provide patterns. Accordingly, local contracting companies control most of the high value-added activities, including design and marketing, which leaves manufacturers in Jebel Mohsen with limited knowledge and exposure to many non-production elements of the business. This, in turn, limits the price-setting ability of manufacturers given their dependence on others for ordering and marketing of products. Nevertheless, most firms in the cluster prefer to do business with local retailers and wholesalers, rather than with international traders with whom they have no flexibility regarding the mark-up on their garments. Manufacturers in Jebel Mohsen therefore tend to be price takers. Furthermore, given severe pricing pressures associated with international competition, they generally have very little room to increase the mark-up on their goods.

Exports are not a regular source of business for most apparel manufacturing firms in Jebel Mohsen. While six of the firms surveyed reported being engaged in export activities, most of these firms were exporting indirectly and primarily to other Arab countries through traders and wholesalers. Firms in the cluster have expressed interest in directly accessing export markets. However, they remain insecure in terms of solidifying contacts in foreign markets and of identifying reliable international brokers. Moreover, compliance with certain export requirements was perceived to be complex and time-consuming. There was also concern expressed with regard to financial risks associated with sudden shifts in the trade policies of foreign countries given the current political climate in the region.

## *2. Inter-firm cooperation in the cluster*

The traditional approach to business is normally practised by firms in Jebel Mohsen, namely, to secure an order and then satisfy all of its production requirements in-house. While this conventional model of apparel manufacturing allows for full control over all the steps in the production process, economic and structural factors have prompted a number of manufacturers to forge a variety of horizontal linkages with other firms in the cluster to perform certain components of production. Recently, a few firms in the Jebel Mohsen cluster have also cooperated in order-sharing and outsourcing.

Apparel manufacturers can improve efficiency and increase revenue streams by sharing large orders beyond the capacities of a single SME and by outsourcing specialized work to firms best placed to perform them. Outsourcing offers cost-savings to less diversified manufacturers in terms of reduced overheads, and provides other producers with opportunities for specialization. Providing all the production services in one firm could alternatively require investments in specialized equipment that could remain underused or that could result in supplementary costs associated with maintaining additional factory space and with recruiting specialized labour.

Approximately one-third of the SMEs in Jebel Mohsen have worked with other firms in an outsourcing capacity. Survey respondents reported that in Jebel Mohsen and across Lebanon, apparel manufacturers are not averse to cooperation when they have excessive workloads that cannot be handled internally. This form of inter-firm cooperation is considered to be one of the main advantages that membership in SAMNL helps to facilitate. However, while firms cooperate by outsourcing and by sharing large orders, these arrangements tend to occur only once a firm has secured a certain contract. There is no evidence of firms planning and bidding collectively for contracts from buyers when a contract is being negotiated.

On the supply side, there are a number of major local suppliers for the different raw materials and accessories that enjoy well-established relationships with firms in Jebel Mohsen. However, manufacturing firms have little experience in sourcing raw materials jointly with other firms. While firms are not reportedly averse to the collective sourcing of inputs, there is little advantage in doing so given that the fabrics and accessories needed to complete a certain order is usually provided by the client. As such, opportunities for joint sourcing are limited. Furthermore, while firms in Jebel Mohsen do not share machinery, they do share information on equipment and assist each other in troubleshooting problems of equipment when these occur.

Many firm owners acknowledge that in response to changes in the global marketplace, SMEs need to seek out new business linkages with other firms in order to find ways to improve productivity and reduce costs. While apparel manufacturing firms in Jebel Mohsen have not yet responded to growing competition by merging and moving into the retail market, specialization and collaborative arrangements provide a potential approach for firms.

## *3. Opportunities*

Firms in Jebel Mohsen recognize that business linkages can play an important role in terms of enhancing their business activities and the vitality of the cluster. Moreover, they recognize that significant potential exists for greater productivity and efficiency improvements by better cooperation and by dividing labour between producers with complementary areas of specialization. However, it is increasingly difficult for SMEs to explore these alternatives in a shrinking and insecure marketplace. Faced with decreasing demand for their products, apparel manufacturers perceive that they do not have the luxury of being able to experiment. As a result, efforts to strengthen the cluster to date have been mostly piecemeal.

In an effort aimed at addressing these challenges more proactively, members of the cluster have decided to study the possibility of forming a consortium for the procurement of raw material directly from suppliers; and to consider selling their products collectively in the region by engaging in common branding and marketing. Additionally, members of the cluster have identified the need to improve business skills and designing capabilities in the cluster, and to identify mechanisms aimed at increasing participation in exhibitions and international trade fairs.

Moreover, opportunities exist for diversifying production lines through existing and enhanced technological capacities. For example, current consumer trends signal interest in specialized fabrics and designs. This is particularly true within the context of fashion-conscious customers of jeans in Lebanon and of more sophisticated buyers of trousers who are interested in stain-proof or wrinkle-free fabrics in the international market. Given that SAMNL has four laundry service providers among its members and two producers of jeans with a capacity to wash jeans in accordance with client requirements, firms in the cluster could collectively market themselves as more specialized manufacturers of jeans and trousers that can provide value-added services related to damp finishing, stone washing, stone bleaching, distressing and rinsing, in addition to oven-related processes related to wrinkle-free treatments and brushing for sand blasting. Design capacities could also be enhanced by collaborating with graduates of Lebanese design schools or with local retail outlets that are looking to sell innovative branded products. This could allow specialization in one or more components of the production process, thereby benefiting all members of the cluster and opening avenues for increasing value added.

The further development of the scope and level of inter-firm cooperation of the firms in Jebel Mohsen could provide opportunities for shared investment and responsibility for the operation, maintenance and use of new equipment and of advanced manufacturing technologies. Moreover, members of the cluster could support the training of personnel for the operation and maintenance of equipment, thereby ensuring the availability of a local service provider to provide prompt real-time service and to avoid downtime. Investments could range from computer-aided cutting machines to such specialized value-added services as ironing or machines that press decorative accessories on finished goods.

### C. APPAREL MANUFACTURERS IN CASABLANCA, MOROCCO

The combined manufacturing and mining sectors in Morocco constitute some 30 per cent of national GDP; agriculture contributes up to 16 per cent; and services account for approximately 54 per cent. In order of decreasing importance, sectors contributing to industrial output are production and processing of phosphate, oil refining, cement, food processing, textiles and clothing, paper and timber, metals, rubber, plastics, vehicle assembly and, most recently, high value-added semiconductor manufacturing.<sup>46</sup> The industrial sector employs approximately 10 per cent of the national workforce and generates much needed foreign exchange, accounting for nearly 65 per cent of Morocco's merchandise exports and 43 per cent of its total exports of merchandise and services.

Over the past several years, Morocco has benefited from strong levels of FDI in production-based capital equipment in a number of manufacturing sectors. This can be largely attributed to the following: (a) a young and highly educated and skilled workforce of 12 million people; (b) political stability; (c) favourable international perceptions of Government effectiveness and its rule of law, compared to other Arab countries;<sup>47</sup> and (d) comparatively high international competitiveness.<sup>48</sup>

Morocco has implemented sweeping structural reforms and investment incentives aimed at advancing the development and competitiveness of the private sector, which has helped it to attract the attention of TNCs. Within that context, new measures include the establishment of regional investment centres; a new customs code to improve access to intermediate production inputs; an improved competition policy; and a legal and fiscal framework that encourages FDI.

In 2003, there were some 1,700 manufacturing firms in the textile and clothing sector in Morocco, of which 36 per cent focused on textile production and 64 per cent were apparel manufacturing firms.<sup>49</sup> Out of that total number, approximately 160 firms were entirely or partially specialized in dyeing, finishing and

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<sup>46</sup> The production of semiconductors has increased in recent years owing to major investments by the United States.

<sup>47</sup> As assessed by the World Bank in its bi-annual reports on global governance.

<sup>48</sup> World Economic Forum, *Global Competitiveness Report 2005-2006*, which is available at: [www.weforum.org](http://www.weforum.org).

<sup>49</sup> Ministry of Commerce and Industry in Morocco, *National Industrial Survey of 2003*, which is available at: [www.mcinet.gov.ma](http://www.mcinet.gov.ma).

washing, which constitute the most environmentally polluting components of textile and garment making. Moreover, approximately 210,000 workers were employed in the sector, which benefited from a strong proportion of highly qualified and trained workers and from various state-of-the-art manufacturing facilities.<sup>50</sup> The apparel sub-sector employs 47 per cent of the manufacturing workforce in Morocco and accounts for 15 per cent of national manufacturing output.

The textile and clothing sector in Morocco has grown significantly over the past decade owing to growing technical production capacity, low labour costs and improved access to markets in the EU and the United States, particularly following the EU-Morocco Partnership Agreement and the United States-Morocco Free Trade Agreement. Exports to the EU, particularly to France, remain strong; and textile and apparel goods produced in designated free zones enter the EU free of duty. Despite these gains, employment and investment in the sector has slowed owing to increasing competition from apparel manufacturers in East Asia in both domestic and foreign markets.

Based on the definition of an SME in Morocco, which encompasses firms that employ up to 250 workers, the sector is dominated by medium-sized firms in industrial complexes in the main cities across the country. On average, there are 150 employees per firm working in the sector and a high level of concentrated production in the sector. Specifically, 12 per cent of all the firms in the sector account for 59 per cent of output, 60 per cent of exports, 43 per cent of workforce, and 58 per cent of investment in the sector. By contrast to textile and garment firms in Jordan and Lebanon, small family-owned SMEs account for less than 2 per cent of firms operating in these sectors in Morocco. Geographically, 59 per cent of all textile and clothing manufacturing firms are concentrated in Casablanca, which account for 63 per cent of output, 64 per cent of exports and 53 per cent of workforce in the sector.

This case study explores the main features of firms operating in the dyeing and washing sub-sector of the textile and garment industry in Casablanca. It explores how existing and potential inter-firm collaboration among firms engaged in dyeing and washing activities could facilitate the transfer of environmental technologies and know-how needed to improve the treatment of wastewater effluent from these companies. This transfer of environmentally sound technologies to developing countries is among the actions identified for implementation at the World Summit for Sustainable Development. Moreover, local firms have signalled that improved environmental performance is a means of attracting foreign clients and additional foreign investment.

This case study was prepared in collaboration with the Technical Centre for Textiles and Garments (CTTH), which is managed by the Moroccan Textile and Apparel Manufacturers Association (AMITH).<sup>51</sup> The findings are based on information generated by the Centre from its membership database; data gathered from an assessment of 127 firms operating dyeing and washing facilities in Morocco, most of which are located in Casablanca; and interviews with 10 dyeing and washing enterprises in three of the five industrial districts located in Casablanca.<sup>52</sup>

### 1. *Main features*

Casablanca, which is the most industrialized city in Morocco, is the main centre for textile and garment manufacturing in the country. There is high concentration of SMEs engaged in the sector operating in five industrial districts located in Greater Casablanca, namely, Ain Chok, Ain Sebba, Sidi Bernoussi, Ben Msik, and Anfa. Within each industrial cluster there is a mix of textile and clothing manufacturers, and of various specialized firms supporting the industry, including many companies that are fully or partially specialized in dyeing and washing operations. Importers of intermediate goods, national distributors,

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<sup>50</sup> Ibid.

<sup>51</sup> M. Joumani, "Etude sur le transfert de technologie du traitement des eaux usées pour renforcer la compétitivité d'une grappe du secteur textile et habillement à Casablanca", which was an unpublished study prepared for ESCWA in 2005.

<sup>52</sup> These interviews were conducted with senior managers to secure more detailed information with regard to local wastewater management capacity, and to highlight the needs of firms engaged in various dyeing and washing operations associated with textiles and garment manufacturing.

wholesalers and retailers are also based throughout the city. Firms in Casablanca have access to various suppliers of fabric, yarn, chemical products, spare parts and other accessories.

There are an estimated 160 dyeing and washing enterprises operating in Morocco, of which at least 85 are located in Casablanca. These include small manufacturers of jeans who have in-house washing operations, in addition to firms that are not members of AMITH. Out of the 127 firms surveyed at the national level, the 79 firms that operate dyeing and washing facilities employ fewer than 100 employees. While annual revenues vary, 34 surveyed firms tend to generate annual revenues in the range of \$0.34-1.13 million; and most generate annual profits of approximately 10 per cent.

The Casablanca-Mohammedia industrial corridor is on the Atlantic coast. Growing population levels, industrialization, urbanization and national policies aimed at encouraging tourism development along the coast have made water supply and wastewater management among the major environmental and health challenges facing both the region and the country. Consequently, Morocco has adopted a law to limit pollution and establish parameters for wastewater releases into sewage systems and surface waters. However, these limits remain standards and are not yet enforced.

As such, the Government issued a concession to a company, namely, LYDEC, to provide water supply, wastewater treatment and electricity services to the Greater Casablanca area. The company has been working with firms to try to reduce pollution loads on the system, thereby reducing costs associated with investments for wastewater treatment plants that can handle municipal and industrial effluents. While LYDEC has established its own wastewater effluent standards for the textile and garment industry, it does not have the authority to enforce these standards on the private sector. Improving environmental performance by complying with wastewater effluent standards therefore remains a voluntary requirement for manufacturers in Casablanca.

(a) *Production and processing capacity*

The firms engaged in dyeing, finishing and washing operations in Casablanca are distributed as follows: 31 firms in Ain Sebba, 22 in Ain Chok, 15 in Sidi Bernoussi, 10 in Ben Msik, and 7 firms in Anfa. Out of that total, the majority, or 38 firms, employ 20-100 employees; and an additional 21 are smaller enterprises that employ fewer than 20 employees. This indicates that dyeing and washing operations in Casablanca are dominated by SMEs.

The combined capacities of these dyeing and washing enterprises are insufficient to meet the demand of the textile and clothing sector in Casablanca. Assessments reveal that an additional seven or eight dyeing firms, with a combined annual capacity of 25,000 tons, are required to meet the increasing demand of the sector. While this translates into significant opportunities for the expansion of the dyeing and washing sector, it can create additional pollution loads associated with wastewater generated by dyeing and washing operations. Several organizations, associations and experts have indicated the need of the technology transfer to the dyeing sector in order to improve its productivity, quality and environmental performance.

(b) *Technological and technical capacity*

Limited financial resources for investment prompt most SMEs to invest primarily in low-cost second-hand equipment, which has lower productivity rates than more modern machinery. Consequently, maintenance cost increases, and production is often affected by frequent interruptions of the machines. This reduces returns on investment and affects the ability of smaller firms to invest in new technologies.

Machinery and equipment is generally imported from France, Germany and Italy. The management and operation of the imported technology are usually in the hands of foreign companies or foreign experts employed by local companies.

Out of 60 wastewater treatment stations that are owned and operated by private firms in Morocco, five serve the dyeing industry. However, a modest two of these are functioning, both of which are not in Casablanca and are managed by foreign companies. However, one of the firms interviewed did have a

covered basin for reducing the temperature and acidity levels of water effluents prior to release into the municipal system; and others noted that such reservoirs are being required by international clients.

Knowledge and know-how concerning the environment and different wastewater treatment methods tend to be mixed among business owners in the industry. Out of the 10 firms interviewed, half indicated that their clients had imposed on them some type of environmental requirement, while only three were aware of the national regulations on water. However, six of these firms were aware of the wastewater effluent standards being promoted by LYDEC; and seven indicated that they were aware of the various ways to treat wastewater, particularly the physical-chemical treatment options.

(c) *Inter-firm linkages*

While the scale and diversity of inter-firm linkages in the textile and garment industry in Morocco was beyond the scope of this case study, it is worth mentioning that several export consortia have been established among firms in Morocco to support the sale and marketing of textiles and garments.<sup>53</sup> Moreover, AMITH maintains an extensive network of firms across the country, and CTTH conducts regular training activities and prepares feasibility assessments and projects for supporting firms and clusters of firms in the sector. More than half the textile and clothing firms operating in Morocco are members of AMITH. Furthermore, most industrial zones in Casablanca maintain their own associations, which help to reinforce networking and the potential for inter-firm cooperation at the local level.

Through various projects and meetings coordinated by CTTH, a number of enterprises have indicated their willingness to undertake collective actions and to develop synergies among themselves aimed at increasing their competitiveness in the international marketplace. Moreover, three out of the ten firms interviewed in Casablanca noted that they had already engaged in some type of joint activity with other firms in the field of environment.

## 2. *Challenges and constraints*

Mounting pressure on environmental infrastructure and international consumer preferences for environmentally sound production processes are raising the environmental awareness of the private sector in Morocco. Moreover, foreign investors and clients of the Moroccan textile and garment industry are increasingly requiring local manufacturers to adopt sound environmental management practices as a prerequisite to securing international contracts. This has generated a new set of challenges for SMEs operating in the textile and garment industry, namely, the need for more specialized human, technical and financial resources.

(a) *Compliance with environmental requirements*

Many dyeing and washing firms have participated in recent programmes aimed at raising awareness on wastewater and various related issues, which have been organized by Government ministries, LYDEC, international organizations and foreign technology suppliers of services of environmental goods and services. As a result, most dyeing and washing firms acknowledge increasing awareness of the industrial trend to reduce pollution from dyeing and washing operations. Moreover, many firms indicated that some clients had expressed a need for improved environmental performance in their dyeing and washing operations.

Additionally, most dyeing and washing operators realize that improved environmental performance is increasingly required by their client firms to access export markets and, therefore, can serve as an important marketing tool. A total of seven out of the ten firms interviewed expressed interest in securing an Oko-Tex eco-label for certifying environmental management; only one firm was familiar with the European Eco-Label; and four out of the ten firms, particularly the larger SMEs, were interested in securing ISO 14001 certification. As of 2004, Oko-Tex had awarded 15 certificates to textile and garment manufacturers in Morocco, and established its first office in Morocco in 2005 to provide conformity assessments services

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<sup>53</sup> Many of these consortia were established with technical assistance provided by UNIDO.

associated with the use of its label. However, this number remains very modest, considering the number of firms operating in the Moroccan textile and garment industry.

(b) *Human and financial constraints*

Nearly all the firms interviewed in Casablanca indicated that they would require financial and technical assistance in order to comply with environmental regulations and wastewater norms in the event that such regulations became mandatory. Most of the enterprises were aware of the availability of funds by the Fonds de Dépollution Industriel (FODEP) aimed at providing a portion of the financial assistance needed for environmental investment, including wastewater treatment facilities. However, all the firms interviewed complained of the complexity of the administrative procedures and lengthy delays associated with obtaining those resources.

Accordingly, despite the availability of some financial support, only four other firms indicated their readiness to invest in their own wastewater treatment station, one of which has already submitted a request for financial assistance to FODEP to that end. Moreover, the transfer of knowledge and know-how is set to involve training staff or recruiting qualified personnel in order to operate and manage wastewater treatment facilities adequately. Only one of the ten enterprises interviewed was not interested in receiving such technical assistance, which can be attributed to the fact that the firm has a foreign director who already possessed the requisite technical skills.

3. *Opportunity for inter-firm cooperation to facilitate technology transfer*

Collective action by a cluster of firms can help to overcome the human, technical and financial constraints associated with investments in environmentally-sound technologies. Moreover, it can assist SMEs in the textile industry to improve their environmental performance. An assessment was therefore conducted to determine whether the costs of a wastewater treatment station, including investment, operating and managing costs, could be reduced if such a system were shared by a cluster of firms operating in the same sector. A total of nine out of the ten firms interviewed expressed a willingness to cooperate with other firms on a collective wastewater treatment station.

The cost assessment was based on a review of various environmental technologies that could be appropriate for the treatment of wastewater generated by the dyeing and washing operations. The assessment was complemented by two pilot project investments being implemented by CTTH that tested the effectiveness of two effluent treatment options in small and large firms in Casablanca. Estimates on wastewater effluent levels are based on figures received from the SMEs in the dyeing and washing sector. Specifically, four firms indicated that they released 100-200 cubic metres (m<sup>3</sup>) of wastewater per day; and three others indicated that they released 300-400 m<sup>3</sup> of liquid waste per day.<sup>54</sup>

Individual firms can reduce costs by 42 per cent if they seek out collective action with other firms to install, operate and maintain a shared wastewater treatment station (see table 6). Further cost saving could be generated by discounts of 10 per cent that agents would be willing to provide if the firms signed service contracts with them. For example, the cost of investment in a wastewater treatment facility for an individual firm is estimated at €518,000, compared to some €309,000 that would be paid by an individual firm in a collective of 20 companies.<sup>55</sup> This represents savings amounting to €209,000. Additionally, cost savings could be generated during operation, maintenance, management training and other services. This demonstrates how economies of scale can reduce costs to individual firms, particularly SMEs, that are willing to invest in new technologies by collaborating with similar firms operating in the same cluster. This is particularly relevant for SMEs facing compliance with common environmental requirements and that are located in the same geographic area.

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<sup>54</sup> Larger firms tend to release more than 1,000 m<sup>3</sup> of wastewater on a daily basis, which therefore requires investments in larger wastewater treatment facilities.

<sup>55</sup> In both cases, the treatment capacity for individual firms is set at 300 m<sup>3</sup> of wastewater per day.

TABLE 6. COST REDUCTIONS IN WASTEWATER TREATMENT ACHIEVABLE  
THROUGH COLLECTIVE ACTION  
(Thousands of euros)

Actions	Cost to individual firm based on individual action	Cost to individual firm based on the collective action of 20 enterprises	Savings
Investment in a water treatment station	Average capacity of 300 m <sup>3</sup> per day	Average capacity of 6,000 m <sup>3</sup> per day	209 m <sup>3</sup> /day
	518	309	
Operations and maintenance charges per year	€0.5/m <sup>3</sup> 45	€0.3/m <sup>3</sup> 27	18
Costs of feasibility studies	8	4	4
Training costs on various themes <sup>a/</sup>	16	0.8	15.2
Commercial visits	2	0.4 <sup>b/</sup>	1.6
Total	589	341.20	247.80

Source: Compiled by ESCWA.

Note: The figures are provided in euros given that most imported environmental goods and services in Morocco are priced in euros.

<sup>a/</sup> Training costs were calculated as comprising 20 work days per year.

<sup>b/</sup> In the area of commercial visits, the data for the collective costs were calculated for five firms.



## V. TECHNOLOGY TRANSFER FOR SMES IN THE ARAB WORLD

In most developing countries, including those in the Arab region, there are fundamental barriers to the flow of technologies from the producers of such technologies to the SMEs that seek to acquire them and integrate them effectively into improved production processes. SMEs in the Arab region are increasingly seeking new technologies to replace archaic equipment and labour-intensive procedures. By increasing productivity and resource efficiency through technology transfer they enhance the competitiveness and, in many cases, the viability of their businesses. This chapter makes specific references to the case studies of this report to review the constraints experienced by SMEs in adapting their businesses to globalization in increasingly open Arab economies.

### A. BARRIERS TO TECHNOLOGY TRANSFER CONFRONTING SMES IN THE ARAB REGION

SMEs face many constraints to growth owing, in large part, to globalization and modern transport and communications that bring distant products within easy reach of consumers all across the world. Traditionally, SME manufacturing firms in Arab countries produce culturally-specific consumer goods for local markets, including food and clothing. Local markets were relatively closed and business was secure. Over the past few decades this situation has undergone a revolutionary change. Food and clothing preferences have lost much of their local characteristics, and competition from foreign producers has grown substantially. As a result, many SMEs are facing reduced demand and market share for their goods in local markets. At the same time, entry to export markets is not automatic. Foreign consumers demand high quality products; Governments impose strict environmental, health and safety standards; and competition with other exporters is intense.

By increasing productivity and resource efficiency, modern technologies allow firms to reduce production costs, improve product quality, and both restyle and diversify products. Each of these end results adds value to their output, thereby increasing the international competitiveness of firms. Technology is therefore central to enhancing the competitiveness of SMEs.

Many SMEs in the Arab region have not yet updated their businesses with the modern technologies needed to ensure their viability and sustainable growth. For such firms, the case studies reveal various barriers to technology transfer that must be addressed if they are to succeed in making the technological shift needed to increase their competitiveness in domestic and global markets. These barriers are summarized below.

#### 1. *High cost of production inputs*

Competing in global markets alongside large enterprises, SMEs are at a relative disadvantage when sourcing production inputs. Unlike large firms, they do not benefit from lower prices possible through large volume purchases of production inputs. The issue was cited as a major competitiveness concern by a majority of firms surveyed in the case studies.

Competition with foreign firms that benefit from subsidized inputs by their Governments was also cited as a problem. Apparel manufacturers in Jordan and Lebanon find it difficult to compete with firms in the Syrian Arab Republic where cotton is subsidized; and olive oil manufacturers in Lebanon have difficulties in export markets owing to the high cost of their inputs relative to those in Greece and Spain, which enjoy substantial EU agricultural subsidies.

In addition, the high cost of inputs can have a technological basis. Older technologies are much less resource efficient than their modern counterparts, thereby necessitating greater quantities of inputs to production. This problem was observed in Jordan and Lebanon where small apparel manufacturing firms that lacked computer-aided cutting machines wasted valuable fabric, which in turn increased the purchasing requirements of fabric.

## *2. Absence of productivity growth*

With production methods unchanged for decades, many SMEs have failed to realize productivity growth. In order to raise output, they often increase labour allocations to production with diminishing returns. Apparel manufacturers in Jordan experienced this effect. While they increased workers in order to boost output, the fixed number of sewing machines limited increases in output.

Additionally, in the olive oil sector in Lebanon, old technologies continue to dominate production processes. There are a limited number of modern olive oil presses, with many manual presses still in use. While the majority of these mills are ancient traditional mills, these can be easily upgraded to produce high quality oil; and their operations can be modernized to reduce manual labour.

## *3. Limited human capacities*

For many SMEs, knowledge of newer production technologies and the human capacity to use them is lacking. For micro-sized firms in particular, this was seen to be a problem as revealed by the case studies. Olive oil processors in Lebanon are typically older and with limited education beyond primary school. They are unaware of how traditional production processes that they perceive as increasing output can significantly reduce quality. The ubiquitous practice of mixing oil with batches from previous years was observed to increase acidity levels in the final product, thereby greatly reducing quality and the potential for higher producer prices.

Given the limited human capacities of many small SMEs, technology acquisition by these firms needs to be complemented by a transfer of know-how, processes, procedures and management skills aimed at using effectively and exploiting fully the productivity gains offered by new production technologies. Increased collaboration between SMEs and universities and technical schools must be supported to ensure a successful transition to newer technologies.

Moreover, limited human capacities negatively affect the decision-making process in areas other than those related to technology. One major example is the reluctance of management to pursue export-oriented growth strategies. Apparel manufacturers without trained managers in Lebanon and Jordan perceive procedures necessary to access export markets to be complicated. Consequently, they have hesitated to seek out foreign buyers. Similar perceptions were raised by small agro-food producers in Lebanon who have traditionally sold their products by word of mouth or to the Government. There is therefore a clear need to develop modern export agents for SMEs whose tasks could include the following: (a) to intermeditate with foreign buyers; (b) to facilitate pre-shipment financing; (c) to manage adherence to time schedules; (d) to assist with packaging and shipping; and (e) to help prepare customs declarations.

## *4. Inadequate technological base for supporting new business approaches*

New production technologies offer various opportunities for diversifying production in terms of style, functionality and quality of products. Without them, however, the case studies demonstrate that such options are often severely limited for many Arab SMEs that lack modern technologies. For apparel manufacturers, older technologies were found to limit styling and the use of certain materials in clothing manufacture. For agro-food producers, quality constraints were common. The artesian production of honey lacks advanced processing techniques and affects the level of quality.

Most Lebanese agro-food manufacturing SMEs have not implemented modern control methods for the safe processing of food. During production, there is a lack of regular inspections to ascertain product and process specifications. Moreover, SMEs also lack proper testing facilities for evaluating the quality and food safety of final products. The absence of adequate and affordable testing facilities has become a major barrier to exports for agro-food manufacturing SMEs. There is therefore a need for a commercial, fully-equipped testing laboratory to certify product inspections and assist in securing official documents for exports.

Technologies involve processes and techniques as well as capital equipment. Disseminating processes through capacity building and training can help SMEs to improve their productivity and sales. The studies in

South Lebanon show that sustainable *zaatar* harvesting practices can support the wider sustainability of local agriculture and can contribute to improved honey production in the area. For its part, honey production can be enhanced simply by modifying beekeeping practices and by improving cooperation among beekeepers.

#### 5. *Lack of market information and producer-consumer linkages*

Many SMEs sell their products exclusively through distributors and wholesalers and, therefore, have little knowledge with regard to setting up retail businesses. The lack of market information was evident for clothing manufactures in north Lebanon who work solely with distributors and wholesalers. Information dissemination on prices can improve the bargaining power of manufacturers who can, moreover, add value to their businesses by direct marketing. However, data gathered from case studies on small producers in the agro-food sector in Lebanon indicate that access to market information is less of a problem for them given that they have a tradition of selling output informally to end consumers.

#### 6. *Shrinking financial resources for investment*

Given the loss of market share in domestic and foreign markets owing to increased competition, SMEs are generating less revenue and are able to save less for the future. For apparel manufacturers in Jordan and Lebanon, reductions in cash-flow arising from lost orders that are due to import competition are compounded by production overcapacity. This makes it difficult for owners both to finance and justify the purchase of new production equipment. The situation has reached the point whereby agents no longer market new equipment or their services to manufacturers in these areas. Indeed, it is because SMEs in these situations can no longer make investments for technological upgrading as individual entities that they are compelled to look at collective solutions presented by clustering to overcome these financial constraints. Among the options available to SMEs is pooling capital for joint projects at the cluster level or seeking out support through investment funds, including, for example, those funds aimed at improving environmental performance in Morocco.

#### 7. *Limited options for financing technology upgrades*

Currently, one of the most fundamental challenges facing SMEs in the Arab region is the inaccessibility to financing. Given variable cash flows, low-valued assets and the absence of formal accounting records, small SMEs are unable to attract the interest of commercial lenders. Rather, family-owned SMEs rely largely on loans and investments from family members and friends. In most cases, this source of family funding has reached its limit so that external sources of funding are needed to finance technological upgrading. This situation characterizes the small apparel and agro-food producers examined in the case studies.

### B. FACILITATING TECHNOLOGY TRANSFER AND FDI THROUGH SME CLUSTERS

Despite the many challenges facing small SMEs in the Arab region, there are some opportunities. Specifically, trade liberalization, which has opened local markets to foreign producers, has equally opened vast foreign markets to Arab producers. Increased access to foreign markets by Arab producers provides an opportunity to learn new production methods, raise awareness regarding innovative machinery, expand exports and generate the revenue needed to acquire new technologies. At the same time, however, foreign quality and technical standards require investments in new technologies before increased exports can be realized. Consequently, there is a vicious circle whereby SMEs need new technologies to expand their businesses, and yet only the growth of their businesses can generate the funds needed to finance technology acquisition. However, clusters provide a means of untangling the loop, provided they are adequately managed and strengthened.

Inter-firm cooperation in clusters has its basis in common situations and needs of cluster members, and in addressing common challenges through joint rather than individual actions. Given their proximity to each other both in terms of geography and economic activity, members of a cluster have the opportunity to improve productivity through joint action associated with many common business functions. The case studies reveal that there is considerable scope for expanding cooperation in both agro-food and apparel

clusters, and for reaping benefits from collective actions. These arrangements subsequently allow SMEs to better access technological goods and services, in addition to investment opportunities. Some of these benefits are reviewed below.

### *1. Reduced cost of inputs and improved quality of outputs*

Firms operating in the same sector producing similar goods often source the same inputs, perform similar production processes and seek to reach a common market of intermediate distributors and final consumers. Apparel manufacturing firms in Jordan and Lebanon demonstrate that they can collectively order fabrics, clothing accessories, labels, and packaging and packing materials from suppliers, thereby benefiting from lower supplier prices for volume purchases. Similarly, the agro-food firms can lower their cost for production-related goods by jointly purchasing such goods as sugar, bottles, bees, labels and packing materials.

Economies of scale generated through collective action can also reduce labour and transaction costs. The case study on honey producers in Bint Jbeil shows that different members of the group are responsible for performing different tasks during the production process. As such, collective effort can reduce the time and level of effort otherwise required at the individual level to complete each stage in the production process. Moreover, joint transport and movement of bees between locations during different seasons reduces the cost of transportation. Subsequent to an increased output, local beekeepers turned to the use of more sophisticated technologies for processing, filtering and packaging honey, which in turn improved the quality of the final product. Within that context, while these technologies and services were already known to be available, none of the honey producers had sought out these services on an individual basis prior to the involvement of the CDA and the strengthening of inter-linkages between members of the cluster.

### *2. Shared production and process technologies*

By their very nature, agricultural cooperatives provide an opportunity for farmers in the same geographic area to come together to share equipment and resources needed to prepare, produce, process and market commodities. While cooperatives arising from informal clusters, including those supporting the olive oil sector in Lebanon, do not necessarily enhance cooperation between individual producers, their effectiveness can be enhanced by strengthening cooperation between their members. As stated above, the olive oil quality could be improved if a CDA was in place to coordinate with farmers and local mills regarding the harvesting, timing and scheduling of olive pressing. This could reduce pressures on mill capacity in the cluster, reduce the risk of down-time associated with overuse of olive presses, and improve the resulting olive oil quality by reducing the time between olive picking and pressing. Moreover, the need to invest in additional mill capacity can be avoided by better coordination among local users and providers of olive milling services. Within that context, a cluster facilitator can help to monitor the system and pursue efficiency improvements in the use of shared services and equipment.

### *3. Improved access to business support services*

The initial stages of cluster formation among neighbouring SMEs can often involve intermittent cooperation on non-proprietary business activities. These include assisting each other with such technical problems as practical advice on machine repairs and loaning spare parts. This type of cooperation is crucial, particularly for small clusters of firms working in rural or remote communities that do not have easy or immediate access to maintenance service providers or to distributors of equipment. This was demonstrated in the surveys of apparel manufacturers in Jabel Mohsen and the Marka-Zarka corridor, which are located outside the major metropolitan areas of their respective countries. In these cases, small business owners often turned to their neighbours when they needed a piece of equipment to keep their production lines running. Indeed, fostering the transfer of technological inputs, information and services between small producers in a cluster can be as important as the transfer of new production technologies from large to small firms.

Additionally, business services can be acquired collectively by members of a cluster. By sharing resources for such common business functions as accounting, information technology, marketing, export and

laboratory services, firms can reduce the costs compared to arranging for such services independently. Each of these services otherwise requires investment in some level of technology that is typically beyond the human or financial capacity of a small firm. For example, the cost of product sampling and testing can be reduced if SMEs operating in a cluster solicit jointly the services of conformity assessment providers. By exposing collective demand for these services, providers could be encouraged to establish a branch office in their community or to provide regular services to SMEs in a cluster, as in the case of Oko-Text in Morocco. Interest in such arrangements was also expressed by LIPSOS and associated olive oil producers through their efforts to establish a specialized testing facility for olive oil in Lebanon, as well as by other local olive oil producers seeking to reduce the time and cost associated with complying with foreign market regulations and standards. The case study also exposed the high cost of complying with HACCP testing requirements and the savings that could be generated by joint action or by investing in a joint testing facility.

#### *4. Ability to secure larger and more value-added orders*

The benefits of clustering equally arises when one firm, which experiences difficulties in meeting volumes or time schedules for a given production run, subcontracts part of the job to a nearby firm. Outsourcing value-added components of the production process as illustrated, for example, in the cluster of firms in Jebel Mohsen, is also a way for a small firm to take on larger, more lucrative contracts without having to weaken human and financial capacity in a variety of specialized services. Washing, laundering and embroidery are some outsourcing services that SMEs in apparel manufacturing clusters use in Jordan, Lebanon and Morocco. Indeed, while the survey of firms in Morocco demonstrates that larger firms are sometimes able to integrate vertically various aspects of the production process under one roof, smaller firms in Casablanca experience difficulties in that regard. Consequently, these smaller firms either seek out outsourcing arrangements or become providers of specialized services, including, for example, dyeing and finishing. The experience therefore shows that by combining their production capacities, SMEs can bid and undertake large orders typically made by foreign buyers and multinational clothing firms despite their small size.

#### *5. Facilitated market access and access to information*

Most manufacturing SMEs with fewer than 50 employees do not have adequate human, financial or technical resources. The survey of firms in Jordan, Lebanon and Morocco also reveals that most have limited understanding and access to computers and the Internet, which reduces their ability to access rapidly and manage easily information concerning preferences, trends and export requirements in foreign markets. By working together, small producers can share the time and cost involved in researching, purchasing and analysing market information. Moreover, joint marketing strategies can be pursued through short-term arrangements, including shared displays at international trade shows, or through more advanced approaches, including the establishment of an export consortium. The benefits to small and medium manufacturers of working together in the areas of marketing are multiplied by the fact that exposure to the international marketplace engenders and raises awareness of new production and process methods, particularly those being used by competitors. The transfer of knowledge and information is therefore enhanced, as well as the potential to adopt new business practices.

#### *6. Increased financial capacity for investments in new technologies*

Another benefit of clustering for technology transfer is that firms working together can jointly invest in, own and operate production equipment that is not required on an exclusive or continuous basis by any one firm. As exposed in the case study of apparel manufacturers in Jordan, this can include pursuing a shared investment in a computer-aided design and cutting machine. Moreover, in the area of olive oil, collective arrangements for handling and disposing of olive waste residues from mills present opportunities for shared investments in recycling facilities. Areas for investment in new technologies that SMEs cannot otherwise afford on an individual basis include building specialized laboratories for testing olive oil or, in the case of beekeepers, investing in shared processing facilities to improve the quality of honey.

The ability of collective action to increase opportunities for technology transfer and investment is particularly apparent in the case of the dyeing and washing sector in Casablanca. Within that context, SMEs

in the same area exposed their willingness to finance and operate wastewater treatment facility collectively in order to comply with wastewater effluent standards. The cost assessment associated with this case demonstrates the feasibility of such a project and the cost saving that could be generated for each firm by pursuing the investment together.

### *7. Improved opportunities for attracting FDI*

Inter-firm cooperation to facilitate technology transfer is based both on sharing costs for capital equipment and on increasing the potential to attract financing needed to acquire technologies in commercial markets. The combined assets, cash flows and liabilities of two or more firms significantly reduce the risk of defaults on borrowed capital. In addition, closely cooperating competitive firms forming an export consortium can attract the interest of large international enterprises seeking to invest in new production sites in developing countries. Such arrangements can offer high returns on investment and can increase the attractiveness of investing in smaller firms. Indeed, while it is extremely difficult for an individual SME to attract foreign investment, a cluster of competitive and complementary SMEs can succeed in attracting FDI.

Markets in developing countries that have been successful in attracting FDI are those that have enacted a sweeping programme of financial reforms, including as follows: (a) privatizing major industrial sectors; (b) floating currencies; (c) establishing tax free industrial zones; (d) reducing import and export tariffs; (e) lifting technical barriers to trade; and (f) lowering substantially limitations to the free flow of cross-border capital. Furthermore, the potential to attract FDI is directly linked to national policies, financial regulations and technological capacities of recipient countries. As purely commercial transactions, they are undertaken only when the political, economic and technical climates promise long-term investment security and profitability. These conditions are beyond the capacity of SMEs to satisfy or secure. Accordingly, while Governments must seek to direct FDI towards specific sectors that offer potential for increasing national income, special policies must equally be adopted that take into consideration the particular needs of SMEs and opportunities for FDI that can be presented by SME clusters seeking to work together.

## VI. CONCLUSIONS

Technology transfer remains a basic requirement for SMEs in the Arab region that seek to enhance their international competitiveness and to increase value added in their manufacturing activities. Findings from the case studies substantiate the central need for technological upgrading and expose the human, technical and financial constraints limiting the ability of SMEs to acquire and assimilate new technologies.

Both clustering and collaborative approaches to technology acquisition and investment can improve the ability of SMEs to overcome these challenges, particularly in the agro-food and apparel manufacturing sectors, when a suitable facilitator is in place to support the development of the cluster. The agro-food case studies demonstrate that cooperation among rural beekeepers in South Lebanon is observed to be naturally amenable to clustering, and has resulted in increased productivity and opportunities for knowledge transfer.

While cooperation is more limited in the olive oil sector in Lebanon, opportunities exist for economies of scale and business networks to improve product quality through better cooperation and joint testing of products. Furthermore, the sub-sectors examined in the agro-food case studies demonstrate that SMEs remain closely attached to informal local markets that link them to individual consumers. However, as quality and productivity improve along with output, informal distribution channels based on trust and word of mouth are no longer sufficient to market final products. Consequently, small- and medium-scale producers are having to seek out certification through more rigorous quality control arrangements attesting to food safety and food quality in order to access more diffuse markets both domestically and abroad. Overcoming costs and technical obstacles for complying with these conformity assessment systems are possible through collective actions among SMEs.

Within the apparel manufacturing industry, the case studies reveal that SMEs in Morocco have already achieved remarkable success in enhancing their international competitiveness and in accessing foreign investment. However, the environmental requirements being imposed by importers in destination markets are perceived by local manufacturers to be a new challenge to their competitiveness in areas where the cost of enhancing environmental performance is too high. Collective approaches for investing and operating wastewater treatment facilities therefore provide a viable option for SMEs seeking to secure eco-labels or new clients that demand a higher level of environmental performance.

Similar economies of scale can equally be realized among SME clusters operating in the garment sectors of Jordan and Lebanon. Within the context of an increasingly competitive marketplace, the competitiveness of SMEs can improve through joint investments in shared computer-aided technologies, more formalized outsourcing relationships between large and specialized firms, increased use of information technologies, and collective marketing arrangements to improve access to domestic and foreign clients

The case studies also illustrate many examples where inter-firm cooperation failed to occur. SMEs often view each other as competitors and therefore fail to recognize that mutually beneficial gains can be achieved through cooperation. Furthermore, SMEs are often family-owned businesses, particularly in the apparel manufacturing sector in Jordan and Lebanon. As such, there is often a perception among them that the details of their businesses are “family secrets” that cannot be shared with other firms for fear of losing potential competitive advantages. Policies and programmes are therefore needed to raise awareness concerning the benefits that can be reaped from collective actions and to create an enabling environment that encourages the deepening of SME clusters.

The two case studies in Lebanon, namely, the beekeepers in South Lebanon and the apparel manufacturers in Jebel Mohsen, confirm the crucial role played by the CDA in terms of promoting collaborative arrangements among producers and catalysing the development of the cluster. Within the context of the honey cluster in South Lebanon, the CDA played a pivotal role in building trust, facilitating communication and coordination among honey producers, and helping members to improve their competitiveness by transferring and demonstrating the application of technical knowledge and know-how through a pilot project. However, as demonstrated in the case of the apparel manufacturers in Jebel Mohsen, the CDA can also be a home-grown leader in a local community who fosters greater cooperation and collaboration among members of the cluster, and transfers best business practices learned through professional experience gained abroad.

The lessons learned from these two case studies show that the success of a programme on cluster development depends to a large extent on the right choice of agent. International experience and lessons drawn from the cases reveal that an effective CDA must possess the following attributes and skills: (a) strong leadership and communication skills; (b) solid work ethic; (c) personal commitment towards achieving cluster development objectives, while serving as a neutral party; (d) technical expertise in the production processes undertaken in the cluster; (e) ability to foster new ways of thinking and to transfer new knowledge in a practical and user-friendly manner; (f) understanding of the cultural and socio-economic characteristics of the cluster; and (g) good negotiation skills that can be effectively applied to help cluster members build consensus and resolve conflicts in the cluster when they arise.<sup>56</sup>

Consequently, policymakers must seek to enhance technology transfer and access to investment by strengthening clusters and networks. In doing so, care must be taken to support clusters that have demonstrated their interest and engagement in strengthening inter-firm relationships and exhibited openness to technological change. This is crucial given that, while experience indicates the important role of the CDA as a catalyst for change and technology transfer, the vitality of clusters is based on the inherent capacity of its members to innovate and seek out new forms of doing business. Moreover, while clusters can be strengthened, they cannot necessarily be created. Similarly, an environment for innovation and adaptation of new technologies can be fostered, but not forced.

Research indicates that there are several policy options and measures that can be adopted to encourage clusters and networks for technology transfer while taking into account the special needs of SMEs. These measures include the following:<sup>57</sup>

(a) To facilitate the transfer of information and practical knowledge through training, the exchange of experiences, demonstration projects and various media, thereby exposing firms to new ideas and increasing their capacity to identify and make use of new technical possibilities. This includes exposing firms to best available technologies or alternative production methods that can be adopted or adapted to meet local needs. It also requires improving management capacity by providing training in basic business skills;

(b) To enhance inter-firm linkages and connectivity between members of a cluster or network by building trust and improving lines of communication between firms. A local leader or CDA can facilitate this process by monitoring and exposing the benefits of cooperation, identifying areas for potential collaboration and facilitating the flow of information among members of the cluster;

(c) To promote entrepreneurship and reduce the cost of failure associated with taking risks. Financial arrangements that reduce requirements for accessing financing and provide low-interest, long-term instruments that are responsive to the constraints faced by SMEs can encourage business owners to pursue investments in new technologies and change traditional business practices;

(d) To foster a friendly business environment for technology transfer and foreign investment by strengthening legislation in IPRs, while encouraging that contracts ensure the transfer of hard and soft technologies to local recipients of FDI.

Globalization has created the opportunity to increase the quality and quantity of technology and investment available for enhancing economic growth and sustainable development. The World Summit on Sustainable Development calls on countries to assist developing countries to that end. Small- and medium-sized manufacturers need assistance and encouragement to take advantage of these opportunities. The lessons from this study show that clustering can provide mechanisms for enhancing the technical capacities and technological capabilities of individual producers in the Arab region. Strengthening clusters for technology transfer and investment is therefore an important tool for helping SMEs to take advantage of the opportunities presented by the global marketplace.

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<sup>56</sup> This is partially drawn from UNIDO, "CDA session note", which was presented at the Joint ESCWA/UNIDO Regional Workshop on the Development of Manufacturing SME Clusters/Networks and Capacity Building in Selected Countries of the ESCWA Region (Beirut, 15-19 March 2004).

<sup>57</sup> B. Carlsson, "Public policy as a form of design", which is available at: <http://design.case.edu/2002workshop/Positions/Carlsson.doc>.