Towards a Smart Specialization Strategy for Haifa, Israel

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Abstract

The notion of smart specialization has gained considerable prominence in the international discourse on regional development. The idea of directing the attention of regional policy towards strengths and opportunities in a region’s knowledge base, and of developing regional economic and innovation strategies in a participatory public-private entrepreneurial process of discovery has unfolded policy relevance especially in countries of the European Union and its neighborhood. Nevertheless, the concept of smart specialization can be applied to regional economies in other countries, too. The present study does so for the city of Haifa, Israel. It provides a profile of the Haifa regional economy, examines regional policies in the framework of the Israeli economic and political context, and identifies possibilities for regional policy to focus on in the coming years. Drawing on the idea of an entrepreneurial process of discovery on the regional level which is a critical component of the smart specialization concept, the study suggests how such an entrepreneurial process of discovery could be organized in the case of Haifa. Conclusions drawn from this study can inform the elaboration of smart specialization strategies in other regions, too.

Towards a Smart Specialization Strategy for Haifa, Israel
Report on a student research project at Heidelberg University

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Cover picture: panorama of the city of Haifa © M. Benner
Table of contents

Table of contents .................................................................................................................................................. iii
List of figures ........................................................................................................................................................ iv
List of tables ........................................................................................................................................................ iv
Preface ................................................................................................................................................................. 1
I Introduction .......................................................................................................................................................... 3
  1.1 Smart specialization and clustering .......................................................................................................... 3
  1.2 Methodological approach ......................................................................................................................... 6
II Country context: Israel ..................................................................................................................................... 8
III Haifa’s regional economy .............................................................................................................................. 14
  3.1 Regional economic structure ..................................................................................................................... 14
    3.1.1 Overview ........................................................................................................................................... 14
    3.1.2 Information and communication technology ..................................................................................... 16
    3.1.3 Life sciences ..................................................................................................................................... 19
    3.1.4 Chemical industry ............................................................................................................................. 23
    3.1.5 Tourism, sport and leisure .................................................................................................................. 25
    3.1.6 Logistics .......................................................................................................................................... 28
    3.1.7 Aerospace and defense industry ....................................................................................................... 30
  3.2 Regional development policies in Haifa ..................................................................................................... 31
    3.2.1 Haifa Economic Corporation (HEC) ................................................................................................. 31
    3.2.2 Other agents of regional development ............................................................................................ 34
  3.3 Regional knowledge base .......................................................................................................................... 35
    3.3.1 Research and study programs at Technion and the University of Haifa ........................................... 36
    3.3.2 Entrepreneurial potentials: Entrepreneurship and technology transfer ....................................... 38
    3.3.3 A preliminary overview of Haifa’s regional knowledge base ......................................................... 41
IV Towards a smart specialization strategy for Haifa ....................................................................................... 44
  4.1 Pathways towards smart specialization ...................................................................................................... 44
  4.2 Entrepreneurial discovery process: A roadmap towards smart specialization ...................................... 48
V Conclusions and recommendations .............................................................................................................. 51
References .......................................................................................................................................................... 54
List of figures

Figure 1: Combining targeted and horizontal policies ................................................................. 5
Figure 2: Structure of the information and communication technology sector ......................... 16
Figure 3: Structure of the life sciences cluster ........................................................................... 20
Figure 4: Structure of the chemical industry .............................................................................. 23
Figure 5: Structure of the tourism, sport & leisure sector ......................................................... 26
Figure 6: Structure of the logistics sector .................................................................................... 28
Figure 7: Structure of aerospace & defense industry ................................................................. 30
Figure 8: Major sectors and clusters in Haifa and their sources of knowledge ......................... 41
Figure 9: Architecture of a smart specialization strategy for Haifa .......................................... 47

List of tables

Table 1: SWOT analysis of the Haifa regional economy .............................................................. 15
Table 2: List of faculties at Technion and the University of Haifa ............................................. 37
Preface

Smart specialization is a highly fashionable idea in the current regional development discourse. Spurred by the high prominence given to the smart specialization notion by the European Commission, regions all over Europe (including not only the European Union but its accession countries, too) have spent the past years designing their smart specialization strategies.

In the rest of the world, smart specialization has not (yet) achieved a similar degree of prominence in regional policy as in Europe. However, smart specialization seems to attract growing attention from countries in the EU’s neighborhood. This is not surprising, given that the international regional policy discourse tends to follow its own waves. While the 1980s witnessed an international wave of interest in incubators, start-up centers and science parks, the 1990s and 2000s were the era of clustering. Could smart specialization be the next fad?

Previous trends show that over the course of such a cyclical wave, enthusiasm among regional development practitioners typically cedes to a certain degree of disillusionment. Similar to bubbles on financial markets, regional policy fads tend to begin with high (and often, unrealistic) hopes and end with (maybe equally exaggerated) disillusionment. Academic research has the responsibility to guide practitioners through the waves of regional development ideas. In an analogy to Keynesian anti-cyclical stabilization policy, researchers have a role to play in attenuating too high expectations and in identifying realistic possibilities of what a new concept of regional development can do – provided its use is suitably adapted to the idiosyncratic context of the regional economy in question.

For researchers and practitioners alike, it is thus important to interact when designing and implementing new concepts of regional development. There is a strong case for regional development strategies to be formulated on the basis of thorough scientific regional analysis. At the same time, researchers should take an interest in policy-relevant notions such as smart specialization. This was the idea behind a seminar in economic geography at Heidelberg University. A small number of students with a solid background on regional-development theories were assigned the task to perform research on how to design a smart specialization strategy for Haifa, Israel. By analyzing a regional economy and developing ideas on how to promote it on a sound theoretical foundation and with realistic goals, students were prepared for future careers either in the academic or the practical realm of regional development. Gaining policy-oriented research experience in a country outside the European Union exposed students to a new political and economic context that differs to a considerable extent from the German and European context they were used to. Last but not least, publication of this study was meant to develop a sense of policy relevance among students, and to acquaint them to standards of academic and policy-oriented writing.

The Haifa regional economy was chosen because it provides one of only a few contexts in an industrialized country outside but close to the European Union which offers suitable condi-
tions for smart specialization but where no smart specialization strategy exists to date. The present study elaborates on the results of this research project.

Some basic caveats apply. Despite the depth of information gathered by students, the methodology is based exclusively on desk research. To analyze the Haifa regional economy in more detail, face-to-face interviews with public and private agents including enterprises in Haifa would be needed. Because such a task is beyond what a university seminar can achieve, this study does not attempt to present a comprehensive regional economic analysis or even a full-fledged smart specialization strategy. Instead, what this study attempts to do is to present some preliminary ideas on what a smart specialization strategy for Haifa could focus on, and on how an entrepreneurial process of discovery could be organized.

We hope that this study will draw some attention of researchers and policymakers alike, and contribute to the rapidly growing field of literature on smart specialization.

Maximilian Benner
Heidelberg, July 2016
I Introduction

The concept of smart specialization has become one of the current trends in regional development. Because access to some lines of funding under the umbrella of the European Union’s cohesion policy depends on regions having formulated a smart specialization strategy (Foray et al., 2012, 9), regions all over Europe (not limited to EU member states but also accession countries) have been busy developing so-called regional innovation strategies for smart specialization (RIS3) during the past years.

Usually, what is happening in regional development in Europe or North America tends to spread to other countries after a certain time lag. As the example of cluster policy shows, international policy transfer is a common phenomenon in regional development (Kiese, 2009). Countries in the EU’s neighborhood are natural candidates for experimenting with new ideas of regional development, and for learning from experiences made in Europe. Interest for smart specialization in EU neighborhood countries can thus be expected to grow in the years to come.

Therefore, research on how to adapt and apply smart specialization within the institutional, economic, and political context of EU neighborhood countries will be needed. This study attempts to contribute to this discourse by focusing on the case of Haifa, Israel. After giving a short overview on the basic concept of smart specialization, the study introduces the institutional, economic, and political context of Israel. It then analyzes the Haifa regional economy, and gives some advice on strengths of the Haifa regional economy a smart specialization strategy could focus on, and on how strategy development could be organized. Lastly, the study presents some recommendations and conclusions for policymakers and practitioners in Haifa which could also give some guidance to those wishing to develop smart specialization strategies elsewhere.

1.1 Smart specialization and clustering

Basically, smart specialization is one of the concepts that follow the reorientation of regional development towards the growth objective. Instead of balancing interregional disparities by targeting lagging regions and countering these regions’ infrastructural deficits, newer concepts strive to promote economic growth by focusing on regional economic strengths and op-
opportunities. Just like cluster policy (Benner, 2009; 2012a; 2012b), smart specialization focuses on the opportunities a region could seize to improve its competitiveness by further developing its strengths. In contrast to clusters, however, smart specialization does not focus primarily on specific sectors or value chains but on underlying regional capabilities in a region’s knowledge base, including what Maskell and Malmberg (1999) call “localised capabilities” such as skills and knowledge available in a region but also its institutions, infrastructure, and resources. Now, clusters as localized concentrations of enterprises and related agents in a sector or value chain (Benner, 2012a; 2012b) will usually form a major component of strengths in a region’s economic structure and build on what a region’s knowledge base offers. Consequently, cluster policy is usually an essential part of smart specialization strategies (European Commission, 2010, 7; Benner, 2014).

Still, smart specialization goes beyond clusters. Because smart specialization focuses on “concentrating knowledge resources and linking them to a limited number of priority economic activities” (Foray et al., 2012, 11), it is meant to promote not just concentrations of economic activities (such as clusters) but also linkages between them. For example, a region might host clusters in sectors or value chains that appear completely unrelated at first sight but build on the same or on complementary knowledge resources available in the region’s knowledge base. New technological trajectories or market convergence might lead to new growth opportunities at the interface between these clusters. Classical cluster policies run the risk of ignoring these new activities at the interface between clusters and of “only look[ing] into clusters” (Benner, 2012a, 21), thus increasing the risk of a monostructured regional economy or even lock-in (Grabher, 1993). Smart specialization is meant as a policy method to promote new technological opportunities at the intersections between existing clusters in addition to promoting growth potentials within clusters.

Basically, smart specialization requires a combination of horizontal policies directed at the regional knowledge base and including policy interventions in the fields of education, science and research as well as promoting experimentation and entrepreneurship, and targeted interventions to promote clusters or cluster potentials. Ideally, the first set of policies should strengthen and develop the regional knowledge base as well as facilitate new technological and market trajectories, while the second set of policies would come into play if and when these trajectories lead to the evolution of real economic activities. Because this is a dynamic process, both sets of policies might reinforce each other. While the first set of policies is meant to lead to a permanent reconfiguration of the regional knowledge base and should – in
the best of cases – generate new trajectories over time, the second set is likely to have repercussions on the regional knowledge base. The latter aspect will probably be most relevant for new fields at the intersections between existing economic activities or clusters (suggesting space for entrepreneurial activities in a Schumpeterian sense of creative destructions and finding new combinations). Figure 1 illustrates this logic which Benner (2014) calls smart experimentation to clarify the necessity for smart specialization strategies to combine targeted with horizontal policies.

**Figure 1: Combining targeted and horizontal policies**

![Diagram of targeted and horizontal policies](image)

**Source:** own work building on Benner (2012b, 221; 2014, 15).

In this logic, a smart specialization strategy serves mainly to ensure coherence between different policy levers and notably between horizontal and targeted policies, and at aligning them towards strengths and opportunities grounded in the regional knowledge base. In a sense, a smart specialization strategy focuses on what could be called a region’s key enabling competencies.

At the same time, smart specialization offers a regional governance perspective by calling for a participatory, public-private “entrepreneurial process of discovery” (Foray et al., 2009, 2) to discover strengths in the regional knowledge base and to develop (horizontal and targeted) policy levers to promote them.

The rationale behind such a methodology is to include both public facilitation and private knowledge into the process of prioritization and strategy formulation on the regional level (Foray et al., 2009; McCann and Ortega-Argilés, 2011). Just how to organize this entrepre-
neurial process of discovery is a critical and highly complicated issue. Several problems emerge: Do private enterprises have an incentive to disclose their knowledge about their competitive strengths (and weaknesses)? How to ensure alignment between agents’ perceptions of regional capabilities and realities on the ground? And: Which stakeholders should be involved and how? In particular, a participatory process on the regional level faces the serious problem that it usually addresses “insiders”, that is, businesspeople or enterprises that are already well established and visible to policymakers. Voluntarily or involuntarily exclusive involvement of these insiders might lead to the strategy formulation process being captured by vested interests. At least, established agents’ perceptions might not encompass the full breadth of developments in the regional economy. Perceptions and opinions of “outsiders” such as small and newly established businesses, soon-to-be entrepreneurs, immigrants or students are typically not considered. Ignoring the voices of these outsiders is highly problematic for a combination of horizontal and targeted policies as it was suggested above and illustrated in Figure 1. After all, horizontal policies aim precisely at facilitating the emergence of new trajectories which are often driven by outsiders. Developing a smart specialization strategy based only on opinions expressed by established stakeholders (such as those active in existing clusters) is likely to disregard new growth potentials that could emanate from the regional knowledge base. Even more critical, well-established stakeholders might not have an interest to suggest policies that promote outsiders because successful outsiders might eventually threaten insiders’ competitive position. Conversely, an entrepreneurial process of discovery based on a maximum level of inclusion, e.g. through an online questionnaire open to everybody, will probably be too broad and yield too much unfocused information to handle. After all, smart specialization is all about prioritization and focus. Striking this delicate balance is perhaps one of the most critical questions in implementing smart specialization in practice (Benner, 2014; forthcoming).

1.2 Methodological approach

The study’s methodology is based on desk research by students of Heidelberg University. Despite the depth of information gathered by the authors, the limitations of this methodology have to be emphasized. To analyze the Haifa regional economy in more detail, in-depth, face-to-face, semi-standardized interviews with public and private agents including enterprises in Haifa would be needed. Such a task is well beyond what can be done in a student research
project in the framework of a university seminar. Accordingly, this study does not attempt to present a comprehensive regional economic analysis that could serve as a basis for an entrepreneurial discovery process, and even less so a full-fledged smart specialization strategy (bearing in mind that such a strategy would have to be finalized after public-private consultations as part of a participatory entrepreneurial process of discovery on the regional level). Instead, what this study attempts to do is to present some preliminary ideas on what a smart specialization strategy for Haifa could focus on, and some recommendations on how the necessary participatory entrepreneurial process of discovery could be organized. The starting point for this task was the following research question:

_In what areas and how can the region of Haifa promote smart specialization?_

This general research question that points towards identifying building blocks for a smart specialization strategy was further broken down in the following sub-questions guiding the research task:

- What are the clusters or cluster potentials in the Haifa regional economy?
- How do agents in the Haifa regional economy promote these clusters or cluster potentials?
- What is the common knowledge base of the Haifa regional economy?
- What can a smart specialization strategy for the Haifa region focus on?
- How can the entrepreneurial process of discovery necessary to develop a smart specialization strategy for the Haifa region be organized?

The present study attempts to answer these questions within the limits of the methodology, and is meant to provide impetus for further research.
II  Country context: Israel

When elaborating regional development strategies from the point of view of relational economic geography, agents from different spatial scales and with different economic rationalities need to be taken into account as all of them shape the regional setup through path-dependent and contingent processes (Bathelt and Glückler, 2012). This is why before examining the regional context in the city of Haifa in subsequent chapters, the general context of the Israeli economy and knowledge infrastructure will be discussed. This is particularly necessary because theory suggests that knowledge spillovers can be facilitated by spatial proximity (Benner, 2012b) and all of the three main cities in Israel – Tel Aviv, Jerusalem, and Haifa – are located in relatively close proximity to each other. Despite the small size of Israel, strong interregional differences exist between the northern and southern periphery and the centrally located high-tech centers of Tel Aviv, Jerusalem, and Haifa (kooperation-international.de, 2016), and are reflected by strongly varying policies by local governments which in the end “create major gaps in the quality of the services residents receive” (Doron and Arian 2014, 448). These inequalities are prevalent not only between cities and the periphery, but also between the three major cities (Alfasi and Fenster 2005), a fact that will also be discussed in the following sections.

In general terms, Israel has undergone a fast-paced change from an agrarian state with a socialist orientation to a marked-based diversified high-tech industrialized country, which was recently listed as an “OECD high income state” in the World Bank’s Doing Business report (World Bank Group, 2016). With an annual population growth rate of more than 2 %, the country with currently more than 8.2 million inhabitants has a per capita gross national income of USD 35,000 with continuous growth rates in the last decade (Central Bureau of Statistics, 2016a; World Bank Group, 2016). Israel’s gross domestic product grew since 2002 (2014: 2.6 %) despite several profound external shocks (e.g. Gaza conflict, global financial crisis). This is partly due to the relatively diversified structure of the economy, a fact that will be discussed more precisely in the following sections. Very recently, increasing levels of employment can be observed, especially in the manufacturing (12 % in 2015) and information and communication technology (ICT) sectors (6 %). The latter sector is a driver of the overall high level of economic development in Israel, which is mainly due to fast-growing high-technology industries. Israel’s employment structure corresponds to its status as an OECD country, corresponding to its membership in the OECD since 2010 (Central Bureau of Statis-
tics, 2016a). But what precisely made Israel “the most successful country after the United States in establishing high-tech industries” (Wonglimpiyarat, 2016, 18) and initiated its evolution to become the recent “ICT powerhouse” (Breznitz and Ornston 2013, 1231)?

Taking a look at the country’s factor endowment, Israel is a small country with limited natural resources. Although Israel does possess natural gas reserves (Germany Trade and Invest, 2016), the substantial competitive advantage of the Israeli economy is based on another production factor: human capital. Today, Israel has the highest density of engineers worldwide (Invest in Israel, 2016; Chorev and Anderson, 2006, 163), but this has not always been the case. Back in the 1960s, the Israeli economy was not strongly integrated into global value chains and had an outdated industry structure. Since then, two major parameters led to a dynamic development. The first one contributed to the emergence of what some scholars identified as so-called “Silicon Wadi” in Israel in comparison with the emerging US semiconductor industry in Silicon Valley. Similar to the American case, the origins of high-tech industries are related to vast government investments in defense-oriented research (e.g. Trajtenberg, 2001). Notably, the so-called “Lavi” program to develop a first-class jet fighter led to intensive education and training of a large number of highly qualified scientists, engineers, and technicians. By the end of this program and other similar initiatives in the 1980s, a large highly skilled workforce was available, strongly pushing the subsequent emergence of high-tech industries. The second factor in building Israel’s currently good human capital base came with the demise of the Soviet Union when massive immigration to Israel took place and provided the evolving Israeli high-tech industry with another wave of well-educated and skilled workers (Trajtenberg, 2001; Wonglimpiyarat, 2016). Most of these new immigrants were highly motivated to help revive the national economy by starting new businesses or by using their knowledge in other ways. In combination with continuously improving education levels (Chorev and Anderson, 2006, 163), the direct effects of these two factors can, for example, be seen in “an impressive growth in the annual number of patents […], starting from about 50 in the late 1960s, to over 600 in the late 1990s” (Trajtenberg, 2001, 366). Thus, the developments in Israel provide an example of how drastic changes in human capital can influence a national innovation system. This influence becomes clear by the fact that in Israel, from 1968 to 1983 high-tech industry increased its share in output from 6 to 24 % and its share in exports from 5 to 28 % (Roper and Grimes, 2006, 301). This development underscores Israel’s economic development during the past decades (Trajtenberg, 2001; Chorev and Anderson, 2006; Roper and Grimes, 2006; Wonglimpiyarat, 2016).
Regarding the overall balance of trade it has to be stated that in the case of Israel with its relatively small domestic market (Yinnon, 1996), economic development in the last decades has been highly influenced by evolving integration into global value chains, with Israel especially serving as a base for research and development (R&D), and increasing export rates. The fact that Israel has a good infrastructure with highly skilled technicians and scientists led to the “reverse technology transfer” phenomenon which Roper and Grimes (2006, 302) describe as “multinational companies investing in R&D laboratories in Israel to benefit from the strengths of the Israeli national system of innovation but then manufacturing the products developed elsewhere.” In this sense, more than 300 multinational companies (MNCs) have opened a local branch so far, with some of the world’s most innovative and valuable ones such as Intel or Google amongst them (Invest in Israel, 2016). This matching of endogenous resources with strategies of external stakeholders is one of the main reasons for why high-tech industries contribute to such a high degree to the overall Israeli gross domestic product. But this remarkably high dependence on external stakeholders not only initializes growth impulses in core technological areas such as computers, communication technology and biotechnology (Wonglimpiyarat, 2016) but also bears risks. Among these risks is the fact that a high percentage of patents granted in Israel does not belong to domestic firms but instead to subsidiaries of MNCs (Trajtenberg, 2001), which in the long run may lead to a certain drain of knowledge and competences included in these patents.

As mentioned above, Israel features severe interregional disparities. These disparities are visible, on the one hand, between the three major cities (Jerusalem, Tel Aviv, Haifa) and peripheral regions as “foreign-owned firms – particularly North American-owned businesses – have had a tendency to adopt metropolitan locations” (Roper and Grimes, 2005, 303). On the other hand, there are strong differences between these three main metropolitan areas. Tel Aviv undoubtedly represents the economic center of Israel, where “firms enjoy ‘cluster’ based advantages due to a high concentration of other high-tech firms” (Roper and Grimes, 2005, 303). Whereas Tel Aviv hosts the bulk of high-tech firms in Israel with 86 % in 2000 (Roper and Grimes, 2005, 303), Jerusalem represents the political center of the country which hosts judiciary and legislative institutions. The city of Haifa completes this trilogy by being the economic center of Northern Israel. Having once been a strong national counterpart for Tel Aviv because of production sites of heavy industry and the harbor, “Haifa City, once considered a competitive centre to Tel Aviv, has suffered for the past 30 years from a ‘poor business climate’ syndrome, and has gradually lost most of its assets. Catalysing [t]his process was a
transfer from Haifa to Tel Aviv of almost all of the established national companies’ headquar-
ters” (Kipnis, 1998, 655).

This interregional polarization also holds true for indicators such as flows of venture capital
(VC). As Roper and Grimes (2005, 304) note “in 1999, 78% of all investments were made in
Tel Aviv area, 14% in Haifa and the North and 8% in Jerusalem.” The spatial distribution of
venture capital is therefore highly unequal. Nevertheless, venture capital has recently been
described as “the main mechanism behind the successful creation of Israeli high-tech clusters”
(Wonglimpiyarat, 2016, 23). Long-lasting economic growth has on the one hand led to a de-
cline in the unemployment rate as well as to a certain resilience to external shocks (Invest in
Israel, 2016; World Bank Group, 2016), and on the other hand provided an opportunity for the
rise in venture capital available. In the 1999-2002 period, 0.6 % of Israel’s GDP were provid-
ed as venture capital to the Israeli high-tech industry (Chorev and Anderson, 2006, 164)
which, in combination with strong growth in inward foreign direct investment (World Bank
Group, 2016), presumably facilitated overall economic development. In this way “the Israeli
market has opened up to foreign competition and international investments” (Chorev and An-
derson, 2006, 163).

Considering the fact that Israel exhibits the world’s highest rate of R&D expenditure with a
share of more than 4.2% of GDP (Invest in Israel, 2016; Chorev and Anderson, 2006, 163;
Wonglimpiyarat, 2016, 21), it is not surprising that the country hosts a well-developed entre-
preneurship ecosystem. Most notably in the three major agglomerations, there is a compre-
hensive landscape of different kinds of incubators and accelerators (some of them will be pre-
sented more precisely in the following chapter). The Global Entrepreneurship Monitor (GEM,
2016) lists six major enablers of entrepreneurship in Israel: (i) “excellent physical and digital
infrastructure”; (ii) “a high level of investment in primary and secondary education”; (iii)
“world class universities and engineering colleges”; (iv) “a high level of entrepreneurial aspi-
rations”; and (v) “strong social networks” in combination with (vi) “a culture that appreciates
successful enterprising.” Following Doron and Arian (2014, 445) it can be stated that “since
its establishment in 1948, the Jewish state has transformed itself from a third world country
[…] into what has been labelled ‘A Start-Up Nation’.” Apart from the increasing availability
of venture capital and of vibrant start-up activity, recent trends may have contributed to this
process, such as the observation that a “changing lifestyle of the young generation and the
computer era have attracted many youngsters into computer science, electronics and IT fields”
(Chorev and Anderson, 2006, 163).
Therefore it can be stated that despite severe spatial and economic disparities, “Israel is recognized as a model of high-tech clusters whereby the successful cluster development is seen as a result of government’s policy in advancing VC landscape [sic!] to support entrepreneurship” (Wonglimpiyarat 2016, 24). Following Wonglimpiyarat’s (2016) design of the Israeli innovation system, public agents play a significant role in this system. While in this way several private protagonists remain out of consideration at the national level, the role of public policy is evident, for instance, in the fact that state tax initiatives played a major role in the development of Israeli high-tech industry (Friedman et al. 2016; Invest in Israel 2016).

Wonglimpiyarat (2016) regards several US organizations as important for the Israeli innovation system. The importance of US-Israeli economic ties is supposedly related to the sizeable Jewish diaspora in the United States. Strong ties exist, for example, in education (e.g. the MIT Club of Israel) or investors choosing initial public offerings (IPOs) at New York’s NASDAQ stock exchange. The main actor on the Israeli side of the innovation system is the Office of the Chief Scientist (OCS). Acting directly under the umbrella of the Ministry of Economy and Industry, this important agency aims at developing integrated national strategies and initiatives for the overall evolution of Israeli economy. Initially the OCS started with “a university professor who came to the office only twice a week” (Breznitz and Ornston, 2013, 1231), just having the imprecise goal to simplify the supply of R&D capital in Israel. Over the years and with first visible results, the OCS was provided with a first full-time director in 1974 and from then on continuously enlarged its importance within the national economic policy framework. The growing relevance is highly visible in an ever-rising annual OCS budget during the 1990s. As Breznitz and Ornston (2013) state, total R&D grants in all OCS programs increased from less than USD 200 million in 1990 to almost USD 450 million in 2000. This development is underscored by a statement of the first full-time OCS director Itzhak Yaakov who saw the “objective as the maximization of industrial R&D without targeting any specific sectors or technologies. This conceptualization led the OCS to embark on a long series of horizontal technology policies” (Breznitz and Ornston, 2013, 1232). The Israeli national innovation system has thus strongly evolved around the central policymaking role of OCS (Breznitz and Ornston, 2013; Wonglimpiyarat, 2016).

Over the years, several far-reaching initiatives have been developed under the umbrella of OCS. In 1991, for example, the so-called “Technological Incubators Program” was launched, whose aim was to let immigrants from the former Soviet Union acquire management skills. As Wonglimpiyarat (2016, 25) states, this program has been a vast success with the “ability to
create approximately 70-80 new ventures each year.” A second important initiative was the MAGNET program launched in 1992, which faced the problem that “a large number of companies in Israel existed in the same technological space and each was too small compete against bigger MNCs” by simplifying the formation of consortiums (Breznitz and Ornston, 2013, 1235). A third large program (Yozma) aimed at fostering private VC funds oriented towards investments in the ICT and life sciences sectors. Between 1992 and 2000, the State of Israel launched a governmental VC fund with a volume of more than USD 100 million designed to support the creation of private VC funds, and in this way contributed to the supply of venture capital at the national level (Breznitz and Ornston, 2013; Wonglimpiyarat, 2016).

It is within this framework of economic development and innovation policy in Israel during the past decades that the current state of the Haifa regional economy can be understood, as well as in the above-mentioned spatial system of Israel with its marked dominance of the greater Tel Aviv agglomeration in economic terms. The following chapter analyzes the characteristics of the Haifa regional economy within this national context.
III Haifa’s regional economy

Since Kipnis (1998) analyzed options for technological and industrial development for metropolitan Haifa and wrote that Haifa searched its place vis-à-vis Tel Aviv, much time has passed. It seems as if the Haifa regional economy has evolved considerably in the meantime. This chapter gives an overview of the current state of the Haifa regional economy and provides details on its strengths and weaknesses, and on opportunities and threats it faces.

3.1 Regional economic structure

After an overview with a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis of the Haifa regional economy, an analysis of the regional economic structure follows. This section takes a closer look at the structure of six leading sectors or clusters which are visible in the Haifa regional economy (information and communication technology; life sciences; chemicals; tourism including sport and leisure; logistics; and aerospace and defense).

3.1.1 Overview

Haifa is situated on a wide natural bay in the Northwest of Israel and lies between Mount Carmel and the Mediterranean Sea. It is the third largest city in Israel with 277,100 residents in the city (compared to 264,400 inhabitants in 2008) and about 1,000,000 in the whole district of Haifa in 2014 (Central Bureau of Statistics, 2015; Haifa Municipality, 2011). Popular wisdom has it that “Haifa works, Jerusalem prays and Tel Aviv plays” (ANIMA, 2011) which sums up the image of Haifa as a modern industrial center that somewhat lacks the glitter of Tel Aviv. The SWOT analysis in Table 1 summarizes the strengths, weaknesses, opportunities and threats of Haifa in broad socio-economic terms.
Table 1: SWOT analysis of the Haifa regional economy

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Tolerant metropolis (population of ca. 1 million) with an exotic Mediterranean ambiance</td>
<td></td>
</tr>
<tr>
<td>• Strong industrial clusters (Petrochemicals, IT, Electronics, Aerospace &amp; Defense, Health)</td>
<td></td>
</tr>
<tr>
<td>• Strong academia &amp; innovation: MATAM and Technion as Israel’s MIT</td>
<td></td>
</tr>
<tr>
<td>• Largest port in Israel: Attractive regional gateway thanks to convenient rail/road connections (less congested than in Ashdod)</td>
<td></td>
</tr>
<tr>
<td>• Touristic attractions (e.g. Baha’i Gardens)</td>
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<tr>
<td>• Relative demographic stagnation (metropolitan areas of Be’er Sheva and Tel Aviv are growing nearly twice as fast)</td>
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<tr>
<td>• Competition with central Israel (Ashdod Port, financial power of Tel Aviv, political power of Jerusalem)</td>
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<tr>
<td>• Image deficit (e.g. as declining and rusty industrial city, air pollution)</td>
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<tr>
<th>Opportunities</th>
<th>Threats</th>
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<td>• New gas finds and gas pipeline</td>
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<tr>
<td>• Government-backed development of Haifa Port</td>
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<td>• Business anchor projects (e.g. new Haifa Life Sciences Park)</td>
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<tr>
<td>• Growing MICE (Meetings, Incentives, Conventions, Events) tourism</td>
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<td>• Assets in medical tourism</td>
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<td>• Reinforced attractiveness of Tel Aviv (Tel Aviv Global Initiative)</td>
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<tr>
<td>• Controversy on port privatization</td>
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<tr>
<td>• Industrial relocations (in textile, mechanics, electronic components)</td>
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<tr>
<td>• Regional political uncertainty as a constant threat to tourism</td>
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Table 1 leads to the conclusion that the Haifa regional economy offers some distinctive strengths and opportunities but will indeed have to address the question of finding its place vis-à-vis the country’s larger cities, Tel Aviv and Jerusalem. Elaborating a smart specialization strategy that builds on Haifa’s strengths and that attempts to seize opportunities offers a
highly relevant chance to do so. To prepare such a smart specialization strategy based on re-
gional economic strengths, however, requires closer examination of leading sectors and clus-
ters in Haifa. The next sub-section therefore analyzes the structure of six leading sectors or
clusters, casting light on the most important companies in these sectors and clusters and their
connections among them and to research institutions. The profiles of these sectors and clusters
are meant to give a stylized picture but cannot claim to be comprehensive or complete.

3.1.2 Information and communication technology

The structure of the localized information and communication technology sector in Haifa is
illustrated in a stylized way in Figure 2 below.

**Figure 2: Structure of the information and communication technology sector**

The structure of the information and communication technology which is likely to qualify as a
cluster (given the spatial agglomeration of enterprises and universities relevant for this sector
in Haifa) can, for the sake of analysis, be divided in two parts: research and development, and
manufacturing. Especially in research and development, Haifa hosts an impressive array of
large MNCs who perform applied research or development efforts there. Enterprises which
mainly engage in research and development include the following ones:
• **Google:** In Haifa, Google works on subjects such as machine learning or data mining as well as on global marketing campaigns. The company also serves as an incubator for innovative new businesses (Google, 2016).

• **Intel:** Haifa hosts Intel’s main development center in Israel, as well as offices for sales and marketing support. The development center develops mobile microprocessors, advanced networking components, connectivity solutions, as well as other software tools and technologies. Moreover, Intel operates an “Internet of Things Lab” in Haifa which offers know-how on tools, technology and engineering, and works with startups. The lab’s thematic foci lie on agriculture, transportation, smart homes and smart cities (Intel, 2016a; 2016b).

• **Microsoft:** The company’s Israel research and development center is one of Microsoft’s three strategic development centers worldwide. The objective behind the company’s presence in Haifa is to tap into Israel’s technological and entrepreneurial assets. Microsoft works with students and researchers, and promotes education on technology with the aim of fostering Israel’s talent pool as well as its high-tech and entrepreneurial community. In terms of products and solutions developed in Haifa, Microsoft works on subjects such as security technologies, consumer analytics, hardware, or business analytics (Microsoft, 2016).

• **Apple:** Together with Apple’s other office in Herzliya (greater Tel Aviv area), the Haifa facility of Apple’s research and development center in Israel concentrates on subjects such as hardware and software integration in view of the “Internet of Things” and other important future developments (TechTime, 2016).

• **IBM:** The company’s research and development lab in Haifa is located on the campus of the University of Haifa. On this site, IBM develops products and solutions related to subjects such as cloud computing, storage, big data, social analytics, mobile technologies, security, quality and life sciences. The lab also focuses on healthcare and retail. In healthcare, IBM works on elaborating ideas for innovative healthcare technologies such as machine learning, causal analysis, medical imaging analysis, bioinformatics, cognitive computing, or text data analysis. IBM collaborates with pharmaceutical companies, academic institutions (underscored by the location of the lab on a university campus), public agencies such as health ministries, healthcare providers, and hospitals (IBM, 2016a; 2016b; 2016c).
• **Hewlett Packard**: The company’s lab is located on the campus of Technion. Part of its mission is to interact with the research and development community in Israel including research institutes and companies. The Haifa lab works on analytics for memory-driven computing technologies and notably on technologies and products to handle big data volumes (Hewlett Packard, 2016).

• **Qualcomm**: In Israel, Qualcomm focuses on research and development of advanced wireless communications systems. The company has a leading position worldwide in the fields of 3G, 4G and next generation wireless technologies, and has research and development centers in Israel. Qualcomm’s Open Innovation Lab in Haifa works with Israeli companies and aims to integrate their technologies in 3G and 4G devices. In particular, technologies in focus are real-time TV broadcasting, WiFi technologies, wired connectivity, mobile enterprise security, and digital pens and gestures based on ultrasound technology (Qualcomm, 2016).

• **Matrix IT**: Headquartered in Herzliya (greater Tel Aviv area), Matrix IT is among the leading IT companies in Israel and provides infrastructure and consulting services, outsourcing, training and assimilation. For example, Matrix IT works with MNCs such as Apple, Microsoft and IBM (Matrix IT, 2016).

Besides from these large companies and MNCs, there are several notable enterprises which mainly engage in manufacturing of hardware and software:

• **D.A.M.**: The company specializes in planning and designing printed circuits by using computerized systems (D.A.M., 2016).

• **Prog4Biz**: The company provides software development solutions and concentrates on database applications and customized development of web applications, core facilities management software, and life science and research-related software development (Prog4Biz, 2016).

• **Minicy Catom**: This web planning company specializes in branding and design solutions. It also focuses on the development of web-based systems (MATAM, 2013b).

• **Compulab**: The company is among the largest manufacturers of computer-on-module and system-on-module products worldwide, and manufactures miniature fanless PCs for embedded and industrial applications. The company engages in product design, hardware design, software development, and electronics manufacturing and testing. Its products are embedded in systems in telecommunication, automobiles, gaming, medical technology, aerospace and marine technologies (Compulab, 2016).
• *Fibernet:* This company develops and manufactures fiber-optic and electronic solutions. Fibernet provides solutions to customers worldwide related to technologies such as telecommunications, defense, communications infrastructure, or medical devices. The company cooperates, *inter alia*, with Technion and IBM (Fibernet, 2016).

From this (certainly not all-encompassing) profile of companies engaged in either R&D or manufacturing or both in Haifa, it becomes evident that Haifa hosts a large stock of knowledge and economic activity in the information and communication technologies sector, including world-leading MNCs, some smaller and endogenously grown companies, and some subsidiaries of Israeli IT companies with headquarter in other locations. Through their R&D laboratories, MNCs perform research and development in Haifa and seem to benefit from the knowledge generated by the region’s two major universities, Technion and the University of Haifa (which will be characterized in the analysis of the regional knowledge base later in this chapter), as does Matrix IT which also partners with IBM, Apple and Microsoft. IBM collaborates with the University of Haifa, Technion and the healthcare sector whereas Hewlett Packard cooperates with Technion and Microsoft works with students and researchers of different institutions. In comparison, the smaller and endogenously grown companies tend to produce hardware and/or software. Probably to seize advantages of proximity, most of the companies, including especially large MNCs, are located in the MATAM Scientific Industries Center (that will be characterized in more detail later in this chapter). From the list above, this applies to Intel, Google, Apple, Microsoft, Qualcomm, D.A.M., Minicy Catom, Matrix IT as well as to many others such as local offices of Yahoo, Cisco and Flextronics (MATAM, 2013b). In contrast, Hewlett Packard and IBM are located directly on the campuses of the two universities. Israeli IT companies with subsidiaries in Haifa tend to have their headquarters in the greater Tel Aviv area (for example in Herzliya), which is not a surprising finding and underscores the competition between Tel Aviv and Haifa.

3.1.3 Life sciences

The structure of the localized life sciences sector in Haifa is illustrated in a stylized way in Figure 3 below.
Similar to the information and communication technologies sector, the life sciences sector in Haifa can be seen as a cluster. For analytical purposes, the structure of this cluster can be divided in three parts: research and development, manufacturing, and hospitals. In the latter group, Haifa features three highly reputed hospitals:

- **Rambam Health Care Campus**: Rambam is a 1,000-bed academic hospital and highly renowned worldwide. Its mission is to serve over two million inhabitants of Israel’s Northern region. Rambam is located next to Technion’s Ruth and Bruce Rappaport Faculty of Medicine and the Rappaport Family Institute for Research in the Medical Sciences. Rambam engages in practice, education, and research. It is a hub for medical innovation and promotes collaborations between Rambam scientists, Technion’s Ruth and Bruce Rappaport Faculty of Medicine, the University of Haifa, and companies in the biomedical sector. Notably, Rambam is the exclusive provider for trauma treatment, oncology, neurosurgery and molecular imaging in Northern Israel (Rambam, 2012).

- **Bnai Zion Medical Center**: The Bnai Zion Medical Center is a 450-bed general hospital established in 1922. It provides medical care, education, research and health-care services for Israel’s Northern region. Bnai Zion focuses on rehabilitation services in-
cluding orthopedic, neurological, cardio, physical and occupational therapy. Notably, Bnai Zion is the only hospital in Israel’s Northern region that offers a comprehensive rehabilitation program. Bnai Zion Medical Center collaborates with Technion’s Faculty of Medicine. It functions as a teaching hospital for students at this faculty (Bnai Zion Medical Center, 2016).

- **Carmel Medical Center**: Carmel Medical Center serves the region of Haifa and Israel’s Northern region. It figures among Israel’s leading health care organizations. Carmel Medical Center focuses on cardiology, vascular surgery, and thoracic surgery and offers 4,400 hospital beds, representing one third of Israel’s total number of acute hospital beds. Similarly to the other two, previously mentioned hospitals, Carmel Medical Center partners with Technion’s Ruth and Bruce Rappaport Faculty of Medicine and the Rappaport Family Institute for Research in the Medical Sciences, combining academic research with clinical work (D.R.A. Medical, 2016).

The manufacturing part of Haifa’s life sciences cluster includes notably the following companies:

- **Lipogen**: This company introduced and clinically tested soy lecithin Phosphatidylserine, a dietary ingredient for cognitive dysfunction and dementia. Lipogen specializes in the development and manufacturing of specialty phospholipid nutrients for stress management and cognitive function support. Lipogen is building a research and development center for phospholipids (Lipogen, 2016).

- **Gadot Biochemical Industries**: This company produces food and nutraceutical ingredients such as citric acid and various citrates (Gadot, 2016).

- **NanoPass Technologies**: This enterprise regards itself as a pioneer in developing and commercializing solutions for painless intradermal delivery for vaccines and large molecules and produces advanced hollow microneedles (NanoPass, 2016).

- **Orpheus Medical**: This company provides clinical video and imaging documentation solutions. For example, Bnai Zion Medical Center is among its customers (Orpheus Medical, 2016).

Finally, the following companies are involved in research and development but also in manufacturing:

- **Novetide**: Specializing in research and development, manufacturing, and marketing of peptide-based drug substances, Novatide offers proprietary custom-manufactured
products for clinical development and for commercial supply. The company operates two FDA-inspected manufacturing facilities. Its R&D capability is linked to the research infrastructure at the company’s shareholder Israel Chemical Industries’ research facility called IMI TAMI (Novetide, 2016).

- **Philips Medical Systems Technologies:** This subsidiary of Dutch MNC Philips develops and manufactures diagnostic medical imaging solutions by computerized tomography (CT) (MATAM, 2013b).

- **General Electric (GE) Healthcare:** GE Healthcare Israel as a subsidiary of American MNC General Electric develops and specializes in technologies such as ultrasound, nuclear medicine, magnetic resonance imaging (MRI), CT, or healthcare information technology (HCIT). GE Healthcare Israel operates a multi-disciplinary research and development center near Haifa. This R&D center aims to tap into technological knowledge available in Israel by engaging in partnerships with local technology companies and academia (General Electric, 2016).

- **DIR Technologies:** This company develops and manufactures pharmaceutical quality assurance applications in non-contact tests, including the identification of counterfeit drugs and quality assurance for fabrication and packaging processes of the pharmaceutical industry (DIR Technologies, 2016).

- **Pluristem Therapeutics:** As a clinical-stage biotherapy company, Pluristem uses placental cells to develop cell therapies for inflammation, ischemia, hematological disorders, or radiation exposure. Pluristem works with industry and academic partners outside of Haifa (Pluristem Therapeutics, 2016).

The structure of the life sciences cluster in Haifa exhibits two big international enterprises (GE Healthcare, Philips Medical Systems) but clearly more endogenously grown companies. Most of them engage in manufacturing and in R&D, but only GE Healthcare and Novetide operate R&D Centers (with Lipogen currently establishing one), while other companies focus mainly on collaboration with academia or other companies. All of the three hospitals work together with the universities and notably with Technion’s Ruth and Bruce Rappaport Faculty of Medicine which appears to play a major role in life sciences-related R&D in Haifa. Moreover, four of the companies (Philips Medical Systems, Pluristem Therapeutics, Orpheus Medical, DIR Technologies) are located in the MATAM science park (MATAM, 2013b).
3.1.4 Chemical industry

The structure of the localized chemicals sector in Haifa is illustrated in a stylized way in Figure 4 below.

**Figure 4: Structure of the chemical industry**

The chemicals cluster in Haifa is closely linked to the city’s status and history as a port city (Kipnis, 1998, 658-659). Again for analytical reasons, the structure of the chemical industry in the Haifa region can be divided into the groups of manufacturing, research and development, and the Bazan Group which merits a closer analysis due to the importance of its subsidiaries in Haifa’s chemicals sector. The Bazan Group’s subsidiaries include the following ones:

- **Bazan Group (also known as Oil Refeneries Ltd.):** As one of the leading oil refineries in the Eastern Mediterranean, Bazan Group is Israel’s largest integrated refining and petrochemicals entity. The company produces mainly for the Israeli market but also engages in export, arguably benefitting from its proximity to Haifa’s port. Bazan’s subsidiaries such as Carmel Olefins, Gadiv Petrochemical Industries and Haifa Basic Oils, underscore its status as integrated petrochemicals group (Bazan Group, 2016).
• **Carmel Olefins**: This subsidiary of Bazan Group produces petrochemical products that function as raw materials for the plastics industry. Carmel Olefins manufactures Polypropylene as well as Low Density Polyethylene (Carmel Olefins, 2016).

• **Gadiv Petrochemical Industries**: Being one of the country’s leading petrochemical companies, Gadiv produces petrochemical products such as aromatics, aliphatic solvents, and intermediates for use in the chemical, pharmaceutical, plastic and food sectors (Gadiv Petrochemical Industries, 2016).

• **Haifa Basic Oils**: This company produces base oils, paraffin wax and special lubes for the automotive and industrial machinery, tire, rubber and candle industries, as well as special applications. Haifa Basic Oils also provides laboratory services for other industries such as the wax and oil sectors (Haifa Basic Oils, 2016).

Apart from the Bazan Group, Haifa hosts a number of enterprises which mainly manufacture chemical products. This group includes notably the following enterprises:

• **Dor Chemicals**: Dor produces intermediate products for the chemical, gasoline, pharmaceuticals, agriculture, plastics and wood sectors. Dor Chemicals works on solvents recycling mainly in the pharmaceutical sector. The company’s customers include, for example, the Bazan Group/Oil Refineries Ltd. (Dor Group, 2016).

• **Chemovil**: This company is one of Israel’s leading producers of chemical raw materials and provides logistical services such as industrial chemistry, waste management, lab services, supervision, and testing (Chemovil, 2016).

• **Epolac**: Engaging in paint and coating manufacturing, Epolac produces paints with diverse chemical and physical properties. Customers include the Bazan Group/Oil Refineries Ltd., Carmel Olefins, Gadot, Gadiv, Haifa Group, and Dor Chemicals (Epolac, 2016).

• **Haifa Group**: Haifa Group is among the leading global suppliers of potassium nitrate. Its products specifically include specialty plant nutrients and industrial chemicals (Haifa Group, 2016).

• **Paz Lubricants & Chemicals**: This company is part of Israel’s largest petroleum oil group. It specializes in lubricating oils and greases (Paz Lubricants & Chemicals, 2016).
Chemicals companies in Haifa which perform research and development and partially manufacture include the following ones:

- **IMI TAMI Institute for Research & Development:** Being a private company, IMI TAMI is the largest research and development center for industrial chemistry in Israel. It is a member of Israel Chemicals Ltd. Industrial Products Group and engages in projects for other chemical and pharmaceutical companies across the world (IMI TAMI, 2016).

- **Frutarom:** This enterprise is active in the development and production of flavors and ingredients for the food, beverage, pharmaceutical, nutraceutical, and cosmetics industries. Frutarum runs R&D labs around the world and collaborates with research institutes, universities, and start-ups (Frutarom, 2016).

- **Bitum Petrochemical Industries:** Bitum develops and manufactures waterproofing and sealant materials for the construction industry and for private homes (Bitum, 2016).

Summing up, the chemicals cluster in Haifa consists of a considerable number of companies in the main sub-sectors of petrochemicals, food chemistry and agricultural chemicals, and pharmaceuticals (notably the latter with links to the life sciences sector). As a central agent in this cluster with its buyer-supplier links to other companies, the Bazan Group with its subsidiaries stands out.

3.1.5 Tourism, sport and leisure

The structure of the tourism, sport and leisure sector in Haifa is illustrated in a stylized way in Figure 5 below.
Haifa's topography is in and by itself a tourist attraction. Located between the Carmel mountain forests and the Mediterranean Sea, almost every point in the city offers a view towards the sea or the green. Haifa features a large number of tourist attractions, including a UNESCO World Heritage site, museums, beautiful beaches, and many more. Haifa is also a short drive away from the Carmel forests, the Galilee and the Sea of Galilee, some of Israel's most popular holiday destinations (Haifa Municipality, 2016b).

Apart from a tourism industry geared towards national and international market demand, some attractions in the tourism, sport and leisure sector are designed to appeal mainly to the resident population of Haifa and Northern Israel. The sector as a whole can be structured into two major analytical parts: Firstly, projects to enhance Haifa’s attractiveness to tourists and inhabitants developed by the Haifa Economic Corporation (HEC), and secondly, longer-standing tourist attractions of Haifa. The first group comprises the following initiatives:

- **German Colony**: The German Colony is a historical neighborhood in central Haifa established by the Templers in the 19th century. HEC engaged in the renovation and development of this neighborhood with the goal of upgrading its touristic appeal, arguably primarily for tourists. Amidst the renovated Templer buildings, many restaurants and cafés have sprung up in recent years (Haifa Economic Corporation, 2011j; Haifa Municipality, 2016b).

- **Coastal beaches**: Haifa features a number of beaches in Israel along the Mediterranean Sea including the well-known Bat Galim Surfers Beach. HEC developed the Haifa
coasts including amenities such as boardwalks, large open spaces, dancing areas, cafés, sports facilities, sanitary facilities, or pools. This initiative was probably aimed both at tourists and the resident population (Haifa Economic Corporation, 2011k; Haifa Municipality, 2016b).

- **Sports Park in Kiryat Haim:** HEC planned and established a sports park for the Haifa Municipality in the Kiryat Haim neighborhood, a project clearly aimed at the local population of Haifa (Haifa Economic Corporation, 2011i).

- **International Convention Center Haifa:** Wishing to promote niche tourism such as MICE tourism, HEC set up an International Convention Center for conventions, exhibits, performances, and cultural events. In addition, the center features c. 6,000 square meters of space for retail and services (Haifa Economic Corporation, 2011h).

- **Sammy Ofer Stadium:** The stadium located near MATAM technology park serves as a venue for sports and recreation, entertainment and cultural events, and hosts the two football clubs Maccabi Haifa and Hapoel Haifa (Haifa Sports and Entertainment Complex Ltd., n.d.).

Apart from these HEC projects, Haifa offers the following attractions (Haifa Municipality 2016b):

- **Baha’i Gardens:** The well-known and scenic Baha’i Gardens on the northern slopes of Carmel mountain have been declared a UNESCO World Heritage site. The vast gardens include the domed Temple of the Bab, which is a pilgrimage site for adherents to the Baha’i faith.

- **Museums:** Haifa offers a variety of museums on subjects such as history, art and other topics (e.g. Haifa Art Museum, Madatech on science, technology and space, Mané-Katz Museum for art and Judaica, Shteklis Prehistoric Museum, or the archeological Hecht Museum on the campus of the University of Haifa).

- **Castra Mall:** This rather unusual mall located next to MATAM and the International Convention Center is dedicated to arts and contains art galleries and museums.

- **Mount Carmel and Chai-Bar:** Mount Carmel Nature Reserve is Israel's largest national park, and is home to a variety of wildlife. Chai-Bar Carmel Nature Reserve has the aim of reviving species that have not lived in this area for a long time.

- **X-Park:** This is the largest extreme action park in Israel, covering a surface of over 13,000 square meters and featuring action entertainment activities such as climbing, crossing rope bridges, or paintball.
HEC has supported a number of projects which contribute to upgrading the attractiveness of Haifa for tourists. Some of the projects are now seen as major attractions of Haifa. On the whole, Haifa offers many possibilities for tourists and caters to a variety of interests such as sports, culture, nature, shopping, business, or relaxing. In 2014, Haifa had 15 hotels and ten motels with altogether 1,803 rooms which is much less capacity than that offered in other destinations like Jerusalem, Tel Aviv, or Eilat. 225,600 guests spent 490,400 nights in Haifa. The room occupancy rate was 60.9 % but only 25 % of all tourists who arrived in Israel visited Haifa (Haifa Municipality, 2014; Central Bureau of Statistics, 2016b).

Despite the strong competitive assets of high-profile tourist destinations such as Jerusalem, Tel Aviv, the Dead Sea, and (maybe to a lesser degree) Eilat, there seems to be room for enhancing Haifa’s role as a tourist destination. Considering the considerable number of attractive destinations in Northern Israel such as Akko, the Galilee (including its wineries), Safed, Nazareth, and Tiberias and the Sea of Galilee, positioning Haifa both as a destination in its own right and as a hub for tourism in Northern Israel seems to be a promising avenue for economic development.

3.1.6 Logistics

The structure of the logistics sector in Haifa is illustrated in a stylized way in Figure 6 below.

**Figure 6: Structure of the logistics sector**

Source: own work based on data of Israeli Science and Technology Homepage (2016); MATAM (2013b).
The role of the logistics sector in Haifa seems obvious at first sight, given Haifa’s history as a major port. However, the establishment of the deep-water port in Ashdod in the 1960s somewhat called into question Haifa’s role as a logistics hub (Kipnis, 1998, 655). Adding to this is the fact that Israel’s major airport is Tel Aviv’s Ben Gurion airport located at a distance of roughly 120 kilometers from Haifa.

The logistics sector in Haifa is analyzed here in the two groups of air and sea transport. In air transport, Haifa’s role is rather weak and based on Haifa Airport which was Israel’s first international airport. This small airport offers domestic flights to Eilat and Tel Aviv’s secondary Sde Dov Airport, international charter flights, and cargo shipments to domestic destinations (Israel Airports Authority, 2016).

More importantly, sea transport in Haifa is characterized by the port and some companies providing shipping services:

- **Haifa Port:** Haifa hosts Israel’s largest port. It is located in Haifa’s natural, protected bay. The port’s facilities enable shipping and transportation of all types of cargo and include docking facilities for large cruise liners, allowing for cruise tourism (Haifa Port, 2016).

- **ZIM Integrated Shipping Services Ltd.:** This company is a carrier in global container shipping. ZIM operates a fleet and a network of shipping lines for cargo transportation services, and has local offices and representatives around the world (ZIM, 2016).

- **Gold Line Shipping:** This company provides services related to shipping, logistics, and relocations, and offers logistical services to foreign companies in Israel (Gold Line Shipping, 2016).

- **Coral Group:** Coral Maritime Services Ltd. figures among the leading shipping companies in Israel. It serves as port agent, offshore and logistics agent, ship manager, broker and charterer (Coral Group, 2016).

- **Kamor Shipping and Tanker Services:** Kamor is one of Israel’s leading shipping companies. It provides shipping agency and husbandry services as well as loading and unloading of vessels. The Bazan Group is a shareholder of Kamor (Kamor, 2016).

- **Bell-Mar Shipping:** This enterprise provides services to companies using tank containers for transporting raw materials such as food and chemicals, and tank container rental services (Logistics Israel, 2016).
Dynamic Shipping Services Ltd.: This company provides sale and purchase, chartering, brokerage, consultancy, and agency services. It specializes in attending, inter alia, special project cargos, general cargo ships, bulk carriers, container ships, and tankers (Dynamic Shipping Services, 2016).

From this profile of the logistics industry in Haifa, the role of the port and related service providers becomes clear. The small airport does by far not match the port’s importance for the logistics sector. The presence of many shipping companies highlights the importance of the port. Notably, two of the companies mentioned, ZIM Integrated Shipping and the Coral Group, are located in the MATAM technology park (MATAM, 2013b).

3.1.7 Aerospace and defense industry

As for the last of the six priority sectors presented here, the structure of the aerospace and defense sector in Haifa is illustrated in a stylized way in Figure 7 below.

**Figure 7: Structure of aerospace & defense industry**

![Diagram of Aerospace & Defense Industry]

Source: own work based on data of Israeli Science and Technology Homepage (2016).

The aerospace & defense industry can be divided into the two groups of commercial applications and defense systems for the purpose of analysis and served notably by two companies:

- **Elbit Systems**: Elbit is an international high-technology enterprise developing various airborne, land and naval systems and defense, homeland security and commercial aviation applications. Elbit Systems performs R&D and collaborates with academia, e.g. with Technion (Elbit Systems, 2016).

- **Rafael Advanced Defense Systems Ltd.**: This company designs and produces high-tech defense systems for air, land, sea, and space applications. Rafael has entered partner-
ships with civilian partners aimed at the development of commercial applications. With roughly 7,000 employees, Rafael is the largest employer in Israel’s Northern region (Rafael Advanced Defense Systems, 2016).

Both companies develop and manufacture defense systems but also commercial applications. Technion plays a role both as supplier of qualified scientists and engineers as well as a partner in university-industry collaboration.

After this profile of the Haifa regional economy, the next section examines regional development policies pursued in Haifa, and its major agents.

3.2 Regional development policies in Haifa

Regional development in the city of Haifa is mainly the task of the Haifa Economic Corporation (HEC), a municipal company, but some other agents also have a role to play in the economic and innovation ecosystem of the city.

This section introduces HEC and some of these other agents but again, can offer only a stylized overview instead of a complete or comprehensive picture of regional development policies and landscapes.

3.2.1 Haifa Economic Corporation (HEC)

HEC is the major agent in economic development in the city of Haifa. It is completely owned by the Municipality of Haifa and was established in 1972 (Globes, n.d.). HEC is supervised by a twelve-member board of directors including representatives of the city council and Haifa Municipality. Currently, the board includes the mayor of Haifa Municipality, the municipality’s general manager who serves as chairman of the board, HEC’s chief operating officer (who at the same time manages the Life Sciences Park company and the Haifa Stadium Company), Haifa Municipality’s deputy mayor, two department heads of Haifa Municipality, two members of the City Council, representatives of the municipal administration, and one professor from Technion’s Faculty of Industrial Engineering and Management (Haifa Economic Corporation, 2011b).
HEC promotes Haifa’s regional economy through the set-up of large-scale economic development projects. It focuses on areas such as high-technology and biotechnology industries, renewable energy, or tourism, recreation and sports, and works with municipal and governmental institutions (Haifa Economic Corporation, 2011a).

One of HEC's central objectives is to develop the high-technology industry in the city, and to establish Haifa as a leading R&D center internationally. To do so, HEC engages in the development of industrial areas. Probably HEC’s most well-known project is the MATAM Scientific Industries Park, a large science park at the Mediterranean Sea hosting a large number of major international high-technology companies including Intel, Elbit, Google, IBM, Microsoft, Yahoo, Philips and others (several of these companies have been introduced in company profiles in the previous chapter). Resident companies employ some 8,000 people on MATAM premises. In addition to providing space for high-tech companies, MATAM also offers a network of support industries and service providers. The park is managed by the MATAM company, a joint venture between HEC and the Gav Yam Land Corporation (Globes, n.d.). Apart from office space, MATAM offers a range of services for resident companies and their employees including child-care facilities, a medical clinic, and a shuttle service to the nearby Carmel Beach railway station (MATAM, 2013a). The MATAM company has two subsidiaries: Shatam provides management and maintenance services for resident companies, while the International Convention Center subsidiary manages MICE premises such as theaters, a convention hall, meeting rooms, and exhibition areas located near to MATAM’s campus (Haifa Economic Corporation, 2011c; 2011d).

Another HEC initiative to promote high-technology industries is the Hi-Center Acceleration Center. HEC set up a subsidiary company to manage this center in partnership with Haifa Municipality. Basically, the Hi-Center Acceleration Center is a technology incubator whose goal is to assist entrepreneurs and small companies in the process of technology and prototype development as well as in the commercialization of ideas on the market. The center was supported by a grant (NIS 40 million) by the Israeli government. The OCS is involved in reviewing ideas to be promoted with this grant (up to NIS 1 million per project). Selected companies are provided with rent-free offices in the Hi-Center and are exempted from municipal taxes (Haifa Economic Corporation, 2011e).

Another focus sector of HEC is the life sciences cluster in Haifa. Among the goals of Haifa Municipality and HEC is to initiate a network for business and academic innovations in the life sciences sector in partnership with medical centers, research institutions, companies in the
medical sector, and technological incubators. Currently, HEC and the Industrial Buildings Corporation Ltd. are developing the Haifa Life Sciences Park which might come to play a similar role for Haifa’s life sciences cluster as does MATAM for the information and communication technology cluster. The park is located right next to MATAM (and thus in proximity to the International Convention Center, Sammy Ofer Stadium, the central bus station, and Carmel Beach railway station) and intended to host life sciences companies and enable them to benefit from the spatial proximity to other companies in the same sector and hence from possible knowledge spillovers (Globes, n.d.). HEC has established working relationships with medical and research institutions such as the Rambam Health Campus, the Rappaport Family Institute for Research in the Medical Sciences, Technion, the Samuel Neaman Institute, the Haifa Boston Foundation, and MNCs to develop the new park (Haifa Economic Corporation, 2011f; Haifa Life Sciences Park, n.d.).

Another HEC project designed to promote Haifa’s life sciences cluster is the Biosys initiative which can be seen as a brand for life science technologies established by the HEC. The “Haifa Biosys” label stands for all of the activities in this sector in Haifa (Haifa Economic Corporation, 2011g).

As part of its focus on tourism, sports and leisure, HEC develops commercial areas as well as cultural, sports and recreational venues designed to enhance the city’s attractiveness to tourists and inhabitants. One of HEC’s projects in this field is the Sammy Ofer Stadium as part of the new Sports City. Construction of the stadium began in 2009 and ended in 2014. Similarly, HEC established the Kiryat Haim Sports Park with an investment of NIS 15 million (Haifa Economic Corporation, 2011i; Haifa Sports and Entertainment Complex Ltd., n.d.).

Another HEC flagship project in the tourism, sport and leisure field is the International Convention Center Haifa designed to enhance Haifa’s position in the MICE market. The center is located near MATAM premises and includes convention and exhibition spaces as well as cultural venues (Haifa Economic Corporation, 2011h).

A major HEC project aimed at upgrading the city’s tourism potential was the renovation of the German Colony quarter in the city center. HEC restored the historic character of German Colony which was the first Templer settlement in the country. Renovation of the quarter included landscaping and the creation of promenades, open spaces, and gardens. In a similar vein, HEC developed boardwalks, open spaces, dancing areas, cafés, resort and sport facili-
ties, sanitary facilities, pools, parking lots and other amenities at the city’s beaches (Haifa Economic Corporation, 2011j; 2011k).

The final focus area of HEC’s work is environmental quality. As Kipnis (1998) notes, Haifa has traditionally had a reputation for industrial pollution. Probably to counter this long-standing perception, HEC initiates projects contributing to environmental quality such as the set-up of photovoltaic devices on public buildings (Haifa Economic Corporation, 2011l).

3.2.2 Other agents of regional development

Notwithstanding HEC’s central role in regional development in Haifa, other agents in research and education play major roles in developing the Haifa regional economy. These agents include the following ones:

- **Rambam Health Care Campus:** This large and internationally renowned hospital complex was introduced in the previous section above and plays a major role in Haifa’s life sciences sector, together with Technion’s Ruth and Bruce Rappaport Faculty of Medicine which is located in close spatial proximity to the Rambam campus (Rambam, 2012; Technion, 2016a).

- **Bnai Zion Medical Center:** This municipal hospital (described in the previous chapter) provides medical care, education, research and other services, and closely cooperates with the Rappaport Family Institute for Research in the Medical Sciences and Technion (Bnai Zion Medical Center, 2016).

- **Rappaport Family Institute for Research in the Medical Sciences:** This independent research institute located in Haifa works in the field of biomedical sciences and is affiliated with Technion (Rappaport Institute, 2006).

- **Technion – Israel Institute of Technology:** This world-renowned public research university is the oldest university in the country, having been established in 1912. Technion offers degrees in a large number of disciplines including science and engineering and related fields like architecture, medicine, industrial management and education. A stunning 75% of Israeli engineers have studied at Technion (Zecchini, 2011). Its study and research programs will be presented in more detail in the next section which deals with Haifa’s regional knowledge base (Technion, 2016b).
- **University of Haifa**: Like Technion, the University of Haifa is a public research university but puts a particular focus on social sciences, humanities, law and education. It also includes several research institutes like the Evolution Institute, the Tourism Research Center, and the Center for the Study of National Security. Its International School offers language programs in Hebrew and Arabic which are well known internationally. The University of Haifa’s profile will be examined more closely in the following section (University of Haifa, n.d.).

- **IN-VENT**: This project organized by Haifa Municipality’s Youth Department offers a co-working space for Haifa-based entrepreneurs. Partners of IN-VENT include Technion’s BizTEC, HEC, and companies. IN-VENT offers networking services among entrepreneurs and with other professionals and industry leaders, and workspace such as an open space, an office, and meeting rooms (IN-VENT, 2016).

- **MATI**: The business development center (MATI) in Haifa assists new small and medium-sized enterprises (SMEs) in their establishment with services such as business planning assistance, and helps existing SMEs to grow. MATI a non-profit organization established in 1991 by various agents from the public and private sectors including Haifa Municipality and the Ministry of Industry and Commerce (MATI Haifa, n.d.).

After this description of the regional development landscape in Haifa, its agents, and their policies and projects, the final section of this chapter now turns to the regional knowledge base in Haifa.

### 3.3 Regional knowledge base

Apart from the research institutes presented in the preceding chapter and section, Haifa’s regional knowledge base is strongly characterized by two of Israel’s major universities located in the city: the University of Haifa and the Technion – Israel Institute of Technology. While the knowledge available in a regional economy is not directly observable, it is possible to sketch the regional knowledge base using study programs and research foci of higher education institutes (HEI) such as Haifa’s two major universities as proxies for the underlying knowledge and competencies in science, technology, research, and innovation.
At the same time, as was illustrated in Figure 1, a region’s knowledge base will be strongly affected by entrepreneurship, which can serve as a proxy for entrepreneurial energy and creativity and thus for soft skills relevant to regional development. Taking a closer look at the link between HEIs and entrepreneurship, for example at HEI’s entrepreneurship centers and programs, thus enables an approximation of this “soft” aspect of the regional knowledge base. This section therefore presents an outline of programs offered by Technion and the University of Haifa, and goes on to approximate entrepreneurial potentials in the Haifa regional economy by examining the two HEI’s entrepreneurship initiatives.

3.3.1 Research and study programs at Technion and the University of Haifa

The range of study programs at Technion and the University of Haifa is enormous. Despite their wide scope, it is striking that most of the faculties and departments of the two HEIs are consistent with the leading sectors and clusters in the Haifa regional economy. Therefore, information and communication technology, aerospace, life sciences, chemistry, logistics and tourism are the most important fields of study (University of Haifa, n.d.; Technion, n.d.; Tayarut School, n.d.).

Technion, for example, offers aerospace engineering, biomedical or chemical engineering, computer science, industrial engineering and management, and medicine. The University of Haifa offers degree programs in natural sciences but also in humanities, law, social sciences, health sciences or information and knowledge management (Technion, n.d.; University of Haifa, n.d.).

While the lines are far from clear-cut, it appears that Technion offers a predominantly science-oriented profile while the University of Haifa has a strong focus on social sciences and humanities.
Table 2: List of faculties at Technion and the University of Haifa

<table>
<thead>
<tr>
<th>Technion</th>
<th>University of Haifa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerospace Engineering</td>
<td>Faculty of Education</td>
</tr>
<tr>
<td>Architecture and Town Planning</td>
<td>Faculty of Humanities</td>
</tr>
<tr>
<td>Biology</td>
<td>Faculty of Law</td>
</tr>
<tr>
<td>Biomedical Engineering</td>
<td>Faculty of Natural Sciences</td>
</tr>
<tr>
<td>Biotechnology and Food Engineering</td>
<td>The Herta and Paul Amir Faculty of Social Sciences</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>Faculty of Social Welfare and Health Sciences</td>
</tr>
<tr>
<td>Chemistry</td>
<td>Graduate School of Management</td>
</tr>
<tr>
<td>Civil and Environmental Engineering</td>
<td>Leon H. Charney School of Marine Sciences</td>
</tr>
<tr>
<td>Computer Science</td>
<td>Physical Education Department</td>
</tr>
<tr>
<td>Education in Science and Technology</td>
<td>Continuing Education &amp; Extension Studies</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>Israel School of Tourism</td>
</tr>
<tr>
<td>Humanities and Arts</td>
<td>International School</td>
</tr>
<tr>
<td>Industrial Engineering</td>
<td></td>
</tr>
<tr>
<td>Materials Science and Engineering</td>
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<tr>
<td>Mathematics</td>
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<tr>
<td>Mechanical Engineering</td>
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<tr>
<td>Medicine</td>
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<tr>
<td>Physics</td>
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</tr>
<tr>
<td>International School</td>
<td></td>
</tr>
</tbody>
</table>

Source: own work drawing on Technion (n.d.); University of Haifa (n.d.); Tayarut School (n.d.).

As Table 2 demonstrates, the two HEIs in Haifa offer an enormous breadth of knowledge, on the one hand in science and engineering, and on the other hand in humanities and social sciences. This breadth of scientific knowledge can serve to enable and facilitate a large number of economic activities in many sectors. Yet, for these knowledge potentials to unfold economically, innovation and knowledge have to spill over from the academic sphere to the business world. Initiatives to promote entrepreneurship and technology transfer are thus another component defining the potentials of Haifa’s regional knowledge base. The next sub-section therefore analyzes entrepreneurship and technology transfer programs at Technion and the University of Haifa.
3.3.2 Entrepreneurial potentials: Entrepreneurship and technology transfer

Technion offers several initiatives designed to promote entrepreneurship among its students and technology transfer between the academic sphere and the business world, including the following ones:

- **William Davidson Faculty of Industrial Engineering and Management**: This faculty plays an important role because it offers three programs for entrepreneurship and innovation. Besides that, the faculty works to improve its relations with industry including contacts to companies such as Intel, the leading Israeli pharmaceuticals company Teva, and management consulting companies. Since 2010, the “Industrial Engineering and Management Affiliates Program” tries to establish cooperation between the university and leading industrial companies both in Israel and abroad (William Davidson Faculty of Industrial Engineering and Management, n.d. a; n.d. b).

- **Knowledge Center for Innovation**: The aim of the Knowledge Center for Innovation is primarily to promote research on innovation and to spread this knowledge among researchers, students, managers, and practitioners. In this way, it strives to provide methods and tools of innovation management and commercialization of ideas and products. The Knowledge Center for Innovation attempts to enhance cooperation with other organizations and to put them in touch with the university, industry and policymakers through events such as innovation forums (Technion Knowledge Center for Innovation, n.d.).

- **Bronica Entrepreneurship Center (BEC)**: BEC is the first contact point for entrepreneurship at Technion. The center supports start-up creation and serves as a non-profit program for all Technion students, faculty members, and alumni. The main focus is on entrepreneurship education including academic courses and extracurricular activities to promote the entrepreneurship community at Technion and to help technology-oriented entrepreneurs who want to launch their business. Technion offers about 20 different courses for students, as it offers other formats such as meetings in an informal setting that provide students with an opportunity to share their ideas (Yazamut Technion, n.d.).
• **BizTEC**: This non-profit program was established at the Technion in 2004. Basically, the program features an annual national competition designed to support students with their entrepreneurship ideas or projects. The challenge consists of different stages. First, the students have to send in their application before, on the second stage, they can participate in an e-school where professionals and lecturers offer workshops serving as accelerators. Per year, roughly 100 applications are submitted at the first stage, up to 30 of which are selected for participation in the e-school stage. The next step is the summer accelerator where each team will be assigned a mentor from the relevant sector and receive guidance. Eventually, the finalists compete for a USD 10,000 prize and have the opportunity to represent Israel at the Intel Challenge Europe. So far, over 130 start-up companies were established by alumni. For example, the finalist of the 2013 round of the competition has developed a nanosatellite system aiming to provide internet connectivity everywhere in world (BizTEC, n.d.; The William Davidson Faculty of Industrial Engineering and Management, n.d. a).

• **Technion Excellence Program**: Technion offers students to participate in its “Rothschild Scholars Program” for excellence which consists of an individual study program and encourages students to use their creative energies, to work exclusively in specific areas of knowledge, and to enhance their competences. Part of the program is personalized mentoring of students by a senior faculty member (Technion Program for Excellence, n.d.).

• **T³ Technion Technology Transfer**: By combining science and engineering, T³ effectively functions as a high-technology entrepreneurial incubator. The program aims at simplifying the development of new ideas and their commercialization on world markets through entrepreneurship. The program is under the umbrella of the Technion Research and Development Foundation Ltd. It offers expertise in matters of intellectual property including patenting, licensing inventions, and engaging in business agreements that match innovators with investors (T³ Technion Technology Transfer, n.d.).

• **BioRap Technologies Ltd.**: This technology transfer program belonging to the Rappaport Family Institute for Research in the Medical Sciences aims at promoting technologies and innovations in biomedicine. It has been active since 2001 and assists researchers at the Rappaport Institute in questions of business development, intellectual property, and commercialization (BioRap Technologies, 2014).
Similarly, the University of Haifa offers a number of entrepreneurship and technology transfer support schemes such as the following ones:

- **Carmel – Haifa University Economic Corporation Ltd.:** The University of Haifa’s technology transfer organization is designed to commercialize ideas and innovations generated in the university on world markets. One of the office’s tasks is commercializing the intellectual property and research of the university’s different faculties. Furthermore, the purpose is to establish, develop and monitor ventures as well as to create joint ventures and collaborations with external partners. Focus areas include agriculture and agri-bio fields, the environment and clean tech, life sciences and pharmaceuticals, education and humanities, computer science and information technology, and marine sciences. Besides, the corporation provides the Carmel Inventions Fund which is funded by private investors and invests in selected ventures from the university’s advanced pharmaceuticals and natural science labs (Carmel Ltd., n.d.).

- **HuStart – Haifa University Entrepreneurship Center:** This new entrepreneurship center at the University of Haifa is an initiative run and coordinated by the students’ union. Its purpose is primarily to enhance the entrepreneurship culture and education among students, and to assist them in creating their start-up ventures. The center is meant as a platform for sharing ideas, creating projects, and networking between students as well as with entrepreneurs. The center offers programs such as an introductory course on entrepreneurship, a program for entrepreneurs who already have developed their basic idea or are looking for collaborations, and an accelerator program that provides space, tools, and mentoring for entrepreneurs (HuStart, n.d.).

The comprehensive landscape of entrepreneurship initiatives at the two HEIs and notably the demand for entrepreneurship support which is evident, for instance, in the fact that roughly 100 teams of entrepreneurs participate in Technion’s BizTEC business planning competition each year (BizTEC n.d.) demonstrates the prevalence of a vibrant entrepreneurial spirit and culture in the Haifa regional economy and notably in its high-technology sectors such as its information and communication technologies and life sciences cluster.
3.3.3 A preliminary overview of Haifa’s regional knowledge base

The initiatives outlined above only give a partial indication of knowledge available in Haifa. Drawing a more complete picture of Haifa’s regional knowledge base would certainly require a more comprehensive stocktaking including, for instance, technical and vocational schools, life-long learning and training organizations, and less tangible sources and repositories of skills and knowledge.

Still, considering the central role of Technion and the University of Haifa in the regional economy, linking their research and education foci with the sectors and clusters currently visible in the Haifa regional economy gives at least a preliminary overview of the regional knowledge base. Importantly, this exercise gives an indication on interfaces and complementarities that could enable agents in the Haifa regional economy to seize eventual opportunities in the wake of possible technological or market convergence.

**Figure 8: Major sectors and clusters in Haifa and their sources of knowledge**

- **Aerospace**
  - Technion
  - University of Haifa

- **Information/communication technology**
  - Technion
  - University of Haifa

- **Life sciences**
  - Technion
  - University of Haifa
  - Rambam

- **Chemicals**
  - Technion

- **Logistics**
  - (University of Haifa)

- **Tourism**
  - University of Haifa

Source: own work.
Figure 8 above presents major sectors or clusters in the Haifa regional economy, and links them to sources of knowledge. This illustration can only present an indicative and stylized overview, but it draws attention to possible fields of convergence that could presumably be served by the regional knowledge base in the Haifa regional economy, as well as those in which Haifa’s regional knowledge base presumably has some gaps.

It becomes clear from Figure 8 that the major sectors and clusters in the Haifa regional economy are well supported by academic knowledge available in the region and that no major gaps appear to exist:

- Information and communication technology: Computer science, physics, and mathematics programs at Technion are relevant for this cluster, as may be natural sciences at the University of Haifa.
- Life sciences: Technion offers programs in biology, biomedical engineering, biotechnology and food engineering, and medicine. The University of Haifa has a faculty of social welfare and health sciences. Rambam Health Care Campus might be added here as a source of (applied) knowledge.
- Chemicals: Technion’s programs in chemical engineering, chemistry, and possibly materials science and engineering can be relevant for this cluster.
- Logistics: Haifa being a major port city, one might expect that the knowledge needed by the region’s logistics sector is rather applied than academic. Still, programs in marine sciences at the University of Haifa might play a role here.
- Aerospace: Technion’s programs in aerospace engineering, civil and environmental engineering, computer science, electrical engineering, industrial engineering, materials science and engineering, mathematics, mechanical engineering, and physics might be relevant for this sector. The same applies for programs in natural sciences at the University of Haifa.
- Tourism: The University of Haifa offers courses in its Israel Tourism School in Haifa, Tel Aviv, and Jerusalem (Tayarut School, n.d.). Apart from this direct education and training in tourism, some other study programs at Haifa’s HEIs might indirectly be relevant for the sector, such as architecture and town planning or humanities and art at Technion, or humanities at the University of Haifa.

When it comes to possible new fields of convergence where entrepreneurial action in a Schumpeterian sense of creative destructions and finding new combinations could take place, the following intersections between present clusters and sectors visible in the Haifa regional
economy and founded on capabilities and competences in the regional knowledge base become evident:

- Considering the cross-cutting role of information technology, intersections to possibly all other sectors are thinkable. To an even larger degree, direct intersections can be expected with life sciences and aerospace.

- The intersection between life sciences and chemicals is equally evident, especially in the pharmaceuticals industry apart from biotechnology.

- With a view on the role of oil refining in Haifa and the city’s role as a major port location, the intersection between the chemicals and logistics sectors is relevant for Haifa. This intersection could become highly relevant for the Haifa regional economy if Israel does indeed develop into a major exporter of natural gas (Germany Trade and Invest, 2016).

- The intersection between Haifa's tourism sector and the life science cluster is interesting because it might offer possibilities to expand in medical tourism. It should, however, be noted, that other niches in tourism such as wine tourism (at the intersection between the agrifood sector and tourism) do not appear to be founded on localized academic knowledge, although the Carmel region and the Galilee are among Israel’s most important wine-growing regions.

Apart from the academic knowledge and skills available for existing clusters or sectors and intersections between them, the region’s two HEIs offer several study programs that do not directly cater to the regional economy’s leading sectors. Among them are subjects that are cross-cutting in nature and whose demand is likely to be spatially dispersed (e.g. law, education, management, or social sciences). The fact that the HEIs offer some subjects relevant to cultural and creative industries such as architecture and town planning or humanities and arts seems somewhat undervalued in regional development, especially in comparison to Tel Aviv’s vibrant creative and cultural scene.
IV Towards a smart specialization strategy for Haifa

This chapter draws on the analysis of the regional economic structure and regional knowledge base of Haifa undertaken in the previous chapter, and consolidates the findings into some stylized facts that could guide the eventual elaboration of a detailed smart specialization strategy for Haifa.

The first section discusses what major pillars such a smart specialization strategy could focus on and builds on the leading sectors, clusters, knowledge strengths and opportunities the Haifa regional economy features, as they were discussed above. The second section then offers some thoughts on how the entrepreneurial process of discovery necessary to develop a smart specialization strategy for Haifa in a participatory way could be organized, responding to the caveats discussed in the introductory chapter of this study.

4.1 Pathways towards smart specialization

From the analysis of Haifa’s regional economy and regional knowledge base in the preceding chapters, several findings emerge that could serve as points of departure for a smart specialization strategy:

- Evidently, existing clusters in the Haifa regional economy would be major pillars of any smart specialization strategy. Leading sectors such as information and communication technology, life sciences, aerospace, logistics, and chemicals would merit focus, drawing on knowledge available in the region’s two major HEIs Technion and University of Haifa and other scientific infrastructure (e.g. Rambam Health Care Campus) and on existing enterprises, some of which are large world-class companies. Directing targeted support to these sectoral foci under the umbrella of a smart specialization’s strategy would probably involve a continuation and further development of current support initiatives such as MATAM and the Life Sciences Park.

- Horizontal support to creativity, innovation, and entrepreneurship appears well covered through the large breadth of subjects treated by Technion and the University of Haifa, and the various entrepreneurship and technology transfer programs offered
by these HEIs. Continuing immigration to Israel, including to Haifa, offers another opportunity for continued entrepreneurial spirit and vibrancy, and innovation.

- Despite these underlying strengths, some opportunities apparent from Haifa’s regional knowledge base can be identified which could be seized through targeted support in the framework of a smart specialization strategy. In particular, intersections between leading sectors or clusters offer possibilities for new technological and economic trajectories to unfold. Among them are, for example, the intersection between logistics and chemicals in view of possible growth opportunities in natural gas exploration and export, medical tourism at the interface between life sciences and tourism, cruise tourism at the intersection between logistics and tourism, as well as possible technological fields that might emerge at the convergence between information technology and chemicals or information technology and logistics. For example, the interface between information technology and life sciences is underscored by research and development in health informatics performed at IBM’s R&D lab on the campus of the University of Haifa (IBM, 2016c). Another example of technological convergence at the intersection between information technology and life sciences is life science-related software development by Prog4Biz (Prog4Biz, 2016), as are technologies used in medical devices and developed by Haifa-based companies such as Compulab (Compulab, 2016) and Fibernet (Fibernet, 2016).

- Apart from fields of convergence, and given Haifa’s attractiveness as a tourist destination, developing niche tourism such as wine tourism (linking Haifa’s touristic assets such as the German Colony and the Carmel and Galilee region’s wineries) could offer additional growth fields.

- In terms of the general orientation of a smart specialization strategy for Haifa, the city might choose to concentrate on some aspects of the scenarios proposed by Kipnis (1998, 656-657) who basically suggests Haifa developing into (i) a region absorbing growth spillovers from the dominant greater Tel Aviv region; (ii) the central metropolis for Northern Israel; or (iii) a “good place to live” (Kipnis 1998, 657) focusing on the quality of its environment and of life in the city and its region. Realistically, Haifa’s options for economic growth will involve a combination of all three scenarios. Given greater Tel Aviv’s sheer economic prowess, Haifa will always have the chance to absorb growth spillovers from the country’s main economic powerhouse. At the same time, given Haifa’s status as a larger city, the high scientific
reputation of its two major HEIs Technion and the University of Haifa, the presence of world-class enterprises (e.g. Apple, Hewlett Packard, IBM, Intel, or Microsoft), its touristic assets, its port, and its location as the urban center of Northern part of the country, Haifa will naturally play the role of Northern Israel’s metropolis. Looking at the assets in Haifa’s regional knowledge base, however, the third scenario would merit some closer attention in the framework of a smart specialization strategy to be developed. Haifa might thus position itself as a city to live and work. Doing so might help to counter the image deficit identified in the SWOT analysis in sub-section 3.1.1. Clusters such as life sciences and tourism can be drivers of such a strategy of economic growth consistent with quality of life and environmental sustainability. The information and communication technology sector is well consistent with such an orientation. Other sectors such as logistics or chemicals might be reoriented into this direction, in consistency with wider societal tendencies especially in industrialized countries. Further developing research and study programs at Haifa’s HEIs on sustainability in these sectors (e.g. sustainability management with a focus on chemicals, logistics, or tourism)\(^1\) could strengthen the region’s knowledge assets and might eventually generate sustainable business models through entrepreneurship or technology transfer.

- Given that Haifa’s major HEIs offer programs in fields related to cultural and creative industries, it seems worthwhile to consider a certain focus of the smart specialization strategy to be developed on how the localized knowledge and skills (e.g. in arts and humanities fields) can be used in economic activities consistent with Haifa’s existing economic assets (e.g. in tourism).

Summing up, Figure 9 below gives an overview of the basic architecture a smart specialization strategy for Haifa could follow, drawing on the smart specialization and smart experimentation logic presented in the introductory chapter.

\(^1\) For example, the University of Haifa presently offers a “Global Green MBA” degree (University of Haifa Faculty of Management, n.d.).
Developing a smart specialization strategy along these pillars would need a participatory approach to organize the necessary public-private entrepreneurial process of discovery on the regional level. This process would also be the place for agents to agree on concrete measures and actions to implement the smart specialization logic elaborated above and illustrated in

Source: own work building on Benner (2012b, 221; 2014, 15).
Figure 9, to define priorities and sequencing, to allocate funding, and to define stakeholders’ commitments accordingly. The next section offers some suggestions on what to consider when setting up and implementing such a process.

4.2 Entrepreneurial discovery process: A roadmap towards smart specialization

When planning the participatory entrepreneurial discovery process that is a central feature of the elaboration of a smart specialization strategy, it is important to be aware of the dangers that can go along with such a process, as were discussed in the introductory chapter. In particular, the entrepreneurial process of discovery should be organized in a way open enough to include not only “insiders”, that is, well-established businesspeople and enterprises, but also “outsiders” who could shape future trajectories in the regional economy such as soon-to-be entrepreneurs, students, or immigrants (Benner, 2014; forthcoming). At the same time, the process should not be too open as not to dilute the necessary focus that is, after all, the *raison d’être* of any smart specialization strategy.

Solutions to this dilemma are not obvious. Still, for the case of Haifa, we suggest several ideas on how to reduce the dangers of both over-reliance on established insiders (and hence, in extreme cases, eventual lock-in) and dilution of focus:

- The participatory entrepreneurial process of discovery should in any case be based on a thorough and scientific study of the regional economy, similar in its intention to the present study but more comprehensive and drawing on a considerable number of qualitative and semi-standardized interviews with stakeholders in the regional economy, as well as on a quantitative analysis of regional economic data. This step is indispensable to link subsequent discussions during the participatory entrepreneurial process of discovery with objectively analyzed and confirmed strengths and weaknesses of the regional economy, and hence to ensure evidence-based strategy design.

- Involving well-known stakeholders in the regional economy such as successful entrepreneurs or managers of larger companies, chairpersons or presidents of associations, and other notable entrepreneurial personalities (such as business angels) is definitely necessary to benefit from their knowledge and vision. Combining sectoral
(i.e. cluster) and cross-sectoral participation formats would unearth a diverse set of perspectives on the regional economy.

- At the same time, we propose participation of academia, similarly in intra- and interdisciplinary formats. Interdisciplinary formats can be expected to approach fields of convergence and spillovers that can be important for the future development of the regional knowledge base.

- Involving students, graduates, immigrant entrepreneurs, participants of entrepreneurship training courses, soon-to-be entrepreneurs (e.g. recommended by business angels), users of the IN-VENT co-working space, as well as artists and creative people (in view of ways to promote cultural and creative industries as well as tourism) could contribute outsiders’ opinions. Focus groups could be a suitable format to involve these groups. Another idea would be a pitching event or “business plan competition” for ideas on how to promote the regional economy. Involving initiatives such as the “Entrepreneurs in Jeans” meetup group in Haifa (Meetup, 2016) would be a further possibility to make voices heard that would not be present in traditional participation formats.

- A questionnaire among young and/or small companies could complement the steps outlined so far and serve to contribute further outsiders’ opinions and perspectives.

- Agents from other locations (e.g. Tel Aviv, Jerusalem) and national agents (e.g. representatives of the Ministry of Economy and Industry, OCS, national science agency MATIMOP) in view of their relations to the Haifa regional economy should not be forgotten. The same holds true for opinions of regional development experts. Equally, it makes sense to consider the question of the regional economy’s openness from the outside. To do so, international investors could be invited to participate in the strategy formulation process and to contribute their opinions (e.g. invited by bilateral chambers such as the Israeli-German Chamber of Industry and Commerce). Students from the international schools of Technion and the University of Haifa (whose language programs are well known internationally) could be another source of valuable outside opinions.

- In the end of the strategy formulation process, insights from all of these participation steps could be consolidated, presented, discussed, and disseminated in a final event.
Because of continuing evolution of the regional economy and its underlying knowledge base, we recommend reiterating this entrepreneurial process of discovery (including the preceding scientific regional economic analysis) regularly, most likely every five to seven years. Apart from necessary adaptations and modifications of the smart specialization strategy, this regular reiteration will serve as a stocktaking of the state of the regional economy and as a monitoring and evaluation tool for the design and the implementation of the smart specialization strategy. For this, suitable indicators will need to be defined, bearing in mind the attribution gap between implementation of the smart specialization strategy and the evolution of the regional economy. Available indicators could enter into a monitoring and evaluation methodology inspired, for example, by the EU’s Regional Innovation Scoreboard (European Commission, 2016). On a permanent basis, monitoring and related policy learning could be achieved through international peer review processes, for example in the framework of the OECD’s Local Economic and Employment Development (LEED) program (OECD, 2016), bearing in mind that Israel is a member state of the OECD.
V Conclusions and recommendations

Considering its methodological limitations, the present study does not allow for a comprehensive set of recommendations on how to promote the Haifa regional economy in the coming years or even decades. It has, however, demonstrated that the Haifa regional economy does have some characteristic strengths and opportunities that could indeed be promoted through a thoughtfully designed smart specialization strategy.

This final chapter suggests some ideas that could enter into the design of such a smart specialization strategy for Haifa:

- A smart specialization strategy for Haifa should combine targeted interventions to promote existing clusters and cluster potentials (such as information and communication technology, life sciences, aerospace, logistics, chemicals, and tourism) where appropriate, and horizontal interventions aiming at the further development of the regional knowledge base through measures that stimulate creativity, innovation, and entrepreneurship.

- We have identified some interesting niches for the Haifa regional economy that would merit a closer look when designing a comprehensive smart specialization strategy, such as medical tourism, cultural and creative industries, cruise tourism, and wine tourism. These (and other possible new fields) should be examined more closely under the lens of their consistency with the vision of Haifa as a city to work and live, which could be a guiding idea for the smart specialization strategy.

- We recommend directing the attention of a comprehensive smart specialization strategy for Haifa especially towards intersections between existing economic activities, sectors, and clusters. We consider Haifa’s regional knowledge base broad enough to allow for the emergence of new economic or technological trajectories at these intersections. To facilitate the emergence of these trajectories, actions that enable networking between agents active in different sectors or clusters and that create contacts among them appear worthwhile. Once possible trajectories become visible, more targeted actions such as specific business plan competitions could be considered.

- Some assets of Haifa’s regional knowledge base such as study programs in arts and humanities offered by Technion and the University of Haifa could prove relevant to promote cultural and creative industries. We are aware that promoting cultural and
creative industries is currently a fashionable trend in regional development in industrialized countries across the world. Accordingly, we consider it important to attach realistic expectations to a policy towards promoting cultural and creative industries. Still, we consider Haifa a strong and attractive location to further promote cultural and creative industries, at least to a certain extent. Such a policy would be highly consistent with Haifa’s touristic assets, and with a smart specialization strategy following the proposed guiding idea of positioning Haifa as a city to work and live. For example, one possibility worth considering would be to link Haifa’s reputation for ethnic and religious coexistence with cultural and creative industries, e.g. through dedicated festivals combining Jewish and Arab culture. While there is a “Holiday of Holidays” festival celebrating religious coexistence each year in December (Jerusalem Post, 2015), such a new type of festival could specifically focus on coexistence in defined niches in arts and culture (e.g. cinema or music). Another way to promote cultural and creative industries and tourism alike could be a festival dedicated to a signature culinary product (e.g. falafel or hummus), possibly opening pathways towards culinary tourism. Creating national and international visibility through such festivals could strengthen Haifa’s claim to be a city to live and work that could be the general thrust of a smart specialization strategy, and contribute to rebranding the city and moving it away from its traditional image as a “rusty” industrial location.

- To develop a smart specialization strategy that is well adapted to the regional economy’s strengths and opportunities and the regional knowledge base, we recommend organizing the participatory entrepreneurial discovery process in a comprehensive way that involves not only “insiders” but also “outsiders”. We have presented some preliminary ideas on how to do so, but many more can be developed on the way.

The present study could only give a short and preliminary overview over the profile of the Haifa regional economy and its regional knowledge base. Before designing a smart specialization strategy, a much more comprehensive analysis following a more diversified methodology would be needed. What does emerge from our analysis, however, is that Haifa is basically a strong location with characteristic strengths, and that it is likely to benefit from a well-designed smart specialization strategy consistent with existing strengths, opportunities, knowledge, and skills. Besides, some of the conclusions and recommendations related to the process of designing a smart specialization strategy and organizing the participatory
entrepreneurial process of discovery could give some guidance to policymakers and regional-development practitioners in other locations, too.
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