European Entrepreneurial Regions

Regional ecosystem mapping: Region of Central Macedonia

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TABLE OF CONTENTS

TABLES

FIGURES

EXECUTIVE SUMMARY

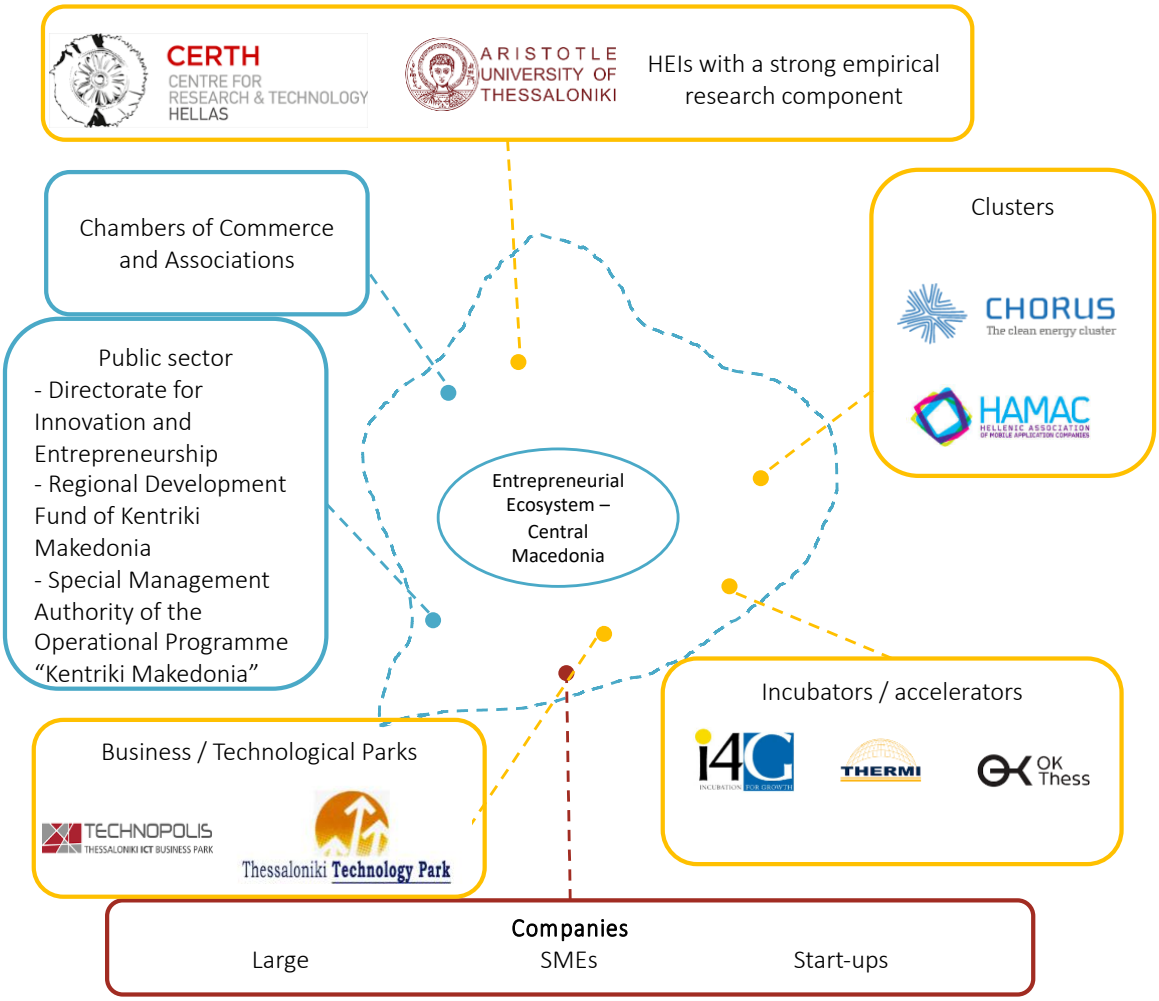
Central Macedonia is the second largest region in Greece where 17.5% of the country's population is concentrated (1,883,339 inhabitants in 2016). Thessaloniki is the capital and is further divided in seven regional units.

The most important services sectors in the region are financial services, transport and communications, recreational, tourism and transport services. The manufacturing sector is dominated by medium to low technology intensive sectors, such as the food industry, textiles and clothing, non-metallic mineral products and furniture where the majority of firms are SMEs. Larger companies are found in industries such as metal production, chemicals and plastics. The main exporting sectors are those of food and drink, chemicals, plastics and textiles.

The priorities of the Regional Research and Innovation Strategies for Smart Specialisation (RIS3) can be classified in two groups: vertical specialization and horizontal support. On the first group the areas for regional specialization are the agricultural sector, the building materials sector, the textile and clothing sector and the tourism sector. On the second group, the areas of horizontal support are ICT, energy, environment and Transport and logistics technologies.

According to the perception of local stakeholders the ecosystem is characterised as being between nascent and evolving. There are several start-ups particularly in the ICT, biotech sectors but also in less technology-oriented sectors such as food and beverages and there is at least one success story per year.

Figure 1: The entrepreneurial ecosystem in Central Macedonia (non-exhaustive)



The following Table 1 highlights a SWOT analysis of the elements of the regional entrepreneurial ecosystem including the actors, the framework conditions and the policy-mix. The SWOT is based on the insights gained during the in-depth mapping, namely the local workshop in the city of Thessaloniki, interviews with local stakeholders and secondary data collected.

Table 1:Updated SWOT analysis for the Central Macedonia entrepreneurial ecosystem

Strengths	Weaknesses
Agri-food • Broad range of economic activities in the agrifood sector. Sector with the largest volume of exports in the region • R&D Capabilities in agrifood • Established network with other EU regions and research organisations through Interreg, JRC thematic platform and H2020 projects • Dynamic ICT sector	**Agri-food** • Participation in (international) networks/ value chains • Low technology adoption by traditional producers • Incentivising enterprises to dedicate resources/ invest in new technologies • Financing delays • Reaching critical mass

	• Public platform for exchange/pooling of materials • Limited cooperation between traditional companies and between traditional companies and innovative start-ups
Horizontal • Major institutions performing R&D (Aristotle University and CERTH) • Private initiatives supporting innovation (incubators and clusters). • New VC funding of Thermi starting in 2020. • Various initiatives supporting entrepreneurship: – Plenty entrepreneurship competitions for students and young start-uppers. – The Interactive Electronic Participation Platform http://e-dialogos.pkm.gov.gr which constitutes a new innovative open public dialogue platform. – A new Independent Division for Innovation and Entrepreneurship Support in RCM organizational chart. – The Independent Office of the Regional Ombudsman for Citizens and Enterprises. – The integration of RCM in the European Interregional Cooperation Program «INTERREG EUROPE» for the purpose of the development of circular economy and how it can help SMEs to turn environmental challenges into opportunities (CESME & BIOREGIO Projects) – Agreement for cooperation between the Region of Central Macedonia and the CERN institute for technology transfer, commercialization and tenders (2017)	**Horizontal** • Lack of a clear economic development model at regional level, despite the efforts of the last few years. Negative Growth Definition: Huge decrease in GDP per inhabitant in RCM the past years (-28%,14vs08). Traditional productive labor intensive sectors and medium and low technology intensity. • Desertification of many industrial areas once branded as best practices i.e. Kilkis Business Area, with ripple negative effects and weakness exploitation of their comparative advantages. • Dramatic reduction of private and public investments. • A high number of very small SMEs, who lack the ability to embody innovative activities dominates the regional business profile (low absorptive capacity for innovation adoption and know-how, technology transfer from business sector), and leads to low global competitiveness advantages • SMEs economic activity appears over-concentrated in the Metropolitan Area of Thessaloniki. • Most R&D employment and expenditure concern higher education and government, while business receive the lowest percentages. • In terms of energy used resources, there is a clear dependence on lignite and oil compared to RES. • Absence of a brand name in almost all regional priority sectors and problematic access to foreign markets. • Lack of guidance and a low level of technical training and lifelong learning programs. • Brain drain of highly educated graduates and skilled personnel, mainly in STEM.
Opportunities	**Threats**
Agri-food • Development of solutions to mitigate climate change	**Agri-food** • Climate change impacts on agri-food production and quality • Brain drain in relevant skills

Horizontal • Market expansion for innovative products and services through active involvement in EU funded opportunities (EER, Interreg) • Market expansion in the Balkans peninsula. • Public funding alternatives for SMEs provided by EU initiatives and new programming period • Private funding initiative - New VC of Thermi • New types of cooperations between clusters and incubators • Dynamic ICT sector to provide innovative solutions • Low labour costs offers local SMEs the opportunity to increase their competitiveness in various markets, even high skilled ones like ICT • European and national environmental policy offers opportunities to SMEs to focus on. • Major new investments in e.g. port of Thessaloniki • Improvement of framework conditions: – Institutional reforms, reducing red tape, promoting more transparent public tendering and liberalizing markets – New national e-Procurement portal and procedure	**Horizontal** • Complex legislation and tax national system (instability and frequent changes) • Due to economic crisis, the great majority of funding originates from public sources. • Lack of stable economic conditions and policies to attract private investments from domestic and abroad. • Increasing competition in the context of the new EU accession countries. • High degree of brain drain. • Reducing the demand for goods and services due to the prolonged economic recession at national level. • A new global trend of more tariffs and barriers in global trade, could affect our business model and our resilient capacity, to react.

Regional stakeholders identified the following potential for interregional cooperation as the most relevant:

Access to finance:

- Peer learning from other regions on access to finance for high tech and more traditional companies in e.g. the agri-food sector in terms of 1) design of mechanisms regarding the attraction of funds and 2) type of cooperation between public institutions and with stakeholders from the entrepreneurial ecosystem.

Design of instruments to support scale-ups:

- Peer learning on mechanisms to support start-ups to scale in the different local contexts would help provide inspiration for new/novel mechanisms and increase knowledge on the effectiveness of mechanisms. This is particular the case for the mechanisms the region has been implementing in the current programming period such as the innovation vouchers for which the region has limited experience. Another mechanism of interest to the region that can be designed in cooperation with other regions is a pre-commercial public procurement on areas of common interest to unlock the many conditions of Structural Funds.

Joint incubation programme:

- A joint incubation programme between EER regions has been discussed among the local stakeholders during a workshop organised in Thessaloniki as well as the possibility to bring in touch start-ups with corporates from other EER regions in the priority thematic areas of the region.

Agri-food:

Regional cooperation on the following topics:

- QR code in agri-food combined with blockchain for the supply chain (B2B).
- Sensors for weather conditions in agri-food. Expand the community of practice in grapes to olives and kiwis.
- Agri-food and Logistics.
- Precision agriculture as an area the region has an excellent track.

1 INTRODUCTION

This report has been prepared in the framework of the project entitled '*Fostering collaboration through mapping, analysing and interlinking of European Entrepreneurial Regions*' launched by the European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs and the Executive Agency for Small and Medium-sized Enterprises (EASME). This project is funded by the COSME programme.[1]

The objective of this project is to strengthen the impact of existing actions aimed at further developing start-up and scale-up support. It aims at fostering collaboration across the European Entrepreneurial Regions (EER) and developing and implementing concrete collaborative action plans that will foster scale-ups and entrepreneurs along common thematic priorities.

This project builds on the long-standing experience of the EER initiative of the Committee of the Regions. The EER label has been awarded to regions for the commitment and policies to make their region one of the most resilient and ambitious places in Europe with forward-looking actions. Strategic topic areas are identified based on mapping, analysing and interlinking of EER labelled regions.

In this context, the objective of this report is to map the regional entrepreneurial ecosystems of the participating EER regions focusing on the analysis of their actors, policies and market-enhancing services and also exploring the potential linkages within and across the regional entrepreneurial ecosystems.

The following 10 EER labelled regions participate in this project:

1. Catalonia,
2. Central Macedonia,
3. Flanders,
4. Île-de-France
5. Lombardy,
6. Lower Austria,
7. Marche
8. North Brabant,
9. Northern & Western Region, Ireland
10. Western Greece.

The project is implemented by Technopolis Group, Idea Consult, Ismeri Europa, Infyde, the University of Athens and SPI.

[1] https://ec.europa.eu/growth/smes/cosme_en

2 THE ACTORS IN THE ECOSYSTEM

2.1 The role of entrepreneurs

2.1.1 Overview of the entrepreneurial dynamics

Start-ups and scale-ups: Due to the lack of representative and reliable data on start-ups and scale-ups for the region of Central Macedonia we combine a number of different sources to assess the local ecosystem. We start by looking at the data from the Orbis database which shows that during the period 2013-2016 ca. 4% of the total number of companies were start-ups. They tend to concentrate on traditional sectors such as wholesale, retail, tourism related activities and agri-food which are also the main sectors represented in the region. In addition to the traditional sectors computer programming activities rank high in the most dynamic sectors in the region.

Table 2: Overview of the number of start-ups in Central Macedonia

Sector	Number start-ups
Restaurants and mobile food service activities	25
Computer programming activities	15
Freight transport by road	14
Accounting, bookkeeping and auditing activities; tax consultancy	13
Travel agency activities	11
Wholesale of fruit and vegetables	11
Business and other management consultancy activities	10
Other transportation support activities	9
Wholesale of chemical products	9
Wholesale of other food, including fish, crustaceans and molluscs	9
Wholesale of other machinery and equipment	9
Other processing and preserving of fruit and vegetables	8
Wholesale of clothing and footwear	8
Wholesale of pharmaceutical goods	8
Beverage serving activities	7
Retail sale of clothing in specialised stores	7
Wholesale of other household goods	7
Construction of residential and non-residential buildings	6
Engineering activities and related technical consultancy	6
Hotels and similar accommodation	6
Other human health activities	6
Retail sale of cosmetic and toilet articles in specialised stores	6
Wholesale trade of motor vehicle parts and accessories	6

Sector	Number start-ups
Wholesale of beverages	5
Wholesale of coffee, tea, cocoa and spices	5
Wholesale of metals and metal ores	5
Wholesale of tobacco products	5
Wholesale of wood, construction materials and sanitary equipment	5

Notes

Period accounted for: 2010-2016

Calculation: date of incorporation every year, three years before; Definition of company population: active companies with minimum 5 employees (over 10 years at least 5 per year).

In terms of scale-ups according to the Orbis database during the period 2013-2016 ca. 2% of the total number of companies were scaleups. Similarly, wholesale trade, agri-food and tourism are the sectors where most scale-up activity takes place along with computer programming activities.

Table 3: Scale-ups

Sectors	Count of scale-ups
Wholesale trade, except of motor vehicles and motorcycles	31
Manufacture of food products	18
Accommodation	11
Manufacture of wearing apparel	8
Manufacture of fabricated metal products, except machinery and equipment	7
Computer programming, consultancy and related activities	6
Retail trade, except of motor vehicles and motorcycles	6
Civil engineering	5
Specialised construction activities	5
Warehousing and support activities for transportation	5
Manufacture of other non-metallic mineral products	4
Manufacture of paper and paper products	4
Food and beverage service activities	3

Sectors	Count of scale-ups
Manufacture of chemicals and chemical products	3
Manufacture of electrical equipment	3
Manufacture of machinery and equipment n.e.c.	3
Other manufacturing	3
Human health activities	2
Office administrative, office support and other business support activities	2
Repair and installation of machinery and equipment	2
Waste collection, treatment and disposal activities; materials recovery	2
Wholesale and retail trade and repair of motor vehicles and motorcycles	2

Notes

Period accounted for: 2010-2016

Approach: Companies classifying as scale-up in either one of the following periods: 2010-13, 2011-14, 2012-15, 2013-16

Calculation: average annualised growth greater than 20% per annum, over the three year periods

According to the Crunchbase[2] database during the period 2013-2019, 75 innovative technological companies have been active. The most common thematic area is digital including also e-commerce, telecom, advertising, agriculture, construction and health.

[2] Crunchbase is a platform for finding business information about private and public companies. Crunchbase information includes investments and funding information, founding members and individuals in leadership positions, mergers and acquisitions, news, and industry trends. Originally built to track start-ups, the Crunchbase website contains information on public and private companies on a global scale. https://www.crunchbase.com/

Figure 2: Innovative companies world based on Crunchbase data (words>=2)

Most accurate information on the entrepreneurial ecosystem can be provided directly by the three major incubators. The information collected is described in Table 4.

Table 4: Information provided by incubators

Incubators data on start-ups
The three main incubators are Thermi which includes a VC (the only VC in Northern Greece), Ok!thess[3] and i4G. Together they provide a good estimate of the start-up scene in the Central Macedonia region. Together they provide a very good estimate of the start-up scene in the Central Macedonia region. The total number of start-ups is however not the sum of companies supported in each incubator as companies tend to work with more than one. The figures collected provide an order of magnitude. The figures collected do however provide us with an order of magnitude.
Ok!thess: funded by the Niarchos institute; supported **68 start-ups** since the start of its operations in 2016; some stopped due to a lack of market.

sector	**Company not incorporated**	**Incoroporated company**	**Total**
Agri-food	3		3
Bio-economy and circular economy		1	1
ICT	14	14	28
Other	20	16	36
Grand Total	37	31	68

Source: Ok!Thess

[3] https://okthess.gr/en/

Thermi: supported at least **above 100 start-ups** since the start of its operations in 2014. Biotech and ICT are among the top areas in start-up activity. Less technology oriented ideas supported are often from within the agri-food and beverages sectors.

Rate of failure and the extent to which start-ups / scale-ups leave the region: Some stakeholders in the region believe that in most cases financing start-ups to scale leads to them leaving the region. Examples include companies whose R&D stays in the region while production moves abroad (outside of Greece). Moreover, it is believed that excellent students often immediately move abroad and do not seek support from a local incubator for their entrepreneurial ideas.

Venture capital is only available in the capital. The only VC that has existed in Northern Greece is the one of Thermi and is currently in the phase of divesting. The new VC of Thermi is expected to start in January 2020.

With respect to the rate of failure an observation from incubators is that it has been decreasing partly at least because of more safe ideas being put on the market, within thus the context of knowledge transfer and hence the transfer of successful ideas from other European countries. Moreover, in the great majority of cases entrepreneurs who fail with one idea re-adapt their business model or explore different ideas.

Ecosystem evolvement during the past 5 years: The ecosystem is still dominated by start-ups in traditional sectors. The size of the entrepreneurial ecosystem as measured in terms of start-ups and scale-ups does not show any notable positive or negative growth according to the Orbis data (growth of ca. 0% for both start-ups and scale-ups).

Some progress has been made in supporting entrepreneurial activity namely through the European Structural and Investment Funds. The region, however, does not attract new technologies and capital sufficiently. Moreover, stakeholders point out the need to improve the regulatory environment for instance by including tax incentives for business angels.

Local stakeholders expect to attract more foreign capital and gain in knowledge transfer of advanced technologies. There are also clearly some areas where the region shows potential, certainly in advanced technologies in the sector of agri-food and ICT and in the thematic area of bioscience. These are also the areas in which cooperative projects are deemed beneficial for the region. Specifically, in the ICT sector digital transformation of the society as a whole (e.g. personal data, smart contracts) and the economy (businesses across all sectors) is seen as a major opportunity. A growing market for ICT companies is the applications for the public administration (G2B and G2C). Other market segments served by local companies are applications for tourism, culture, transport and logistics, health and agri-food.

According to the regional GEM survey[4] (2018) ca. 40% of survey respondents believe they have the knowledge, skill and experience to start a new business. However only 8% expects to start a new business within the next three years and 19% perceive there will be good opportunities in the region in the next six months. Given the timing of the survey the results and in particular the deterioration in the intentions to start a new business can be attributed to the economic crisis. At the same time the improved perception on future opportunities matches qualitative perceptions of local stakeholders regarding a more

[4] https://www.gemconsortium.org/wiki/1141

positive prospect of the local economy due to news on investments and successful entrepreneurs in the media.

Table 5: GEM

	Do you have the knowledge, skill and experience to start a new business? (% of yes)		In the next six months will there be good opportunities to start a business in the area where you live?, (% of yes)		Are you alone or with others expecting to start a new business including any type of self employment within the next three years? (% of yes)	
Year	**2014**	**2018**	**2014**	**2018**	**2014**	**2018**
Kentriki Makedonia	48%	43%	15%	19%	12%	8.3%
Dytiki Ellada	46%	40%	15%	15%	10%	8.7%

Source: GEM

The start-up and scale-up scene in advanced technologies is rather small. However, there is typically at least one success story per year.

2.1.2 Horizontal assessment

Cooperation is limited between businesses, between business and academia/research centres and between start-ups and large companies. Incubators are struggling to connect representatives of major innovative organisations that tend to work in their own silos.

Main challenges for start-ups and scale-ups are financing, the employment of highly qualified personnel due to the brain drain, the limited R&D capacity and the lack of cooperation.

- In terms of financing there is a gap for microfinancing. It is said to be easier to find funding from venture capital of the size of 300,000 euro for a tech company rather than microfinancing of 30,000 since this capital is considered high risk.
- The entrepreneurial ecosystem is nurtured from private initiatives rather than a central governmental support. A degree of de-centralisation from the capital is needed as currently all funds tend to be seated in the capital despite the applications made by the region.
- Infrastructure is also partially a barrier. For instance, the installation of a DLS line which is very basic.
- Lack of market. Many start-ups fail due to a lack of a market.
- Lack of scale. Most cluster activities as well as incubators and other publicly supported infrastructure are small, they do not attract the interest of research organizations and large companies with the result that they remain small and there are no major success stories.

2.1.3 Assessment for the top 2 thematic synergies priorities

Stakeholders representing Central Macedonia within the EER expressed interest in developing collaboration and coordination through the EER project in the following areas: 1) Agri-food and 2) Bio-economy and circular economy. In each of the two areas the digital component is considered important. Main challenges in the top two thematic areas in Central Macedonia point to the lack of market, technology uptake, cooperation and financing (see Table 6).

Table 6: Challenges for agri-food, bio-economy and circular economy

Challenges agri-food	Bio-economy and circular economy
Participation in (international) networks/value chains New technology adoption by traditional producers Financing delays	Stimulation of private financing Reaching critical mass (not possible on all sectors) Stimulating enterprises to dedicate resources/invest Public platform for exchange/pooling of materials Solutions to mitigate climate change impacts on e.g. agri-food which the region is currently facing

Main opportunities for collaboration: a summary of ideas discussed during the workshop among the stakeholders representing the entrepreneurial ecosystem range from cooperation on a specific technology e.g. blockchain, at the sectorial level e.g. logistics and at the level of design/application of support mechanisms to support transformative activities of the economic fabric of the region.

Table 7: Ideas for cooperative projects among stakeholders within the region

Ideas for cooperative projects
Creation of a QR in agrifood combined with blockchain for the supply chain (B2B)
Incubation programme with Lombardy and Flanders
Pre commercial procurement on topics of interest to unlock the main many conditions of European Structural and Investment Funds
Sensors for weather conditions in agrifood, expand the community of practice in grapes to olives and kiwis
Agrifood and Logistics
Bringing in touch start-ups with corporates from other EER regions
Scale-up funding

Ideas for cooperative projects
Design of support mechanisms (peer learning)

2.2 Large companies in the entrepreneurial ecosystem

2.2.1 General overview of the established enterprises' interaction with the ecosystem

The economy of the region is SME-driven with ca. only 1% among the companies representing large companies in terms of number of employees.[5] Wholesale trade, manufacture of food products and retail trade together account for 55% of the volume measured in numbers of companies and 65% measured in numbers of employees (see Table 8 and Table 9).

Table 8: Number of Employees and Number of companies

Prefecture	Number of employees	Number of companies
Thessaloniki	68 317	3 578
Imathia	4 448	186
Kilkis	4 905	113
Pella	4 017	220
Pieria	3 530	185
Serres	3 150	205
Chalkidiki	3 928	243
Grand Total	**92 295**	**4 730**

Source ICAP, 2016

Table 9: Number of large companies as share by sector

NACE rev.2 (digit 2)	Percent share in total number of companies	Percent share in total number of employees
Wholesale trade, except of motor vehicles and motorcycles	26%	17%
Manufacture of food products	18%	11%
Retail trade, except of motor vehicles and motorcycles	11%	34%
Food and beverage service activities	5%	3%
Security and investigation activities	5%	11%
Human health activities	5%	4%
Manufacture of beverages	3%	1%

[5] Grand total excludes companies with missing information on the number of employees and companies with zero employees.

NACE rev.2 (digit 2)	Percent share in total number of companies	Percent share in total number of employees
Manufacture of paper and paper products	3%	1%
Manufacture of rubber and plastic products	3%	1%
Warehousing and support activities for transportation	3%	2%
Accommodation	3%	1%
Insurance, reinsurance and pension funding, except compulsory social security	3%	3%
Travel agency, tour operator and other reservation service and related activities	3%	2%
Services to buildings and landscape activities	3%	2%
Education	3%	1%
Social work activities without accommodation	3%	1%
Sports activities and amusement and recreation activities	3%	6%

Source ICAP, 2016

The interaction of large companies with the entrepreneurial ecosystem is very low to non-existent. There are anecdotal initiatives driven by incubators with objective to open channels for customers or for the establishment of cooperation between large companies and start-ups. The experience with cooperation has been with two companies in the beverages sector and precision agriculture.

2.2.2 Horizontal assessment

Specific challenges and opportunities faced by large companies: Companies tend to focus on their internal capabilities and (mostly short-term) profitability while the value of R&D is not always evident. There is still a path-dependence in terms pf preferring turn-key solutions and reluctance to R&D collaboration with academic institutions.

Interregional collaboration is not a priority and it is difficult to organise it collectively. Companies organise their value chains and international collaborations based on individual needs. For the development of the ecosystem priority should be given to intraregional exploitation of synergies in particular between research organisations and business. Of course, interregional is important when skill and knowledge complementarities are needed but as long as challenges are not primarily addressed within the country competitiveness is unlikely to improve significantly.

2.2.3 Assessment for the top 2 thematic priorities of the region

The large companies in the priority areas of Agri-food are listed in Table 10. In Agri-food none of the companies is located in the city of Thessaloniki. In ICT we identify 99 companies, all SMEs. Bio-economy and circular economy companies are not possible to trace in official statistics.

A listing of extroverted companies is provided by the Greek Exporters Association (SEVE) online (see https://www.seve.gr/en/κατάλογος-εξαγωγέων/). It includes companies

classified by sector at a high level of granularity and includes companies in the three thematic areas in focus. A listing of innovative companies has been sourced by the 'Crunchbase' database.

Table 10: Identified large companies in the selected sectors

Agri-food
1. ΑΓΡΟΤΙΚΗ ΕΤΑΙΡΙΚΗ ΣΥΜΠΡΑΞΗ - ΑΛ.Μ.ΜΕ. Α.Ε.
2. ΑΜΒΡΟΣΙΑΔΗΣ ΚΟΤΟΠΟΥΛΑ ΕΞΟΧΗΣ Α.Β.Ε.Ε.
3. ΚΡΙ-ΚΡΙ ΒΙΟΜΗΧΑΝΙΑ ΓΑΛΑΚΤΟΣ Α.Β.Ε.Ε.
4. ΑΛΕΞΑΝΤΕΡ Ε.Π.Ε.
5. ΑΛΜΗ Α.Β.Ε.Ε.
6. ΑΡΑΜΠΑΤΖΗΣ, ΜΙΧΑΗΛ, Α.Β.Ε.Ε. "ΕΛΛΗΝΙΚΗ ΖΥΜΗ"
7. ΚΡΟΝΟΣ Α.Ε.

Global value chains of critical importance

According to the most recent study of SEBE[6] 29% of the region's exports were in **agri-food** which represents the sector with the highest volume of exports in 2017 (measured in euro millions). The products exported the most within agri-food are 'Vegetable and fruit preparations' and 'Fresh fruits and fruits' representing 9% and 7% of total exports respectively.

Of crucial importance in agri-food value chains are the distribution Networks and specifically supply chains:

- Traceability in agricultural products.
- Information technologies in the supply chains.
- Sustainability and innovation in the supply chains.

The main Gaps of the agri-food value chain in Central Macedonia are:

- Branding and marketing and its interconnection with tourism, culture, tradition and history, and
- The genetic material of indigenous seeds (lack of indigenous seeds).

Important products of companies with vertically integrated production in the region of Central Macedonia are mainly:

- Cereals (Rice 88% of national production is concentrated in the region)
- Dairy products
- Mussels (suffers from an unclear operations framework)
- Winery
- Cotton
- Spirulina

6 Federation of Northern Greece Exporters

- Olives and olive oil

Table 11: Central Macedonia external trade key figures

In million euro	2017	2016	2015	2014	2013
Exports	4 670.8	4 237.8	4 070.9	4 336.7	4 335.8
Imports	5 749.9	5 297.7	5 318.5	5 356.8	5 309.3
Trade balance	-1 079.1	-1 054.9	-1 247.6	-1 020.0	-973.5
Exports/Imports	81.2%	80.1%	76.5%	81.0%	81.7%
Exports • 2017: 16.4% share of exports • Yearly change: 2016-17 +10.2% • Export performance: 17.2% of GDP			**Imports** • 2017: 11.7% share of exports • Yearly change: 2016-17 +8.6% • Export performance: 17.2% of GDP		
Trade balance • Deficit • Yearly change 2016-17: +2.3%			**Export shares by sector** • Food: 29.3% • Petroleum products: 18.1% • Textiles: 12.2% • Chemicals and plastics:10.6% • Metals: 8.4 • Other: 21.3		

Source: Export mapping study of Greece by region, Greek Exporters Association Institute for Export Research and Studies (2019)

2.3 Research System and universities

2.3.1 General overview of the research and higher education system in the region

This section aims to provide an overview of the sources feeding the pool of potential entrepreneurs, talent, knowledge and innovation, and technological innovation (preferably with high appropriability) ensuring higher likelihood of scale-up in the region of Central Macedonia.

The approach towards entrepreneurship differs by university. The Aristotle University of Thessaloniki and the Centre for Research and Technology Hellas (CERTH) are geared towards empirical research and as such have links with the entrepreneurial ecosystem. More recently the Center for Interdisciplinary Research and Innovation (KEDEK) as an autonomous research structure of the Aristotle University of Thessaloniki has been established which aims at more effective interdisciplinary cooperation structures to support competitiveness. Thessaloniki INTEC, the Thessaloniki International Technology Center aims at Innovation Mega Projects. The Park, which is about to launch operations will be a 20 hectare non-profit PPP with 40% private participation, 20% business associations and 40% public. All major research establishments of the area and nearly 100 Greek companies have signed a letter of intent specifying mega-projects to be incubated mainly in the areas of AI, advanced materials and clean energy (agri-food will probably follow). Interest from outside Europe is already expressed for collaboration (US, Japan) and there are at least 10 startups ready to move in.Total budget for Phase A is €58 million. Other universities (for

instance the University of Macedonia) conduct activities geared towards entrepreneurship such as for instance postgraduate and master courses on innovation and entrepreneurship.

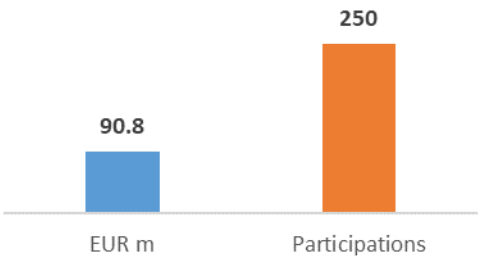
ELKE is the statutory body of the Aristotle University of Thessaloniki in charge of the management of the University's research and related activities. It includes a Centre for the Dissemination of Research Results, a Technology Transfer Office and also activities for the Establishment of Thematic Research Networks. The Centre for the dissemination of Research Result provides 1) office premises, 2) conference and exhibition facilities, wherein the products and services developed by the university's researchers are promoted. The Technology Transfer offices focuses on 1) patent licensing and royalty agreements, 2) establishment of spin-offs, and 3) innovative tools for the dissemination of research results. The Thematic Research Networks involve interdisciplinary collaborations between researchers, laboratories and infrastructure in common research areas and social problems. ELKE finances and coordinates this activity.[7]

In terms of spin-off activity like the university laboratory Urban and Regional Innovation Research (URENIO) and Intelspace Innovation Technologies S.A. (INTELSPACE), there is no formal recording of the spin-offs from universities and research centres in Central Macedonia. While some information could be gathered from ELKE it will only provide a partial view. This information could be coupled with data from companies in Horizon2020 to improve the overview.

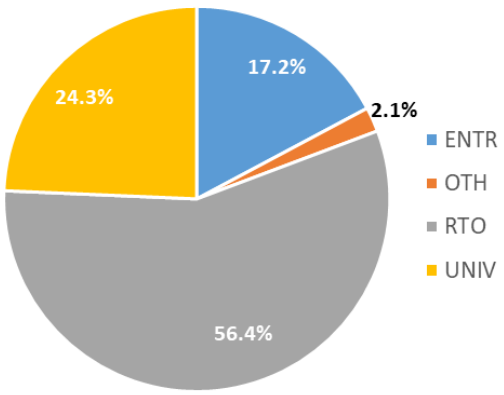
Horizon 2020 data: The overview below provides a snapshot of the basic profile of Central Macedonia. It showcases the available capabilities of the region in thematic areas of relevance to the main sectors prioritised by the region namely agri-food, circular economy and ICT.

Figure 3: Basic profile based on participation in Horizon 2020 – Central Macedonia

EUR million obtained (2014-2018) and no. of participations in Horizon 2020

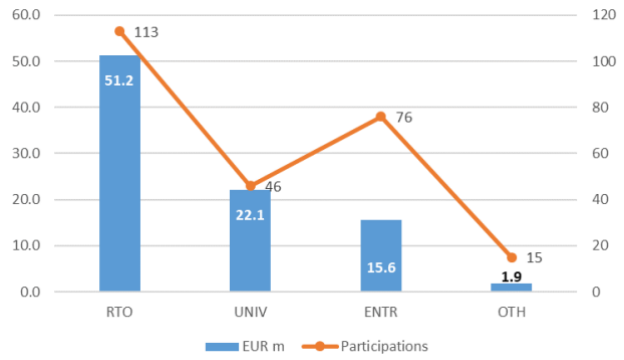


Distribution of H2020 funds (%) obtained by type of organisation

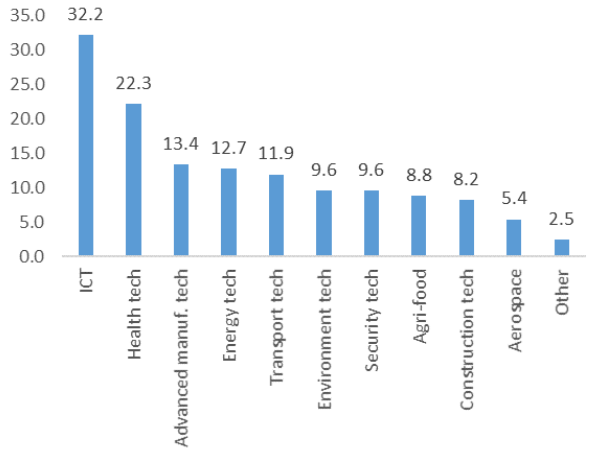


[7] For more information on ELKE see: https://www.rc.auth.gr/Content/Display/RC_PROFILE

Funds obtained (EUR million) and participations (no.) by type of organisation



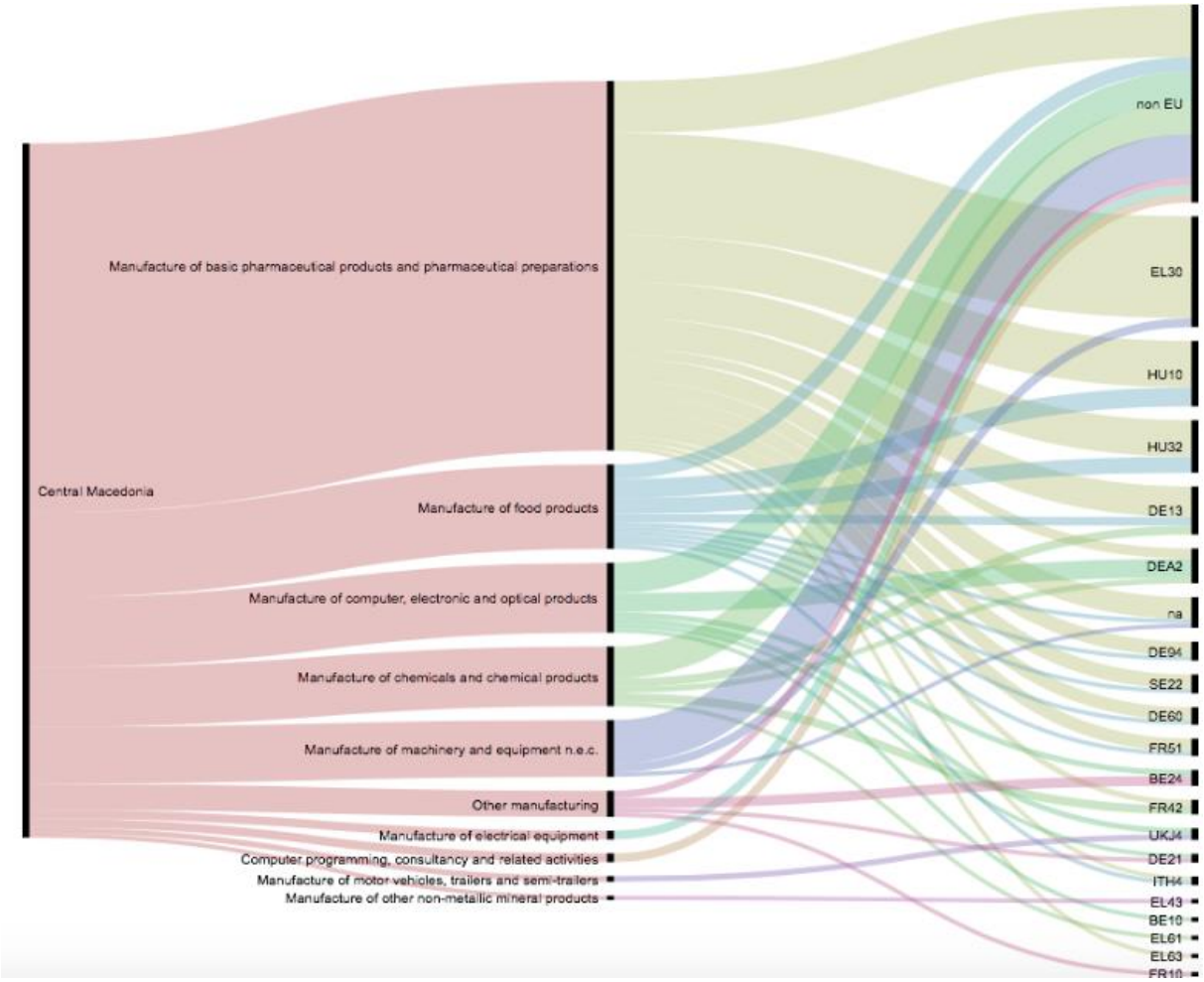
Funds obtained (EUR million) by sector



Source: RED © 2019 (ISMERI Europa); data can be consulted on the R&T Telescope™ (www.technology-telescope.com)

Patents: Patents by sectors as included in Patstat/Regpat are provided below. A similar conclusion can be drawn as above in terms of the relevance of high tech capabilities in the region in relation to its economic structure and the main sectors identified by the region as priority. Combined with the H2020 overview the data confirm the importance of the health sector capabilities in the region.

Figure 4: Patents by sector



Notes: cut off point regions with at least 3 patents

Approach: inventor

Students and graduates: STEM persons employed in the region show a slight declining trend with an average annual growth of ca. -0.5% in the period 2010-2018. On the contrary scientists and engineers increase with an average annual growth of ca. 4%. The latter may hint at the difficulties in the absorption capacity of companies and the effect of brain drain.

Table 12: Science and Technology human capita

CATEGORY	2010	2011	2012	2013	2014	2015	2016	2017	2018
Thousand									
Persons employed in science and technology	174.9	173.6	163.9	149.0	151.0	156.4	164.6	167.1	167.9

CATEGORY	2010	2011	2012	2013	2014	2015	2016	2017	2018
Scientists and engineers	34.8	38.2	36.9	36.8	34.1	41.7	43.9	42.2	47.4
Percentage of active population									
Persons employed in science and technology	21.1	21.4	20.5	18.8	19.1	19.3	20.1	20.6	20.7
Scientists and engineers	4.2	4.7	4.6	4.6	4.3	5.1	5.4	5.2	5.9

Source: Eurostat

In the area of digital skillset and education, the local educational system offers a steady flow of ICT graduates; the students in digital subjects represent the 6% of all students over the last five years (Digital Cities Challenge Assessment report Thessaloniki, 2019).

2.3.2 Horizontal assessment

Challenges in the research system arise due to:

- The lack of a co-operation culture particularly for industry – academia collaborations which is expressed from both the industry and academia showing reluctance and appreciation of the potential of R&D co-operation.
- Another major challenge is brain drain as a result of the crisis and the lack of business opportunities.
- The translation of knowledge into innovation. While Universities and Research Centers perform well in terms of FP7 and Horizon 2020 participations and are involved in international research networks there is a disconnect between research outcomes and related innovative activity on the ground.

Opportunities at the same time arise due to the excellent research capabilities of the institutions.

2.3.3 Assessment for the top 2 thematic priorities

Research and innovation strengths in the region are captured by H2020 participation data and Interreg. Through these projects the region strengthens its specialisation in its priority areas and its position in cross-regional networks working in the same topics. Opportunities for collaboration from the research perspective as captured by H2020 include:

- Food quality, safety and traceability
- Innovative food processing
- Primary agricultural production

Given the transversal nature of digital technologies and their importance for the priority sectors of Central Macedonia it is worth while noting the specialisation of the region in

Cognitive systems and AI, Content technologies, Innovative components and equipment and Telecommunication architectures and systems.

Table 13: Agri-food

	Fisheries & aquaculture	Food quality, safety and traceability	Health and functional claims	Innovative food processing	Primary agricultural production
Lower Austria	specialised	weak	weak	weak	specialised
Central Macedonia	**weak**	**specialised**	**weak**	**specialised**	**specialised**
Western Greece	weak	weak	weak	weak	weak
Catalonia	not specialised	not specialised	specialised	specialised	not specialised
Ile de France	highly specialised	highly specialised	weak	specialised	highly specialised
Border, Midland and Western	weak	highly specialised	weak	not specialised	not specialised
Lombardy	weak	weak	weak	weak	specialised
Marche	weak	weak	weak	specialised	weak
North Brabant	weak	not specialised	specialised	specialised	specialised
Flanders	weak	weak	weak	weak	weak

Table 14: Digital

	Advanced computing	Cognitive systems and AI	Content technologies	Innovative components and equipment	Telecommunication architectures and systems
Lower Austria	weak	specialised	weak	not specialised	weak
Central Macedonia	**not specialised**	**highly specialised**	**highly specialised**	**specialised**	**specialised**
Western Greece	highly specialised	highly specialised	not specialised	weak	specialised

	Advanced computing	Cognitive systems and AI	Content technologies	Innovative components and equipment	Telecommunication architectures and systems
Catalonia	specialised	specialised	specialised	not specialised	specialised
Ile de France	specialised	not specialised	not specialised	not specialised	specialised
Border, Midland and Western	not specialised	not specialised	highly specialised	weak	highly specialised
Lombardy	specialised	not specialised	not specialised	highly specialised	specialised
Marche	weak	weak	specialised	weak	weak
North Brabant	not specialised	not specialised	not specialised	highly specialised	specialised
Flanders	weak	weak	weak	weak	weak

Interreg or other international cooperation projects are summarised below.

Table 15: Interreg projects in the thematic areas of Agri-food and Circular economy

Operation name	Operation summary	Operation start date	Operation end date	Total eligible expenditure allocated to the operation	Union co-financing rate as per priority axes
CESME	Circular Economy for SMEs	01.04.2016	31.03.2020	119 850.00	85.00%
BIOREGIO	Regional circular economy models and best available technologies for biological streams	01.01.2017	31.12.2021	74 755.80	85.00%
RUMORE	Rural-Urban Partnerships Motivating Regional Economies	01.01.2017	31.12.2021	80 716.00	85.00%

Notes: data can be found locally or on the online keep.eu database.

2.4 Market services and ecosystem builders

This section is meant to provide information on one of the horizontal priorities for cooperation – namely building the ecosystems through using intermediaries (e.g. digital hubs, innovation hubs, ecosystems around technological sectors, etc).

2.4.1 General overview

Support services include innovation labs and (pre) incubators, technological/business parks and co-working spaces. These initiatives which create infrastructure supporting entrepreneurship and start-ups are undertaken predominantly from private initiatives and are supported by local stakeholders including the city of Thessaloniki, the Region of Central Macedonia, the local universities and business associations. A non-exhaustive listing includes:

- Pre-incubator
  - OK!Thess (https://okthess.gr/en/)
  - Thermi (http://www.thermi-group.com/el/)
- Incubators
  - i4G (i http://i4g.gr/w/) and
  - Thermi (http://www.thermi-group.com/el/)
  - Technopolis Thessaloniki (https://www.technopolis.gr/en/mainpage)
- Business/Technological parks
  - Technopolis Thessaloniki (https://www.technopolis.gr/en/mainpage) which hosts digital companies
  - Technological Park of Thessaloniki (http://www.thestep.gr/root.en.aspx)
  - Thessaloniki International Technology Center (Thessaloniki INTEC)
- Co-working spaces
  - in OK!Thess

However, infrastructures for experimentation and prototyping, e.g. fab labs are lacking.

Liquidity provision is among the top expectations by most start-ups. Between 20-30% however approach incubators with the purpose of services in making a business plan/business model.

There is no lack of **professional services** for start-ups in Central Macedonia especially. There is however high demand and a lack of good developers as these profiles are key in all key sectors of the productive economy. Services provided are predominantly private not public.

In Central Macedonia there is currently no special focus on supporting scale-ups by the public authorities. The maturity of the local ecosystem is considered low for a coordinated effort on scale-ups.

Clusters interacting with / supporting the entrepreneurial ecosystem: Clusters are considered an important stakeholder of the entrepreneurial ecosystem by both public and private stakeholders i.e. incubators (see appendix C). The interactions between clusters and incubators have been practically inexistent but are now starting to grow. The region

has also tried to support the existing clusters and stimulate the creation of new clusters by designing a support mechanism for clusters. The interest, however, has been low with only two new clusters and another six from the existing clusters applying to receive the support.

Publicly funded support organisations include: Directorate of Innovation and Entrepreneurship Support, Region of Central Macedonia; Regional Development Fund of Kentriki Makedonia; Special Managing Authority for the Operational Programme Kentriki Makedonia. No evaluation of the effectiveness of those publicly funded support organisations has taken place yet.

Among other publicly funded organisations with activities in supporting entrepreneurial activity there is the Chamber of Commerce and Industry with past activities for instance in the blue economy and tourism.

The public sector considering the lack of private funding from banks acts as a catalyser for SMEs certainly considering the SF funding to enhance SMEs' competitiveness.

2.4.2 Horizontal assessment

Support structures and measures in place: As mentioned above the region of Central Macedonia has three privately run incubators and one VC the one of Thermi. These are considered key as without them the region would have needed to rely on Athens or fund them with public money. The services provided by the incubators are listed in Table 16.

Table 16: Services provided by incubators

Thermi	Ok!Thess	i4G
• Incubator – Renting Space to innovative enterprises – General Purpose installations – Fund Raising – Back office Services (legal and accounting advice, secretarial support, call center, patent grant support, internet access) – Value added Services: Technical audit, financial consulting, financing e.t.c. – Business Consulting: Monitoring of business plans, benchmarking, commercial output reports etc.	• Acceleration programme – A co-working space allowing up to 20 teams of up to 5 persons to meet and work together – Access to high speed Wi-Fi (100/100Mbps) – Participation in seminars and lecture related to innovation at the OK!Thess premises – Daily guidance by a coach specialised on startup related matters – Support by a mentor in the same field of economic activity as the startup team – Space for social interaction with other	• Incubator – Office space and infrastructure – Business services:legal, accounting, IT and desk clerk support – Network: working together with similar minded people, events – Access to market: in Greece and Globally – Coach & mentorship: founders providing advice on e.g. market business development, competition, company structure etc. – Consutancy: start-ups support in business planning, sales, investor

Thermi	Ok!Thess	i4G
– Networking: With Universities, Technology Institutions, Research Parks, Chambers of Commerce, Industrial Federations and Associations e.t.c • Accelerator (pre-incubator)	teams working in OK!Thess' space – International networking – Access to capital.	meetings preparation, human resources etc.
• Above 100 companies (period 2014-2019)	• 68 companies (period 2016-2019)	• 45 companies entered i4G (period 2013-2019)

Source: Ok!thess: https://okthess.gr/en/; i4G: http://i4g.gr/w/; Thermi: http://www.thermi-group.com/en/thermokoitida/

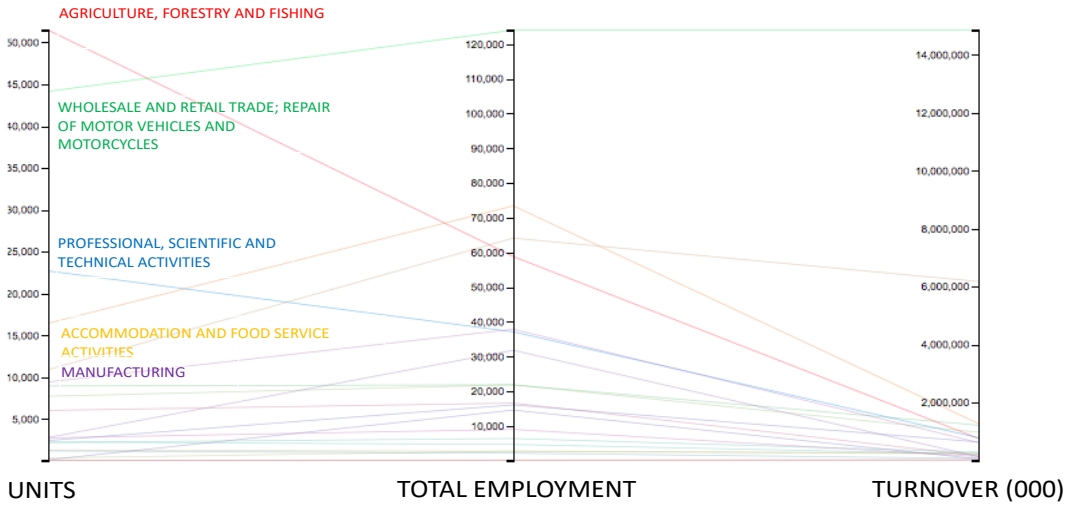
Among the main challenges for the development of the ecosystem is the market size both in terms of the companies seeking the services of incubators but also the market for the innovative solutions of start-ups. Moreover, the opportunities associated to the neighbouring countries and the role of Thessaloniki as the centre of the Balcans have not materialised. Finally, the geographic location of the region away from the decision-making centre with limited influencing power is another limiting factor.

3 FRAMEWORK CONDITIONS FOR ENTREPRENEURSHIP

3.1 Quick snapshot of the industry and economic performance

Economic structure: The key sectors of the economy of Central Macedonia are Agriculture, Wholesale and retail trade, Professional, scientific and technical activities and Accommodation and food service activities (based on Eurostat figures in 2016 visualised in Figure 5). The region shows a very high concentration in terms of both number of employees (ca. 74%) and number of companies (ca. 76%) in the capital city of Thessaloniki (see also Table 1).

Figure 5: Units, Employment and Turnover in 2016 – NACE dig1



Source: Elstat, 2016[8]

3.2 Human capital

Labour and product market regulations are national. The Greek labour market and employment relations system have been subject to immense pressures, leading to fundamental changes both in the structure of institutions and in the behaviour of the main employment relations actors. Long before the economic crisis, the institutional framework of the Greek labour market was dominated by active state intervention, a governmental corporatism. Interventions in the labour market were organised and promoted through the three successive bail-out programs. The most important reforms were a major departure from the previous system of Free Collective Bargaining. These changes include abolishing the "principle of favourability", suspending the obligatory extension of collective agreements until the end of the economic adjustment program, reducing the time expired collective agreements remain in force to three months from six, introducing non-union representatives into firms with the right to conclude company-level collective agreements (the so-called "associations of persons") and establishing a legal minimum wage (cut by 22 per cent), not by collective agreement, with sub-minimum rates for employees under

[8] Available at: http://www.statistics.gr/en/statistics/-/publication/SBR01/-

25 years old. The reforms promoted a policy of complete decentralisation of the collective bargaining system without prior consultation with the social partners.[14]

3.3 Financial capital

3.3.1 General overview of access to finance in the region

The Greek banking system is composed of four major systemic banks, some ranches of multinational commercial banks (the latter operating almost exclusively in the Athens area) and very few smaller or local cooperative banks. Capital outflows and the need to pass stress tests and implement restructuring plans has significantly diminished liquidity and access to the banking system for business loans remains difficult. Path dependency does not help, as banks were traditionally lending companies against collaterals rather than on the merit of their business plans.

A similar pattern applies to VC. Business Angels, Venture Capital and Private Equity schemes are very few and concentrated around the capital. The only VC that has existed in Norther Greece is the one of Thermi and is currently in the phase of divesting. The new VC of Thermi is expected to start in January 2020.

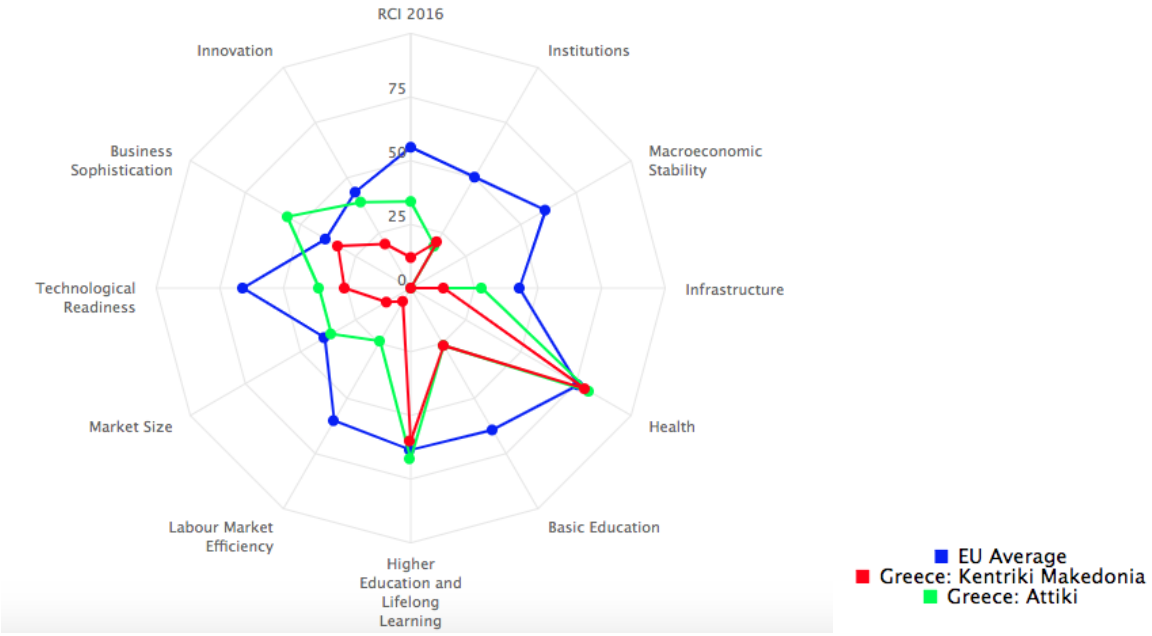
The VC market took off with the JEREMIE Initiative during the 2007-2013 programming period and enlarged with Equifund, a fund of funds endowed with € 200 million in national and EIB/EIF public expenditure. It is expected to leverage extra funds from international credit institutions as well as private investors. In total Equifund expects to provide Greek start-ups with up to 1 billion for early-stage and growth-stage funding by 2022 (Antoniades et al., 2018). Technology Transfer Funds and Accelerator Funds are supported. The former target projects and / or projects. and companies (SMEs) coming from universities, research centres or other organisations with significant research activity. These Funds use funds for pre-seed, proof-of-concept while The Acceleration Funds target groups / projects and / or start-ups that are associated with entrepreneurship support structures such as incubators, Technology Parks, co-working spaces, HEIs and HEIs, research centres etc. The funds are not active in the region.

3.3.2 Horizontal assessment

The availability of financing for start-ups/scale-ups is very limited and there is in particular a gap for microfinancing as this capital is usually considered high risk. The funding of the regional productive system depends mainly on the subsidiaries of the national systemic banks, which have limited liquidity and are not geared towards risky investments. Additional sources come from the regional public support schemes. Three small VCs existed in the period 2004-2008 run by incubators and there is one more VC, that is expected to be launched in January 2020. In addition, incubators invite Funds at the region or organise roadshows to Athens. Angel investments and crowdfunding are practically inexistent. Efforts to access them transregionally (Athens) are in place but have not produced any visible results yet.

3.4 Infrastructure for local needs and global access

According to the 2016 European Regional Competitiveness report, Central Macedonia ranks 233 out of 263 regions in the infrastructure pillar which is composed of the following indicators: 1) Accessibility of motorways; 2) Accessibility of railways; 3) Accessibility to passenger flights4) Intensity high-speed railways. As such the region ranks below the EU average.



According to the Digital Cities Challenge initiative in the city of Thessaloniki the penetration of digital technologies in the physical infrastructure is very slow. The only exception pointed out is with universities and research centres as most of the universities and research centres offer 1Gbps fixed broadband Internet connectivity on their campuses to their staff and students together with free Wi-Fi both outdoors and indoors.

Country assessment of digital infrastructure

Although statistical data regarding fixed broadband connections at the regional level are missing, the available information at country level shows that 70.6% of the country households, with at least one member aged 16-74 years old, use the broadband internet connection at home. According to recent statistics providing data for the average of Greece, the main reasons for not accessing the internet at home are: (a) lack of skills (70.2%), (b) the usefulness of internet information (23.1%) and (c) the high equipment cost (18.0%).23 The responses regarding the cost of the equipment reflect the cost of the access to the internet, which is higher than the EU average. According to a study by the European Commission, the price for 12-30 Mbps and 30-100 Mbps stand-alone internet and the double play (Internet + fixed telephony) is almost double the EU average. Also, the double pay with TV and the triple play for the same basket of 12-30 Mbps and 30-100 Mbps cost more than the EU average for the >100Mbps basket.

Regarding the use of digital infrastructure from businesses, 86.6% of companies with 10 or more employees have an internet connection (country total, statistical office). 97.8% of them used DSL or any other type of fixed broadband connection (e.g. ADSL, SDSL, VDSL, FTTH, cable technology), while 54.6% used broadband connection using mobile telephony networks (3G or 4G). As regards the maximum contracted download speed used by the enterprises for their fixed broadband connection to the Internet, 71.7% has at least 2 but less than 30Mbps, 20% has at least 30 but less than 100Mbps, and 5.4% has more than 100Mbps.24

The existing fixed broadband infrastructure is improved as the telecommunication providers upgrade their network offering 50Mbps VDSL connections in many districts of the city. Moreover, investments are made to expand a privately-owned fiber optic network to cover wider areas in the city. The aim is to bring to the premises of every home or business subscriber the capability offered by FIBER-to-the-Premises high-speed technology.25

Free wireless access to the internet is limited at the university campuses, which however is accessible only by the academic community. Wi-fi access in all other public spaces is not available, as the

Municipality has not yet implemented a municipal wireless network. The lack of free citywide wireless access to the Internet is the most significant deficit in the digital infrastructure of the city. The problem is relieved by the private initiative as most of the coffee shops and restaurants offer free Wi-Fi to their customers.

Source: Digital Cities Challenge- Assessment report for the city of Thessaloniki (2018)

3.5 Culture

By and large Greece has a substantial share of self-employed people, but entrepreneurship is almost exclusively in microenterprises. Society (and the banking system even more) did traditionally not tolerate failure but there is some evidence of change thanks to the press praising international experiences as well as to recent legal amendments on bankruptcy law and second chance. Giving back is a culture of highly successful entrepreneurs but more in terms of becoming patrons or creating foundations than directly sponsoring start-ups.

What is now playing an important role are the many events organised around start-ups and the creation of vibrant communities of younger people. The traditional target of becoming a civil servant has diminished (partly due to public sector austerity policy that has minimized civil service hiring) while more and more young people are driven by the ambition to become successful, new-economy entrepreneurs.

The local press reports on upcoming investments, like the big investment of Cisco the important IT company, or the installation of the research center of Pfizer, the bio-med company or the expansion of the port and the airport of Thessaloniki contributing to raising the entrepreneurial spirit after the crisis. The press at national level is continuously reporting on national and international start-up and scale-up success stories.

There is also activities pointing to a greater extroversion of the entrepreneurial ecosystem. For example in Central Macedonia the companies in the ICT sector approached the region to organize together with Technopolis a mission to San Francisco to explore business opportunities and to L.A to approach the cinema community, and to investigate the possibility of establishing cinema studios in Thessaloniki.

4 POLICY MIX FOR ENTREPRENEURSHIP

4.1 National framework for entrepreneurship support

The Greek economy has suffered significantly from a persistent post great-recession crisis and is only timidly recovering since 2018. Regulatory rigidities and funding constraints constitute the major challenges for enterprise and investments. Human resources are both a challenge and an opportunity: the crisis led to a cost cutting policy that has turned the skilled labor force into an attraction but has also triggered significant brain drain. Based on 2017 EUROSTAT data, the flow of emigration has more than doubled in the period 2009-2015. The total emigration outflows of Greeks between 2010-2015 ranges between 280,000 and 350,000 people[1]. A potential of return migration would be a major asset for entrepreneurial success.

Entrepreneurship support and access to finance has received significant policy attention in rhetoric terms without yet transforming it into effective policy support, which is still anchored in a traditional grant philosophy. With scarce national physical capital, almost all schemes implemented since 2008 are co-financed by the EU Structural Funds and to a lesser extent funds from the EIF/EIB and the EBRD.

A major instrument for entrepreneurship support (both for enterprises and for support structures) is the Operational Programme Competitiveness, Entrepreneurship and Innovation 2014-2020 and the Regional Operational Programmes. The following problems are pertinent:

- There is no comprehensive long term and specific strategy for entrepreneurship support. There are a few strategic documents (National Strategy for Research and Innovation for Smart Specialization 2014-2020; Regional Smart Specialization Strategies; the National Digital Strategy; the 2018 Greece: A Growth Strategy for the Future") with uncoordinated priorities, their core element being subsidies of different kinds. Subsidies follow highly bureaucratic procedures and time to contract is notoriously long. Authorities do not realize that at least in the case of new technologies the timing is at least as important as the subsidy itself. RIS3 places emphasis on eight sectors: agri-food; life sciences &health – pharma; ICT; energy; environment and sustainable development; transport and logistics; materials – construction; culture and tourism - cultural &creative Industries. Within these specialization areas, there is strong implicit support for entrepreneurship and new business creation, although these are not explicit goals. The problem with RIS3 is that it was adopted after EPAnEK and the Regional Operational programmes.
- Despite recent reforms imposed in the context of bailing the country out of the crisis significant burdens persist: corporate taxation and social security costs, necessary to reach the agreed budget surplus, discourage investments; an outdated highly bureaucratic public accounting system that creates bureaucracy in every step of the daily dealings of the business sector and last but not least incredible delays in law enforcement.

Hence, it is no surprise that Greece was rated 67th out of 190 countries in the World Bank 'Ease Of Doing Business' Rating and 56thin the World Bank 'Starting a Business' Rating for 2017. This applies to the whole territory with no regional exceptions.

The sectoral Operational Programme for Competitiveness, Entrepreneurship and Innovation (EPAnEK) is endowed with €4.916 billion of public expenditure budget (€3.84 billion are EU funds). There are 13 Regional Operational Programmes, which also finance

entrepreneurship support schemes. A successful JEREMIE pilot in the 2007-2014 period led the Greek government to adopt more financial instruments, the 'EquiFund' mentioned above and a Risk Allocation Fund, 'Entrepreneurship Fund II': grants loans to SMEs.

Additional smaller financial schemes are regularly announced and implemented (female and youth entrepreneurship, promotion of self-employment, microfinance, social entrepreneurship, crowdfunding etc.).

This generous, grant-focused bureaucratic policy has led the creation of far too many subsidy-dependent intermediaries with overlapping targets and timing all over the country, most of which do not survive after the provision of grants. A national study aiming at mapping 'Active Support Structures for Entrepreneurship' did not produce either comprehensive results or any interesting lessons learned. Ambitious, comprehensive and continuous mapping and monitoring is necessary. It will assist regional development policy with lessons learned and potential for transregional cooperation within the country.

More recently a few international NGOs and national, even regional entrepreneurship movements (Endeavor) started operating in the country and constitute the anti-model to the public subsidy relying model.

4.2 Regional development policy

4.2.1 Regional policy objectives

The vision of Central Macedonia has been summarised in its EER proposal in 2018 as follows: "*we want the Region of Central Macedonia to be one of the leading entrepreneurial and innovative regions in South Eastern Europe, based on RTDI, empowering the ecosystem, strengthening the links between the four helixes (industry, research, government and society) and finally increase the development of new, or the improvement of existing tradeable products and services to be able to compete in the global markets sustainably*". The SWOT drafted in 2018 for the EER application remains valid. However, the region already recognizes the need to go deeper in the specialisation of the region and include the technological specialization by priority sector especially in the case of agri-food, a sector that is technologically advancing in the region due to the local presence and activities of key stakeholders.

The priority areas of Central Macedonia's RIS3 strategy are the following: eco-innovation across manufacturing, agricultural and service sectors (green ICT and tourism), and specific innovation actions to improve efficiency through e-government and public-private partnerships for public service delivery.

4.2.2 Regional policies supporting entrepreneurs and scale-ups

The financial support available to businesses in Central Macedonia comes predominantly from the European Structural and Investment Funds (ESIF). The funds under the Regional Operational Programme 2014-2020 thus describe the means to implement Central Macedonia's RTDI strategy and overall development strategies. More specifically the budget for enhancing SMEs' competitiveness represents 10.79% of EU allocation hence €83,287,076. Other related areas supported by ERDF include the enhancement of access to and use and quality of ICT and the strengthening of RTDI with 1.16 per cent and 2.38 per cent of the EU allocation respectively.

Table 17: Interventions and budget (in € million)

Interventions	mil
1a.1 Strengthening Public Research and Innovation Infrastructure	6.25
1b.1 Innovation & Entrepreneurship Ecosystem Support Mechanism	1.36
1b.2 Investment Plans for Innovation, Research and Business Development of Central Macedonia	4.57
1b.3 Innovation vouchers for micro, small and medium-sized enterprises	4.00
2b.1 Investment Plans for the Production of Advanced ICT Products and Services	2.93
2b.2 ICT technology vouchers for micro, small and medium-sized enterprises	2.93
2c.1 Development / upgrading of ICT services provided by Public Agencies in the areas of intervention of Sustainable Urban Development Strategies (SBAAs) in other cities of the Central Macedonia Suburbs, except the Metropolitan Unit of Thessaloniki	0.62
2c.2 Development / upgrading of ICT services provided by Public Agencies	4.81
2c.3 Development / upgrading of ICT services provided by Public Agencies in the area of intervention of the Strategic Sustainable Urban Development Strategies	1.55
3a.1 Boosting startups and innovative entrepreneurship	19.81
3a.2 Fostering New and Innovative Entrepreneurship in Sustainable Urban Development Strategies	4.99
3c.1 Developing the capacity of SMEs to produce advanced products and services	12.66
3c.2 Supporting entrepreneurship and adaptability to market needs in the Thessaloniki Metropolitan Unit's intervention area of Sustainable Urban Development Strategy	2.50
3a.1 Boosting startups and innovative entrepreneurship	51.62
3a.2 Fostering New and Innovative Entrepreneurship in Sustainable Urban Development Strategies	3.75
3c.1 Develop the capacity of SMEs to produce advanced products and services	2.94

Interventions	mil
3c.2 Supporting entrepreneurship and adaptability to market needs in the Thessaloniki Metropolitan Unit's Sustainable Urban Development Strategy intervention area	22.38
4e.1 Development of a bicycle path system in the intervention area of the Sustainable Urban Development Strategy (SBAA) of the Thessaloniki Metropolitan Unit	1.00
4e.2 Urban mobility in the areas of intervention of the Strategic Sustainable Urban Development (SBA) of other cities in the Central Macedonia Suburbs, except the Metropolitan Unit of Thessaloniki	1.27
4e.3 Development of "smart" mobility management systems in the area of intervention of the Thessaloniki Metropolitan Unity Strategic Sustainable Development Strategy (SBAA)	2.85
4e.4 Interventions for "clean" urban transport and their promotion in the area of intervention of the Strategic Sustainable Urban Development (SBA) of the Thessaloniki Metropolitan Unit	2.57

Table 18: Interventions and budget planned (in € million)

Planned interventions	mil
1b.2 Investment Plans for Innovation, Research and Business Development of Central Macedonia. It will concern the development of business investment plans in collaboration with research institutions	4.56
1.b.3 Innovation vouchers for micro, small and medium-sized enterprises. It will concern vouchers provided to businesses for collaboration with researchers to solve problems and develop business opportunities	4
2b.1 Investment plans for the production of advanced ICT products and services. It will focus on business financing for the development of ICT products and services	2.9
3a.1. Support start-ups	25
3c 2 Supporting entrepreneurship and adapting to market needs in the Thessaloniki Metropolitan Unit's Strategic Sustainable Urban Development (SDWA) intervention area and involving SME support in the Thessaloniki Metropolitan Unit	2.5
3d.3 Enhance extrovert entrepreneurship and promote local character in the Sustainable Urban Development Strategies (SDWA) intervention areas. It will focus on supporting processing and tourism businesses to strengthen the extroversion of SMEs in the Thessaloniki metropolitan area	3

The region has also been drawing funding from the "Competitiveness, Entrepreneurship and Innovation" (EPAnEK) for which information on beneficiaries from Central Macedonia is available.

4.2.3 Regional entrepreneurship policy measures fostering cross-border linkages

There are at the moment no policy initiatives in the region that have an interregional dimension.

4.2.4 Regional governance arrangements

The formal governance, as planned nationally for every Greek region, is strongly influenced by the design of the absorption of ESIF, which is the major contributor of development funds. The arrangements are as follows:

- The Regional Authority is the elected governing body.
- There is a Management Authority (MA) in every region, which is responsible for the management of the corresponding Regional Operational Programme in accordance with the public Accounting rules and the principle of sound financial management. The functioning of the regional MA is determined by the Central MA in Athens. The MAs have an important role and in additional to funding they intervene in planning and implementation to ensure compatibility with Eu and national rules. In the case of State Aid appointed Intermediary Agencies implement calls to support private companies.
- The Directorate for Development Programming (DDP) carries responsibility for the design of regional development based on a multi-annual programme actualised annually. In the case of Entrepreneurship, the DDP also acts as the Intermediary Agency for the implementation of support schemes implemented in the context of the Partnership Agreement with the EU. As Intermediary Agency the DDP has an envelope of public funding of 28.605.279,00€ for the support of entrepreneurship. The problem is that there is neither a unit nor an explicit responsibility for monitoring and evaluation.
- Following national regulation, a Regional Research and Innovation Council (PSEK) was created in each region, operational since 2016. It is an instrument formed to support the development and implementation of Research and Innovation giving regional innovation systems more autonomy. PSEK supports the Regional Authority through suggestions, field studies, recordings and evaluations of existing infrastructure or available human resources, ideas on regional clusters, technology intermediaries etc.

In addition to the above the region has set up a one stop liaison office to monitor the execution of the smart specialization strategy with a duration of four years. One of the activities of the latter will be the distribution of questionnaires to beneficiaries and applicants through the online portal and other appropriate channels. The region is currently developing the methodology for the evaluation of support programmes also in cooperation with the JRC. Finally, the region has set up an office in Brussels to facilitate the communication between the region and Brussels and beyond to in the future serve as a info point for businesses and other stakeholders.

There is a dedicated site containing information relevant for entrepreneurs and investors, http://www.pde.gov.gr/ependyseis/

4.2.5 Assessment of the regional policies for entrepreneurship

One of the major problems has been the delays in launching the calls and hence in the operationalisation of the Central Macedonia OP due to bureaucratic processes. As a consequence of the delay the design of the new RIS3 will need to be made without having performed the final evaluation of the current RIS3 strategy. The design of support

measures will thus be based on the available information available from an interim evaluation.

In the design of measures to support entrepreneurial activity, the region of Central Macedonia would benefit greatly from the experience of other regions in implementing for instance voucher schemes, which is a measure currently running in the region as well. Good practice of measures that worked well in the local context would be welcomed as a source of inspiration.

5 REGIONAL SWOT AND CONLCUSIONS

5.1 Maturity of the regional ecosystem

According to the perception of local stakeholders the ecosystem is characterised as being between nascent and evolving. There are several start-ups particularly in the ICT sector and there is at least one success story per year.

Table 19: Maturity of the ecosystem

Stage of EE Does the system rely more on:	Nascent	Evolving	Mature	Sustainable
Market-forces		X		
Policy interventions		X		

5.2 Updated regional SWOT as basis for inter-regional collaborations

Table 20: Updated SWOT of the entrepreneurial ecosystem

Strengths	Weaknesses
Agri-food • Broad range of economic activities in the agri-food sector. Second highest sector in terms of exports • R&D Capabilities in agri-food • Established network with other EU regions and research organisations through Interreg, JRC thematic platform and H2020 • Dynamic ICT sector	**Agri-food** • Participation in (international) networks/ value chains • Low technology adoption by traditional producers • Incentivising enterprises to dedicate resources/ invest in new technologies • Financing delays • Reaching critical mass • Public platform for exchange/pooling of materials • Limited cooperation between traditional companies and between traditional companies and innovative start-ups
Horizontal • Major institutions performing R&D (Aristotle University and CERTH) • Private initiatives supporting innovation (incubators and clusters). • New VC funding of Thermi starting in 2020.	**Horizontal** • Lack of a clear economic development model at regional level, despite the efforts of the last few years. Negative Growth Definition: Huge decrease in GDP per inhabitant in RCM the past years (-28%,14vs08). Traditional

- Various initiatives supporting entrepreneurship:
  - Plenty entrepreneurship competitions for students and young start-uppers.
  - The Interactive Electronic Participation Platform http://e-dialogos.pkm.gov.gr which constitutes a new innovative open public dialogue platform.
  - A new Independent Division for Innovation and Entrepreneurship Support in RCM organizational chart.
  - The Independent Office of the Regional Ombudsman for Citizens and Enterprises.
  - The integration of RCM in the European Interregional Cooperation Program «INTERREG EUROPE» for the purpose of the development of circular economy and how it can help SMEs to turn environmental challenges into opportunities (CESME & BIOREGIO Projects)
  - Agreement for cooperation between the Region of Central Macedonia and the CERN institute for technology transfer, commercialization and tenders (2017)

productive labour-intensive sectors and medium and low technology intensity.

- Desertification of many industrial areas once branded as best practices i.e. Kilkis Business Area, with ripple negative effects and weakness exploitation of their comparative advantages.
- Dramatic reduction of private and public investments.
- A high number of very small SMEs, who lack the ability to embody innovative activities dominates the regional business profile (low absorptive capacity for innovation adoption and know-how, technology transfer from business sector), and leads to low global competitiveness advantages
- SMEs economic activity appears over-concentrated in the Metropolitan Area of Thessaloniki.
- Most R&D employment and expenditure concern higher education and government, while business receive the lowest percentages.
- In terms of energy used resources, there is a clear dependence on lignite and oil compared to RES.
- Absence of a brand name in almost all regional priority sectors and problematic access to foreign markets.
- Lack of guidance and a low level of technical training and lifelong learning programs.
- Brain drain of highly educated graduates and skilled personnel, mainly in STEM.

Opportunities	Threats
Agri-food • Development of solutions to mitigate climate change	**Agri-food** • Climate change impacts on agri-food production and quality • Brain drain in relevant skills
Horizontal • Market expansion for innovative products and services through active involvement in EU funded opportunities (EER, Interreg) • Market expansion in the Balkans peninsula. • Public funding alternatives for SMEs provided by EU initiatives and new programming period • Private funding initiative - New VC of Thermi	**Horizontal** • Complex legislation and tax national system (instability and frequent changes) • Due to economic crisis, the great majority of funding originates from public sources. • Lack of stable economic conditions and policies to attract private investments from domestic and abroad.

- New types of cooperation between clusters and incubators
- Low labour costs offers local SMEs the opportunity to increase their competitiveness in various markets, even high skilled ones like ICT
- European and national environmental policy offers opportunities to SMEs to focus on.
- Major new investments in e.g. port of Thessaloniki
- Improvement of framework conditions
  - Institutional reforms, reducing red tape, promoting more transparent public tendering and liberalising markets
  - New national e-Procurement portal and procedure

- Increasing competition in the context of the new EU accession countries.
- High degree of brain drain.
- Reducing the demand for goods and services due to the prolonged economic recession at national level.
- A new global trend of more tariffs and barriers in global trade, could affect our business model and our resilient capacity, to react.

REFERENCES

Antoniades, V., Giakoumelos, M., Petkakis, T. and Zacharia, Z. (2018) Greece's Startup Ecosystem: A Prime Opportunity for Economic Growth. Available at: http://www.sev.org.gr/Uploads/Documents/50906/BCG_Greeces_Startup_Ecosystem_Apr_2018.pdf (Accessed: 9 September 2019)

Bosma, N. and Kelley, D. (2019). Global Entrepreneurship Monitor 2018/2019 Global Report. Available at: https://www.babson.edu/media/babson/site-assets/content-assets/academics/centers-and-institutes/the-arthur-m-blank-center-for-entrepreneurship/global-research/gem-2018-2019-global-report.pdf

European Commission, Regional Ecosystem Scoreboard [Online]. Available at: https://ec.europa.eu/growth/industry/policy/cluster/observatory/regional-ecosystem-scoreboard_en (Accessed: 2 September2019)

European Commission, Regional Innovation Monitor Plus [Online]. Available at: https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/ (Accessed: 9 September 2019)

European Union (Interact), Projects [Online]. Available at: https://www.keep.eu/search#null (Accessed: 2 September 2019)

Operational Programme Competitiveness, Entrepreneurship and Innovation 2014-2020 (EPAnEK), Programme EPAnEK [Online]. Available at: http://www.antagonistikotita.gr/epanek/secretariat1.asp

Stalkos, D. (2018). Collective Bargaining and Greek Labour Market Reforms [Online]. Available at: https://www.socialeurope.eu/collective-bargaining-and-greek-labour-market-reforms (Accessed: 9 September 2019)

Exporters' Association - SEVE and Institute for Export Research and Studies (2019). Mapping Greece's export activity by region and regional unit. Period: 2013–2017Available at: http://www.e-thesprotias.gr/thesprotiaimages/SEVE-CHARTOGRAFISIEXAGOGIKISDRASTIRIOTITASIPEIROU-PERIODOS2012-2016_F21389..pdf

APPENDIX A : IN-DEPTH MAPPING INTERVIEWS

Table 21: List of interviewees

Organisations consulted	
ΑΓΡΟΔΙΑΤΡΟΦΙΚΗ ΣΥΜΠΡΑΞΗ ΠΕΡΙΦΕΡΕΙΑΣ ΚΕΝΤΡΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ	AGRICULTURAL PARTNERSHIP OF CENTRAL MACEDONIA
ΑΛΕΞΑΝΔΡΕΙΑ ΖΩΝΗ ΚΑΙΝΟΤΟΜΙΑΣ	ALEXANDERIA INNOVATION ZONE
ΑΡΙΣΤΟΤΕΛΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΕΣΣΑΛΟΝΙΚΗ (ΑΠΘ)	ARISTOTELIO UNIVERSITY OF THESSALONIKI (AUTH)
ΣΥΝΔΕΣΜΟΣ ΒΙΟΜΗΧΑΝΙΩΝ ΒΟΡΕΙΟΥ ΕΛΛΑΔΟΣ (ΣΒΒΕ)	ASSOCIATION OF NORTHERN GREECE INDUSTRIES (SWVE)
HELLENIC MOBILE CLUSTER	HELLENIC MOBILE CLUSTER
CHORUS CLUSTER	CHORUS CLUSTER
ΣΥΝΔΕΣΜΟΣ ΕΞΑΓΩΓΕΩΝ (ΣΕΒΕ)	EXPORT ASSOCIATION (SEVE)
ΕΘΝΙΚΟ ΚΕΝΤΡΟ Ἑρευνας & ΤΕΧΝΟΛΟΓΙΚΗΣ ΑΝΑΠΤΥΞΗΣ (ΕΚΕΤΑ)	NATIONAL CENTER FOR RESEARCH & TECHNOLOGICAL DEVELOPMENT (CERTH)
ΣΥΝΔΕΣΜΟΣ ΕΠΙΧΕΙΡΗΣΕΩΝ ΠΛΗΡΟΦΟΡΙΚΗΣ ΒΟΡΕΙΟΥ ΕΛΛΑΔΟΣ (ΣΕΠΒΕ)	NORTHERN GREECE INFORMATION BUSINESS ASSOCIATION (SEPVE)
OK! Thess	OK! Thess
ΠΕΡΙΦΕΡΕΙΑ ΚΕΝΤΡΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ	REGION OF CENTRAL MACEDONIA
ΘΕΡΜΟΚΟΙΤΙΔΑ ΕΠΙΧΕΙΡΗΣΕΩΝ THERMI ΑΕ	THERMI SA
ΠΑΝΕΠΙΣΤΗΜΙΟ ΜΑΚΕΔΟΝΙΑΣ	UNIVERSITY OF MACEDONIA
ΑΜΕΡΙΚΑΝΙΚΗ ΓΕΩΡΓΙΚΗ ΣΧΟΛΗ	US AGRICULTURAL SCHOOL

APPENDIX B: KEY REGIONAL STAKEHOLDERS

Key regional stakeholders
HEIs • Centre for Research and Technology Hellas (CERTH) • Aristotle University of Thessaloniki (AUTh) • University of Macedonia • International Hellenic University • Alexander Technological Educational Institute (ATEITH) of Thessaloniki • American Farm School of Thessaloniki • Materials Industrial Research & Technology Center (MIRTEC) S.A. • School of Pedagogical & Technological Education (ASPETE) • Technological Educational Institute (TEI) of Kentriki Makedonia • URENIO is a university laboratory for the promotion of research and supply of technological services in the fields of cluster development, innovation systems and strategies, and intelligent cities.
Vocational Training Centers • Public vocational training centers (Δ.Ι.Ε.Κ. Κεντρικής Μακεδονίας) • Private vocational training centers – several exist
Chambers of commerce/ Associations • Federation of Industries of Northern Greece • Greek International Business Association (ΣΕΒΕ Συνδεσμος Εξαγωγεων) • Association of Information Technology companies in Northern Greece-(ΣΕΠΒΕ - Σύνδεσμος Επιχειρήσεων Πληροφορικής Βορείου Ελλάδος) • Hellenic Fashion Industry Association (SEPEE) • Αγροδιατροφική Σύμπραξη Περιφέρειας Κεντρικής Μακεδονίας http://agromacedonia.gr/
Business Development and Promotion Agencies • Public: Directorate of Innovation and Entrepreneurship Support, Region of Central Macedonia; Regional Development Fund of Kentriki Makedonia; Special Managing Authority for the Operational Programme 'Kentriki Makedonia; – OKThess (https://okthess.gr/en/) – Thermi (http://www.thermi-group.com/el/) • Incubators – i4G (i http://i4g.gr/w/) and – Thermi (http://www.thermi-group.com/el/) – Technopolis Thessaloniki (https://www.technopolis.gr/en/mainpage) • Business/Technological parks – Technopolis Thessaloniki (https://www.technopolis.gr/en/mainpage) which hosts digital companies – Technological Park of Thessaloniki (http://www.thestep.gr/root.en.aspx) • Co-working spaces – in OKThess • **Clusters:** – Chorus (environmental services) (http://www.chorustcluster.org); – Hellenic Mobile cluster (Business Services Communications Equipment and Services) – Other: Attempts to form clusters in other sectors include energy and biofood sectors. Those are not formally cluster organisations

Key regional stakeholders
• **Other:** – INFALIA is a spin-out company of the Information Technologies Institute (ITI) of the Centre for Research and Technology Hellas(CERTH) – Central Public Library of Veria – Veria Tech Lab (https://www.libver.gr)
Key regional financial institutions, venture capitalists, business angel networks • THERMI A.E. (www.thermi-ventures.com)
Regional employment services (Περιφερειακές υπηρεσίες απασχόλησης) • Regional Labour institute (Ινστιτούτο Εργασίας ΙΝΕ Γ.Σ.Ε.Ε.) headquartered in Veria

APPENDIX C: SWOT DIGITAL TRANSFORMATION FOR THE CITY OF THESSALONIKI

	Strengths	Weaknesses	Opportunities	Threats
Infra-structure	• 100% 4G coverage in the city • Ongoing investments for fibber-to-home • Free Wi-Fi in universities campuses	• Average broadband access speed is inadequate for bandwidth demanding applications (e.g. IoT)	• The planned investments for the upgrade of the network by local providers will facilitates the implementation of the strategy	• The planned investments may delay the penetration of 5G (lock-in effect)
Access to Data	• The municipality of Thessaloniki promotes open data • ICT companies are interested in developing applications that use open data • The municipality of Thessaloniki has created 112 open data sets and planes to open more	• Open data sets are not structured, controlled for quality, provided at real time, and APIs are not available • Only the Municipality of Thessaloniki provides open data	• Use OD for developing commercial applications • Use of OD for improving policy design • Use OD by businesses to improve their services and decision-making	• Delays in ensuring quality and continues update of data could harm the credibility of OD and the feasibility of using them
Digital skillset	• The HEI education is sufficient • The HEIs organise coding schools and extracurricular training and activities for students and non-students	• There are shortages in some specialities • Businesses cannot attract talents who preferer to go abroad • Shortage of soft and product development skills	• Coordination of the training initiatives by the municipality • Development of training services especially on subjects and skills not covered by HEIs	• The inflexibility of the current legislative framework for the training services supported by public funding (KEK) could hinder the public funding of training
Compa-nies digital competencies	• There are dynamic ICT companies that can provide the necessary services • Port is in a digital transformation path	• Private investments for business education are low • The ICT literacy of employees is very low compared to the EU average	• Digitalise the processes in key economic sectors • Exploit synergies among sectors across the value chain	• Non identified

	Strengths	Weaknesses	Opportunities	Threats
	• Tourism already is experimenting with digital applications and services	• The use of ICT for commercial activities and logistics is lower than the EU average	• Develop know-how for Smart Cities technologies and services in local ICT companies and public administration • Experiment with disrupting technologies	
Commu-nity	• A digital community is formed including ICT companies, HEI, and research centres	• There is no critical mass within the main actors • Fragmented efforts of the stakeholders • Limited interaction between ICT and non-ICT entities	• Systematic development of the ecosystem • Enlargement of the community by attracting non-ICT companies	• Non identified
Finance	• City's strategy is in line with the national digital strategy and the Regional Operational Programme • ROP potentially will co-finance public and private investments on ICT • Successful efforts for attracting VC and BA funding	• Bank lending terms are not attractive • There is no experience in the municipality in innovation procurement procedures – It is a grey area regarding the legislation • Tide public budgets	• Exploitation of existing ROP funds • Use of innovation procurement and pre-competitive procurement methods by the municipality for the procurement of digital applications	• Strong competition in claiming funding from the ROP • Resistant by the administration on applying new methods of procurement • Pressures to reduce debt could hinder the use of loans
Support services	• City supports entrepreneurship • There are successful support infrastructures for start-up	• Absence of experimentation and prototype development infrastructures (e.g. fab-labs)	• Development of service / infrastructure for experimentation and service planning • Strengthening existing innovation support infrastructures	• Non identified

	Strengths	Weaknesses	Opportunities	Threats
Governa-nce and leader-ship	• The city is making efforts for coordination and consensus building • The City has developed a digital strategy	• Delays in the implementation of City's digital strategy • Despite the consensus at the top, there has been little effort to raise awareness among businesses and the public	• Strengthening the coordination role of the City	• Non identified

Source: DG GROW Digital Cities Challenge (2018)

APPENDIX D: MONITORING FRAMEWORK

Table 22: Entrepreneurial ecosystem mapping monitoring framework

Pillar	Factor	Description	Indicator	source
Actors	Entrepre-neurs	Entrepreneurs aspiring growth drive the system and their success nurtures the ecosystem as supplier, customer, mentor and financier.	• Start-ups registered per 1000 inhabitants • Innovative start-ups in total start-ups	• ICAP • Crunchbase/ Dealroom
	Large companies & industrial fabric	Large companies can act as mentors, clients, funding sources, but may also hamper growth through defensive action or early acquisitions	• Number of large companies	• ICAP
	Research System and Universities	A pool of potential entrepreneurs, talent, knowledge and innovation, technological innovation ensures higher likelihood of scale-up	• Percentage of active population employed in science and technology • Percentage of Funding for research in total funding of HEIs	• Eurostat • ?
	Market services	Professional services (design, production, quality	• Percentage of market service companies in total businesses	• ICAP

Pillar	Factor	Description	Indicator	source
		control, business services), consultants, private accelerators offering the quality start-ups need to become competitive and scale up		
	Publicly funded support organisa-tions	If the market does not provide the necessary services, the public sector steps in as a catalyser	• Organisations receiving public funding to conduct innovation projects	• EpaNek • SF Managing authority
	Density of actors and interaction and culture	Entrepreneurial Ecosystems never occur in a business vacuum	• Percentage of firms in the business population that collaborate for innovation • Cluster specialisation	• Community Innovation Survey • European Cluster Collaboration platform
Frame-work conditio ns	Human Capital		• Percentage of tertiary educated people	• Eurostat
	Financial Capital	Necessary condition for firm creation and growth	• Percentage of Venture capital investments in GDP	• Crunchbase
	Infrastructu re for local needs and global access	Support specific needs plus digital infrastructure for any type of company	• Motorway potential accessibility-Spiekermann & Wegener, 2016 • Railway potential accessibility-Spiekermann & Wegener, 2016 • Number of passenger flights (accessible within 90' drive)-Eurostat/EuroGeographics/National Statistical Institutes • Intensity of high-speed railways-UIC, railway operators, EuroGeographics, OpenStreetMap, TomTom, RRG, Eurostat, DG REGIO	• Regional competitiveness index

Pillar	Factor	Description	Indicator	source
	Culture	Openness, diversity, leadership, tolerance for failure, entrepreneurial recycling, giving back, events, role of the media	• Percentage of people who have the knowledge, skill and experience to start a new business? • (% of yes)	• Global Entrepreneurship monitor
	Spatial concentra-tion	Agglomeration economies, network effects	• Employment concentrations at nuts 3 level	• ICAP based calculations
	Regional develop-ment policy	Need to intervene for market and systemic failures	• Percentage of budget for enhancing SMEs' competitiveness in total ESIF funding	• DG REGIO
	Demand		• Disposable income per capita • Potential market size expressed in GDP • Potential market size expressed in population	Regional competitiveness index • Eurostat: nama_10r_2hhinc & nama_10r_3popgdp • Eurostat, DG Regio estimates • Eurostat, DG Regio estimates

Source: Authors elaboration based on the entrepreneurial ecosystems mapping conducted for this project and E. Stam (2014)

APPENDIX E: START-UPS FROM OK!THESS INCLUDING A REFERENCE TO THE THREE THEMATIC AREAS IN FOCUS

The list below is an example of the entrepreneurial mapping the region could obtain by the incubators.

#	Startup name	Sector	Status	Company incorporated?	Website	Description
1	Elektronio	Other	Active	Yes	https://elektroniowheels.gr	Premium electric bicycles and trikes with revolutionary design
2	Greek Tasty	Agri-food	Inactive	No	http://greektasty.com/	Online store woth curated Greek food products serving the US market
3	Movvin	ICT	Active	Yes	https://movvin.com/	Online platform for transport and travel experience services
4	Netscan	ICT	Inactive	Yes	https://www.netscan.co/	Website diagnostics services for web administrators
5	Doggo	Other	Active	Yes	https://www.doggo.gr/	Social networking app for dog owners
6	AdonBoard	Other	Inactive	No	N/A	Online booking platform for events held in the sea
7	BIO2CHP	Bio-economy and circular economy	Active	Yes	http://www.bio2chp.com/	On-site energy production from raw residual biomass

#	Startup name	Sector	Status	Company incorporated?	Website	Description
8	GoZone	ICT	Active	Yes	https://www.gozone.surf/	Real-time training system for windsurfing, kite-surfing and small boat sailing
9	StandOut	Other	Active	No	www.stand-out.gr	Online platform for young people looking for personal growth opportunities
10	Octappush	ICT	Active	Yes	http://www.octappush.com/	User feedback platform helping game developers to create better games
11	K-INVENT	ICT	Active	Yes	https://k-invent.com/	Measuring and training devices for physical rehabilitation and sports biomechanics
12	CityVibes	Other	Inactive	No	http://www.cityvibes.gr/	Online crowdsourcing platform helping people find the best night clubs in town
13	CubesCoding /Robotiles	ICT	Active	No	www.cubescoding.com/	Hardware and software platform helping children learn programming through play
14	Grekaddict	Other	Active	Yes	https://www.grekaddict.com	Online platform helping tourists discover handpicked tours and activities in Greece
15	INOMO	Other	Active	Yes	https://inomodesign.com	Innovative furniture design based on fiberglass

#	Startup name	Sector	Status	Company incorporated?	Website	Description
16	LegalPal	Other	Active	Yes	https://www.legalpal.gr/	Online platform helping users find and hire lawyers
17	RationalData	Other	Active	Yes	https://rationaltech.gr/	Social networking app for food lovers
18	Rhoé	ICT	Active	Yes	https://rhoe.gr/	Intelligent digital hardware and software solutions for smart cities
19	Project Veltio/Novel	Other	Active	No	N/A	Advanced cooking technology
20	LocEye	ICT	Active	Yes	https://www.loceye.io/	Technology helping designers and advertisers measure visual attention
21	Quesing	Other	Inactive	No	https://www.quesing.com/	Online platform connecting instructors with users that seek tailor-made knowledge
22	VideoScoutMe	Other	Inactive	No	https://www.videoscoutme.com	Online platform connecting athletes, scouts, agents and videographers
23	Cando CNC	Other	Inactive	No	N/A	Desktop CNC devices for makers

#	Startup name	Sector	Status	Company incorporated?	Website	Description
24	AidPlex	Other	Active	Yes	https://www.aidplex.com	HealthTech startup provides better treatment solutions for orthopedic patients
25	Proclisis	ICT	Active	Yes	http://proclisis.com/	Procurement software service designed for small and midsized enterprises
26	Fibro-L	Agri-food	Active	No	N/A	Innovative bio-based insulation solutions for beekeepers
27	SimpliCity	Other	Inactive	No	N/A	Online platform promoting citizen participation and problem-solving
28	Freights	ICT	Active	Yes	https://freights.online/	Exchange platform for carriers and freight forwarders
29	Indivivo	ICT	Inactive	No	N/A	Intelligent home decoration assistant
30	AccellUp	Other	Active	No	http://accellup.gr/	Product testing lab helping companies that target the silver market to test their products
31	Par King	ICT	Inactive	No	N/A	App helping drivers find parking spaces
32	ReserVit	ICT	Inactive	No	N/A	Modernizig restaurant reservations

#	Startup name	Sector	Status	Company incorporated?	Website	Description
33	Blue Urchin	Agri-food	Active	No	N/A	Organic hatchery for urchins promoting sustainability in aquaculture
34	RETouCH	ICT	Active	Yes	http://retouch-hs.com/	Robotic rehabilitation solutions for fast recovery of stroke patients
35	SeamX	ICT	Active	Yes	https://seamxsports.com	All-in-one sport event management platform
36	Quantflare	ICT	Active	No	https://quantflare.com/	Web platform to monitor social media and discover patterns related to capital markets
37	Thrive	Other	Active	Yes	N/A	A sales delivery company for pharmacies that want to thrive
38	Wchess	Other	Active	Yes	N/A	Online e-learning platform for chess
39	PrestaCareer	Other	Inactive	No	N/A	Online platform helping freelancers instantly create a work team for projects
40	TremorFreeMe	ICT	Active	No	N/A	Medical wearable device fighting hand tremor for Pakinsons' disease patients

#	Startup name	Sector	Status	Company incorporated?	Website	Description
41	iCry2Talk	ICT	Active	No	http://icry2talk.com	Technology that translates a baby's cry in real-time to help parents and care-givers
42	Bettingun	ICT	Inactive	No	N/A	Technology helping improve returns in online sposts betting
43	QuantPool	ICT	Active	No	http://www.thequantpool.com/	Quantitative analysis and algorithmic strategies for publicly traded securities
44	Youthnest	Other	Active	Yes	https://youthnest.com/	Agency designing projects for social innovation and community growth
45	WineBingo	Other	Active	Yes	N/A	An application and social network to gamify wine tasting
46	Esend24.com	Other	Active	Yes	https://esend24.com	Courier services solution that resolves transparency and cost issues
47	KnowHub	Other	Inactive	No	N/A	Online documentation platform for tech companies with remote workers
48	SoulScan	Other	Active	Yes	https://soulscan.gr/	An all-round mental health marketplace

#	Startup name	Sector	Status	Company incorporated?	Website	Description
49	MySkipper	Other	Active	No	https://myskipper.gr/	An online marketplace connecting tourists to skippers
50	KidMOOCS	Other	Active	No	https://mathemazimas.webnode.gr	Specialized platform offering MOOCS for students who are 4-13 years old
51	Seaview	Other	Active	No	N/A	A 360 guide for ports and marinas helping skippers plan better
52	Reactive	ICT	Active	No	https://reactive.gr/	Enhancing productivity in industry workflows through predictive maintentance
53	Hellenic Soccer Union	Other	Active	Yes	http://hellenicsoccerunion.gr	Online markeplace connecting sports academies and businesses
54	DA Apparel	Other	Inactive	No	N/A	Social good brand allowing people with disabilities to design and produce apparel
55	Cyber Phalanx	ICT	Active	No	N/A	Cybersecurity solutions for small businesses
56	Robinfood	Other	Active	No	N/A	Online platform helping businesses reduce food that goes to waste
57	Digitalist	Other	Active	No	N/A	Online marketplace connecting digital marketers with businesses

#	Startup name	Sector	Status	Company incorporated?	Website	Description
58	Nokeys	ICT	Active	Yes	https://nokeys.eu/	Cloud-based solution for keyless access to short-term rental properties
59	LiveStreamTv	Other	Active	Yes	N/A	Services for live streaming across multiple social media destinations
60	Enchatted	ICT	Active	Yes	https://enchatted.com/	Software tools for testing and evaluation of chatbots and voice apps
61	RENVIS	ICT	Active	Yes	https://renvis.gr/	Decision-support systems for smart manufacturing
62	Labelloop	ICT	Inactive	No	N/A	Software technology for improved supply chain management over blockchain
63	ComeTogether	ICT	Active	No	https://cometogether.network/	Collaborative economy for events, powered by an EOS Blockchain protocol
64	Shifting our city	Other	Active	No	N/A	Urban game design to help visitors and citizens learn about a city
65	Math training gloves	Other	Active	No	N/A	A fun math training aid for young children with learning disabilities

#	Startup name	Sector	Status	Company incorporated?	Website	Description
66	ARelive	ICT	Active	No	N/A	Augmented Reality solutions bringing ancient ruin sites back to life
67	Tickets For Good	Other	Active	Yes	www.ticketsforgood.gr	Service helping event organizers promote their events while generating social impact
68	Chealsearoom	Other	Inactive	No	N/A	Live video streaming platform for art events and music gigs

Notes: excludes the last acceleration round.

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