

# Regional underdevelopment and less developed business ecosystems: The case of Eastern Macedonia and Thrace

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## Abstract

This article aims to highlight the different facets of the relative socio-economic underdevelopment of the Greek region of Eastern Macedonia and Thrace. It explores initially regional analysis data, leading to the conclusion that the region does indeed face comparative weaknesses as it exhibits multiplier results and specialization in areas with the lowest value-added and employment. It then presents the main conclusions about small and micro firms of this less developed business ecosystem. It concludes that the region has structural competitiveness problems that are primarily due to the competitiveness of the firms that can host and nurture. The strengthening of competitiveness of this regional business ecosystem requires the improvement of the innovative potential that, in a triple helix condition, is the result of the evolutionary interconnection between local-regional firms, government, and academia. To this end, the proposal to establish a Local Development and Innovation Institute constitutes a new regional policy that can be applied to the region and strengthen the innovative potential of the entire regional business ecosystem.

**JEL classification numbers:** R12, R58

**Keywords:** Underdeveloped regional business ecosystem, Eastern Macedonia and Thrace (REMTh), Stra.Tech.Man Lab research team, Regional triple helix, Local Development and Innovation Institutes

## 1 Introduction

One important research question in today's academic debate and literature is the relationship between less developed regions and the problems of the firms and business ecosystems that they host and nurture. Most relevant studies show that there is a close relationship between these two dimensions (regional underdevelopment and the weak competitiveness of local business structures), which usually leads to the reproduction of a dynamic negative circular causation (Audretsch and Peña-Legazkue, 2012; Huggins and Williams, 2011). Specifically, the concept of a business ecosystem refers to a system of evolving business entities that create and reproduce complex socio-economic relations of competition and cooperation (co-opetition) in order to survive (Brandenburger and Nalebuff, 1996). To this end, it seems that the innovativeness of the firms of a business ecosystem defines the overall prospects of development and prosperity of the hosting socio-economic space, and vice versa (Walsh and Winsor, 2019).

The main feature of the business ecosystem is that it is primarily a strategic concept, in the sense that its existence, survival, and development depend on the broader institutional and political environment (Iansiti and Levien, 2004). At the same time, the dynamics of the business ecosystem co-formulate the institutional, social, and political context in which it operates. In general, the business ecosystem helps the scholar and policy practitioner to use a more advanced concept to realize business co-development at a spatial level. However, even today, the analytical division of a nation's areas into

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individual regions is a widely accepted practice, as is the regional analysis involved (Benedek, 2016; Christofakis and Papadaskalopoulos, 2011).

More specifically, in the current age of restructuring of globalization, where the “tectonic plates” of capitalism are transforming gradually, the dynamics of entrepreneurship and innovation seem to play a vital role in regional development and underdevelopment (Laudicina and Peterson, 2016; Wei, 2015). Of course, the regions, like business ecosystems, include cross-industrial phenomena in the sense that do not host a single industry but contain relations, competitions, challenges, and synergies from different globalized sectors, regardless of their size or technological potential (Hölzl et al., 2015).

In this context, there is an attempt today to interpret the development and underdevelopment potential of the regions not so much at the level of the “autonomous” industry-sector, but at the level of research and development potential, knowledge and educational skills, and entrepreneurship dexterities (Isaksen et al., 2018; Ziesemer, 2018). Of course, the national macroeconomic environment is critical for the development of regions, as it identifies horizontal policies, such as policies for social inclusion, economic management of debt and financial policies (Andrikopoulos, 2013), and the business environment amelioration policies (Dao, 2017). The indicators of the macroeconomic environment, therefore, have a direct impact on how firms grow, and in particular small and medium-sized enterprises that are the majority in all developed nations worldwide (Poufinas and Polychronou, 2018). However, contrary to the macroeconomic environment and macroeconomic policies for regional development and underdevelopment, the micro and meso-level policies acquire increasing significance (Vlados and Katimertzopoulos, 2018). That is, policies aimed at developing entrepreneurship on the one hand and the consequent development of the region on the other, especially in regions that appear to lag in overall innovative and competitive potential (Blackburn, 2016; Golejewska, 2018).

To this end, one region that has gained increasing academic interest recently is the Greek region of Eastern Macedonia and Thrace (REMTh). REMTh is a Greek and European border region that involves structural development problems such as uneven development (Hazakis and Ioannidis, 2014; Sarafopoulos et al., 2014) and problems of managing and developing knowledge at regional level (Vasileiadis and Fragouli, 2019). Therefore, it seems useful to investigate the underdevelopment of this regional business ecosystem compared to other Greek regions and the trends of evolution today. Regions that constitute weak business ecosystems rely on innovative entrepreneurship to compensate for the absence of entrepreneurship support policies and increase their socio-economic outcomes (Szerb et al., 2018). To this end, it is worth also exploring the experience in entrepreneurship development in REMTh’s regional business ecosystem since Greece faces chronic and acute structural problems of competitiveness.

## 2 Methodology

Therefore, this article seeks to achieve the aim of identifying the level of development of REMTh’s regional business ecosystem by presenting and synthesizing the main conclusions of recent studies conducted in this region. More specifically, it uses and synthesizes five studies conducted by the “Stra.Tech.Man Lab” research team in the region recently<sup>2</sup>. Table 1 presents the research material used, based on published articles of the Stra.Tech.Man Lab research team.

Table 1: Presentation of the five articles of the Stra.Tech.Man Lab research team conducted in REMTh

<b>Title</b>	<b>Main research implication</b>
“Towards a new approach of local development under crisis conditions: Empowering the local business ecosystems in Greece, by adopting a new local development policy” (Vlados et al., 2018)	Present the profile of the region through quantitative indicators of regional applied economics.
“The multiple perception of innovation: The case of micro and small enterprises in the region of Eastern	Show how some small and micro firms (up to 50 employees) in the region perceive the concept of

<sup>2</sup> The Stra.Tech.Man Lab research team is based unofficially in REMTh and the Department of Economics of the Democritus University of Thrace, which is the local university based in the region’s capital, the city of Komotini.

Macedonia and Thrace” (Vlados and Chatzinikolaou, 2019a)	innovation internally.
“Crisis, innovation and change management in less developed local business ecosystems: The case of Eastern Macedonia and Thrace” (Vlados et al., 2019b)	Present how some small and micro firms (up to 50 employees) in the region perceive the link between the current crisis phenomenon and the change and innovation management mechanisms as a prerequisite for exiting the crisis.
“Strategy perception and implementation on less developed business ecosystems micro and small enterprises: The service sector of Eastern Macedonia and Thrace” (Vlados and Chatzinikolaou, 2019b)	Presenting how some firms (up to 50 employees) in the region understand some of the fundamental dimensions of strategic analysis and planning.
“Business ecosystems policy in Stra.Tech.Man terms: The case of the Eastern Macedonia and Thrace region” (Vlados and Chatzinikolaou, 2019c)	Presentation of a business ecosystem policy in the region, based on the development of local innovation in terms of strategy, technology, and management (Stra.Tech.Man approach)

The following section presents, first, the identity of REMTh as a less developed region of Greece and Europe. It analyzes mostly critical quantitative parameters at the regional aggregative level from the research made by Vlados et al. (2018). It presents and calculates regional data such as gross value added, coefficient of specialization and location quotient, and subsequently, employment in the region by sector of economic activity, calculations of regional and total multipliers. It then provides additional insight by presenting some facts of the R&D expenditure in the region.

The subsequent section then presents the main findings from the rest published studies by the Stra.Tech.Man Lab research team by trying to unify and highlight findings relative to the structural morphology of entrepreneurship in the region and propose solutions for local development policies. The last section concludes the study by attempting to synthesize the findings and propose future research directions.

### 3 The region of Eastern Macedonia and Thrace as a less developed region

This section aims to perform a quantitative analysis based on REMTh’s regional data. It examines critical elements of regional development that may support the claim that the region is dealing with structural weaknesses and development lagging.

REMTh is a border region on the northern parts of the country that shows symptoms of underdevelopment, at the same time at social, economic, and demographic terms, leading to an inability to keep up with the progress of other European and Greek regions (Prokkola, 2019; Varol and Soylemez, 2019). Such border regions tend to feature high comparative costs, such as negative economies of scale and higher living costs for regional residents and firms (Arieli, 2019; Mayer et al., 2019).

According to the most recent data by the Hellenic Statistical Authority (2019), the region recorded the lowest per capita GDP in 2016 (€ 11,432) compared to the country average of €16,378 (Attica recorded the highest GDP per capita with €22,204). About 5.5% of Greece’s total population resides in the region, which is mainly an agricultural area. Moreover, based on the official description of the region on the European Union’s webpage (European Commission, 2019), REMTh’s GDP fell by 29% between 2008 and 2016, from € 9.5 billion in 2008 to € 6.7 billion in 2016.

This fall in GDP was accompanied also by an increase in unemployment from 8.8% in 2008 to 24.3% in 2014, which is far above the EU-28 average, which stands at about 7.5% currently. Concerning the morphology of the entrepreneurial environment, the service sector dominates the regional economy and faces structural difficulties in acquiring an internationalized perspective. The region records shallow levels of foreign direct investment, while local firms are comparatively less productive in European markets by also facing pressures from low cost neighboring countries.

According to the last report of the Regional Competitiveness Index (Annoni and Dijkstra, 2019), the region lies in one of the lowest competitiveness positions compared to all European regions (Figure 1).

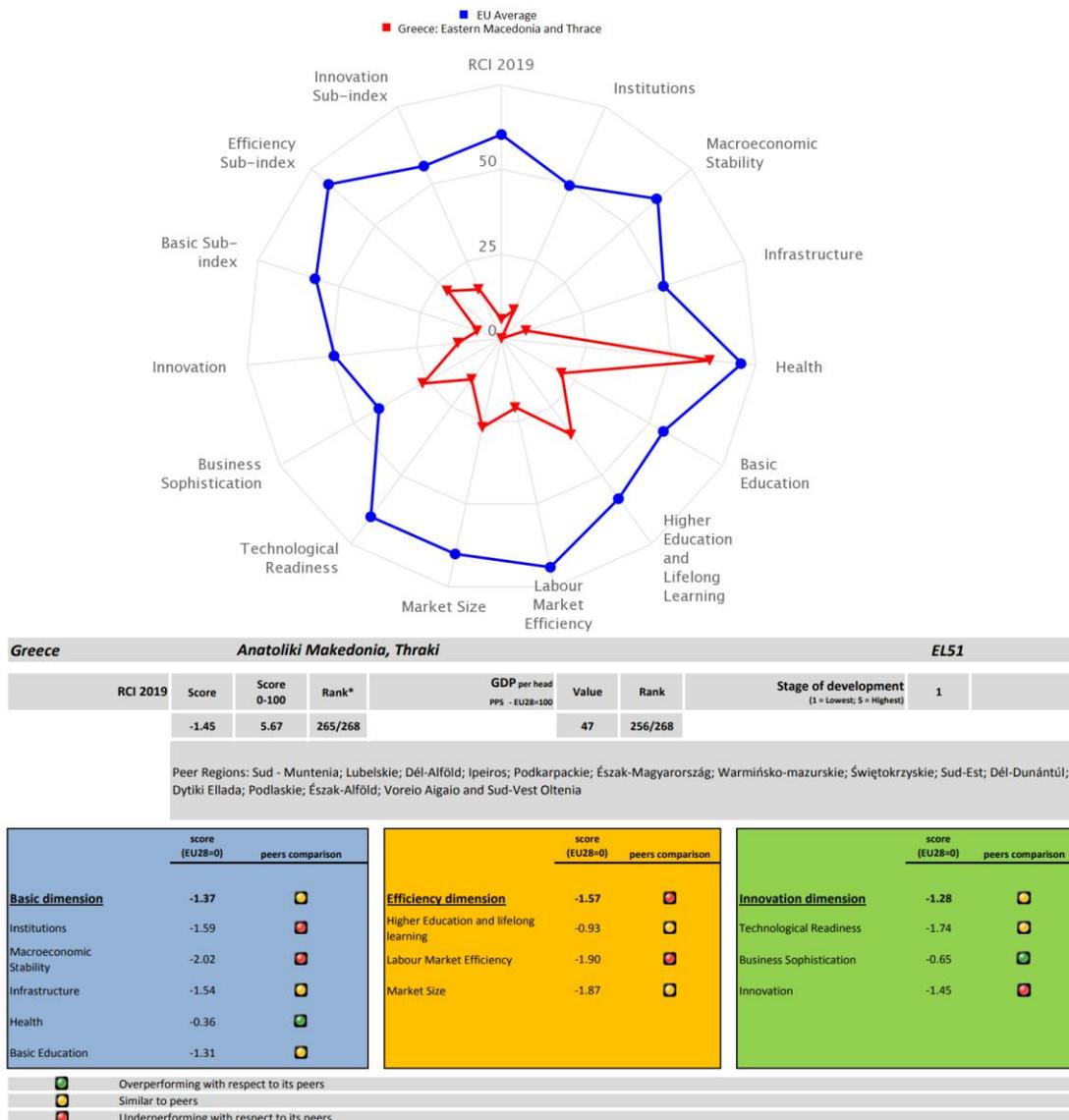


Figure 1: The REMTh according to the Regional Competitiveness Index (RCI), based on Annoni and Dijkstra (2019)

The Regional Competitiveness Index (RCI) methodology is based on the Global Competitiveness Index of the World Economic Forum, except that it measures the different dimensions of competitiveness at EU level regions. According to the authors (Annoni and Dijkstra, 2019, p. 3), “Regional competitiveness is the ability of a region to offer an attractive and sustainable environment for firms and residents to live and work.” RCI consists of 11 pillars divided into three groups: Basic, efficiency, and innovation. The “basic” group comprises five pillars representing the substrate of the economy (institutions, macroeconomic stability, infrastructure, health, and basic education). As these pillars develop in one area, the next step is attracting a more specialized workforce that, in turn, leads to a more efficient labor market. Thus, the “efficiency” group comprises higher education and lifelong learning, labor market efficiency, and market size. Finally, at the most advanced stage of the regional economy, three pillars determine regional innovation, that is, technological readiness, business sophistication, and innovation. The RCI also compares regions that are at a similar level of development (other “peers”), as it identifies the 15 regions closest to one under analysis in terms of average 2015-2017 GDP per capita.

Concerning REMTh’s level of development and competitiveness, this is overwhelmingly lower than the average European region, being in the last places of competitiveness. Excluding the high standard of living and health of the inhabitants of the region, as compared to similar regions, REMTh

appears to be facing problems and shortcomings in terms of macroeconomic stability and infrastructure while the efficiency of the labor market is also problematic, exacerbating the problems of regional innovation.

Based on the finding of Vladoš et al. (2018), the gross value added for selected industries in the Eastern Macedonia and Thrace region declined by 35.5% between 2008 and 2014. Vladoš et al. (2018) also carry out a statistical analysis of the region in an attempt to highlight the structural imbalances found in the business ecosystem of REMTh. Figure 2 presents the gross value-added in the 13 Greek regions and productive sectors for 2014, the region's coefficient of specialization, and the location quotient.

	<i>Gross Value Added by region and sector, 2014 (EUR, current prices, in millions)</i>				<i>Coefficient Of Specialization</i>	<i>Location Quotient</i>		
	<i>I</i>	<i>II</i>	<i>III</i>	<i>TOTAL</i>	<i>CS</i>	<i>LQ (I)</i>	<i>LQ (II)</i>	<i>LQ (III)</i>
<b>Greece</b>	<b>5843</b>	<b>25047</b>	<b>126297</b>	<b>157187</b>				
Attica	307	9155	66509	<b>75971</b>	<b>0.06</b>	0.11	0.76	1.09
North Aegean	110	233	1918	<b>2261</b>	<b>0.05</b>	1.25	0.65	1.07
South Aegean	132	584	4578	<b>5294</b>	<b>0.06</b>	0.65	0.69	1.08
Crete	461	957	6261	<b>7679</b>	<b>0.03</b>	0.16	0.78	1.01
<b>Eastern Macedonia, Thrace</b>	<b>433</b>	<b>1117</b>	<b>4548</b>	<b>6098</b>	<b>0.06</b>	<b>1.91</b>	<b>1.15</b>	<b>0.93</b>
Central Macedonia	1163	3681	16120	<b>20964</b>	<b>0.04</b>	1.49	1.10	0.96
Western Macedonia	238	1908	1685	<b>3831</b>	<b>0.36</b>	0.16	3.13	0.55
Epirus	281	573	2633	<b>3487</b>	<b>0.05</b>	2.16	1.03	0.94
Thessaly	825	1514	5614	<b>7953</b>	<b>0.10</b>	2.79	1.19	0.88
Ionian islands	95	204	2417	<b>2716</b>	<b>0.08</b>	0.93	0.47	1.11
Western Greece	660	1058	5570	<b>7288</b>	<b>0.05</b>	2.42	0.91	0.95
Central Greece	566	2450	3850	<b>6866</b>	<b>0.24</b>	2.20	2.24	0.70
Peloponnese	572	1613	4594	<b>6779</b>	<b>0.12</b>	2.25	1.48	0.84

Source: Temporary data extracted by the Hellenic Statistical Authority. Calculations made by the authors. Update 17/01/2017

Figure 2: REMTh's gross value added, coefficient of specialization and location quotient, based on Vladoš et al. (2018)

Gross Value Added, both in Greece's total and in REMTh, lies overwhelmingly at the tertiary sector (services) as compared to the secondary (manufacturing) and primary (raw materials) sectors. Since gross value added (GVA) measures the value of products and services produced in a particular area of economic interest, the coefficient of specialization is a further factor for further interpreting REMTh's regional data.

The formula used to calculate the coefficient of specialization is  $1 / 2 \sum |(Air / Ar) - (Ain / An)|$  where the sum that refers to all activities is the  $\Sigma$ . For the coefficient of specialization, and the location quotient, the symbols under the gross value added mean the following:

- *Air* stands for the GVA of a particular sector of the region.
- *Ar* indicates the total GVA of the region for the three sectors.
- *Ain* is the country's GVA total in a particular sector.
- *An* is the country's GVA total for the three sectors.

According to the outcome of the value of the coefficient of specialization (0.06), the region is not specialized compared to the national distribution of activities. That is, the region's industrial structure matches the industrial structure of the nation's whole. If the coefficient was greater than 1, then this would have meant that the region is preponderant in terms of national distribution of activities, while an index equal to 1 would have meant that the specialization of the region as compared to the national distribution of activities is analogous to the total national specialization (Mulligan and Schmidt, 2005).

Besides, another useful measurable concept is the location quotient. According to the theory (Chiang, 2009; Sayago-Gomez and Stair, 2015), the formula used to calculate the location quotient is the  $(Air / Ar) / (Ain / An)$  and the  $(Air / Ain) / (Ar / An)$ . When  $LQ > 1$ , then the activity is basic or export-oriented while, when  $LQ < 1$ , then the activity is non-basic, and when  $LQ = 1$ , then the activity is balanced. According to the results of this calculation for the location quotients of the 13 Greek regions, the primary and secondary productive sectors in REMTh are basic or specializing in

these productive sectors while the tertiary sector is non-basic. This image of the region contradicts the fact that the highest value-added lies in the tertiary sector, which is the case for six more Greek regions. It seems that this fact exacerbates the structural competitiveness problems that exist in Greece nowadays (Andreou et al., 2017; Vlados, 2012).

Moreover, the regional multiplier and total multiplier indices can illuminate further regional underdevelopment issues (Figure 3).

	<i>Employment by region and sector, 2014</i>			<i>Regional Multiplier and Total Multiplier</i>			
	II	III	TOTAL	I	II	III	TOTAL
<b>Greece</b>	<b>579473</b>	<b>2931410</b>	<b>3999296</b>				
Attica	210338	1303370	1527413			7.09	8.31
North Aegean	7809	52288	68643	52.32		26.5	32.13
South Aegean	19111	104041	133612			17	3.45
Crete	32908	163775	237780	3.4		s	19.71
<b>Eastern Macedonia, Thrace</b>	<b>26631</b>	<b>124086</b>	<b>210803</b>	<b>1.75</b>			<b>6.14</b>
Central Macedonia	94586	453511	635846	79.8	38.6		179
Western Macedonia	21706	52446	89845	3.32	2.5		6.7
Epirus	17503	75983	116567	2.6	29.6		12.32
Thessaly	40684	159428	262754	2.05	15.58		46.36
Ionian islands	9608	59646	81725	5			32.81
Western Greece	27927	148379	227232	2.2			9.8
Central Greece	42907	111202	193935	2.47	2.9		6.26
Peloponnese	27754	123255	213139	1.72			5.9

Source: Temporary data extracted by the Hellenic Statistical Authority. Calculations made by the authors. Update 17/01/2017

Figure 3: REMTh's regional multiplier and total multiplier, based on Vlados et al. (2018)

As shown by employment by region and by productive sector, the overwhelming majority in REMTh lies is in the tertiary sector. Based on regional employment data, the calculation of regional multiplier and total multiplier indices is possible. To calculate these indicators, the symbols used are as follows:

- *Air* stands for employment in a particular sector in the region.
- *Ar* indicates the total employment of the region in the three sectors.
- *Ain* is the country's total employment in a particular sector.
- *An* is the country's total employment in the three sectors.

The regional multiplier measures the increase in total employment of the region after the increase in the employment of the export sector or, in other words, measures the influence of an export activity unit on the total activity of the region (Domański and Gwosdz, 2010; Hanink, 2007). The formula used to calculate the regional multiplier is the  $Kir = Air / [Air - (Ain / An)Ar]$ . The regional multiplier stands for the  $eir = Air - (Ain / An)Ar$ , while the total multiplier is the  $Kr = Ar / \Sigma eir$ .  $\Sigma eir$  indicates employment in the region's total export activity. There are no multiplying effects when  $eir < 0$  or  $eir = 0$  (which means that  $LQ \leq 1$ ). Based on the calculated regional multiplier, REMTh has a multiplier effect and export activity only in the primary sector, since it records a value greater than 1 (1.75).

Therefore, according to this regional analysis, REMTh has and exposes structural problems and comparative weaknesses. Although gross value added and employment come overwhelmingly from the tertiary sector, specialization and multiplier effects only occur in the primary sector. This fact means that, on the one hand, there are some comparative advantages in the primary and secondary sectors, which cannot outweigh the competitive deficits in the more populous tertiary sector, and this is evident by the extremely low per capita GDP of the region. Therefore, the region has no choice but to focus on more R&D and knowledge-intensive firms, which display the majority of employees and value-added.

However, the existing research and development framework in the region seems to address structural imbalances as well. The following figure presents critical macro-economic indicators

concerning R&D activities in REMTh and compares them with Greek and European indicators for the year 2010.

	<i>Eastern Macedonia and Thrace</i>	<i>Greece</i>	<i>EU28</i>
R&D expenditure – Total (million Euro)	46.25	1,391.16	246,915.3 9
R&D expenditure – Total [% of GDP]	0.56	0.6	2.00
R&D expenditure - Business Enterprise Sector (BES) [% of GDP]	0.17	0.23	1.24
R&D expenditure - Government Sector (GOV) [% of GDP]	0.05	0.16	0.26
R&D expenditure - Higher Education Sector (HES) [% of GDP]	0.35	0.27	0.47
R&D expenditure - Private non-Profit Sector (PnP) [% of GDP]	0	0.01	0.02
R&D Personnel – Total (% of active population)	0.58	0.73	1.06
R&D Personnel – BES (% of active population)	0.07	0.13	0.54
R&D Personnel – GOV (% of active population)	0.04	0.19	0.15
R&D Personnel – HES (% of active population)	0.48	0.42	0.35
R&D Personnel – PnP (% of active population)	0	0.01	0.01

Figure 4: REMTh's R&D expenditure and personnel levels, based on Boden et al. (Boden et al., 2015)

According to the data presented by Boden et al. (2015), expenditure on R&D in REMTh happens mainly at the higher education sector, which accounts for 0.35% of GDP, higher by 0.08 percentage points across the country and 0.12 points lower than the European average. The R&D rate in the business enterprise sector is comparatively lower (just 0.17% compared to 1.24% of the European average) while the government sector spends well below the European average and, therefore, it appears that the locally established university is at a comparatively higher level of competitiveness than the other regional institutions.

To this end, a “triple helix” approach could provide meaningful solutions to the specific problematic situation of the region. In a triple helix perspective, innovation in a national-regional socio-economic system is the result of the co-evolving interconnection between the industry, the government, and the university (Cai et al., 2015; Etzkowitz and Ranga, 2010; Vlados and Chatzinikolaou, 2019d). It seems that the real problem of underdevelopment in today's REMTh is due to the relatively low competitiveness of firms primarily and, secondarily, to the local government's relative incapacity to drive innovative institutional reforms. At the same time, the hosted in the region university should look for possible synergies at all levels of local government and entrepreneurship.

#### **4 Dimensions and structural characteristics of the firms in REMTh's ecosystem based on a series of studies by the Stra.Tech.Man Lab research team**

Entrepreneurship in the region of Eastern Macedonia and Thrace presents structural problems of overall competitiveness. Research and development data at the regional level confirm this fact since regional firms lie at a lower level than the governmental and academic institutions. The Stra.Tech.Man Lab research team, identifying this structural “pathology,” conducted recently a series of field researches in the region in the effort to identify how small and micro firms think and act in terms of innovation. The reason for choosing only small and micro firms was to confirm the structural problems and propose corresponding policies to enhance the innovation of this business ecosystem. The numbered sections below present the main findings of these four field surveys in the region.

##### *1. “The multiple perception of innovation: The case of micro and small enterprises in the region of Eastern Macedonia and Thrace”*

In this regard, according to the study by Vlados and Chatzinikolaou (2019a), small and micro firms in the region appear to have a remarkably “tighter” approach to innovation from what the relevant literature suggests. Most of these firms seem to focus solely and superficially on the “technical dimension” of innovation without being able to appreciate and synthesize the spheres of strategy and management as the building blocks of a firm's innovation. Besides, innovation for these firms is

sporadic mostly, relatively rare, and usually “unexpected” rather than deriving from a systematic organizational process.

For the most part, it seems that the majority of the region’s small and micro firms interpret innovation particularly narrowly and certainly far from the fundamental definition of Schumpeter (1934) and other relevant contemporary theoretical approaches (Ahrweiler, 2010; Baregheh et al., 2009; Damanpour and Aravind, 2012).

*II. “Crisis, innovation and change management in less developed local business ecosystems: The case of Eastern Macedonia and Thrace”*

Complementary to the limited perception of innovation by the small and micro firms in the region is also their perception of the evolutionary link between innovation, crisis, and change management. In particular, according to Vlahos et al. (2019b), these firms perceive the symptoms of the crisis that appear in their environment as totally and exogenously imposed rather than intrinsically created by innovation (Perez, 2010). This field survey conducted in firms employing up to 50 employees showed that these people of everyday practice perceive the crisis mostly in financial terms that reduce their customers’ purchasing power. Predominantly, they do not perceive the crisis in terms of production and competitiveness.

Innovation and the prerequisite change management as a way out of the crisis also do not have a systematic character in these firms. They perceive innovation as a “random derivative” mostly after the advancement of some temporarily useful technical applications instead of a systematically designed combination of organizational strategy, technology, and management. At the same time, change management relates and focuses mainly on cost reduction rather than systematic processes that can nurture organizational innovation and competitiveness (By et al., 2011; Vlahos, 2019). In conclusion, the distance that separates these firms’ actions from the relevant scientific theory standards in this less-developed regional business ecosystem seems to contribute to the reproducing and widening of this underdevelopment.

*III. “Strategy perception and implementation on less developed business ecosystems micro and small enterprises: The service sector of Eastern Macedonia and Thrace”*

However, in a subsequent survey, in a sample of regional firms in the service sector employing up to 50 employees again, the findings are more encouraging for the region’s level of development. In particular, by applying a “strategy perception and implementation index” based on a series of critical strategy questions from the strategic management literature, Vlahos and Chatzinikolaou (2019b) show that these firms desire to systematize their strategy. However, it seems that these firms display a problem of understanding what their “business mission” should be (Altrok, 2011), which probably also reflects the relative underdevelopment in the region in terms of local government.

The general conclusion is again that these small and micro firms do not fully grasp some of the principles of strategic management scientific theory, but there seems to be a convergence and a tendency to acquire strategic skills mainly today as compared to the past five years. Besides, entrepreneurship fostering policies in weaker business ecosystems such as REMTh can use this index of strategic monitoring.

*IV. “Business ecosystems policy in Stra.Tech.Man terms: The case of the Eastern Macedonia and Thrace region”*

To this end, Vlahos and Chatzinikolaou (2019c) propose an integrated business ecosystem policy for the region not only in terms of strategy but also in terms of technology and management. Specifically, by analyzing the firm in “biological terms” (Nelson and Winter, 1982), they argue that firms have and express a particular “physiology” based on the way they synthesize upon their spheres of strategy, technology, and management (Stra.Tech.Man approach) to innovate. According to Vlahos (2004), the strategy of the entrepreneurial entity corresponds to questions related to the current level of development of the organization and what aspires to become in the future. Correspondingly, technology is about how the organization makes use of the available working tools and how it diffuses them into the internal and external business environment. Finally, management provides answers on how to exploit, coordinate, and valorize the total resources available to the organization (Figure 5).

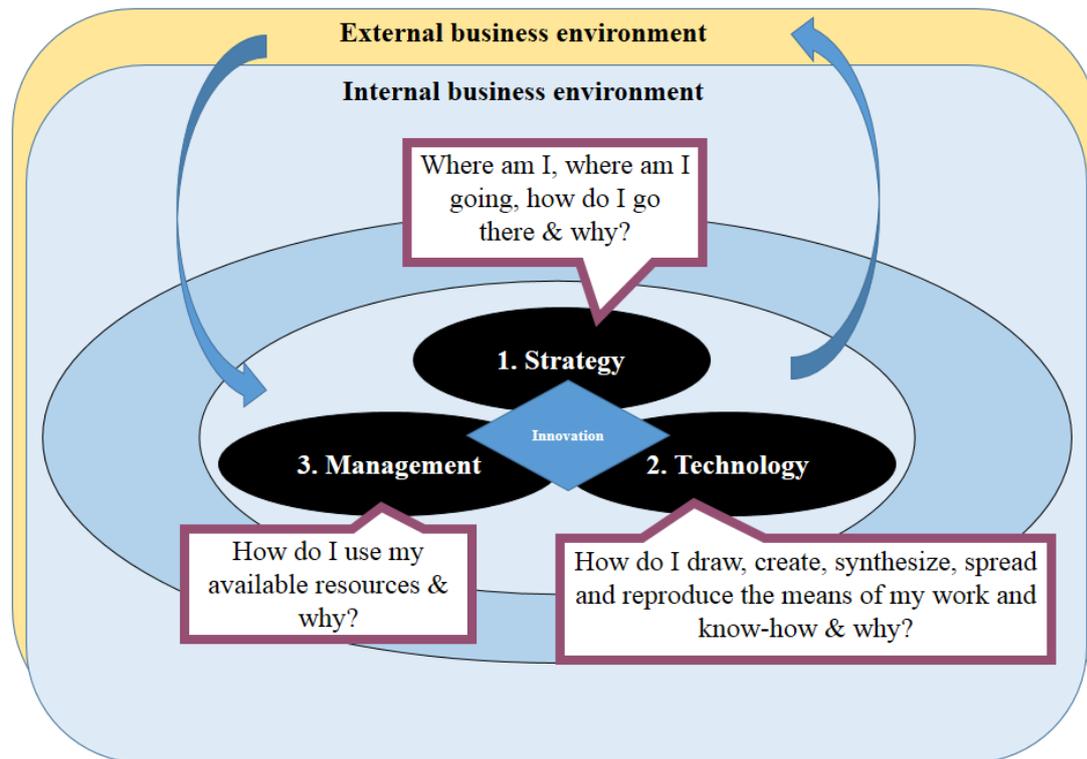


Figure 5: The Stra.Tech.Man approach of the firm's innovation, based on Vlados (2004)

The theoretical application of the "Stra.Tech.Man physiology" through "Likert-type" open questionnaires (Harpe, 2015) shows for a sample of regional firms in REMTh that have a low tendency to systematize their Stra.Tech.Man spheres. In conclusion, this finding can provide the overall image for the underdevelopment of the regional business ecosystem.

## 5 Conclusions and discussion

The present study sought to highlight some of the main features of the morphology of the regional business ecosystem of the Region of Eastern Macedonia and Thrace (REMTh) by presenting recent studies carried out by the Stra.Tech.Man Lab research team in the region. The aim was to explore the local entrepreneurial underdevelopment conditions that this region is facing compared to the other Greek regions and illuminate structural problems in terms of competitiveness and local innovations abilities.

To this end, it utilized and analyzed applied regional data by finding out an asymmetry between the productive sectors contributing to the region with multiplier effects and the value-added and employment found in different productive sectors. Of course, it is worth emphasizing here that regional analysis, by itself, can provide a relatively static representation only of the macroeconomic nature of the data, rather than an evolutionary and historical perspective of the complexities occurring at the micro and meso levels (Dopfer et al., 2004). In this perspective, the traditional regional analysis seems to change character and purpose nowadays by giving different interpretations in terms of regional and local policy. In other words, the dominant paradigm (Kuhn, 1962) in terms of regional policy seems to change, leading to the identification of business agglomerations not so much in a sectoral or "strictly spatial" form, but in business ecosystems of co-evolving firms that display parallel competition and cooperation relationships (Vlados et al., 2019a).

Specifically, through all the studies presented in this article that concern the Region of Eastern Macedonia and Thrace, it becomes apparent that the structural underperformance, reduced developmental potential, and innovational insufficiency of the local business ecosystem is due to the

particular physiology of the small and medium-sized enterprises that make up and mobilize the ecosystem. These are, in fact, the two interdependent and reciprocal evolutionary sides of the same coin: regional underdevelopment is primarily due to the relative competitive weakness and “tonelessness” of the locally installed productive web while the overall structural and developmental lagging of the specific region reproduces the competitive incapacity of the locally operating business ecosystem. This “underdevelopmental” vicious circle seems that can be halted to the extent that it is possible to stimulate systematically the potential of adaptability and innovation of the locally established firms. This halt requires, in particular, their empowerment in terms of strategic targeting capabilities, systematic technological modernization, and managerial improvement, creating the conditions necessary for managing change more effectively internally and entering a virtuous cycle of continuous innovative effort in the contexts of the ever-increasing and demanding global competition.

To this end, the “pilotic” establishment of a mechanism to strengthen local entrepreneurship that uses this Stra.Tech.Man “diagnostic” tool in the form of Local Development and Innovation Institutes can be a policy proposal to address this problem of underdevelopment in the region (Figure 6).

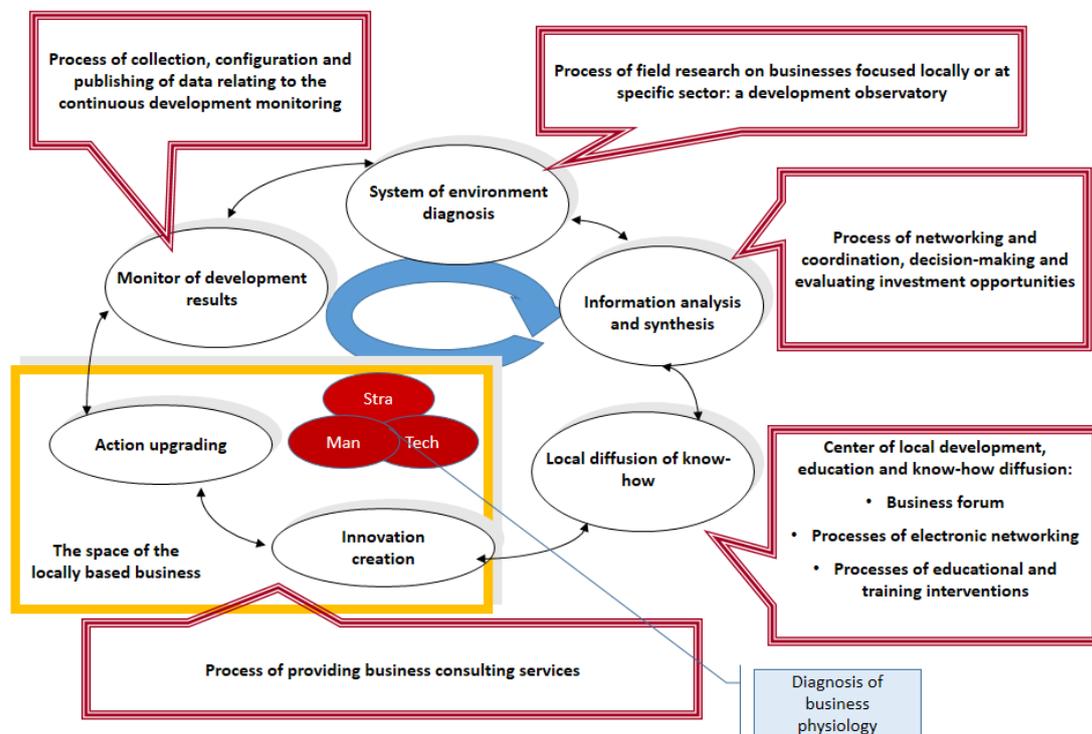


Figure 6: The mechanism of Local Development and Innovation Institutes, based on Vlahos and Chatzinikolaou (2019c)

This business ecosystem policy is, in fact, a “business clinic” that can serve the locally based “business-patient,” bringing together all the local agencies that until yesterday were uncoordinated in the region and that could boost local development in the form of a triple helix of universities, firms, and local government in a local focus. As for the mechanism itself, it consists of a cycle of six successive steps, starting with the system of environment diagnosis. It then has the task of analyzing and synthesizing the information it has collected and then disseminating this expertise to the local business community. Next, it provides in-company training and business consulting in Stra.Tech.Man terms to create innovation and generally upgrade the business activity. Finally, it monitors and re-evaluates the results and restarts. The mechanism monitors both individual firms and agglomerations of firms in the form of networks such as business ecosystems and clusters (Rinkinen and Harmaakorpi, 2018).

Besides, according to the OECD (OECD, 2009), regional policy strategy focuses nowadays on integrated development projects rather than sectoral approaches and does not use tools such as subsidies and state aids solely. It uses a mix of “soft” and “hard” socio-economic interventions, while

regional policy actors are not exclusively at the central government level, but multilayered governance exists that involves different private actors and civil society.

To this end, the research of Boden et al. (2016), which summarizes the results of the theoretical review and implementation of the Research and Innovation Smart Specialization Strategy (RIS3) in REMTh within the European Union framework follows this new approach of the regional analysis. According to the European Commission's website<sup>3</sup>, the guide on Research and Innovation Strategies for Smart Specialization targets policy-makers and regional development professionals responsible for managing the structural funds. It sets out the concept and provides orientations on how to develop research and innovation strategies for smart specialization (RIS3). This guide follows six steps, beginning by the analysis of the innovation potential, followed by setting out the RIS3 process and governance, developing a shared vision, identifying the priorities, defining an action plan with a coherent policy mix, and finally monitoring and evaluating the results.

This approach, which is complementary to the approach of Local Development and Innovation Institutes by the Stra.Tech.Man Lab research team identifies and proposes some main directions for the region (Katimertzopoulos and Vlado, 2017). According to Boden et al. (2016), the region must build on existing innovation capacity and infrastructure and establish feedback channels between firms, government, universities, and civil society (Carayannis and Campbell, 2009) by focusing on value networks rather than different sectors. It needs to build mechanisms that involve stakeholders in regional policy and ensure the creation of networking platforms and relevant international consortia.

### Acknowledgment

We would like to express our gratitude to Dr. Andreas Andrikopoulos, Associate Professor at the Department of Business Administration of the University of the Aegean, who provided useful comments during the writing of this manuscript.

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<sup>3</sup> <https://s3platform.jrc.ec.europa.eu/s3-guide>

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