

"Addressing public policy implementation challenges in lagging regions through the analytical lens of Smart Specialisation"

-Abstract-

Smart Specialisation Strategy (S3) research has contributed to better understanding of that policy framework's conceptual underpinnings but some European regions still find it difficult to turn S3 theory into policy implementation. A key element of the implementation challenge concerns the enabling or constraining role of local institutions on regional development strategies and, more specifically, the entrepreneurial discovery process (EDP). Such a challenge appears to be particularly acute (and empirically unexplored) in lagging regions, characterised by weaker knowledge bases and innovation capacities. It is often in less advanced settings where weaker institutions are found. This paper addresses these gaps by investigating S3 implementation in lagging regions focusing on the dynamic interdependence between the regional institutional environment and EDP. It evidences how particular features of the regional institutional environment hinder EDP as well as how institutional change could enable S3 implementation in two Greek regions. Our results reveal mutual interdependence between inadequate institutions and weak administrative and entrepreneurial capacities, creating adverse pre-conditions for S3 implementation. They also suggest that change requires the replacement of existing features of the institutional environment or creation of new ones, rather than gradual institutional adaptation or transformation.

Keywords:

innovation policy, lagging regions, regional development, smart specialisation implementation

1. Introduction

Smart Specialisation Strategy (S3) research has contributed to improved understanding of the framework's conceptual underpinnings. However, many European regions have trouble turning S3 theory into policy implementation (Thissen et al., 2013), especially in lagging areas (McCann and Ortega-Argilés, 2019). A crucial implementation challenge concerns the role of institutions and institutional environments on regional development strategies (Rodríguez-Pose, 2013) and, more specifically, on the entrepreneurial discovery process (EDP), thereby shaping options for regional policy (Watkins et al., 2015). Prior empirical studies imply a significant relationship between a region's institutional environment and its potential to develop effective S3 strategies (McCann and Ortega-Argilés, 2016). Where the relationship is weak, attention has shifted towards the impact of institutional change on S3 design and implementation (Gianelle et al., 2016, Rodríguez-Pose and Ketterer, 2018).

Institutionalists argue that the combination of adaptive institutional environments with conspicuous knowledge resources creates higher potential for regional economic growth (Cooke and Morgan, 1998, Rodríguez-Pose, 2013). As a result, regional policies must incorporate in-depth understanding of the role played by local institutions to engage in learning and build innovation capacity (Fritsch et al., 2019), concentrating on both formal and informal institutions. However, the relationship between institutions and regional development tends to be context and geography specific, as well as characterised by multi-scalarity (Rodrik, 2004). Moreover, conceptual as well as empirical understanding of the role of institutional factors in 'lagging regions' (EC, 2017) remains limited (Aranguren et al., 2018) as such regions suffer from the 'innovation paradox' (Oughton et al., 2002) - regions most in need of effective innovation policies to revitalise their economy are those lacking proper framework conditions for effective policy action (Marques and Morgan, 2018).

This paper addresses these gaps by investigating S3 implementation in two Greek regions. Firstly, it asks which specific institutions and features of their institutional environment have led to the emergence of policy implementation barriers (Morgan, 2017). We are specifically concerned with the relationship between the institutional environment and EDP. Secondly, it investigates what kind of institutional change is required to enable S3 implementation in the two regions (Kyriakou et al., 2016).

A qualitative case study approach is employed, using interview data from Crete and Central Macedonia (CM). Attention is given to two Greek regions that have been among the hardest economically hit European areas, which increases the challenges of policy-making and implementation in lagging environments. In this respect, case study regions were purposely selected as both are in the process of self-exploring what institutional reconfiguration is needed in order to overcome prolonged recession and create a new favourable environment for public policy implementation.

Fifty-one semi-structured interviews were conducted in 2014-17. Our data contain comprehensive information on the influence of the institutional environment of S3 implementation from different sources. In the case of Crete, we conducted longitudinal analysis to investigate if change has effectively facilitated policy design and implementation of the S3 framework, or changed regional institutional environments, underlying systems of governance or legislation impact on local institutions. So far, policy research has been more oriented towards S3 design, such as how to include institutions in regional development policies (Grillitsch, 2015), rather than improving empirical understanding of how to identify and overcome place-specific implementation barriers. Thus, our main contribution concerns barriers to implementation associated with a region's institutional environment. For instance, whether fiscal rules and administrative procedures obstruct or support entrepreneurial discovery, or institutional support for policy implementation. Moreover, we provide some insights on what kind of institutional change could improve EDP in Crete and CM.

The paper is structured as follows: It provides the theoretical background of smart specialisation policy as a new regional innovation policy and provides recent theoretical and empirical insights on how EDP dynamics are associated with the institutional environment of the region. Then, it builds the conceptual framework and detailed research design to address two research questions. Finally, it provides the profiles of selected regions, followed by key findings, discussion and some concluding thoughts.

2. Theoretical Background

This section reviews the literature on smart specialisation, with emphasis on developing a theoretical framework. It explores contributions on economic and institutional pre-conditions and examines adjustments to existing institutional environments necessary for successful EDP implementation.

2.1. Smart Specialisation Strategies (S3)

2.1.1. Understanding smart specialisation and entrepreneurial discovery

Smart specialisation is a contemporary innovation strategy for regional renewal and development (McCann and Ortega-Argilés, 2016) based on a rationale of policy-prioritisation whereby regions use their own resources to develop entrepreneurial search capabilities for regional renewal and development (Asheim et al., 2011). The discovery of technological or economic ‘domains’ (David et al., 2012), with existing and potential competitive advantages, is based on a dynamic and continuous bottom-up identification process. This is termed ‘entrepreneurial discovery’ (Foray et al., 2012), being closely linked with the concept of economic ‘self-discovery’ (Hausmann and Rodrik (2003).

Arguably, EDP is the cornerstone of smart specialisation strategy, the main means to experiment and discover which domains of the economy will exploit entrepreneurial opportunities for knowledge-based and innovation-driven growth. In theory, any region can implement S3 to diversify its entrepreneurial activities into new or related economic areas (Boschma and Frenken, 2009) for economic renewal and new path creation (Asheim and Grillitsch, 2015). However, EDP is by no means a straightforward process (Landabaso et al., 2014), especially where the necessary institutional and economic pre-conditions for self-discovery are absent (Rodríguez-Pose and Wilkie, 2017, Papamichail et al., 2018). Kirzner (1997) suggested that it is the entrepreneurs, and not the bureaucrats or even the managers, that should take a key role in leading the EDP from a market-driven perspective because entrepreneurs are most likely those that understand best the complexity of a living market and being alert to new market opportunities (Héraud et al., 2018). Others acknowledge entrepreneurs’ value, but also recognise the role of public and administrative authorities in the identification of new entrepreneurial opportunities (Foray et al., 2012). This opens an essential research question concerning how the practical dynamics of this process can be better understood in different regional contexts (Sörvik et al., 2016).

2.1.2. From S3 theory to practice in lagging regions

S3 research has begun to shift to implementation practice. Prior research has investigated S3 practices in advanced European regions, including Møre and Romsdal (Asheim and Grillitsch, 2015); Scania (Moodysson et al., 2015); and the Basque country (Morgan, 2016, Marques and Morgan, 2018), aimed to understand under what framework conditions smart specialisation can be implemented.

Research has also been conducted in less advanced regions, such as Malta (Luke et al., 2014), Andalucía (Gianelle et al., 2014), Wales (Morgan, 2017), Eastern Macedonia, Thrace and North East Romania (Marques and Morgan, 2018) and Poland (Potter and Smith, 2019). For example, new opportunities are offered by new digital and advanced robotic technologies leading to increased automation especially in manufacturing that can be diffused through regional learning coalitions as well as cross-border networks (Barzotto et al., 2019, Bailey et al., 2019). However, evidence of new forms of smart specialisation is limited as crucial framework conditions for successful policy implementation are not yet in place (Radosevic et al., 2017), including critical mass of different actor types with complementary capabilities,

strong networks and social capital, good enough quality institutions and governance capacity (Marques and Morgan, 2018).

Interestingly, the nature and cause of these barriers vary significantly across different environments due to the high heterogeneity across European regions. Empirical findings suggest that smart specialisation failure can be caused by weak policy implementation capacities (Foray, 2016), fragmented learning capabilities and skills (Morgan, 2017), low absorptive and networking capabilities (Papamichail et al., 2018) or poor regional governance and institutional structures (Grillitsch, 2015). The absence of intra- and inter-sectoral networks in both innovation and production, as well as presence of inadequate systems of governance (e.g. high levels of corruption or inefficient social services), poor knowledge dissemination - public R&D capacity exists alongside weak R&D demand by local industrial players (McCann and Ortega-Argilés, 2019) innovation capacity (Vallance et al., 2018), absence of learning networks (Bessant and Tsekouras, 2001) and a culture adverse to risk-taking and entrepreneurship, can inhibit EDP and any related policy effort (Grillitsch, 2015).

2.2. S3 development and the institutional environment

2.2.1. Institutions and regional growth strategies

Finding effective ways of supporting regional policymaking in a world characterised by dynamic interdependencies among components and actors of a regional system is a central mission of innovation and development studies (Grillitsch and Sotarauta, 2018, Fritsch et al., 2019). In particular, it has been long argued that institutions and institutional formations determine the framework under which economic development evolves (Martin, 2000, North, 1990).

At the regional level, there is much discussion about how the characteristics of the institutional environment or local institutional arrangements influence place-based growth (Morgan, 1997). For instance, mutual adaptations between local institutions and agglomeration processes help to explain the success of places such as London and Silicon Valley (Storper, 2018). However, lack of a collaborative mentality and sound network linkages can also lead to limited knowledge exchange and fragmented learning, which hinders EDP. Moreover, inflexible institutional environments and networks can induce excessive path dependency, increasing the risk of locked-in obsolete technological or industrial trajectories (Rodríguez-Pose, 2013). Institutions may have to adapt to changes in economic or technological conditions, or they may initiate changes themselves, requiring actors and economic organisations to adapt to a new sets of rules or regulatory environments (Grillitsch, 2015). In practice, however, the effects of both economic and institutional adjustments can be difficult to discern and predict. In particular, because institutions are multi-scalar, institutional changes can take place at different levels and times, proceed at different rates, or even follow inconsistent strategies (Gong and Hassink, 2019).

Notwithstanding these complexities, from the policy development perspective two key research directions are relevant for policy practice due to their influential role on shaping regional growth strategies. The first seeks to understand the link between institutions and development by recognising the importance of both formal and informal institutions. Formal institutions refer usually to rules, laws and organisation, while informal or tacit institutions include individual habits, routines, social norms and values (Amin and Thrift, 1995). Formal institutions embody the system's 'regulatory pillar', including the rules and laws 'generated by the government or other authoritative bodies that regulate individual and organizational action' (Gong and Hassink, 2019). Informal institutions, on the other hand, correspond to social norms and obligations as well as socially constructed cognitive structures that inspire organisational and individual action irrespective of economics rationality.

The second direction emphasises that it is institutional quality and effectiveness of local institutions not their quantity, that matters (Rodríguez-Pose (2013). Institutional dynamics are examined at two different

levels: the institutional structure (e.g. what regional institutions currently exist and why) and the institutional arrangement (e.g. how these institutions are related to each other and work in practice to favour regional development). This second direction suggests that clear and effective formal institutions support innovation policy development by promoting the conditions for private investments and economic activity (Jütting, 2003), for instance by minimising uncertainty and corruption and encouraging risk-taking and entrepreneurship (Rodrik, 2004).

2.2.2. Regional institutions and S3

The S3 literature has addressed the role of institutions and institutional change in support of policy implementation for regional renewal and development (Asheim and Grillitsch, 2015) with focus on the institutional environment (McCann and Ortega-Argilés, 2016) and the influence of formal institutions on EDP (Rodríguez-Pose and Wilkie, 2015). They tend to be relatively steady over time and have a tangible impact on whether regions with similar framework conditions are able to learn and innovate, thereby exploiting their growth potential or remain deadlocked (Morgan, 2016). Various studies have sought to understand the extent to which institutional reconfiguration and upgrading is required for S3 implementation.

For instance, using Mahoney and Thelen (2009) and Busetti (2015) four modes of institutional change (displacement, layering, drift and conversion), Moodysson et al. (2015) show the processes of replacement of existing rules by new ones (displacement) and introduction of new institutions alongside existing rules (layering) can trigger the creation of new forms of industrial specialisation or the renewal of existing ones in regions whose industrial structure is becoming obsolete. Since most research has been conducted in institutionally thick and economically advanced regions, the question arises whether similar processes remain open to lagging regions.

3. Research Questions

Despite recent efforts to improve applicability of S3 at the regional level (Kroll, 2016), a number of institutionally-related barriers to implementation are still likely to exist in lagging regions. For S3 to become relevant and appropriate as a regional innovation policy, research must focus on the role of institutions and institutional change in S3 implementation. Therefore, new empirical studies are needed to examine and inform the relationship between institutions and S3 implementation challenges, targeting particularly regional environments with weak institutional structures and arrangements.

In this study two research questions are formulated to contribute to this research direction, by generating evidence in the context of two Greek regions. We ask *which institutional features hinder smart specialisation implementation and why*. This research question will be investigated not from the conceptual approach of policy design (McCann and Ortega-Argilés, 2016), but rather in order to identify the features of the institutional environment that hinder S3 implementation.

However, it is not only the impact of the institutional environment on policy implementation that remains unknown. Existing knowledge is also limited on how institutional change can shape policy development (Farole et al., 2011) and, in this case, S3 implementation (Rodríguez-Pose and Ketterer, 2018), especially in lagging regions (Kyriakou et al., 2016). Therefore, we also consider *what institutional changes are needed for successful smart S3 implementation*.

4. Methods

4.1. Case studies

A qualitative multiple case study approach (Yin, 2003) is used. The focus is on lagging European environments, which have been at the top of the cohesion policy agenda and encounter important S3 implementation challenges (Sörvik et al., 2016). Two case studies of lagging regions (EC, 2017), with similar development features have been selected: Crete and CM.

4.2. Sampling strategy

Each region constitutes one case study unit of analysis and is examined separately to investigate similar or contrasting results that relate to S3 practices in the selected regions. The sampling strategy is purposive rather than random, considering five criteria as both regions:

- i. have been hit drastically by the macro-economic crisis in Greece, raising additional implementation barriers to S3 (Morgan, 2017);
- ii. represent lagging characteristics with relatively higher innovation and technological profile as compared to the national average;
- iii. design and implement their own regional innovation strategies;
- iv. are currently in the process of implementing S3 with policy implementation barriers;
- v. have similar institutional environments with high levels of state-centric dependence.

4.3. Data collection

Primary and secondary data were collected. Secondary data were gathered from published work including official reports with the objective of understanding firstly, how S3 practices have been developed in Crete and CM and, secondly, how the institutional environment of the regions has recently been shaped. Primary data were collected by means of fifty-one semi-structured interviews conducted in Greek, all anonymised (see Table 1 in Appendices).

Interviewing took place in two different phases. In the first phase (2014-16), forty semi-structured interviews were conducted through face-to-face meetings and teleconference calls with high-level national and regional innovation experts, academics, local entrepreneurs, and representatives from a varied range of intermediary organisations. The selection criteria included the role, relevance and engagement of the respondents in S3 practices, geared to ensure an enriched representation from diverse private and public-sector stakeholder groups.

The second phase (2017 and 2019) included a longitudinal dimension with an additional set of eleven in-depth interviews conducted in Crete. Longitudinal research was conducted to study strategy implementation progress and to identify and analyse new emerging trends, practices and dynamics of S3 process. New insights were gained concerning the way S3 was developed and progressed.

To support interviewing and favour discussion, a generic interview guide with open-ended questions was prepared and adjusted according to the respondent target group; for the longitudinal research, an upgraded guide was prepared and used.

Interviewees were grouped into three main categories: public sector, academia and private sector. The composition of the respondents included in the sample and the distribution per stakeholder group are illustrated in Table 2.

Insert table 2 here

4.4. Data Analysis

NVivo software (ver7) was used for data analysis. Interviews were transcribed for codification. Data processing and analysis was conducted separately for Crete, CM and the longitudinal research, allowing for single analysis in each regional environment and for comparisons between the case study regions. After first-level coding (227 code references; 46 single quotes) we reviewed all data again and performed a recombination of coded passages, by grouping existing nodes into new tree nodes. We ran the coding again and created a new series of codes and sub-codes to test the ways emerging patterns and ideas from the interviews related to the RQs. Finally, meta-categories were created to identify patterns of association between institutions and public policy implementation in the two regions.

5. Case study profiles

Crete generates approximately 5% of Greek Gross Domestic Product (GDP). However, due to the economic crisis, its GDP per capita in Purchasing Power Standards (PPS) fell by 14% between 2008 and 2015 - with significant effects on businesses. Unemployment rates almost doubled from 2010 to 2017, reaching more than 20% (ELSTAT, 2016).

Crete has a long tradition in tourism which currently constitutes the most specialised and active sector of the island - it represents 54% of the most dynamic companies of the region, followed by services, mainly trade and shipping - 12% (Region of Crete, 2015). Concerning innovation, Crete has recently improved - the European Regional Innovation Scoreboard ranked Crete as a strong innovator in 2019, characterised as a 'pocket of excellence' in Greece (EC, 2019). Among European regions, Crete has shown improvement (Table 3). However, it is still a lagging region in smart specialisation development, given its limited ability to overcome policy implementation challenges (Metaxas, 2019).

Insert Table 3 here

Research and innovation activity is notably more intensive in public research organisations (65% in FP7 and 76% in Horizon 2020) than in the private sector (8% in FP7) (Reid et al., 2015). The most frequent type of innovation is innovation in marketing (32.7%) and organisational innovation (24.4) as opposed to product innovation (13.4%) and process innovation (29.5%) (EKT, 2015). Business R&D expenditure (as a share of GDP) remains below the European average (OECD, 2005), a phenomenon reinforced by economic recession.

Innovation is concentrated in tourism, agricultural products, agriculture-livestock and construction. There is a well-known winery network and some local olive oil associations. Additionally, the Agro-Food Partnership was built to promote Cretan traditional products overseas. Business networks and research synergies, however, are still missing from the regional innovation system, which suffers from a lack of strong, consistent and synchronised public and private sector partnerships with the research system decoupled from the domestic economy.

CM plays a leading role in the Greek economy. The region generates approximately 15% of national GDP (ELSTAT, 2016). Its industrial specialisation is mostly based on service sector activities and agro-food, which traditionally do not have critical R&D investments nor follow a science-based approach (Reid et al., 2012). During the last years, CM has suffered from the Greek economic crisis, GDP per capita (in PPS) decreasing by 22.2% between 2008-2015, (whilst the official regional unemployment rate grew dramatically (by 109.5%) in 2010-2014 (ELSTAT, 2016).

The R&D expenditure is predominantly localised in the public higher education sector (€97.3m in 2013), with an important number of internationally recognised institutions. However, CM R&D expenditure as a percentage of GDP (0.7%) remains well below the EU-28 average of 2.0% in 2015 (EKT, 2015). In addition, no R&D clusters or business networks exist at present to promote systemic innovation and inter-sectoral integration in the region. Avranas and Nioras (2011) show empirically that while academic institutions play a central role in the regional innovation system, their linkages with the local economy remain weak.

Administration and policy governance in the regions

Administratively, Crete and CM are classified in the NUTS2¹, without substantial variations in governance and institutional structures. Despite recent efforts to promote decentralisation, institutional autonomy for policy development remains low so that neither region possesses political, constitutional

¹ Nomenclature of Territorial Units for Statistics (NUTS2): basic regions for the application of regional policies

and executive power to induce appropriate structural changes for regional innovation policymaking (Komninos et al., 2014).

Specifically, Metaxas (2017) has shown that despite modernisation of the Managing Authorities (MAs)² and the new Regional Councils for Research and Innovation (RCRIs) to support governance of public policy, the existing structure fails to co-ordinate and monitor S3 effectively with significant overlap between the roles of national and regional agencies. In addition, the participation of civil society as a key entrepreneurial actor in EDP is limited.

Nevertheless, Crete and CM are two Greek pioneering regions in introducing sophisticated processes for EDP to engage not only academic and research actors but also key actors from the private sector. From 2017 onwards, public policy implementation began to increase its focus on engaging firms, business clusters and other key entrepreneurial actors which are the main target of S3 plans (Metaxas, 2017).

6. Findings

6.1. Which institutional features hinder S3 implementation, and why? (RQ1)

We first investigate the nature of policy implementation barriers in the two regions. Our data pinpoint eleven barriers to S3 implementation in the two regions, with multiple effects on entrepreneurial discovery. We analysed and distilled these barriers into five categories: excess bureaucracy and delays; uncertainties of investment; unclear mission for public action; weak intermediation mechanisms; and poor entrepreneurial settings (Table 4).

Insert table 4 here

6.1.1. Excessive bureaucracy and delays

Our data show that unnecessary administrative burdens currently surround operations in the public sector, e.g. massive paperwork and lengthy response times (82%). These factors affect smart specialisation in two ways. Firstly, hindering broad participation of local actors in entrepreneurial discovery. Secondly, blocking engagement in implementation through extremely complicated and lengthy procedures to receive and manage S3 funding:

"Paperwork and bureaucracy is huge and in fact discourages companies to get engaged in S3. I'm not interested in getting S3 funding if loads of paperwork and unreasonable timelines are needed to approve and disburse instalments" (LYCr49, 2017)

Bureaucratic and time-consuming processes cause important delays in key S3 stages in both public and private sectors including delays in open consultation processes for S3 action in selected priority areas, problems setting up policy initiatives to support realisation of joint S3 projects (e.g. flexible funding schemes, new fast-track services) and obstacles to private-sector engagement. S3 co-ordinators from the public sector of Crete and CM reveal the inefficiency of the system, referring to time-consuming procedures imposed centrally. In the private sector, a Cretan entrepreneur refers to formal government recruitment procedures as an example of time-consuming practices:

"I want to hire five experienced people that will be able to run S3 without following the national procedures of ASEP³. ASEP is an obstacle itself, because I want to hire these people immediately, not in six or twelve months" (SACr45, 2017).

² Public sector organisations which are responsible for managing programmes supported by Cohesion Policy.

³ ASEP is the Greek Supreme Council for Civil Personnel Selection established by Law 2190/1994 as an independent authority responsible for securing the implementation of the provisions on public sector staff selection and recruitment (source: www.asep.gr).

S3 implementation experiences low levels of innovative entrepreneurship due to obstacles routinely embedded in the national legal and formal institutional environment (72% of the sample):

"Entrepreneurs face important institutional barriers when trying to create their new firms. Legal barriers, business licenses, state certificates, accreditations, too much bureaucracy. In S3 we need simple procedures, fast track services, otherwise companies will not be able to participate in smart specialisation projects" (KACr48, 2015)

Recent research (Metaxas, 2017, Metaxas, 2019) shows that the number of S3 proposal calls has improved from 10% to 45% and that information systems are lighter and speedier. But government commitment still weak and EDP units understaffed, clearly at odds with the objectives set out in both regions' S3 action plans to boost innovation-based growth through the creation of new entrepreneurial ventures (Region of Crete, 2015, Region of CM, 2015).

6.1.2. Uncertainty surrounding investments in innovation

Another key barrier is the excessive risk that private-sector entrepreneurs must take to invest in S3 projects (40% of responses). Interviewees from the entrepreneurial community evidence that this problem is caused not only by the current financial environment but also by the unpredictability of formal institutions such as the national fiscal framework. Unpredictability makes it difficult to plan and offset investments in innovation against expected later returns, in spite of the recent introduction of R&D tax credits (130% of qualifying expenses), accelerated amortization of capital expenditures in R&D projects, and a patent box tax deferral regimes:

"How can I invest in innovation when corporate taxation is changing every single month, when nobody knows when and how tax laws will be changed in the future? Innovation is not a game; investments in high-tech and innovation are too risky with uncertain returns" (KOCr15, 2015).

Moreover, uncertainty and instability affect Foreign Direct Investments (FDI), because of the inefficiency and slowness of application of corporate law:

"Why should foreign companies or even institutional investors come to Central Macedonia when it will take years to find their right in the court, if necessary? [...] Entrepreneurs look for fast-track services and cannot wait for Greek courts to make a decision" (MACM19, 2015).

Overall, the environment for investments in innovative activities is perceived to be unfriendly, a clear obstacle to the effective implementation of S3:

"If the region seeks to support innovation and high-tech entrepreneurship in the S3 context, I think the first thing is to create and sustain a stable regulatory environment in which companies could take the risk of innovation [...] I think this framework is currently missing from the region" (FRCr17, 2015).

6.1.3. Unclear mission of public-sector authorities responsible for policy action

Uncertainty is related to unclear missions of public sector authorities (36% of responses). For example, in contrast to studies confirming the value of RCRI in entrepreneurial discovery (Kyriakou et al., 2016) and in S3 practices in general (Radosevic et al., 2017), we find they fail to assist the identification of entrepreneurial opportunities for future S3 investments. This is because RCRI and other similar supportive schemes in public policy (e.g. the Cretan observatory for the promotion of entrepreneurship) lack active engagement of the so-called pure entrepreneurs, the only ones to provide market-driven knowledge for entrepreneurial creativity and imagination (Héraud et al., 2018).

Instead, RCRI consist of governmental and, at best, of academic and business representatives who may have science, technical and managerial knowledge but lack critical skills to discover real market opportunities and lead entrepreneurial discovery. Arguably, entrepreneurial process does not only require

acquisition of technical or scientific knowledge, but mainly meta-knowledge generated and diffused directly from the interplay between the entrepreneur and the market (Héraud et al., 2018). Additionally, the regulatory framework that governs and controls the function of the RCRI in Crete and CM fails to provide well-defined and comprehensive lines of strategic direction. An indicative quote from longitudinal research in Crete exemplifies this point:

"The new regional innovation council is a good idea; it is a must for regional development and innovation. However, it does not work properly now, does it? Do we know its tasks, what about the institutional duties? What is the framework of its operation? We still don't know" (KACr47, 2017)

Similar views are found in CM. They emphasise the delayed establishment and slow operations of the RCRI due to unclear regulatory directions which led to inaction and limited contribution to policy implementation. An S3 expert from CM says:

"We should have created the regional innovation council earlier to support the process of entrepreneurial discovery. However, this was not possible as we were not given a clear institutional framework for its operation, and we still lack this critical issue to make its members more productive for S3" (TRCM35, 2015).

Recent data, (Metaxas, 2017, Metaxas, 2019), reinforces this evidence, pointing to specific failures: lack of coordination meetings, weak political commitment to build functional units, under-staffing and weak action to facilitate EDP. In Crete, our data show that a set of 356 ideas for S3 were generated, with 257 approved for consultation. From these 200 proposals were submitted but only 8 funded up to December 2018. A survey conducted in July 2019 (Region of Crete, 2019) found five critical factors shaping progress with S3, four of them dominated by administrative processes: delays in launching calls, bureaucracy in submissions, limited publicity, and low budgets. Only one, lack of business expertise, was associated with entrepreneurial weaknesses.

6.1.4. Lack of effective intermediation mechanisms and networks

The lack of effective institutional mechanisms to promote intermediary services and establish permanent linkages among key entrepreneurial actors also slows S3 implementation. Lack of efficient brokerage mechanisms fragments entrepreneurial knowledge sharing during entrepreneurial discovery and is perceived as a fundamental problem for S3 implementation (46% of responses). Institutional mechanisms (e.g. efficient science-business translators, innovation accelerators, science parks) are currently missing from both regional environments, impeding the flow of technological and entrepreneurial knowledge between public and private actors. An exception is the Science and Technology Park of Crete (STEP-C)⁴ which seems to be the only active organisation in Greece with incubation and brokerage services. In CM:

"While we have established intermediary organisations and brokerage structures in Central Macedonia, nobody takes an active and continuous intermediary role, and intermediaries are crucial for setting industry-university collaboration. [...] Intermediary services are important for S3, they should be there to support different players of the regional ecosystem come closer and exchange experiences, to understand each other expertise and work together" (GECM33, 2015).

Recent studies pay particular attention to weak networks for S3 in Greece. Metaxas (2019) found that improvements in administrative procedures resulted in significant increases in proposal calls, but local stakeholder networks to support EDP were poor and both regions lacked staff to facilitate entrepreneurial discovery.

⁴ Science and Technology Park of Crete (STEP-C), www.stepc.gr

6.1.5. Weak entrepreneurial settings

The lack of collaborative culture and private-public trust creates critical mass accumulation problems for entrepreneurial discovery. Trust-building problems prevent the creation of networks and clusters for joint S3 action (58% of responses), despite this being a priority for both S3 action plans (Region of Crete, 2015, Region of CM, 2015). There is a general reluctance to collaborate:

"Family-owned companies, particularly the smaller ones, do not collaborate with other companies or organisations to generate innovation, due to their mentality, you know it's a matter of fear, lack of trust I would say, collaboration is something which is out of their organisational culture, they are not familiar with group working practices [...]. This attitude keeps them detached from clusters and networks" (KACr12, 2015).

Trust is not simply an important aspect of policy implementation but a key driving force of smart specialisation success. In both Crete and CM, we find that trust-related problems are recorded in both public and private sectors:

"Greek ministries don't fully trust Greek regions to run smart specialisation strategies" (MACM20, 2015)

"Local enterprises don't trust regional authorities, as they have never focused on their actual problems" (ZOcr10, 2015)

"Companies don't trust other companies, afraid of losing a competitive advantage through the exchange of entrepreneurial ideas and business secrets" (KACr48, 2017).

The S3 co-coordinators of the selected regions give indicative quotes that show the problem of identifying and securing an adequate number of private firms in different S3 implementation phases:

"It is essential to involve more companies for the realisation of smart specialisation strategies if we want to have good results" (KACr12, 2015)

"We need additional companies, private actors, for S3 action [...] the more entrepreneurs we have the most effective results we will achieve" (KOCM21, 2015).

Whilst most calls published so far focus on the underpinning research base and technological development, Metaxas (2019) observes increased participation by private sector SMEs: in CM around 55% of the representatives associated with EDP came from business, around 30% in Crete (Table 5). These data suggest an increase in business awareness of support for new approaches to strengthen regional economy, certainly in formal institution building. It is too early to evidence whether changes are occurring in less formal institutional frameworks.

Insert Table 5 here

6.2. What institutional changes are needed for successful smart S3 implementation? (RQ2)

The evidence in section 6.1 points clearly to the inadequacy of both formal and informal institutions in both regions, suggesting the need for reforms that focus on themes like removal of red tape and lowering of uncertainty surrounding investment in innovation. Our data provide further detailed insights on key changes needed to support EDP and knowledge transfer within S3 implementation framework (Table 6).

Insert table 6 here

Simplification of legal frameworks for starting up innovative entrepreneurship:

Sixty-two percent of our respondents cited the need to simplify legal frameworks for start-up entrepreneurship, which are unclear and ambiguous for potential entrepreneurs. For instance, Sotiropoulos and Christopoulos (2017) show that start-up entrepreneurs must interpret twenty-seven

different laws/regulations when starting new business in the music and dance industry. Many outdated laws are no longer relevant for contemporary innovative entrepreneurship. Start-ups are constrained by the constant amendments and overhauls of entrepreneurial and taxation laws that are impossible for small firms to keep up with. In terms of improving start-up support, our respondents also call for the improvement of start-up activities in support of EDP. Respondents refer to the development of a new start-up tax environment by: (i) taxing business enterprises not based on invoices produced but, as in most other EU countries, on profits; and (ii) providing additional incentives (in addition to research and development credits) such as lower tax rates or elimination of the need for personal insurance for very early ventures. In addition, they stressed the importance of simplifying the procedures necessary for new venture incorporation, making relevant information and the application process available online.

"It is essential for S3 to ensure the participation of new companies, because new open-minded entrepreneurs and innovative start-ups can bring fresh ideas and new techniques for joint entrepreneurial activity" (SACr1, 2014).

"Spin-offs and start-ups have an innovative potential as they tend to keep a close relation with university research labs [...] They can work together with existing companies exchange their knowledge and expertise; this is something that we really want to see in S3" (GECM33, 2015)

Institutional initiatives for cross-regional networking:

"It would make more sense to link resources from different but S3-closely connected regions for joint smart specialisation action plans [...] this would help to have more entrepreneurs and achieve the required critical mass" (MPCM34, 2015)

While local actor interaction is crucial to trigger EDP, intra-regional networking to promote new entrepreneurial knowledge flow and support interaction among those possessing complementary industrial and technological competences is also a necessary pre-condition in lagging regions (Barzotto et al., 2019, McCann and Ortega-Argilés, 2019). 18% of our respondees support improved inter-regional collaborations for cross-sectoral knowledge sharing as well as efforts to make sure EU funds can be used to improve the country's digital infrastructure to ease distant communication and interaction. One example from our research is the case of CM initiating institutional linkages with Peloponnese to exchange S3 ideas, know-how and good practices in the wine tourism industry. This allowed local entrepreneurial actors to coordinate efforts, combine dispersed resources, learn from each other and develop joint S3 proposals and projects.

Another example is from Crete. Through a series of place-based institutional efforts of the regional government to link Cretan entrepreneurship abroad (entrepreneurial missions, business collaborations thematic brokerage events), local wine producers acquired and exploited know-how in wine bottling processes and created cross-regional business-science synergies to improve wine preservation techniques. Improvements opened new business opportunities in Australia and USA. Following cross-sectoral success in wine tourism, Crete is currently expanding inter-regional collaboration into other S3 priority areas including joint pilot projects in waste management and marine environment protection.

7. Discussion

Our empirical findings evidence the implementation challenge of S3 in lagging regions. While S3 barriers have already been examined in previous studies (Kroll, 2016), our analysis focuses on both formal and informal institutions, generating new evidence from two Greek regions. S3 barriers may not only be due to weakness of lagging regions to build science, technology and innovation capacities (Sörvik et al., 2016), low absorptive and networking capabilities (Papamichail et al., 2018) fragmented learning skills (Morgan, 2017) or limited policy implementation capacity (Gianelle et al., 2016). Instead, they can also

be the result of institutional-related features that affect EDP (Rodríguez-Pose and Wilkie, 2017) and, subsequently, policy action at regional level (Muscio et al., 2015). Indeed, although institutions always affect economic development and policy-making, it is often in less advanced settings where weaker institutions are found (Rodrik, 2004, Rodríguez-Pose, 2013).

We asked why specific institutional aspects hinder S3 implementation in Crete and CM. We found high levels of uncertainty and inefficiency in the regional institutional environment and, particularly in their regulatory and fiscal frameworks, including lengthy bureaucracy, massive paperwork and time-consuming processes, unclear mission of public-sector authorities and unpredictability of the fiscal regime. Additionally, we show that formal and informal institutional disconnections (lack of effective intermediation mechanisms and a mismatch between R&D demands and outputs) as well as critical aspects of local entrepreneurial mindset (lack of culture of collaboration and trust building problems) reduce absorptive capacity at regional level (Papamichail et al., 2018) and limit knowledge dissemination, putting S3 implementation and progress at risk. The existence of weak networks is felt especially at the interfaces of public research organisations and private firms undertaking investments in innovation, obstructing knowledge flows and increasing the risk of dynamic coordination failures across different components of the regional system, results aligned with (Rodríguez-Pose and Wilkie, 2017).

In this unstable and problematic environment, our data evidence the need for institutional changes to address S3 implementation challenges. First, simplify the existing legal framework regarding new business creation with the objective of supporting EDP through new venture creation. Although funds have so far been focused on strengthening the local research base and networks, entrepreneurial ventures should be increasingly involved in EDP. There is emerging evidence this is happening, in both priority setting and fund distribution. The creation of local agencies as well as the provision of local responsibilities in the allocation of S3 funds (Metaxas, 2019) was perceived as a step in the right direction, as real decisional power is transferred to local actors with a deeper understanding of the local environment. Second, promote structural reforms for targeting and promoting cross-regional connectivity, in line with the EU's S3 implementation guidelines, as Foray et al. (2012) *Guide to Research and Innovation Strategies for Smart Specialisations (RIS3)* emphasises.

Given that smart specialisation itself can become a trigger of institutional change (McCann and Ortega-Argilés, 2016), it is pertinent to ask what are the processes through which such institutional change could happen. Authors such as Buseti (2015) and Mahoney and Thelen (2009) suggest four possible modes: *displacement*, *layering*, *drift* and *conversion*. Our data suggest that the development of S3 is most likely to be supported by processes of both *displacement* (replacement of existing rules by new ones) or introducing new rules alongside existing ones through *layering*. In this sense, it feels most likely that in the Cretan and CM contexts there will be co-evolution of institutional changes and the S3 process. For instance, fiscal rules that limit investment by causing unnecessary uncertainty or bureaucratic procedures that prevent entrepreneurs from starting new businesses should be *displaced* as they constitute harmful barriers to S3 implementation. At the same time, new rules could be *layered* to promote collaboration between public research institutions and the private sector. In particular, although these entities collaborate and perform with different degrees of success (Metaxas, 2017), overall our data indicate low absorption of funding and incentives to entrepreneurial ventures to participate in EDP, questioning further S3 success rates.

8. Conclusion

This paper investigates the impact of institutions on EDP, in the contexts of Crete and CM. We ask which institutional features of the selected lagging regions create concrete barriers to policy implementation, as well as which institutional changes are necessary to deal with them. We find that several institutional

features play a significant role. Changes are proposed to improve capabilities by removing existing barriers to S3 implementations.

We provide two main contributions. Firstly, the institutional environment can shape regional development by enabling and constraining barriers to innovation and cohesion policy implementation, in this case S3. In Crete and CM, they obstruct EDP, as a result of excessive bureaucracy, institutional uncertainty, risk aversion and paucity of cohesive learning coalitions and misalignment between local R&D outputs and demands (Vallance et al., 2018, McCann and Ortega-Argilés, 2019). While the observed outcome is similar to studies such as Moodysson et al. (2015) that focus on advanced regional settings, the root causes appear to be different. On the one, the risk faced by strong regions, such as Scania, is lock-in to obsolete trajectories, because of institutional path-dependence (Boschma et al, 2017). In regions such as Crete and CM on the other, it is the weaker institutional environment that constitutes a negative pre-condition for triggering entrepreneurial discovery, aggravating a lack of entrepreneurial and administrative capacities.

Secondly, our results suggest that implementing S3 by triggering EDP in these conditions requires significant institutional adjustments. Our findings point towards the need for substantial changes in the regulatory, fiscal and administrative regimes that requires long term co-evolution. This poses a trade-off between allowing time for fixing institutional shortcomings versus providing financial or technical support that would help with the execution of policy programmes and activities in the short-term (Rodríguez-Pose and Wilkie, 2017). Our results show furthermore that formal institutional structures can be put in place but that their presence is not the only condition for entrepreneurial success – learning and cultural change requires informal change as much as formal.

Taken together, these results exemplify the dynamic and mutual interdependence between the regional institutional environment and the process of implementation for economic development policy, as they appear to influence each other in various ways. S3 implementation requires not only the entrepreneurial actors within the system but also formal institutions and the institutional environment to adapt to a new set of circumstances. Our data offer interesting insights into the phase of S3 that concerns entrepreneurial discovery.

Our study has some limitations. Firstly, data cover the 2014-19 period. Despite longitudinal research in Crete, our data cannot fully track the S3 implementation progress. Secondly, we propose some place-based examples of institutional change, ideally suited to address EDP challenges in regions with extreme financial/debit conditions. Thus, selected regions, are by no means identical to other European environments. Therefore, assumptions which go beyond these regional specificities run the risk of not being robust. Data from a broader dataset and regional base are required to draw more reliable results regarding modes of institutional change.

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Appendices

Table 1 List of semi-structured interviews

I/N	Pseudonym	Group of interviewee	Position of interviewee	Region	Date of interview	Type of interview
1	SACr1	Private	Manager, Science and Technology Park of Crete	Crete	01.8.2014	Face2face
2	STCr2	Private	R&D Manager, FORTHnet SA	Crete	20.8.2014	Face2face
3	OICr3	Academia	Professor, University of Crete	Crete	4.09.2014	Face2face
4	RACr4	Public	Governor office, Region of Crete	Crete	12.09.2014	Face2face
5	KACr5	Private	Manager, Technical Institution, Heraklion Chamber of Commerce	Crete	30.09.2014	Face2face
6	AZCr6	Private	Manager, TÜV HELLAS, certification and inspection body	Crete	4.12.2014	Face2face
7	PACr7	Academia	Manager, Research Centre	Crete	4.12.2014	Face2face
8	STCr8	Public	S3 consultant, Region of Crete	Crete	13.12.2014	Face2face
9	TRCr9	Public	S3 consultant, Region of Crete	Crete	17.12.2014	Face2face
10	ZOCr10	Public	Regional Development Fund, Region of Crete	Crete	24.12.2014	Face2face
11	ANCr11	Academia	Professor, University of Crete	Crete	17.01.2015	Face2face
12	KACr12	Private	Heraklion Chamber of Commerce	Crete	17.01.2015	Face2face
13	MECr13	Private	R&D Manager, Plastika Kritis	Crete	17.01.2015	Face2face
14	TSCr14	Private	Entrepreneur, Olive oil sector	Crete	17.01.2015	Face2face
15	KOCr15	Private	Entrepreneur, Manufacturing sector	Crete	11.02.2015	Face2face
16	MICr16	Private	Managing Director, Pancreta bank	Crete	25.02.2015	Face2face
17	FRCr17	Private	Managing Director,	Crete	27.02.2015	Face2face

18	KOCM18	Academia	Development Agency of Crete Professor, Aristotle University of Thessaloniki	CM	6.03.2015	Telephone Skype
19	MACM19	Private	Entrepreneur, business consultancy	CM	6.04.2015	Face2face
20	MACM20	Public	S3 consultant, Region of CM	CM	23.04.2015	Telephone Skype
21	KOCM21	Public	S3 consultant, Region of CM	CM	3.06.2015	Face2face
22	TSCr22	Public	S3 consultant, Region of Crete	Crete	8.07.2015	Telephone Skype
23	KYCM23	Public	S3 consultant, Region of CM	CM	13.07.2015	Telephone Skype
24	TSCr24	Academia	Technological Educational Institute of Crete	Crete	5.08.2015	Face2face
25	KOCM25	Public	S3 consultant, Region of CM	CM	3.09.2015	Telephone Skype
26	PECM26	Public	S3 consultant, Region of CM	CM	3.11.2015	Telephone Skype
27	MECM27	Private	Consultant, Intermediary organisation	CM	16.11.2015	Face2face
28	XACM29	Private	Entrepreneur, manufacturing sector	CM	17.11.2015	Face2face
29	ANCM28	Academia	Professor, Aristotle University of Thessaloniki	CM	17.11.2015	Telephone Skype
30	KACM30	Private	Science and Technology Park of Thessaloniki	CM	18.11.2015	Face2face
31	SKCM31	Private	Manager, Business and Cultural development Centre	CM	18.11.2015	Face2face
32	KACM32	Private	Business and Cultural development Centre	CM	18.11.2015	Face2face
33	GECM33	Private	Federation of Industries of Northern Greece (FING)	CM	19.11.2015	Face2face
34	MPCM34	Academia	Professor, University of Western Macedonia	CM	19.11.2015	Face2face

35	TRCM35	Private	Alexander Innovation Zone of Thessaloniki	CM	20.11.2015	Face2face
36	VLCM36	Private	Entrepreneur, cloth and textile industry	CM	24.11.2015	Face2face
37	SOCM37	Public	General Secretariat for Research and Technology	CM	8.12.2015	Telephone Skype
38	SACM38	Public	Manager, National Documentation Centre	CM	23.12.2015	Telephone Skype
39	XACM39	Private	Entrepreneur, ICT sector	CM	12.02.2016	Telephone Skype
40	KACr40	Public	Manager, Managing Authority, Region of Crete	Crete	17.02.2016	Face2face
41	KOCr41	Public	S3 consultant, Region of Crete	Crete	6.6.2017	Telephone Skype
42	KACr42	Public	Manager, Managing Authority, Region of Crete	Crete	5.7.2017	Face2face
43	SACr43	Private	Incubator Manager, EDAP SA	Crete	6.07.2017	Telephone Skype
44	DACr44	Public	S3 consultant, Region of Crete	Crete	11.07.2017	Face2face
45	SACr45	Private	Manager, Science and Technology Park of Crete	Crete	18.7.2017	Face2face
46	KACr46	Public	S3 consultant, Region of Crete	Crete	21.07.2017	Face2face
47	KACr47	Public	S3 consultant, Region of Crete	Crete	21.07.2017	Face2face
48	KACr48	Private	Manager, Technical Institution, Heraklion Chamber of Commerce	Crete	25.07.2017	Face2face
49	LYCr49	Private	Entrepreneur, Wine sector	Crete	9.8.2017	Face2face
50	SACr50	Private	Manager, Piraeus Bank local branch	Crete	11.8.2017	Face2face
51	KACr51	Private	Manager, Technical Institution, Heraklion Chamber of Commerce	Crete	18.12.2019	Face2face

Source: Authors

Table 2 Composition of respondents

Group of respondents	Crete		CM		TOTAL	
	No. of respondents	(%)	No. of respondents	(%)	No. of respondents	(%)
Public sector ¹	11	36.7	10	50.0	21	42.0
Academia ²	6	20.0	4	20.0	10	20.0
Private sector ³	13	43.3	6	30.0	19	38.0
TOTAL	30⁴	100.0	20	100.0	50	100.0

Notes:¹Public sector (regional administration, public agencies, policymakers)²Academia (universities and research centres)³Private sector (firms, intermediaries, networks, clusters, associations, innovation facilitators, business clubs, chambers of commerce)⁴Includes 10 interviews from longitudinal study**Source: Authors****Table 3 Innovation performance of Crete: List of selected indicators**

Indicator	Performance	Ranking (out of 40)
R&D expenditure (public sector) as percentage of GDP	140.9	19th
Non-R&D innovation expenditures in SMEs as percentage of turnover	190.0	6th
SMEs introducing product or process innovations as percentage of SMEs	153.8	17th
SMEs introducing marketing or organisational innovations as percentage of SMEs	147.0	16th
SMEs innovating in-house as percentage of SMEs	162.5	9th
Innovative SMEs collaborating with others as percentage of SMEs	248.5	4th
Sales of new-to-market and new-to-firm innovations in SMEs as percentage of turnover	166.0	7th

Note: Most recent performance relative to that of the EU (=100), calculated as $100 * \frac{\text{normalised score of the region}}{\text{that of the EU}}$, after correcting for statistical outliers and normalising the data

Source: Elaborated data based on EC (2019)

Table 4 Total number of responses on S3 implementation barriers, effects and causality

Cause of S3 implementation barrier	S3 implementation barriers	Effect on S3 implementation	No. of Responses			Percentage ^(*)		
			Crete	CM	TOTAL	Crete	CM	TOTAL
1. Excess bureaucracy and delays	Unfriendly environment for entrepreneurial action due to massive paperwork and lengthy delays	Hinders broad participation of local actors in entrepreneurial discovery and S3 implementation	24	17	41	80%	85%	82%
2. Uncertainties of investment	High risks of innovation investments	Discourages interest for private investments in selected S3 domains	12	8	20	40%	40%	40%
3. Unclear mission for public action	Unclear mission of public-sector authorities responsible for policy development and action	Prevents public-sector networking and interaction for entrepreneurial discovery monitoring, difficulty in advising S3 implementation progress	12	6	18	40%	30%	36%
4. Weak intermediation mechanisms	Lack of intermediary mechanisms	Small number of public-private synergies for effective entrepreneurial knowledge sharing & diffusion in S3	15	8	23	50%	40%	46%
5. Poor entrepreneurial settings	Lack of culture of collaboration and trust building problems	Critical mass accumulation problems questioning entrepreneurial discovery and S3 progress	18	11	29	60%	55%	58%

^(*)Based on 50 interviews: Crete=30, CM=20

Source: Authors

Table 5: Stakeholders in EDP: Crete and CM (December 2017)

EDP	Representatives (N)	Business (%)	Academia (%)	Public Administration (%)	Civil Society (%)	TOTAL (%)
Crete	800	30	40	10	20	100
CM	300	55	40	5	0	100
TOTAL	1100	85	80	15	20	100

Source: Authors

Table 6 Number of responses on institutional reforms for S3 implementation

Type of institutional change	Effect on S3 implementation	No. of respondents			Percentage ^(*)		
		Crete	CM	TOTAL	Crete	CM	TOTAL
1. Simplify legal frameworks to encourage innovative entrepreneurship	Start-ups bring entrepreneurial knowledge and, together with existing companies' expertise, create knowledge complementarities necessary to inform EDP	18	13	31	60%	65%	62%
2. Facilitate cross-regional networking for S3 implementation	Facilitate private-public networking for knowledge exchange	3	6	9	10%	30%	18%

(*)Based on a total number of 50 interviews: Crete=30, CM=20

Source: Authors