

# The uncharted road to smart specialisation and sustainability in regions



## **The Uncharted Road to Smart Specialisation and Sustainability in Regions**

By Stan Griffioen (Nijmegen School of Management, Radboud University, Nijmegen), Joost Kuijper (Province of Overijssel, Department of regional economics and culture, Zwolle & University of Twente, section Science, Technology Policy & Society), Karolien de Bruine (EU Programme, Regional Development Agency East Netherlands, Department Business Development), Arnoud Lagendijk (Nijmegen School of Management, Chair in Economic Geography, Radboud University, Nijmegen)

## **Introduction**

Around 2009, the European Union introduced the heuristic of smart specialisation in the regional innovation strategy (RIS/S3). With the S3 heuristic, the European

Commission aimed to allocate European structural funding for regional innovation and economic development on the basis of self-discovered entrepreneurial strengths and opportunities. S3 continued the tradition of triple-helix steering, including a strong anchoring in the regional knowledge base, but put more emphasis on differentiation. In the subsequent Operational Programme of the European Regional Development Fund [ERDF], the objectives of sustainability - a low carbon economy - and social inclusiveness complemented the objective of innovation through specialisation (Fitjar, et al., 2019). S3 policies can be seen as a regional variant of the 'mission driven' economic innovation policy, seeking to meet the major societal challenges of our times (Mazzucato, 2013). Accordingly, the main challenge for S3 policies is to balance the 'bottom up' heuristic, with local businesses and organisations playing a key role in the practical orientation, demonstration and implementation of regional strategies, with 'top down' drives of steering, control and 'grand' missions. In S3 terminology, how can S3's operationalisation be truly and effectively grounded in an inclusive process of "Entrepreneurial Discovery" (Nieth et al., 2018), while meeting the broader aims and conditions of EU's regional and economic policy? How does the policy avoid the always-present lures of success stories from elsewhere and boilerplate solutions (Foray, 2014)?

This paper reports on the initial outcomes of an empirical study of how the ERDF objectives of smart specialisation and a low-carbon economy have been operationalised in the Eastern region of the Netherlands, encompassing the provinces of Gelderland and Overijssel. The key question is to what extent the operationalisation of the S3 strategy in that region meets the ambitions of mission-orientation, strengthening regional smart specialisation and sustainability through a bottom-up approach? The outcome draws from a project database constructed by the Regional Development Agency 'Oost NL', gathering the output of the ERDF 2014-2020 and REACT 2021—2022 Operational Programme. It holds the data of 530 unique projects and 1016 unique partners, geographically spread over 246 locations. This database provides data on the kind of activities (sectoral specialisation, location and use of instruments) and all kinds of process detail. A limitation of the database, and therefore our study, is that it does not log the follow-up outcome and impact.

In line with the S3 approach, our conceptual framework is based on the notion of regional business ecosystems, which capabilities are developed and leveraged

(bottom-up) in view of the region's strategic scope (top-down) (Nieth et al, 2018). Crucially, the emergence of novel technologies in and the greening of industrial sectors in regions is not random, but is grounded in the pre-existing collective assets and capacity of actors that shape distinctive technological and industrial platforms (Foray, 2014; Foray & Goenaga, 2013; Kempton, 2013). In order to realise this two-way process, the regional actors forming the Triple Helix play important roles. Within this constellation, public actors employ policy instruments to realise strategic change and to reach specifically set goals, such as carbon-reduction. Business coalitions support partnerships and networking. Knowledge institutions and SMEs play a key role in innovation project consortia in and further attuning of the local knowledge base. As argued by several authors (Asheim & Coenen, 2005; Balland et al., 2019), the type and locational setting of the knowledge base underscores the relevance of geography for knowledge creation processes and consequently for innovation policies.

In this light, we pose four questions, which also structure the remainder of the paper:

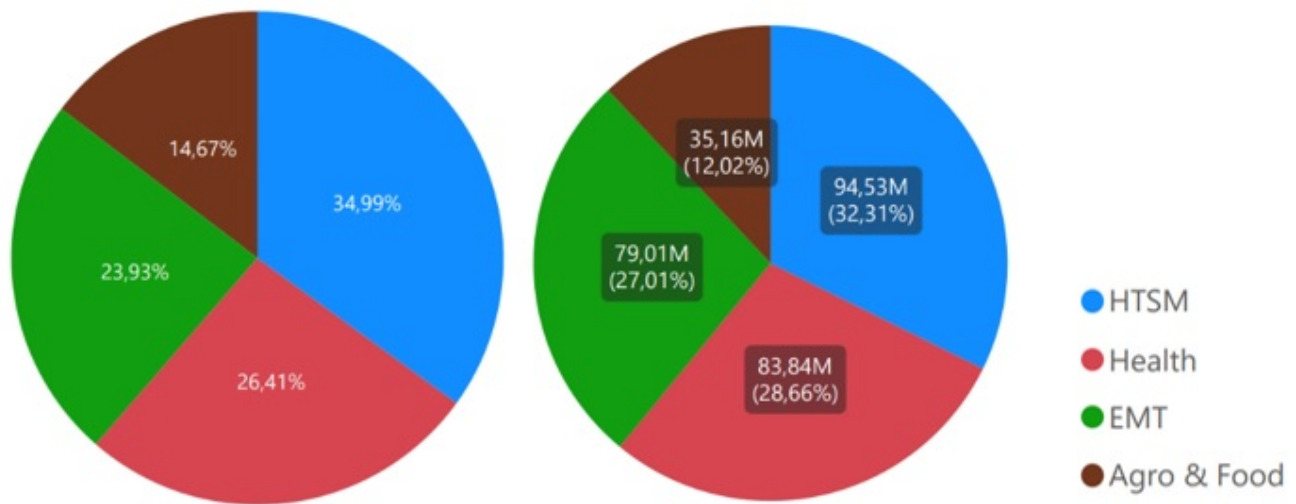
- Which strategic scope and direction for smart specialisation did East Netherlands develop and pursue, and how does this meet project interests?
- How does the Triple Helix influence innovation-targeted business ecosystems in the East Netherlands?
- How is the geographical spread of the realised ERDF & REACT 2014-2022 projects in the East Netherlands shaped, and what does this say about 'bottom up' initiatives?
- In what manner have policy and funding instruments been deployed in order to reach the East Netherlands RIS3-goals?

# **1. The East Netherlands Smart Specialisation Strategy**

Between 2005-2013, the Netherlands ran a cluster-oriented regional innovation programme named "Peaks-in-the-Delta", which was based on public-private

research partnerships between excellent research groups and front running companies, mainly within the same region. The experience gained in that programme created an installed base and a proven profile for the European heuristic of regional innovation and smart specialisation policy, which was later made compulsory for ERDF-recipients. East Netherlands' recent ERDF investments of the 2014-2020 programme further elaborated this cluster orientation towards four main themes reflecting the region's knowledge base, innovation capacities and ambitions (OP Oost, 2013): High Tech Systems and Materials [HTSM] supported primarily by the University of Twente (plus applied universities and company networks); Agriculture and Food, around Wageningen University, Health Care & Prevention, around Radboud University (including the Medical hospital and the Health Valley cluster), and Energy and Environmental Technology [EET]. The latter is rooted in a more diverse set of applied universities, networks and private R&D, with some concentration around Arnhem. The policy also encourages crossovers between these clusters, and beyond. Innovation projects as funded in the ERDF Operational Programme is about applying new technological and user insights in stages of industrial research and product development towards modular testing and full-scale demonstration.

Our project database of the ERDF Operational Programme reveals to what extent the region's project portfolio chimes with this cluster orientation. The largest share of projects, partners and investments is related to the theme of HTSM (35%, € 94m), followed by Health (26%), EET (24%), and lastly Agri-Food (15%). Crossovers between these themes occurred most often between Health and HTSM, accounting for 36% of all crossover projects, followed by respectively HTSM and AgroFood (22%) and EET and AgroFood (14%). The cross-over projects may be seen as the potential for relative diversification, combining partners from different sectors and knowledge domains.



**Figure 1: ERDF 2014-2020's project participation (left) and granted funding (right) per S3-theme**

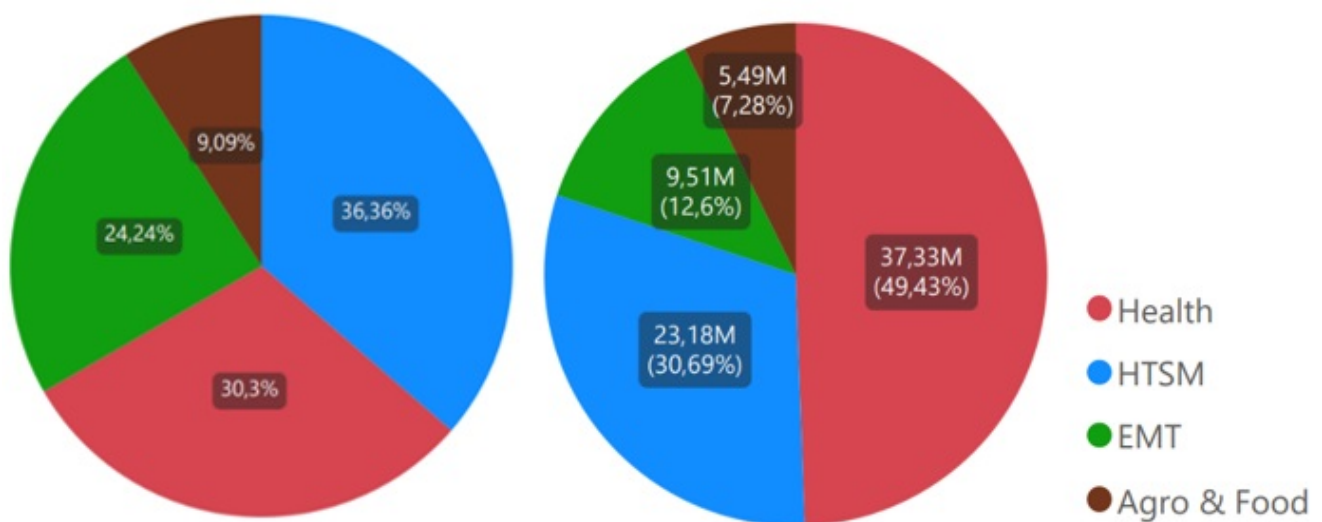
## 2. The Regional Knowledge Base and its role in the Triple Helix

We will now delve into the second question of how the region Triple Helix supports innovation-targeted business ecosystems through their embedding in the regional knowledge base. Asheim and Coenen (2005) underscore the critical role of universities in knowledge and network creation, complemented by public research institutes and vocational training, and supported and enhanced by the Triple Helix. In the Netherlands, the history of crafting policy on the basis of such regional strengths in the economic structure and knowledge can be traced back to the early 2000s. The relevance of science and technology for national and regional development was acknowledged by the national government and advisory councils (AWT, 2003). In the slipstream of a national high level Innovation Platform established in 2004, regional triple-helix organisations arose, specifically in regions with a university location.

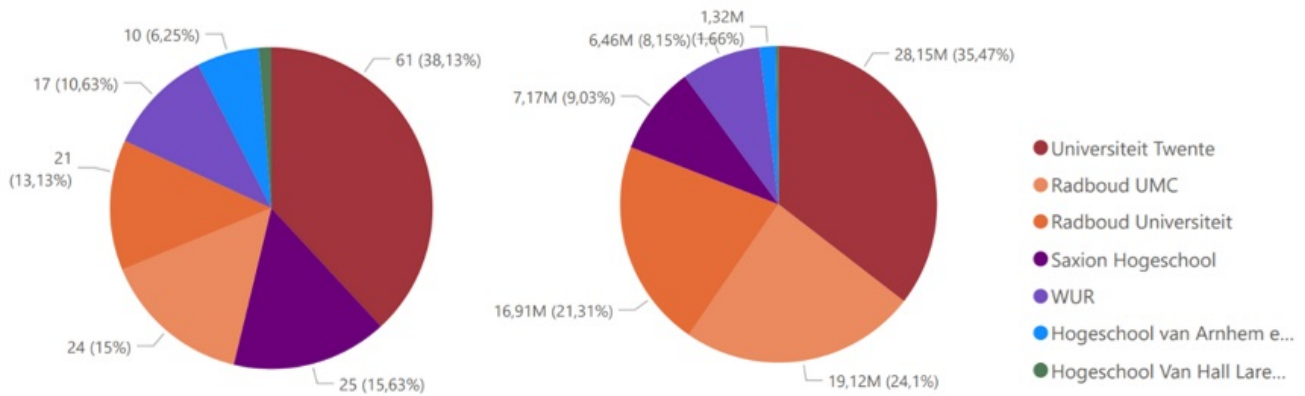
Our database gives insights into the role of the local universities and other knowledge centres. Somewhat surprisingly, the contribution of knowledge institutes appears rather modest, with an average participation share of 14% of total amount of projects. To compare, the average participation in projects from private companies is 61%. The University of Twente, with its engineering-based

profile, has been the largest beneficiary of the ERDF investments and was also involved in one third of all projects - both in numbers as budget-wise. The projects primary focus on HTSM and Health, which have outperformed the other two themes during this programme period. The Radboud University and its medical centre (UMC) are the second and third largest beneficiaries individually, mainly focusing on Health.

A lower participation share comes from the Wageningen University & Research, both in project volume and allocated budget. Though it is a key national knowledge institute within the Agribusiness and Food theme, its participation in the ERDF programme has been relatively limited with a share of merely 8% of the total knowledge institutions' project participation (figure 3). The lower relative position of the smart specialisation theme Agri-Food is visible in both the total distribution of allocated budget and in the participation share of knowledge institutes in the region. While further research is needed here, we presume that that the innovation capacity and IP assets of partnering SMEs in the AgriFood sector are sufficient to execute the research and development for the commonly agreed project objectives. Overall, our results indicate that there is a strong bottom-up capacity in the region. While this is line with the region's S3 strategic scope, it comes with a relatively modest direct participation from the knowledge-oriented Triple-Helix parties. The entrepreneurial discovery process has indeed been helpful to generate a business-induced and demand-led flow of projects.



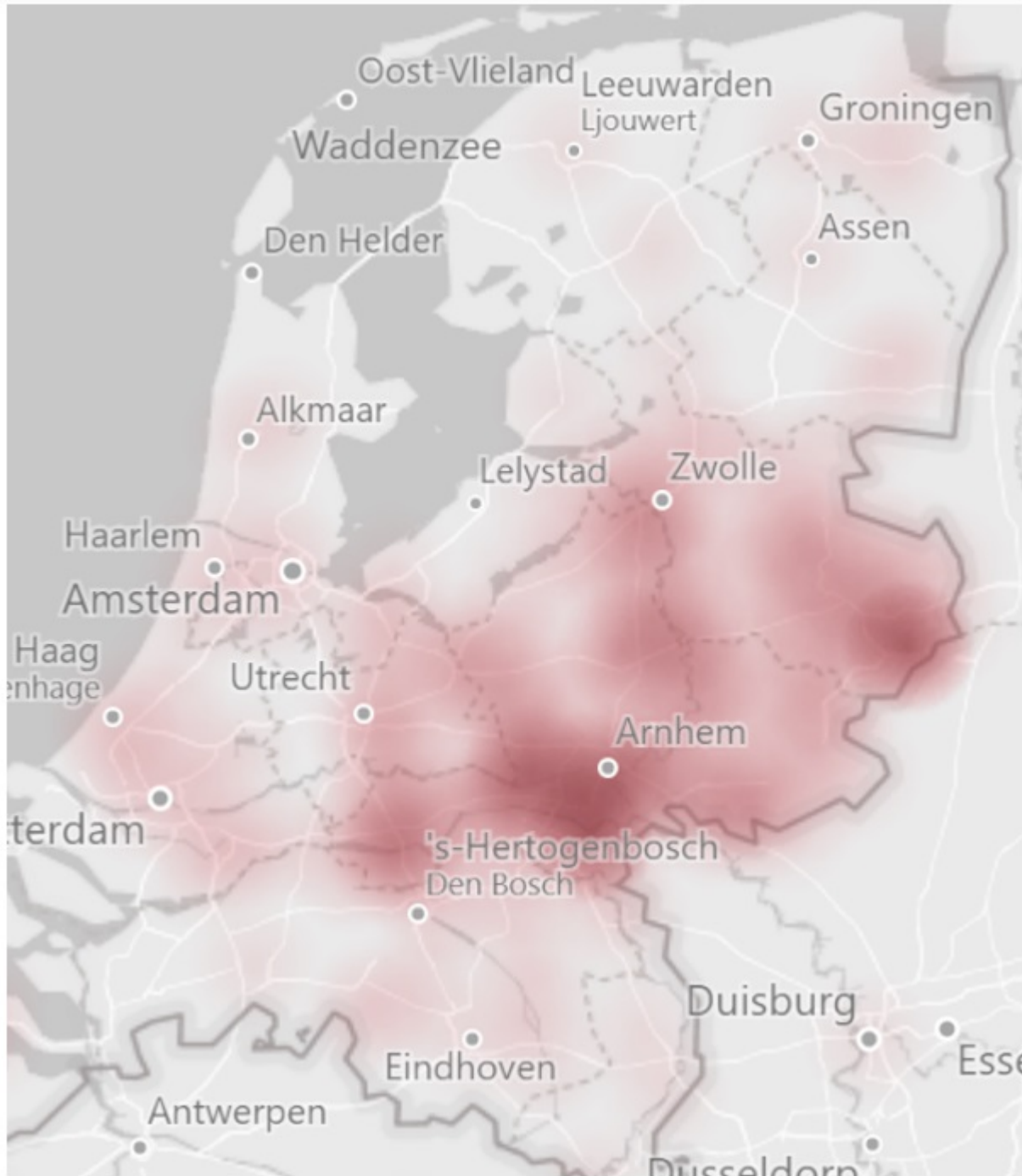
**Figure 2: knowledge institutions' project participation (left) and granted funding (right) per S3-theme**



**Figure 3: project participation (left) and granted funding (right) per knowledge institution**

### 3. Geographic Spread of ERDF Investments in Innovation

Further evidence on the balance between more top-down and bottom-up project development can be found through the analysis of a heat map visualising the concentration of ERDF-investments in East Netherlands (figure 4). This map reveals to what extent the threefold cluster development is concentrated around the main knowledge hubs (Twente, Wageningen, Nijmegen), and to what extent we may notice other distributions (question 3). Our results reveal some balance. On the one hand, the three university cities of Enschede (Twente), Nijmegen and Wageningen, plus the ‘energy’ hub Arnhem, present the main beneficiaries, both in terms of project volume and budget. On the other hand, the data also show a considerable spread over the two provinces. This is an indication that the strength and contribution of underlying cluster and business networks generate a sufficient volume of granted projects. This is testimony to how many SMEs, constituting the main innovators of East Netherlands’ economic structure, are active in innovation, while not being located in the direct proximity of the relevant knowledge hub (cf. Lagendijk et al., 2020).

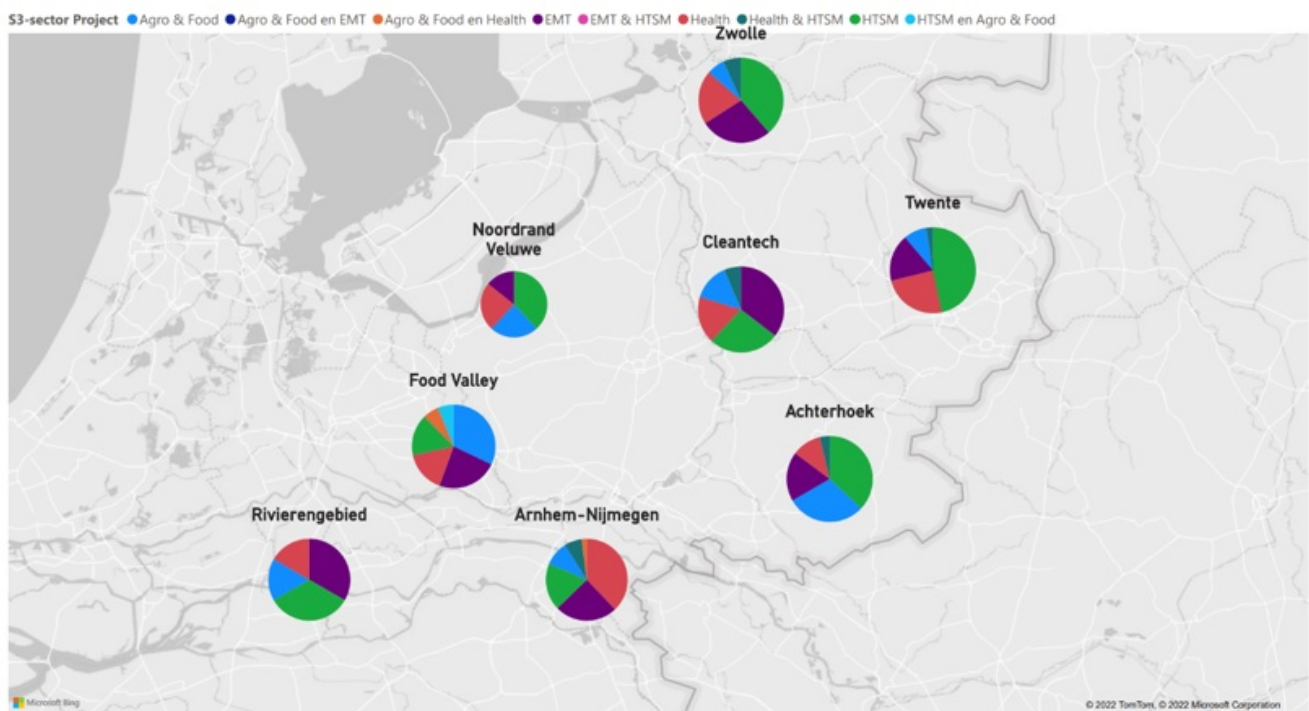


**Figure 4: heat map of granted funding of the ERDF 2014-2020 programme**

Zooming into the eight daily urban system regions in the Eastern Netherlands, thematic foci are visualised in figure 5 and summarized according to project participation in table 1. The region of Twente, which also encompasses the university city Enschede, has the strongest thematic focus on HTSM with over 50% coverage (including crossovers), with adjacent manufacturing industry-region Achterhoek along the German border as a close follower. Arnhem-Nijmegen also shows a relatively strong focus on Health (45%), and the Food Valley around Wageningen has its relative specialisation in AgriFood (43,7%).



More 'bottom up' developments are manifest in the subregions of Zwolle and the Cleantech region, both with somewhat stronger presence of HTSM and EMT. The other daily urban systems in East Netherlands have a more evenly distribution of project output per specialisation theme. Nevertheless, they all give shape to 'bottom up' networking and partnering complementing and enhancing the profile in smart specialisation. When zooming out to the scale of the Netherlands, the impact of the regional ERDF programme on the wider innovation landscape of the Netherlands becomes clear, with partner organisations participating in project from all other Dutch regions, except the province of Zeeland.



**Figure 5: East Netherlands DUS-regions and their thematic distributions**

	AgroFood	EET	Health	HTSM
Achterhoek	37%	17%	20%	40%
Arnhem-Nijmegen	15%	26%	45%	26%
Cleantech Regio	18%	36%	24%	33%
Food Valley	44%	24%	25%	25%
Noordrand Veluwe	26%	17%	26%	39%
Rivierengebied	17%	33%	17%	33%
Twente	12%	19%	25%	50%
Zwolle	7%	27%	27%	24%

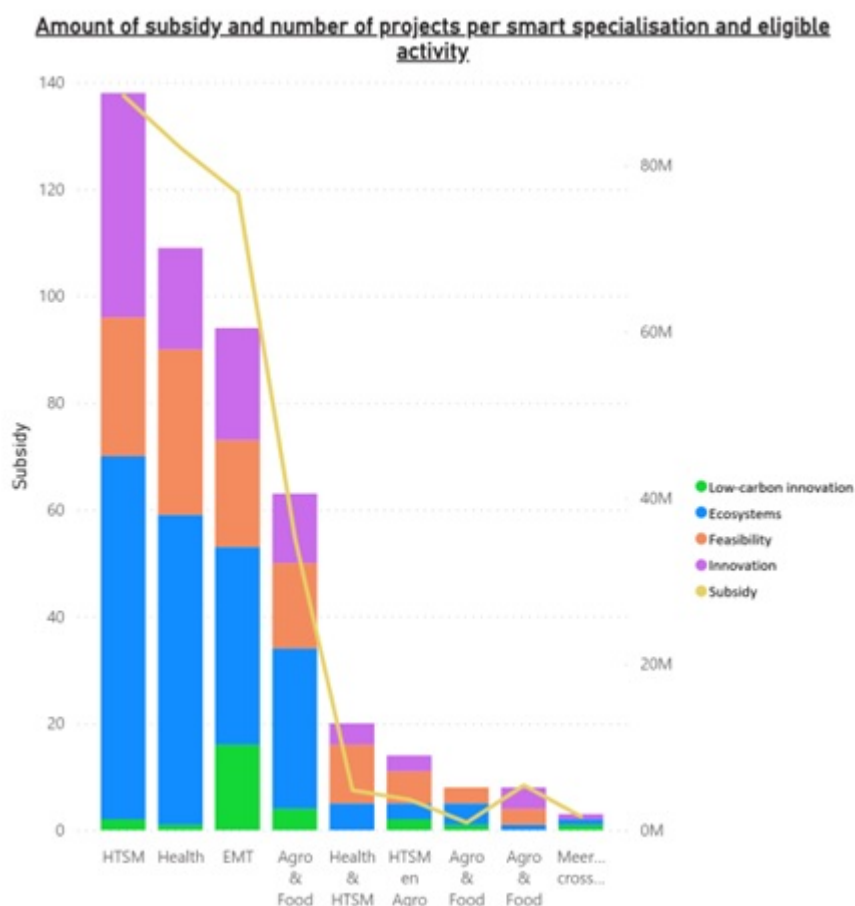
**Table 1: DUS-regions and their percentual distributions based on project participation per theme<sup>[1]</sup>**

## 4. Portfolio of instruments

The database also enables a closer look at the portfolio of instruments to develop the smart specialisation patterns and the low-carbon objective. Three main types are distinguished: shared innovation ecosystem facilities, innovation project consortia and feasibility vouchers. Shared innovation facilities are generally part of ‘top down’ taken initiatives, while innovation networks and business vouchers often stem from more ‘bottom up’ individual initiatives, although all allocation of funding is subject to a competitive open call process.

Starting with the broad HTSM-theme, the bar chart in figure 5 shows that strengthening the thematic innovation ecosystem is the major instrument applied to stimulate smart specialisation. The ecosystem approach supports open technology, innovation and fieldlab demonstration facilities, operated in and by niche clusters and network development. Examples are the Advanced Manufacturing Centre of UT, Fraunhofer Gesellschaft and some larger manufacturing companies in Twente and Achterhoek. Other examples are the energy smart grid demonstrator facility of Connectr in Arnhem and the Mechanical Recycling lab in the Polymer Science Park cluster (Zwolle). In HTSM,

the relative share of the innovation projects is higher than in the other themes. Overall, the instrument of small vouchers for SMEs to do feasibility studies is a proven instrument. If positive, this often leads to follow-up innovation project consortia with several SMEs and knowledge parties, already involved in the feasibility phase. Finally, the objective of a low-carbon economy matches innovation projects in environmental and energy technologies.



**Figure 6: project participation (y1) and granted funding (y2) per funding type, including low-carbon activities**

## Conclusions

In this paper we analysed the project monitoring database of the ERDF/REACT Programme over the period of 2014-2022 and reflected upon the realisation of smart specialisation and sustainability objectives at the regional scale of East-Netherlands.

The regional innovation strategy for smart specialisation did not start completely blank. Choices about the combination of economic potential and knowledge base

were already made and operationalised during the period in anticipation of the ERDF/REACT Programme. This gave triple-helix actors in East-Netherlands a head start in developing a project portfolio directed towards the given objectives of smart specialisation and sustainability. Our initial portfolio analysis shows that the project output coincides for two of the three specialisation themes with the knowledge profile of the three universities in East-Netherlands. In the Agri Food theme, the private knowledge capacity of companies somewhat downsized the central position of the Wageningen knowledge base. Moreover, the aggregate specialisations of High-tech Systems and materials and Health generated considerable crossover activity. This supports the assumption that the operational programme spurred related diversification into new economic directions. Though the knowledge institutes participated in many individual projects, their share in the total distribution of budget remained modest.

The entrepreneurial discovery process seemed to have worked well in the combination with vital business clusters and networks to allocate the major part of budget to consortia of companies. The daily urban system regions around the three main knowledge institutes share the specialisation theme of their institute, so Twente in HTSM, Arnhem-Nijmegen in Health and Wageningen in AgriFood. Yet, the heatmap analysis shows that also in the other regions within East-Netherlands a sufficient number of innovation projects have been generated, but with a less outspoken specialised profile.

Finally, the analysis of various policy instruments within the operational programme period indicates that there are three main type instruments to stimulate smart specialisation, namely: shared innovation ecosystem facilities, innovation project consortia, and feasibility vouchers. In sum these are applied in the same proportion among the specialisation themes in East-Netherlands. As for the objective of sustainability, the low-carbon economy, there is a clear match between the project portfolio in environmental and (renewable) energy technologies and the emerging smart specialisation theme.

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[1] The percentages do not add up to 100% each, as the percentages include crossovers. For example, a cross-over between Health and EET will add up in both the Health and the *EET* cell in a certain DUS-region.